IMPORTS AND EXPORTS PERMITS/LICENSES ADMINISTRATION SYSTEM

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(R132413M)

Imports and Exports Permits/Licenses Administration System

BY

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Submitted in partial fulfillment of the requirement for the degree of

Bachelor of Science in Information Systems (Honors)

Department of Computer Science and Information System in the

Faculty of Science and Technology at the

Midlands State University

GWERU

November, 2016

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Abstract

This research gives a detailed overview of the Imports and Exports Permits/ licenses administration system with the main purpose of identifying and summarizing facts, identifying and analyzing alternatives to solve the identified problems faced at the Ministry of Agriculture Mechanization and Irrigation Development. Different data gathering techniques which include questionnaires, interviews and observations were used and the researcher discovered that the Ministry of Agriculture Mechanization and Irrigation Development has been suffering from data redundancy problems, human errors, fraud and biases from the receiving and processing of applications, to the process of issuing imports and exports licenses. The traditional way of administering the permits was less effective and time consuming since most of the permits were issued after the period in which they were required had elapsed. Operating in this business contemporary environment characterized by the ever changing technology requires an organization to adopt to the new efficient technologies so as to remain competitive and ensure sustainability. As such, the objectives of this research were to develop an online administration system that is more efficient and less prone to errors which allows the online application, processing and issuing of imports or exports licenses as well provide business partners, importers and exporters with real time updates. PHP and MySQL were used to develop the system aligning the objectives to the user requirements of the system. The implementation of the system into the working environment was done after various testing strategies had been carried so as to mirror the system functionality against the user requirements. After successfully going through the testing process, the users were fully trained before different maintenance schedules for the system were put in place. Recommendations were also documented for future development or upgrade which include integrating the system with the existing AGRITEX farmers contracting system among others.

Declaration

I, Shava Watson hereby declare that I am the sole author of this thesis. I authorize the University of Midlands to lend thesis to other institutions or individuals for the purpose of scholarly research

Signature……………………………. Date……………………………………………………………...

Approval

This dissertation entitled "**Imports and Exports permits/licenses administration system**" by Shava Watson (**R132413M**) meets the regulations governing the award of the degree of BSc Honors in Information Systems of the Midlands State University, and is approved for its contribution to knowledge and literal presentation.

Supervisor………………………………………………………………………………….

Date………………………………………………………………………………….

Acknowledgements

Glory and honour be to God, who has led me this far. My gratitude is also extended to my supervisor Mr. P. Mamboko under whose supervision I am excelling. Thank you for your support may the good Lord richly blesses you. My appreciation also goes to the Economics and Markets Department for the opportunity to build a foundation for my career. My heartfelt gratitude will never be complete without mentioning my family, the Shava family, thank you for the support both financially and emotionally, I'm sure this good work you have started in me will always be a source of encouragement. Finally, I wish to thank my friends and colleagues whose suggestions helped in improving my ideas.

List of Acronyms

CD	Compact Disk
HDs	Head of Department
CDs/DVDs	Compact Disk/Digital Versatile Disk
DFD	Data Flow Diagram
ID	Identity number
IT	Information Technology
HTTP	Hyper Text Transfer Protocol
MAMID	Ministry of Agriculture Mechanization and Irrigation.
RAM	Random Access Memory
R.O. I	Return on Investment
SQL	Structured Query Language
UPS	Uninterrupted Power Supply

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CHAPTER ONE: INTRODUCTION

1.1 Introduction

The use of information and communications technology (ICT) in agriculture has recently proved to be very effective and reliable (Hostettler et al 2015), despite this acknowledgement the use of ICT interventions to improve efficiency is still not fully utilized in the field of agriculture. Time, money and other resources could be saved if importers, exporters and the Ministry of Agriculture embrace the use of Information and Technology in their interactions. This project intends to allow the application, processing and approval of licenses and permits for importing and exporting online. This involves creating an imports and exports permits/licenses administration system that will be administered by the department of Economics and Markets which enables importers and exporters to interact with authorities and with each other as well as get real-time updates of information relevant to them. In constructing this online-based permits application system, the project intends to use Macromedia Dream Weaver for designing the appropriate user interfaces, diagramming tools, and XAMPP web server for creating the database.

1.2 Organisational background

The current Ministry (Ministry of Agriculture, Mechanization and Irrigation Development - MAMID) goes back to the time of formation of the Government of National Unity (GNU) in March 2009. MAMID is in charge of food supply including security and the monitoring of all agricultural activities. It consists of 15 parastatals and departments.

Trade is therefore essential in the Ministry since it is the foundation of the Zimbabwean economy. It sustains an estimated figure of up to 80% of the populace and records for 23% of formal jobs. The segment adds between 14 to 18.5% to the Gross Domestic Product (GDP) and roughly 33% of export earnings (Ministry of Agriculture, 2016). The eventual fate of Zimbabwe lies in the improvement of a differentiated, dynamic, vibrant and proficient agricultural sector in both local and international trade.

The Ministry keeps up and improves Zimbabwe's agricultural productivity through controlling and regulating all agriculture related activities by providing information disposal functions which include different acts, policies and programs.

1.2.1 Organisational structure

Buchman and Huczynski (2004, p. 874) state that "an organizational structure is a formal system of task and reporting relationships that controls, coordinates and motivates employees so that they work together to achieve organisational goals". It is therefore, present to characterize how different jobs, duties and posts are isolated, assembled and co-ordinated formally in that particular organisation. An organisational structure contains positions and these positions characterize the activities that people who hold those positions really seek after, henceforth leaving less space for individuality (Rosengren 2000). This ensures that everyone is well versed with what they are expected of making the outcome of their duties predictable. Considering the fact that MAMID is a large organisation with so many departments, this writer was able to recognize its hierarchical structure sort/model as the functional departmentalisation structure. The functional departmentalisation structure exists when employees are assembled according to the organisation's different capacities/functions (Aquinas 2008). Its primary favorable position particularly to a large organisation like the MAMID is that, there is an unmistakable and effective utilization of assets since the leaders as well as the major stakeholders of the organisation know about the immediate needs of every function and can undoubtedly screen progress and also co-ordinate efforts for the different departments or functions included.

Like every successful organization, Economics and Markets has well-structured organogram that clearly shows the flow of authority, power and accountability. The director of Economics and Markets is the most elevated power and the overseer in this department. Straight forwardly under his purview are two sections (every serving an alternate function) these are: 1) Marketing and Trade, 2) Economics and Policy, 3). These two sections are head by each a deputy director who report directly to the director. Each section has got its own subordinates who are all economists and vary on their level and grade as shown below on the diagram. Also reporting directly to the director is the I.T officer who exists as a sub section of the economics and markets departments.

This is well explained and represented by the following diagram.

Fig 1.1 Organisational Structure for Economics and Markets – MAMID
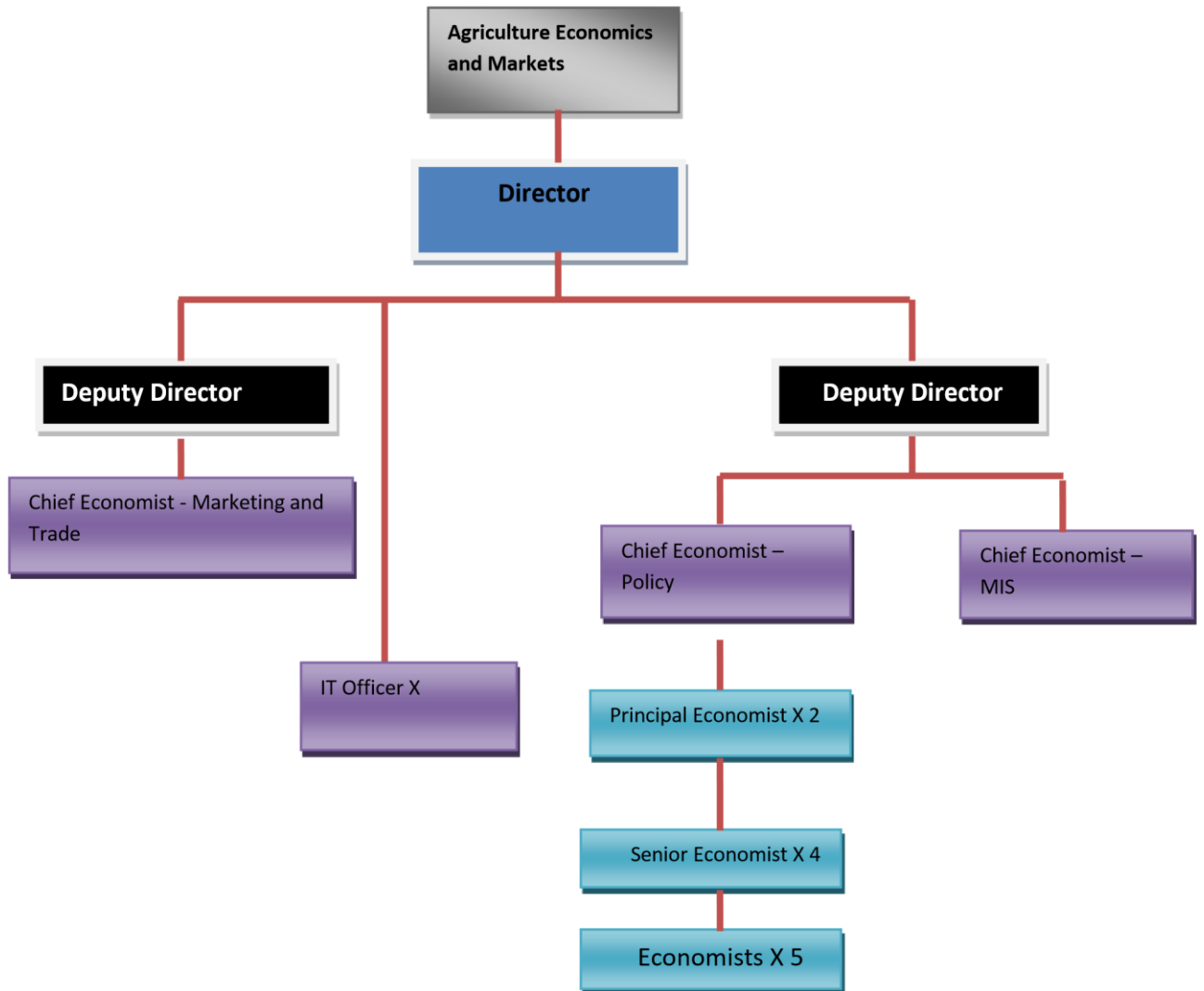
1.2.3 Mission Statement

Rollinson and Broadfield (2002, p. 450) state that "a mission is normally taken to be a somewhat global (and vaguer) statement of an organisation's goals, which expresses the fundamental reason for its existence". They go on further to define the mission statement as an announcement of an organisation's basic purpose behind its presence. Another scholar Daft (2008) defines a mission statement as a broad method for giving importance of an organisation's inspiration which then helps that particular organisation to be perceived from whatever different associations of near kind. Below is the mission statement for MAMID.

Promote and sustain a viable agricultural sector through the provision of appropriate agricultural infrastructure, mechanisation, technical, administrative and advisory services in order to optimize agricultural productivity to ensure food security.

1.2.4 Vision

Rollinson and Broadfield (2002) define a vision as the changes in an organisation's domain, together with a precise impression of the heading in direction in which the organisation must take if it is to exploit environmental or ecological changes. The vision of MAMID is:

To be the bread basket of the SADC and COMESA regions by 2015.

1.2 Problem definition

Hass and Springer (2014) suggest that in conducting a research the most critical step is problem definition. They go on further to agree that stating the problem obviously gives the heading to the whole research process. Neelankavil (2015) defines problem definition as a reasonable articulation of the data required to help the decision maker. At MAMID, the process of applying for, processing and administering import and export licenses is highly manual and thus introduces numerous challenges. Applicants have to manually submit their applications to the ministry or government agencies and then wait for several days to receive the recommendation pertaining the application. This limits the issuance of permits to only working days and hours. Moreover, the paper based system is not full proof to manipulation and it encourages corrupt tendencies as it involves too much face to face human interactions. In most cases, there is no real time access to information

for verifications at border post since there is little or no access to comprehensive database of applications and the type of goods being brought in or out of the country for ease of decision making at these posts.

1.4 Aim

To develop a system that enables online application and issuing of import and export licenses/permits for the Ministry of Agriculture Mechanisation and Irrigation.

1.5 Objectives

Richman (2002) suggests defining the main objectives of the research as the next step after clearly defining the problem at hand that the particular project or research will address. Rollinson and Broadfield (2002) define an objective as a transient proclamation of results that ought to be accomplished. In relation to that, the objectives of this research are listed below.

- ➢ To enable online applications of licenses/ permits.
- ➢ To enable online receiving and downloading of permits and licenses.
- ➢ To monitor communication between license issuers and importers or exporters.
- ➢ To enable online tracking of the status of applications.
- ➢ To provide business partners, importers and exporters with real time updates through the system notice board.

1.6 Research instruments and methods

Valencia (2016) suggest that the research section should include portrayals of the instruments utilized in a research study. The most fitting information gathering strategy relies on upon how prospective participants can be chosen, where you are willing to go for data furthermore, the amount of time you need to do the research study (Kimberly 2006). This project will involve 3 main development tools and three research techniques. These tools and techniques have been chosen because they are easy to learn and appropriate in support of the work that needs to be done. The tools to be used are XAMPP web server, diagramming tools and Macromedia Dream Weaver. XAMPP web server will be responsible for creating a database that will store needed farmer

information. This software tool is greatly instrumental in the development stage of the project because it allows frequent querying and correcting of information therefore information from the database will be easy to find and integrity maintained. The database will be accessible online on a web browser such as Google Chrome using an interface created by Macromedia Dream Weaver. Diagramming tools such as Flow charts and Entity Relational Diagrams will be also used in the Design stage of the project.

The research techniques used in this research study are questionnaires, interviews and observations. Kimberly (2006) defines questionnaires as a set of arranged questions usually answered sequentially by a number of certain individuals to obtain information for a particular research. An observation is a process of data gathering through watching a procedure or different procedures while they are being performed (Dennis et al 2012) while an interview can be simply best defined as a methodology intended to acquire data from a man's oral reaction to oral requests.

1.7 Importance of the study

Imports and Exports Permits Administration System will enable the Economics and Markets department move with time and reduce paperwork. The system will reduce time spent in creating, processing and filing records thereby reducing human error and leaving officers with more time to focus on other business thus improving production. The Importers and Exporters on the other hand will save on time and money as they will no longer have to travel to the Economics and Markets offices as they will have to access the required information on their mobile phones, laptops or desktops. The registration process that traditionally takes time and used to be riddled with confusion and errors will be done more conveniently at home. The project will also improve use of communication technology and enable the different stakeholders realize more value for their electrical gadgets.

1.8 Limitations

Generally numerous researches are affected by different limitations which include design and measurement and this is probably unavoidable, hence they must be recognized and attended to with appropriate measures (Stommel & Wills 2004). During the conduction of this research, the

following restrictions were recognized (additionally included are the solutions implemented to moderate every restriction):

The first limitation that this researcher noted is that not every customer internet access to download the application forms which can also be simply downloaded on a smartphone, for example, most of the farmers who apply for permits to import hatching eggs are located in the remote areas. To rectify this, the ministry will promote user training to encourage such clients to use the new technologies instead of travelling long distances now that internet connectivity is always available.

Another limitation is that the system is only used by clients who can freely navigate through the system web pages thus computer abled. As a measure to rectify this, online based and easy to use instructional exercises will be uploaded on the website and made available through the system's interfaces.

Considering the fact that there are financial costs associated with developing and implementing the system, this presents itself as a limitation - nonetheless, the ministry has shown eagerness and ability through providing a spending plan for such and the ministry can manage the cost of such expenses.

1.9 Conclusion

This chapter dealt with a proposal to establish an online Imports and Exports Administration System for the Ministry of Agriculture, Mechanisation and Irrigation to be used by the department of Economics and Markets. It gave the background of the organisation, its organizational structure as well as their mission and vision. The problem statement, highlighting the importers, exporters and workers' plight with the current system was given. The project will address the main objectives that were listed. The justification and limitations for the study were addressed, hence the need to proceed to the next stage which is the planning phase.

CHAPTER 2: PLANNING PHASE

2.1 Introduction

Successful leadership for all projects under investment demands an assessment of the, technical, social, economic and operational viability of the project. This involves a thorough assessment of all the financial and none financial factors that contribute to the success or failure of the project. This Chapter goes for legitimizing the venturing of this project through revealing the business value that the project has and this is going to be shown economically through calculating the return on investment, the net present value and also an analysis of the cost benefit. This part additionally investigates the potential dangers that have a higher probability of occurrence during the system development life cycle and also included are ways of reducing their effects.

2.2 Reasons for developing the system

It is of best interest to know the business value that is brought about by a project and furthermore attempt and apply it otherwise it will be anything but difficult to get the endorsement of the management nor will it get the financial sponsoring it requires. The business value should reflect both the intangible and tangible benefits that the system should convey when in use, after all projects are expected to advantage an organisation. The possible level of the practicality and the risk variables that are likely to affect the project must be plainly sketched out before planning begins, thus the requirement for a nearby examination of the dangers and attainability of this project. The accompanying is a couple of explanations behind this system to be developed.

- ➢ To lessen the money and time spent by customers in physically going to the organisation's offices for utilization of the present manual system.
- ➢ To upgrade and add value to the organisation's image through extending the administration time of their clients to 24 hours a day.
- ➢ To enhance the correspondence and information exchange between the systems of the organisation so as to improve confidentiality, proficiency and unwavering quality particularly in imparting imports and exports data.

2.3 Business value

It is by no means easy to point out and highlight the business value that is brought about by the use of computers in organisations; however, an organisation's productivity can be improved by the use of computers depending on the type of hardware and software that it employs (Strassmann, 1990). Haris et al (2008) helps in attending to this viewpoint through posing the question, what must businesses expect from the usage of information and technology? thus, for this situation the imports and exports permits/licenses administration system. He goes ahead to further address this particular question in the following manner; the use of information and techcnology must derive maximum benefits at lower costs.

Namchul (2003) admits that computerization is one of the key elements that create business value. When the imports and exports permits/licenses administration system has been fully implemented, the Economics and Markets department will find itself performing more effectively. There will be less paperwork and human traffic in terms of importers and exporters visiting the ministry offices for application and collection of the permits/licenses. This means that these stakeholders will now have more time at their disposal to use for other productive issues. The project will see the department join others in the global arena, in embracing ICT in doing business. Through the website platform information sharing and data management will be enhanced. These business qualities are streamlined into the accompanying fundamental classifications.

- ➢ **Organisational value**: Hypothetically, MAMID's technological image is going to be improved since there is going to be a smooth front line organization arrangement or administration provision. This will support the cooperative attitude of the organisation.
- ➢ **Administrative worth:** The system will be an important organizational framework that will be used for helping in offering better administrations through wonderful services to its clients.
- ➢ **Customers' value:** Time will be spared and directed towards other profitable exercises. This will likewise diminish costs which incorporate voyaging and printed material expenses

- ➢ **Operating value:** Working at the organisation will not be limited to working hours only since the system will be accessed online making it possible for the users to apply for permits at home.

- ➢ **Employee's value:** The workload for the employees will be greatly reduced since most of the work that was done manually will be now automated.

- ➢ **Security esteem:** The database of the new system is going to be encrypted and also programming algorithms that enforce access controls such as login passwords and also the use of views is going to be enforced.

2.4 Feasibility analysis.

The go ahead green light for each and every given project is only given after taking all the necessary precautionary steps which include feasibility calculating to guarantee that the project is going to be a success and a profitable one (Bruce & Langdon, 2000). Feasibility study is also referred to as an economic analysis is more of a cost benefit analysis that is carried out to ascertain whether if a project is going to satisfy the objectives of an investor (Munizzo et al, 2015). According to Laplante (2007) a feasibility study is done to confirm if the proposed system is going to contribute to the objectives of the organisation, whether this system can also be produced using the state of art of technology available in a budget that is reasonable and if the proposed system can be implemented without affecting the existing systems. A Feasibility Study inspects the capability of finishing a project with no significant disturbances, considering legal, fiscal, innovative, timing and different components. Rather than just diving into the venture and expect the best out of it, time and assets can be spared if a specialist is to unmistakably analyse both the positive and negative results that can be gotten from a task through leading a feasibility study. According to Stimpson et. al (2004) the following are the main aspects of feasibility study:

2.4.1 Technical feasibility

The significant area of interest in evaluating the feasibility of a project in technical realtions is basically to assess and assert if a framework is viable mulling over the condition of hardware and the overall public included, in this way confirming to discover if the clients for the system being worked on have the obliged abilities to make utilization of that framework (Mathers, 2006).

Accorrding to Rosenblatt (2012) technical feasibility is far reaching of deciding the attainability of a project checking the present condition of technology that is accessible.

The technology that is required by the proposed system is all inside the organisation and effectively available. thus the system can be successfully developed and implemented with no anticipated technical issues. The following software and hardware are going to be required by this project.

2.4.1.1 Hardware and software requirements

Table 2.1 (a) Hardware specifications

Quantity	Component	Specifications	Status
1	Hp client server	▪ 4gb RAM ▪ Core i5 processor ▪ Speed of 2.4 GHz ▪ 150gb HDD.	This component is not available but the organisation has agreed to purchase the server as soon as it is needed.
1	Hp backup server	▪ 4gb RAM ▪ Core i5 processor ▪ Speed of 2.4 GHz ▪ 150gb HDD.	This component is also not available and the organisation has also agreed to purchase the server as soon as it is needed.
1	Laptop	▪ 4gb RAM ▪ Dual Processor ▪ Speed of 2.0 GHz ▪ 50gb HDD	The developer has his personal laptop that suit these minimum expected requirements.

Table 2.1 (b) Software requirements

Quantity	Component	Specifications	Status
1	Operating System	Windows 7 or better preferably 64 bit	The I.T department has many licensed Operating Systems that are ready for installation whenever required.
30	Anti-virus.	Avira antivirus	Not available and the organisation has agreed to purchase the antivirus to ensure the success of the project.
1	Microsoft Office	Office 2007 or better version	The I.T department has many licensed Microsoft Office products that are ready for installation whenever required.
1	Macromedia Dreamweaver	Dreamweaver 8 or better	The developer has managed to download the software on the internet.
1	Xampp	Version 1.7.7 or better	The developer has managed to download the software on the internet.

2.4.2 Economic feasibility

The principal aspects addressed by the economic feasibility of a project are the financial strengths and other related resources that can be quantified in monetary terms in relation to the costs that an organisation is liable to bring about the required proposed system, also paying as much attention to the usage and keeping up of the proposed framework after implementation (Kendal, 2006). An effective assessment of all the capital and operational is necessary and is to be carried out in order to effectively demonstrate the feasibility of a project economically hence there is need to take into consideration of cash flows that contemplate each and every one of the best alternatives forgone is selecting this project (Nan Si, 2010). Economic feasibility is more concentrated on the financial costs that are to be incurred during the development of a project and how they can be kept at minimum (Munsaka, 2013). The costs of developing a new project and cash inflow that is expected to be generated by this project when implemented are all going to be weighed against each other in order to make decisions on whether the project should be carried on with or not .To simplify this, economic feasibility infers that costs including the entire costs associated with the possession and upkeep of a system, all consolidated should be surpassed by the normal focal beneficial points that the proposed framework is set to convey.

At the point when the proposed system fully becomes functional, the advantages of this new system will far exceed the expenses. A significant part of the software and hardware required as of now exists within the organisation. The system has extremely low introductory and operational expenses.

2.4.2 (a) Development costs

The aggregate related costs to be experienced in the entire project development procedure are termed development costs (Scarborough and Zimmer, 2005). Jewell (2000) characterizes development costs as expenses that are encountered during the development process of a new system.

Table 2.2 Development costs

Component	Cost US $
Del client server	800
Del backup server	700
Avira antivirus (x30)	350
Total development costs	**1,850**

2.4.2 (b) Operational costs

According to Stoner (2000) operational expenses are costs which keep happening in spite of meeting each and every development cost. Operational costs are particularly related to the operation of a framework (Cadle and Yeates, 2008). Operational costs are only incurred after the system set up/execution and continue doing in that capacity for whatever time span that the framework continues working. These are represented on the accompanying table.

Table 2.3 Operational costs.

Operational costs	2017 US $	2018 US $	2019 US $	Total US $
Maintenance	200	300	200	700
Stationery and consumables	50	25	25	100
Training	300	200	100	600
Total	**550**	**525**	**325**	**1,400**

2.4.2 (c) Tangible benefits

These are substantial advantages or the favourable circumstances that can be conveyed in allegorical or figurative terms (Barnes and Xu, 2001). To an investor these favourable circumstances have quantifiable properties that can reflect instantly (Lucey, 2002). these benefits are represented by the table underneath.

Table 2.4 Tangible benefits

Benefit item	2017 US $	2018 US $	2019 US $	Total US $
Paperwork reduction	350	350	350	1,050
Time enquiries reduction	400	400	400	1,200
Reduced Labour	700	800	800	2,300
Grand total	**1,450**	**1,550**	**1,550**	**4550**

2.4.2 (d) Intangible benefits

These are central focuses or points of interest that an investor is going to be offered back by a venture, however, it is impossible to quantify these benefits to business since it is difficult to convert them into a physically quantifiable state (Lucey, 2002). Immaterial advantages cannot be quantified, cannot be measured, and no individual can truly touch or feel these (Barnes and Xu, 2001). Below are the intangible benefits that were discovered.

- ➢ A reduction in the work load
- ➢ An enhanced image for the organisation as a whole
- ➢ Enhanced satisfaction of the customers
- ➢ Improved moral of the employees and the customers as well
- ➢ Overall enhanced organisational good will

2.4.2 (e) Investment appraisal

Geddes (2002) states that investment appraisal conversely can be used with the accounting term "cash budgeting". Investment appraisal ensures the gathering of imperative information related to the business as options accessible to an organisation therefore enabling the management to settle on choices without neglecting the organisation's objectives without missing the goals (Rohrich,

2007). The following are the investment appraisal techniques that were used in this project evaluation.

2.4.2.1 Cost Benefit Analysis

This evaluation technique is defined by Cadle and Yeates (2008) as justifying the project's quantifiable costs against the expected benefits that will be derived from the project. An examination and evaluation of activities is given by the cost benefit analysis (CBA) and these capacities honourably for the broad ones where administrations cannot be measured past financial gains (in business terms) can in like manner be explored (Lynch, 2009). Brent (2006) defines cost benefit analysis as the appraisal of the aggregate estimation of the present advantages set in with the aggregate costs, in relation to the diverse limitations that can distort this assessment.

Table 2.5 Costs and Benefits Analysis Table

Item	2017: US $	2018: US $	2019: US $	Total US $
Tangible benefits	1,450	1,550	1,550	4,550
Operational costs	(530)	(525)	(325)	(1,380)
Net benefits	**920**	**1,225**	**1,225**	**3,170**

2.4.2.2 Net Present Value.

Cadle and Yeates (2008) define net present value as the difference between the present values of the cash outflows of a project and the present values of the cash inflows, all future cash flows being adjusted to reflect the present day of money. Net present value is referred to as the complexity between the total summed up amount and the present estimates of the cash streams that are anticipated in future,this may be negative or positive value (Sangster, 2004).

The analyst will use a 15% interest rate that is the standard interest rate used by the organisation (Ministry of Agriculture) since a higher interest can easily make adjustments for different economic conditions such as inflation, a dollar paid today will be different from a dollar paid in the next 3 years.

N.P.V = Total benefits - Total costs

$$(1 + r) n$$

N: number of years   r: interest rate.

Table 2.6 Net present value

Year	Net cash flow US $	Discount factor US $	Present value US $
0	(1,850)	1,000	(1,850)
1	920	0.870	800.4
2	1225	0.756	926.1
3	1225	0.658	806.05
N.P.V			**682,55**

A net present value of 33,830 demonstrates that the project is viable and feasible since it returned a positive value.

2.4.2.3 Return on Investment

According to Horngren et al (1996) rate of return on investment (ROI) is simply a better test of profitability, this is calculated through dividing income (or profit) by the investment required to

obtain that income or profit. The real key standard included when managing ROI is that ordinary ought to be identified as a capital rate that might have been used (Randall, 1996).

Return on investment $=$ $\underline{\text{Average annual profit}}$ x 100
$\qquad$ Development costs

ROI $=$ $\dfrac{1,057}{1850}$ x 100

$=$ $\underline{57\%}$

The general standard follows that; a positive ROI esteem exhibits that a venture is viable thusly the figure above of 57% reflects the practicality of this proposed system.

2.4.2.4 Payback period.

Horngren et al (1996) state that payback time can also be referred to as the payback period, they go on to define this as the time or period that a project requires to generate income that is equal to the initial cost of developing that particular project. Romney and Steinbart (2012) state that the required number of years for net savings to equate the initial cost of investment is referred to as the payback period.

Payback period is clarified as the time frame required to recover the investment costs. This payback period is a basic factor in determining whether to welcome the project resulting to the way that long payback periods are not ideal in the financial specialist's interest, Romney and Steinbart (2012) suggest the selection of the project with the shortest payback period. Below are the payback period calculations for this project.

Table 2.7 payback period

Year	Annual cash flow US $	Balance US $
1	(1,850)	(1,850)
2	1,450	(400)
3	1,550	-

Payback period = 1 year and [(400/1,550) x 12] months

= 1 year 3 months

The lower the payback time frame, the more attainable that particular project is, subsequently for this circumstance, a payback period of 1 year 1 month is calculated consequently this is a possible undertaking.

2.4.3 Social feasibility

The primary centre is on a very basic level on the workers' behaviour or conduct that connects to their trends and levels of association after the execution of the proposed system (Kendal, 2006). The effect of a venture on the workforces of an organisation (similarly mulling over their conceivable reaction) is alluded to as social feasibility (Barnes and Xu, 2001). It is of best interest to evaluate how the representatives and the workers are most likely to associate with the system after execution in respect to the fact that they are the final users of a new system (Bruce and Langdon, 2000).

Automating the permits/licenses application process implies that work burden is diminished, thus the workers of the organisation will have more opportunity to go through with their families enhancing their social time at home as well. The lessening of the work heap of the workers wipes out working after hours of the normal working time and this is additionally going to alleviate them from pressure that results from time frames in turn curbing the blunders that they usually make amid the ordinary work time.

Security and privacy within and outside the organization is also going to be enhanced through the use of the proposed system. Since the system is going to make use of electronic signatures for approval this implies that, no employee is going to be aware of the approvals made except only for the system administrator and the responsible parties. Electronic signatures also do away with the need for human signatures protecting the organization's individuals who might fear for victimization for rejecting applications from respectable figures.

Not will only the proposed system motivate the employees, but it will also improve ethnicity within the organization especially at the economics and markets department. The new proposed system will completely curb corruption in the issuing of licenses and this is an ethical aspect that is essential for the development of the economy of our country. (Kendal, 2006) defines ethics as the accepted norm, principles or values that differentiate right from wrong.

The computerizing of the permits/licenses application process on the other hand is going to demotivate the employees of the organization mostly the shop flow workers. Manual work such as the transportation of applications and other paperwork from office to office that was usually done by the office orderly employees will eliminate the need for them and this will leave them jobless.

During the development of the proposed system, the employees may be demotivated by this innovation. Ignorant employees may feel that their work is of little significance or is not appreciated hence the need for computerization and automation (Rosenblatt 2012). This can demotivate them and reduce the organization's productivity. However, as a measure to mitigate this, the researcher managed to sit down with all the heads of departments of the organization and preached about the benefits of the system so that they can share it to their subordinates

2.4.4 Operational feasibility

Operational feasibility measures how well a proposed system eliminates an identified problem, and exploits identified opportunities in scope defining how it fulfils the prerequisites distinguished during the requirements analysis of the system development phase (Munsaka, 2013). The main focus of operational feasibility is on issues which incorporate the proposed system utilization once there is successful implementation (Rosenblatt 2012). It is of best interest to take a glance at the

helpfulness of the recently proposed system mirrored against the present working framework so as to have the capacity to completely welcome the new framework's attainability as far as its operational efficiency is concerned (Rodger, 2005). Keeping in mind the end goal to achieve this, particular edges of the system should be closely examined with a specific end goal to conduct quantifiable examination that reveals the usefulness of the proposed system.

- ➢ Time is going to be saved by the proposed system by permitting customers to save money on travelling to the ministry's main offices since they can now be served concurrently depending on where they are as long as there is access to the internet to make use of the web based modules of the system.

- ➢ The proposed system has programming algorithms that provide the end users and managers will real time updates and information that is formatted and simplified for their own understanding and use. Different interfaces will be provided to different users depending on their information needs together with instant updates that will be easily accessible.

- ➢ The mode of operation that the proposed system will make use of puts into action protective mechanisms such as electronic signatures that will guard against corruption, bribery and also ensure a secure storage of data.

2.4.5 Feasibility conclusion

A close examination of the feasibility study has uncovered that costs associated with the proposed system development life cycle when mirrored against the points of interest this new framework is prone to bring are far considerably less, thus the researcher concludes that it is practical to proceed with developing the proposed system subsequently the need to take an assessment of the different variables which includes risks.

2.5 Risk analysis.

A risk is defined as the likelihood of occurrence of an unfavourable event during a certain period of time or after the execution of a certain process (Heyman, 2010), consequently this is a significant stage where there is need for the researcher to commit to the risk management process of the project. Marchewka (2014) defines project and risk management as a procedure that puts much emphasis on distinguishing, investigating and creating techniques for reacting to project risks

proficiently and viably. Cadle and Yeates (2008) state that the analysis of risks is whereby the likelihood (probability) of the transparency of an event and conceivable effect or harm as a consequence of the event are evaluated. The fundamental explanation behind risk examination and evaluation is to make sense of what dangers and open doors that should be opened in order to minimize the impacts of these risks. As specified before, this is a low spending project characterized by less economic risks. Quite a bit of what is required is as of now available at the organization and what should be procured is accessible and available at moderate costs; the accompanying risks where recognized and moreover included are the measures to control them.

> Outside users can access the system with no authority either purposefully or coincidentally; they show up as a risk with the possibility to hurt both the service and also its clients by either getting to classified information through or by controlling the framework access codes through the web. To mitigate this danger guard systems, for example, firewalls and access controls will be utilized.

> Computers are prone to virus attacks - Gard (2006) defines a computer virus as computer programs that can modify or cripple other computers so as to damage or take control of the program, or to cripple the operating system of the computer. To minimise the risk of this threat the ministry's computers are going to be installed with Avira licensed antiviruses that regularly check-up for patch up files for updating.

> Electricity load shading- Electricity power cuts harm the equipment and in most cases the operating system that the new system is going to reside on because sudden power cuts usually affect the power supply of the machines leading to data loss and corruption of the system. The ministry has a backup generator already installed in order to eliminate the effects of this risk. The system is additionally going to be operated with backup options that are going to be included in the programming algorithms of the system.

2.6 Project work plan

Roeder (2011) states that a project work plan is an accommodating device useful in dealing with specific project areas in relation to work arrangement since it obviously states what should be done, it also states the conditions or dependencies and furthermore the time frames that these specific activities are most likely to consume. In less complex terms, a work plan outlines the project objectives to be refined and also a summary of the schedules including the tasks that are to

be completed in order to achieve the specific stated goals. A work plan is sometimes referred to as the project plan or simply just a proposal report. This researcher adopted the Waterfall model as the System Development Life Cycle because of its organized software development procedures where activities are executed successively. Not simply has the model been used a couple times as a software development technique in this organistaion (which then evaluates its sufficiency by looking over how it has affected other practically identical projects). The time dispersion for each different stage is clearly shown in the project work plan and the Gantt chart shown not long after this segment.

Table 2. 8 Timing project schedule

Phase	Start	End	Duration (weeks)
Project Introduction	18 // 03 //2016	25 // 03 // 2016	1
Project Planning	25 // 03 // 2016	08 // 04 // 2016	2
Project Analysis	08 // 04 // 2016	15 // 04 // 2016	1
Project Design	15 // 04 // 2016	29 // 04 // 2016	2
Project Coding	29 // 04 // 2016	13 // 05 // 2016	2
Project Testing	13 // 05 // 2016	20 // 05 // 2016	1
Implementation	20 // 05 // 2016	27 // 05 // 2016	1
Maintenance	27 // 05 // 2016	02 // 05 // 2016	1

2.6.1 Gantt chart

The Gantt diagram was initially acquainted with the world more than 100 years prior by an American administration advisor by the name Henry Gannt, he achieved such a variety of developments however is for the most part recalled for this graphical representation which was named after him (Graham and Portny, 2011). Bruce and Langdon (2000) concur that assignments on the gantt chart are recorded on the left and over the top are the weeks in time scales of the

project. The bars display when the tasks begin and wrap up, and a clearer project overview concerning the timings and tasks is provided. The Gannt is able to display this through clearly showing the range of the project in relation to the time simplified in sections.

Table 2.9 Project's gantt chart

Weeks	1	2	3	4	5	6	7	8	9	10	11
Introduction	█										
Planning		█	█							□	
Analysis				█							
Designing					█	█					
Code process							█	█			
Test phase									█		
Implementation										█	
Maintenance											█
Documentation		█	█	█	█	█	█	█	█	█	█

2.7 Conclusion

The Ministry of Agriculture Imports and exports permits/licenses administration system was put under project development evaluation techniques and has proved to be a viable project decorated with lower risks, high levels or return and a shorter payback period. The intangible and tangible benefits of the proposed system outweigh the total development costs of the system by a visible margin and this also demonstrates how feasible the project is. The feasibility study has shown that it is of best interest to both the researcher and the organisation to carry on with this project, hence the need to get back to the drawing board and proceed to the project next phase which is the analysis as the project work plan suggests.

CHAPTER 3: ANALYSIS PHASE

3.1 Introduction

The chapter gives a picture of the current system, exposing its shortcomings and justifying the need for implementing the newly proposed system. The explanation and justification of the methods used to gather data in order to complete the study is also carried out in this chapter. The chapter ends in discussing the functional requirements of the new system, but before that, available alternatives such as outsourcing, improving and in house development of exports licenses/permits administration system are also explored.

3.2 Data gathering techniques.

There is one fundamental goal in fact finding and this is the gathering of facts for mostly determining the project's costs, benefits and in addition for timing the project schedules. Thus, in order to obtain more accurate results, different strategies have to be utilized. Investigation of authoritative diagrams, carrying out interviews, evaluation of current reports, and putting observations and surveys into use during the fact finding process is very essential (Shelly and Rosenblatt, 2010). For the effectiveness of an organizational appraisal, various techniques which include questionnaires and interviews should be used (English, 2004). Eventually, the principle point is to pick up substantiate data about the present system demonstrating every single related requirements and constraints. Valuable strategies for picking up an understanding on the issues of the present system and the attainable solutions to address these issues can be gained through the use of questionnaires, interviews and observations. These three data gathering methods are the most common and most widely used and are not limited to these (Powell, 1997).

3.2.1 Interviews

Dennis et al (2012) simply define an interview as a methodology intended to acquire data from a man's oral reaction to oral requests and suggests that this is still the most commonly used fact finding methodology. Seidman (2013) also agrees to this and states that in most cases of a research, an interview that is fully and properly carried out is the most appropriate method of gathering data in a research. The most widely recognized proportion for conducting an interview is 1 as to 1. The following are the advantages and disadvantages of interviews:

3.2.1.1 Findings from interviews

The interviews were conducted by the developer at a very basic level see how the workers responded in person and moreover how they will get along with the new system. The interviewer discovered that some of the employees are resistant to change, some grip change whilst some constantly give negative examinations to various workers with a finished objective to cripple effort which has been put. A couple of employees were met and every one of them in a general sense imparted about the new workplace which was to be achieved by the new system. Results procured after the meetings imparted a couple of things, for instance, outward appearances of contempt, demotivation especially for the individuals who feared retrenchment, yet a couple of delegates had all the earmarks of being chipper about the presentation of this new system since they were totally aware of the points of interest that it would bring about to the organisation with a particular deciding objective to enhance their work. In like manner, to support this examination the investigator expected to make use of a couple of inspectors that would be answered by the workers furthermore the irregular customers.

In addition to the above, the examiner kept on guiding interviews to the employees in such a way that it could be conceivable to basically give their own viewpoints of how they see the change and the execution of the proposed system. For example, investigator facilitated his gatherings amidst coffee breaks and also at lunch times all together keeping in mind the end goal to avoid intruding with the general existing systems of the subordinate duties. The procedure was done at the worker's standby time or additional free time. With respect to these policies, 17 authorities out of a possible 24 who were invited for get-togethers came through and they profitably gave their decisions on the system that was being made and executed. This offered an opportunity to the investigator to see equivalently zones of affectability toward the subordinates, some assistance with the zones that they feel should be updated or upgraded in the present system and moreover zones that they feel will not assist and should be expelled from the proposed system. The expert utilized the meeting agenda as a part of (Appendix B) whilst carrying out the interview.

3.2.1.2 Advantages of interviews

- ➢ There is direct interaction with the actual users of the current system.
- ➢ Motions and gestures can be noted during the process and this help in extracting more useful data that could not have been extracted through writing.
- ➢ Some areas that are difficult to put into paper when writing can be easily discussed.
- ➢ Other relevant issues can emerge that the researcher could not have thought about at first and these can as well be discussed and be useful.
- ➢ People do most of the times take interviews seriously than the other forms of fact finding.

3.2.1.3 Disadvantages of interviews

- ➢ Certain significant details may not be brought out transparently by the interviewee.
- ➢ respondents may not feel too free to express themselves for fear of being victimised or labelled.
- ➢ This was time consuming since there were some cases that needed clarification and explanation from either the respondent side or the interviewer's side.

3.2.2 Questionnaires

Kimberly (2006) defines questionnaires as a set of arranged questions usually answered sequentially by a number of certain individuals to obtain information for a particular research. In circumstances where there are many people whose viewpoints and data should be gained it is better to make use of questionnaires (Dennis et al, 2012). Questionnaires are a carefully arranged set of questions that are compiled to address specific aspects or areas. An impromptu questionnaire can be practically identical to a spontaneous community that just becomes constantly as more structures are assembled, it might work however without advancement (Azzara, 2010).

3.2.2.1 Findings from questionnaires

Different people within the Ministry of Agriculture were given the questionnaires mostly at different intervals so that their answers or responses would not influence one other and at the end

of the day have uniform answers. This was very helpful to the analyst in obtaining honest answers from the respondents. The questionnaires where provided with an optional option that is either to fill in their personal details or not and this ensured that the analyst got unbiased information since anonymousity provided guarantee to the respondents that they need not to be afraid of victimization. This was done during the break time of workers and at whatever point the other employees were free.

The greater part realized by these questionnaires was normal in most part delegates for instance, the permit/license verification and tracking through the use of the new system does not conflict with the operations of the organisation. In this way through the help of a right hand, the investigator made sense when clearly explaining how the system would have been working and have the board say their viewpoints with respect to the proposed system for data gathering.

Answers were obtained from this investigation approach that unquestionably helped the investigator from numerous perspectives in the progression of the proposed system. A specimen for the questionnaire is exhibited in Appendix A.

3.2.2.2 Advantages of questionnaires

➢ Anonymous questionnaires promote unbiased responses since there is no fear of victimization (Powell, 1997).
➢ Data that is given back is particular and direct henceforth simple to assess.
➢ Respondents can attend to the questions at their own time.

3.2.2.3 Disadvantages of questionnaires

➢ The respondent might decide not to answer some areas and these might be the crucial areas.
➢ The respondent may be biased just to please or disappoint the researcher.
➢ Follow up is required since some might throw the papers away.

3.2.3 Observations

An observation is a process of data gathering through watching a procedure or different procedures while they are being performed (Dennis et al, 2012). In simpler terms, the process of watching and grasping the way things are done when a particular task or routine is being performed is referred to as an observation. According to Mccuen (1996) there are various aspects that arise from an observation but the fundamental one is finding the problem at hand.

3.2.3.1 Findings from observations

The analysist carried out observations at the department of Economics and Markets viewing the day to day operations of the traditional manual system of applying for permits. The observer discovered was allowed in some cases to go under cover either as an applicant or as tagged investigator or observer. This helped the analyst in obtaining undistorted information since the employees behaved in their normal way because they were not aware of that they are under surveillance. The observer discovered that employees seemed to be energetic early in the morning but reduced the tempo as the day progressed because of tiredness. As the day progressed, documents awaiting processing increased in quantity and ended up piled in one office or the other in the chain process. This helped the analyst in the justification of the reason for computerizing the whole application process. The perception score sheet in Appendix C was utilized.

3.2.3.1 Advantages of observations

➢ The information gained is first hand and nothing is distorted or hidden from the researcher. Thus, the researcher will get the exact answers that he or she is searching for.
➢ There are no disturbances within the organization since no time is required from the respondents as they will be providing answers whilst working.

3.2.3.2 Disadvantages of observations

➢ Research is limited since the researcher will not be directly interacting with the users of the system.
➢ Some organizations do not well come external observers or feel comfortable to carry on with their day to day activities whilst they are being watched.
➢ The researcher might misunderstand and misinterpret the situation.

3.3 Analysis of the existing system.

System analysis is done to expose the strengths and weakness of an existing system (Stair & Reynolds, 2012). The current manual system being use at the Ministry of Agriculture has its advantages and disadvantages. The disadvantages of the current manual system outweigh the advantages of that this system provides. These advantages and disadvantages are outlined below.

3.3.1 Advantages of the current system.

➢ It is cheap to maintain and implement for such a large organization.
➢ It is easy to appreciate how the system operates or works.
➢ Anyone at the organization can use it.

3.3.2 Disadvantages of the current system.

➢ It is costly to run since most of the transactions are done on paperwork.
➢ There is a high risk for loss of data since there is use of the traditional paper filing system of flat files.
➢ There is more face to face interactions between the clients and employees and this promotes favoritism and bribery.
➢ The application and approval process is only limited to working hours.
➢ Unnecessary travelling of the clients to the ministry's offices making the offices congested affecting day to day operations.

3.3.3 Description of the current system

The process of applying for, processing and administering of import and export licenses is highly manual at the Ministry of Agriculture. Clients or applicants visit the ministry offices to apply and manually submit their applications to the ministry receptionist. Application forms are obtained at the ministry's reception office or can be downloaded on the ministry's website. The clients fill in their contact details and state the type of license or permit they seek after. The agencies (economists) will then either approve or reject the application depending on the quantity of applications that are waiting for approval and processing. This process usually takes a period of two or more weeks. Applicants are usually given a waiting period of two weeks and after that

period has passed, they then are required to visit the ministry's offices again for collection of their permits/ licenses that were granted and this is done at the Economics and Markets office. The status of the applications is usually displayed on the reception notice board. Duplications for successful applications are made and they are stored in the Economics and Markets flat file database for future reference such as auditing. Enlistment for the new client's record was also manually done by the receptionist and in some cases bringing about one client on occasion having two or more records in turn duplicating data and this also made it difficult for the auditing process.

3.4 Process Analysis

As indicated by Yeates and Wakefield (2004) process analysis are managed periods of a process that have been broken down, used to communicate inputs together with outputs, and operations that transpire in the midst of each stage. The upgrade of knowledge on the capacities of a process, and the potential system's centers that can change and extending adequacy can all be identified through process investigation. The analyst utilized a chart to plainly demonstrate the strategies, data, commitments and yields of online licensing and electronic storage of data. A chart is used to demonstrate the contributions, procedures and yields of the system as of now being utilized. Process analysis is used to model the method, data, the system's inputs and outputs together with the progressive work stream by focusing on the movement courses of action and additionally specific action beginning first.

3.4 Data analysis

Bentley and Whitten (2007) state that data analysis is an aspect that seeks to enhance the representation of data when there is need for one to implement it as a database. Berthold and Land (2007) agree that data analysis is carefully taken into consideration and is a well calculated process of decision making on deciding the most useful and important data that has to be taken note of. In simpler terms, this is an activity that includes the modelling, inspection and transformation of data in order to successfully select the data or information that is useful and meaningful so that conclusions can be drawn from it and decision making can smoothly happen.
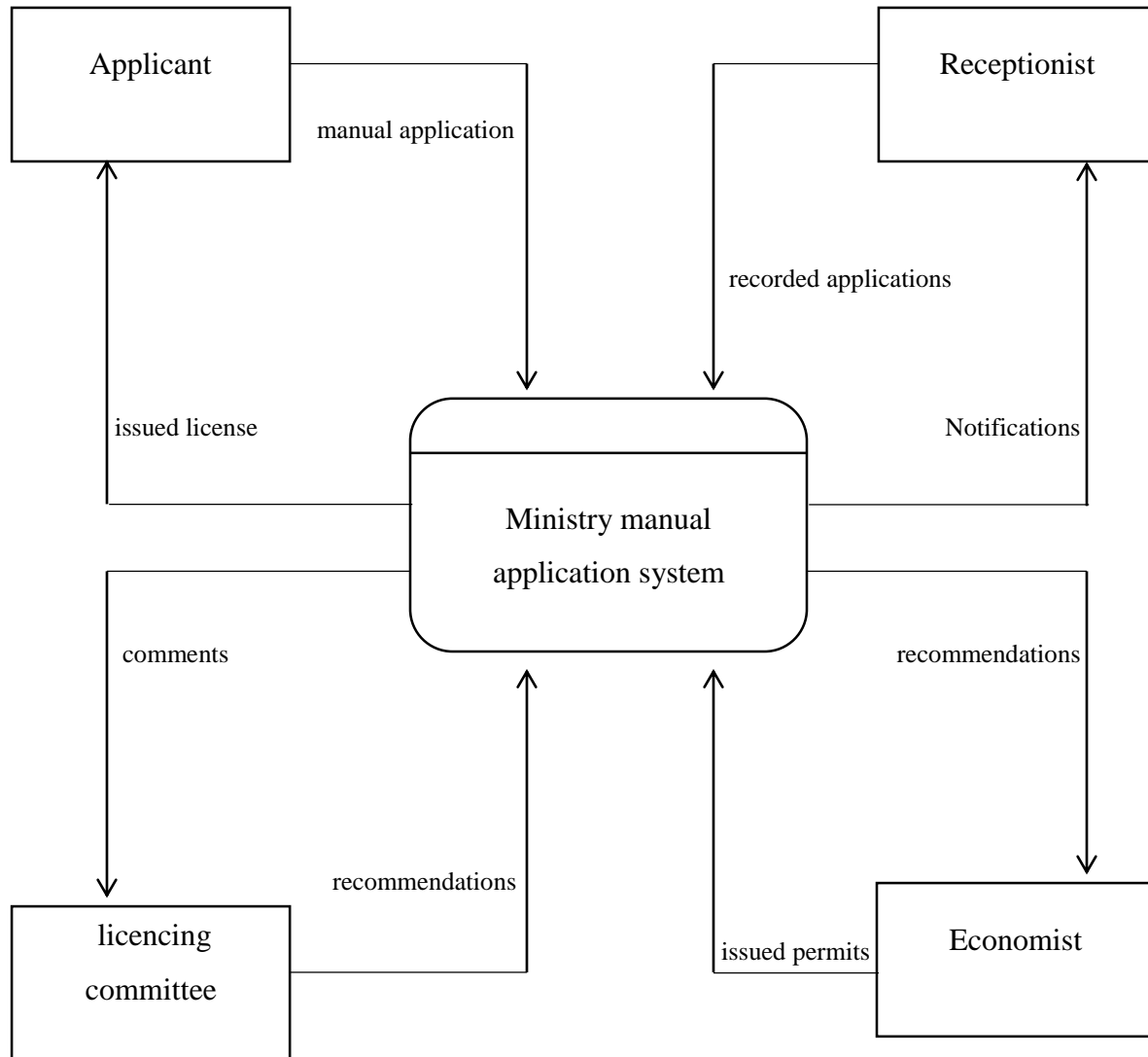
3.4.1 Context diagram

Hatley et al (2000) state that a system is represented as it is blended in its operating environment in a context diagram. The representation or diagram should display all information that is relevant to the system (Clements, 2003).
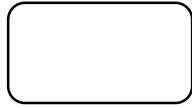
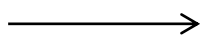**Figure 3.1 Current System's Context Diagram**

Key

|	
☐	Entity
⬭	Process
⟶	Flow of information

3.4.2 Dataflow diagram

A data flow diagram (DFD) is a diagrammatic tool that represents how data flows into and goes out of the system (Langer,2013). According to Satzinger et al (2010) data flow diagrams demonstrate the system's fundamental features or functions in a graphical manner through the use of well-defined or recognized symbols. Hatley and Pirbhai (1987) best define a data flow diagram as an illustration of connected activities of the functional requirements that are identified to a particular system.

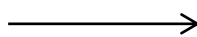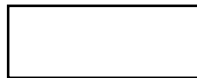**Fig 3.2 Current System's Data Flow Diagram**

Key
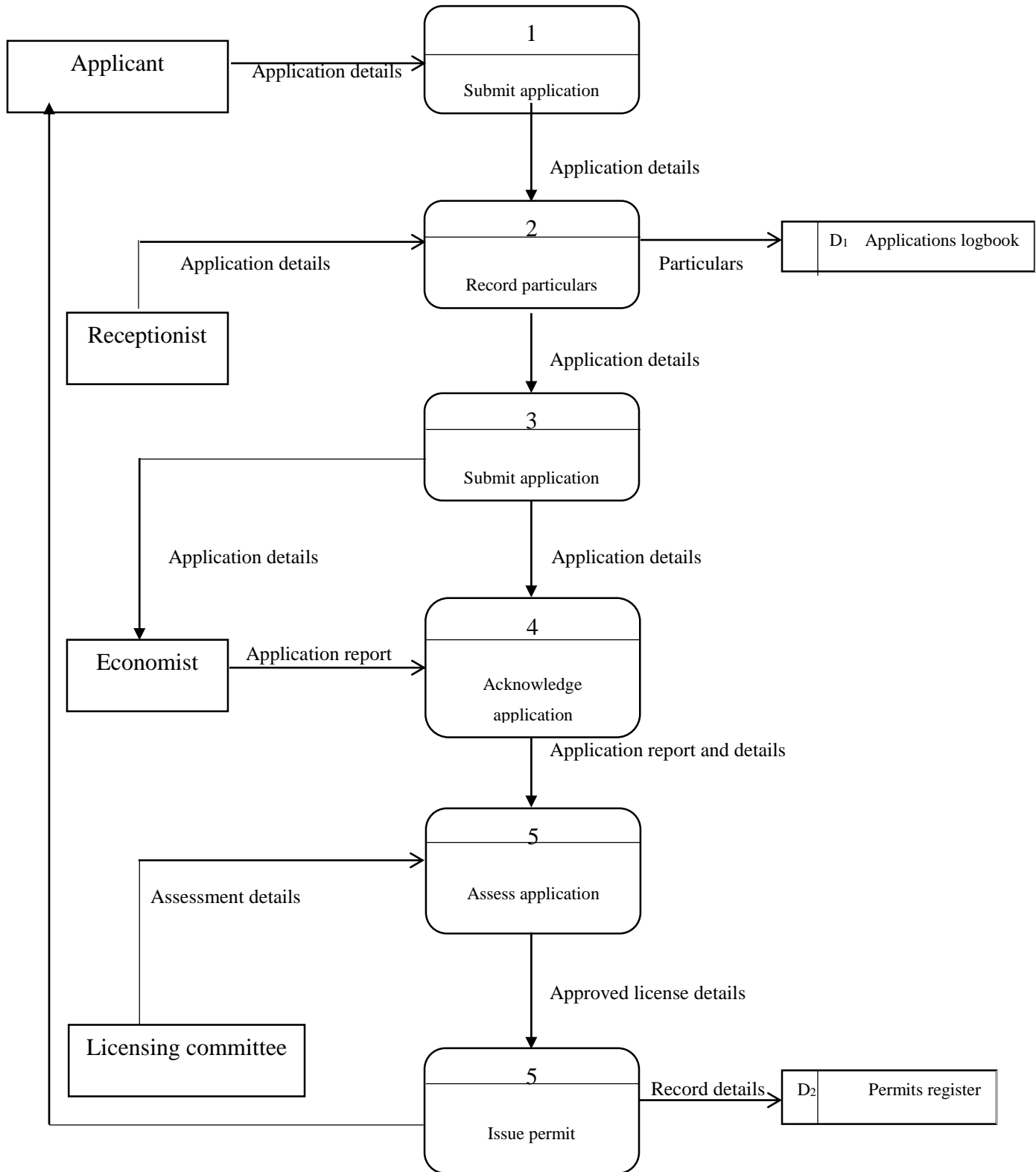
☐	Entity
⬭	Process
→	Data flow
☐	Data store

3.5 Weaknesses of the current system.

➢ The general application and approval process is slow since information is manually passed on from one office to another.

➢ Permits/licenses are not issued according to a standard issuing criteria, most of the times it all depends with who is issuing and this promotes bribery and favouritism.

➢ Issuers or approvers are only two at a given period to attend to hundreds or thousands of applications.

➢ Clients cannot trace the progress of their applications.

➢ There is more paper work which emerge from the application forms, notice board stickers and the actual licenses/ permits which is costly to the ministry.

➢ The traditional filing system is vulnerable to threats such as theft and forgery.

3.6 Evaluation of alternatives

Evaluation of alternatives is done so that the advantages and disadvantages for each available alternative can be captured (Burge et al, 2008). There are various sources that the organization can turn to in order to address the limitations and disadvantages of the current existing system. These are discussed below and namely are: outsourcing; improvement and development.

3.6.1 Outsourcing

Greaver (1999) defines outsourcing as the process of surrendering an organisation's internal activities and decision rights to an external service provider. Shelly and Rosenblatt (2010) refer outsourcing to the process of obtaining a software from an external entity or organization, the organization that provides the software either tailor makes the software for the contracting organization or the organization in need will buy an already developed software that performs similar tasks of the required software to address a particular problem. Jacques (2006) best defines outsourcing as the acquisition from an external source of software services that are similar to those that the organization could have provided for itself.

3.6.1.1 Advantages of outsourcing

- ➢ Daily activities of the organization are not affected and the employees can attend to their day to day activities.
- ➢ Requirements of the technical personnel is lower
- ➢ Flexibility and new ways of doing things can be shipped into the contracting organization (Greaver, 1999).

3.6.1.2 Disadvantages of outsourcing

- ➢ Installing and maintaining the system will require more personnel and this will be very costly to the organization.
- ➢ The source code provided may be vague or difficult to understand for maintenance and modifications due to the different preferred programming algorithms that could have been used.
- ➢ Maintenance and upgrading will continuously demand the services of the software provider which is costly.
- ➢ Security can be breached if confidential sensitive information is given out to the external organizations during the data gathering and requirements analysis processes.
- ➢ This usually demotivates the internal employees especially the I.T department since this move will make them feel incapable of performing a satisfying job.

3.6.2 Improvement

This is just a simply way of modifying the current system so as to enhance its effectiveness. This method does not do away or throw away the existing system but rather improves it either by computerizing certain aspects of its operations and in this case, computerizing the application and information storing processes. This method has however its advantages and disadvantages which are listed below.

3.6.2.1 Advantages of improvement

- ➢ Privacy and confidentiality of the organization is guaranteed.
- ➢ Expenses from paperwork are reduced
- ➢ Less training and operational costs since the system is not completely eliminated but just equipped with a few basic operations.

3.6.2.2 Disadvantages of improvement

- ➢ Some major issues will not be addressed such as tracking and approval of the applications.
- ➢ The improved system will be difficult to upgrade and maintain
- ➢ There could be duplication of data and a mix up of processes such as computerized storage of application details and duplicated licensed stored in a traditional filing system.
- ➢ Improvement will not eliminate face to face interactions which promote corruption.

3.6.3 In-house development

Shelly and Rosenblatt (2010) state that in-house development involves developing of a software by the internal members of an organization especially the I.T department in order to address a particular problem brought about by the current system. The option of in-house development has become increasingly more viable because of the current stability of the software industry due to proper funding hence the availability of open source development tools (Sichel, 1997), such as the visual studio software bundle.

3.6.3.1 Advantages of in-house development

- ➢ More precise and accurate in satisfying the user's requirements and other organizational stakeholders.

- Lower maintenance costs since no external parties are required to update and upgrade the system as per required.
- Can be easily upgraded or modified due to the familiarity of the programming algorithms used.
- A proper documentation is kept for future reference.
- This motivates the organization's employees both the I.T department and other departments as they will trust and rely on one another.
- low development costs since personnel is readily available.
- Security is guaranteed.

3.6.3.2 Disadvantages of in-house development

- This shuts out innovative ideas and new ways of doing things that can be shipped in from other organisations.
- This usually takes time since the I.T department is mainly for support services such as maintenance and not software development

3.7 Requirements analysis

Grady (2006) suggests that the analysis of the requirements should be well managed so that the requirements can align or tally during the design phase with the development concepts and the analysis is conducted in the early development phase of the new system. According to Smith and Kandel (1993) requirements analysis involves scrutinizing the whole system's domain which incorporates the hardware, software and the human resources in terms of how they interact and depend on each other.

3.7.1 Functional requirements

Thompson (2013) relates functional requirements to the targets of the real actual design of the system. When a new system is being developed and is at its design phase, functional requirements can be specified as the requirements that are initially identified and are usually hard to identify (Dufresne, 2008). In simpler terms, a functional requirement is a specific functionality that defines what the system is supposed to accomplish. The Import and Exports license/ Permit Administration System will enable the following major functions

- The new system will enable automation of services or self-service.
- Concurrent access to information and usage of the system will be supported.
- Clients can interact with the system from their different respective areas without congesting the ministry's offices.
- The proposed system will facilitate faster documents exchange will be done electronically.

3.7.2 Non-functional requirements

The way a new system is going to function is ignored by the non-functional requirements (Kasse, 2008). Kulak and Guiney (2004) suggest that it is easy to identify non-functional requirements during the exploration of the functional requirements because the pair are connected to each other. The non-functional requirements of the proposed system are as follows:

- Security: the use of access control methods such as passwords and user accounts will guarantee that privacy and confidentiality of the information of the organization is maintained.
- Performance: concurrent usage and access will speed up the processes of the system.
- Operation: this is an easy to use system that will be easily accessed on the world wide web irrespective of our different geographical areas.
- Supportability: the system shall be easy to install and configure. Incorporating supportability facilitating features will typically result in more efficient system maintenance and reduce operational costs as well as maintain the organization's continuity.
- Usability: the proposed system shall be more efficient to use that is, it will take less time to accomplish a particular task. It will also be easier to learn and more satisfying to use.
- Reliability: the system shall be fit for its intended purpose and performing as the users require it to

3.8.4 Constraints of the success of the system development

A couple of challenges can be defied in the midst of the adjustments and tune ups of the system being made and created. In any case, the challenges perhaps be experienced in the midst of various motivations behind the improvement procedure of the new system.

- Employees may be impenetrable to change as a result of the fear of the obscure. This may generally be as a direct result of the anxiety of using computers.
- The implementation process of the system will a require a ton of time.
- Resources deficiency which come as the major blow to the organisation.
- The accomplishment of the new system is not flawless in any case since programming errors and also the generation of the required algorithms may present itself as a challenge.

3.8 Conclusion

This chapter dealt with an analysis of the existing system and different data gathering techniques were used to expose the weaknesses of the current system. The weaknesses of the existing system helped in defining the functional and non-functional requirements of the new proposed. Different alternatives that are available to the organization in acquiring a new system to solve the identified problems of the existing system were also discussed and in-house development proved to be the best alternative for the organization. As a result, this raises the need to proceed to the next phase which is the design phase, where the development and design aspects of the proposed system are going to be discussed.

CHAPTER 4: DESIGN PHASE

4.1 Introduction

Developing a new system to meet the expected user requirements requires the system developer to move away from the logical description of the system to a more physical approach of how the system will work. According to Michael (2012) the design process is when different standards or methods are put into practice in order to physically design and realize a system with the desired functionality. This is when Logical diagrams and Entity Diagrams are converted into physical data flow diagrams and ER diagrams clearly specifying the automation boundaries to meet the objectives that were stated in the first chapter. This chapter will focus more on the design of the new proposed system and consists of the architectural, physical, database and the interface design.

4.2 System design

Shelly (2005) states that system design is the evaluation and determination of how the proposed The systems design is a system development phase that defines how an information system is going to perform in order to address a particular problem (Stair & Reynolds 2012). This addresses particularly how the system is going to function thus the basic or main functions of the new system in relation to the manner in which the system is going to be developed or constructed. The basic functions of the new system will be represented on the on the context diagram and the dataflow diagram that are to follow. However, it is very important that the required user functionalities should not conflict with the stated objectives of the system but rather align with these objectives.

4.2.1 Description of the new system

The applicant for the import of export permit/license visits the Ministry of Agriculture website to access the application portal and then fill in the application form request. Upon clicking the submit button after filling all the necessary required details, the application will be viewed by an economist. The economist assesses the application before forwarding it to the licensing committee for further processing. The committee will then issue a permit/license for the applicant and the details will be forwarded and stored in the permits database where imports and exports clearing agents at the various border posts of the country can verify the details of any license holder through querying permits/licenses database. Senior economists at the Ministry of Agriculture make up a

licensing committee and are responsible for appointing the economists that are to assess the applications after creating accounts for them. The licensing committee account is managed by the systems administrator at the Ministry of Agriculture.

4.2.2 Context and dataflow diagrams

Shelly and Rosenblatt (2011) define a context diagram as an aerial representation of a business software or system that clearly outlines its scope and limits. Barnes (2001) states that a context diagram demarcates a system's perimeter and displays how data is entered and extracted from the system.
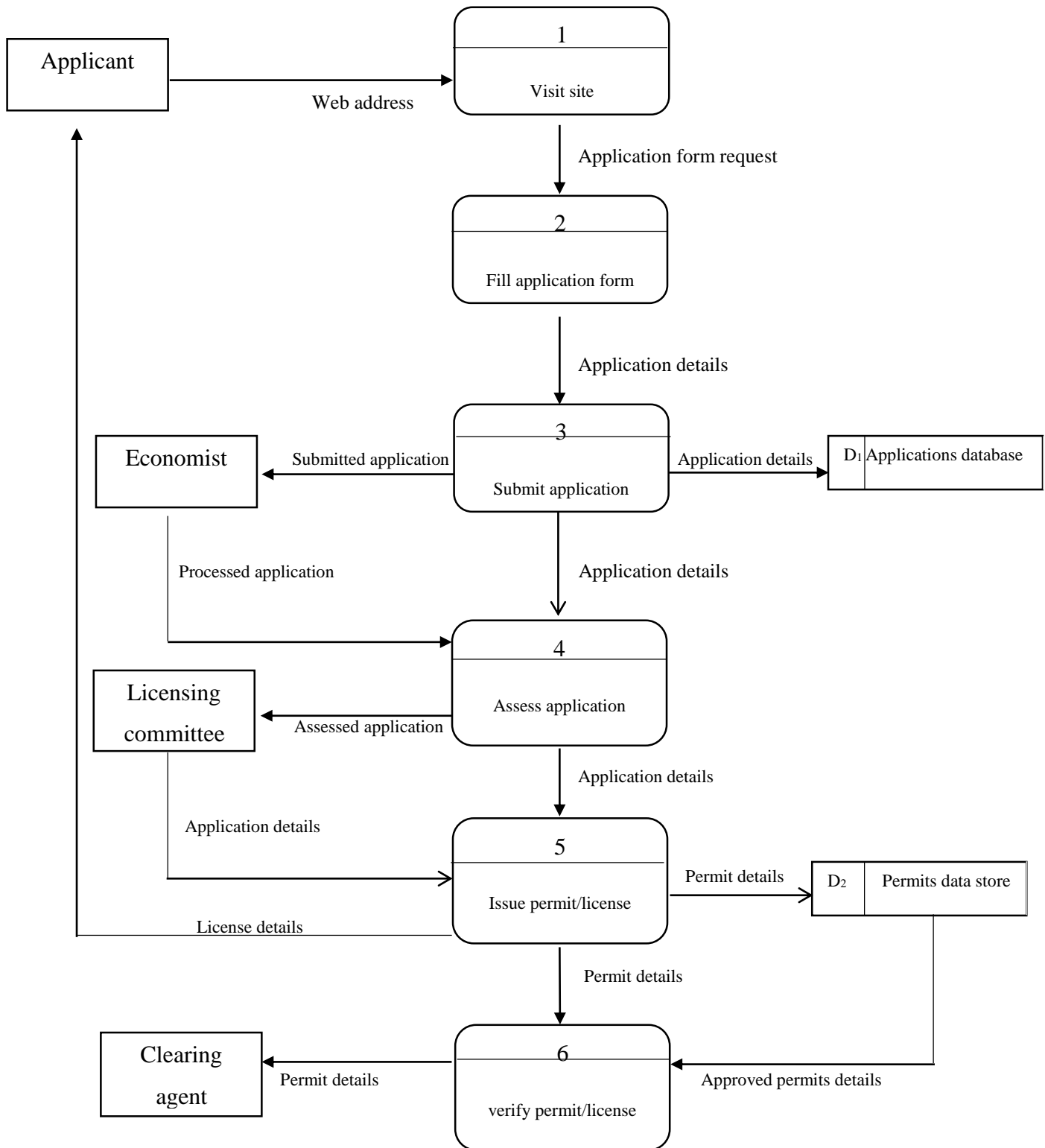
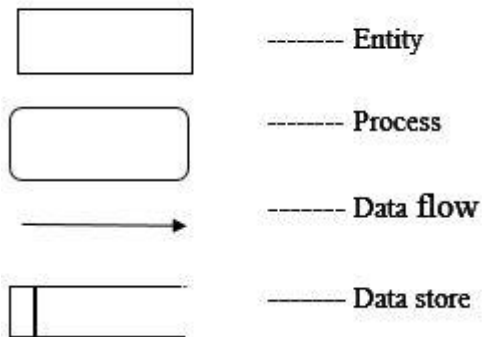### Fig 4.1: Context diagram for the new system
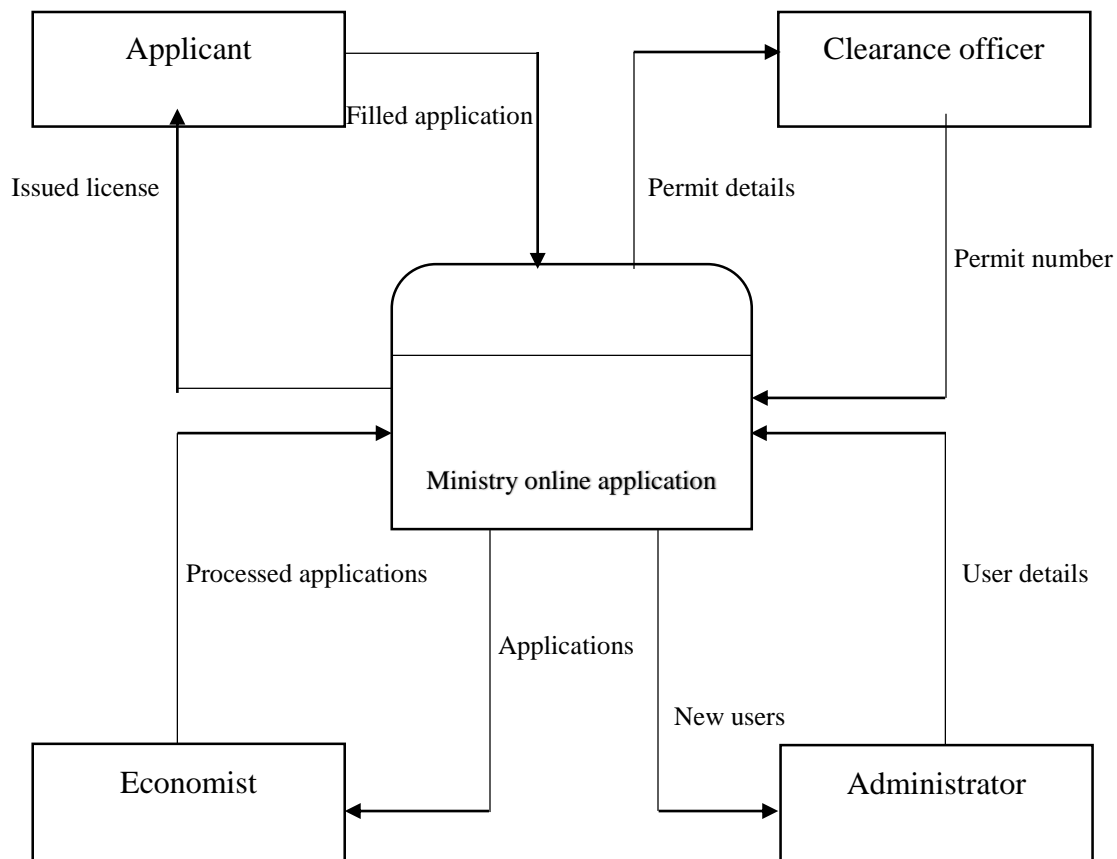
According to Gupta (2005) a dataflow diagram is can be viewed as a tool for representing how data flows within a system and also the work process carried out by a system. Data flow diagrams are used by analysts to understand the movement of data in and out of an organization so that they can have a better appreciation of how a system operates (Barnes et al, 2001).

Fig 4.2 Dataflow diagram for the proposed system

KEY


```
┌─────────────────┐
│                 │      ------- Entity
└─────────────────┘

╭─────────────────╮
│                 │      ------- Process
╰─────────────────╯

━━━━━━━━━━━━━━━▶         ------- Data flow

┌─┬───────────────┐
│ │               │      -------- Data store
└─┴───────────────┘
```

4.3 Architectural Design

Albin (2003) suggests that an architectural design's main emphasis is on splitting a system into its components and into the relationships that are present within these components in order to match the system requirements either none-functional or functional. Architectural design is drawn from the representations of the system requirements specifications and the analysis of the model (Qian et al, 2010). In simpler terms, this is the description of the physical and the logical composition of the system. This is when the software, hardware, procedures, data and people specifications that are involved are clearly stated at this point. In general, architectural design is a plan for the communication, software and hardware setup for a new system, to ensure global support and security.

A brief description of the specialized platform on which the new system is going to run is going to be highlighted. Thus, this is going to be shown through creating a network showing how the vital components of the system are going to be linked together. For the system to fully function and operate, internet connectivity is going to be required.

The architectural design of the new system embraces the following.

> ➢ Client machines: These are the machines assigned to staff offices which the users of the system will make use of for physical interaction and communication with the database server for data retrieval and other processing operations. Thus, this is going to be the location for the Windows designed graphical interface applications.

- ➢ Networking cables: the networking cables such as Ethernets will be mostly used for communication links between the computers and the internet.
- ➢ Printers: this will enable printing of any relevant material.
- ➢ Server: since this system is going to run on the Apache HTTP Server 2.0.64, hence all the information requirements of the organization will dwell on this server. To ensure data integrity and data consistency, all the essential processing of data will be done here.
- ➢ Internet: Internet connection is needed in order for the machines to be able to access the system since the system operates online.

Below is the architectural design of the Imports and Exports License/ Permits Administration System.

Fig 4.3 Imports and Exports License/ Permits Administration System Network Diagram
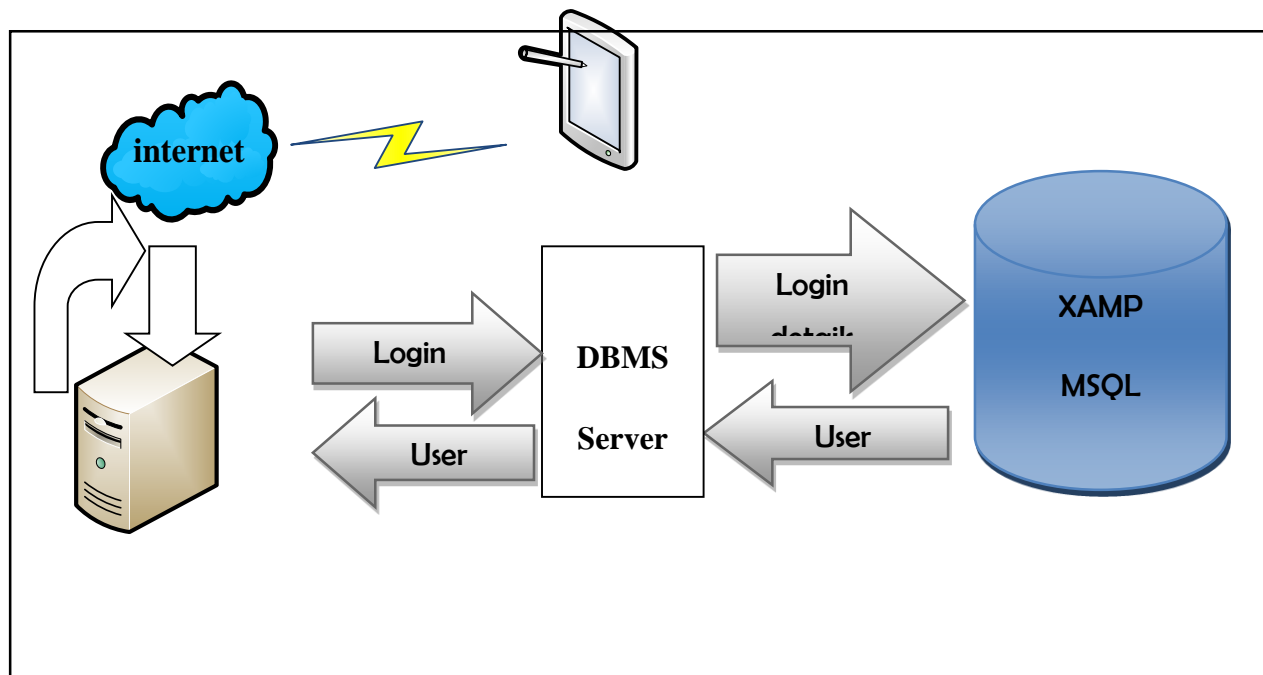
4.4 Physical design

Stair and Reynolds (2012) define physical design as the description of the hardware components that are necessary for the facilitation of the logical design. Shelly and Rosenblatt (2011) agree that physical design is a mapping representing the basic processes of a system. System developers make use of physical design so that they can successfully develop a new system (Gupta 2005). Thus, this is the new system's hardware and software representation. Communication between the hardware components requires software, this software includes operation system, anti-viruses and the networking software just to mention a few. The computers that will be used by the new system are all already connected to the ministry's Wi-Fi connection and accessing the system through the web will not be difficult at all. The system's database is also going to be online hosted and a backup server machine will be provided for the system's administrator to backup data for data consistency.

4.4.1 Hardware requirements

➢ 2x Computers with 2GB RAM size, dual-core processor with minimum speed of 1.7 GHz, 150GB HD

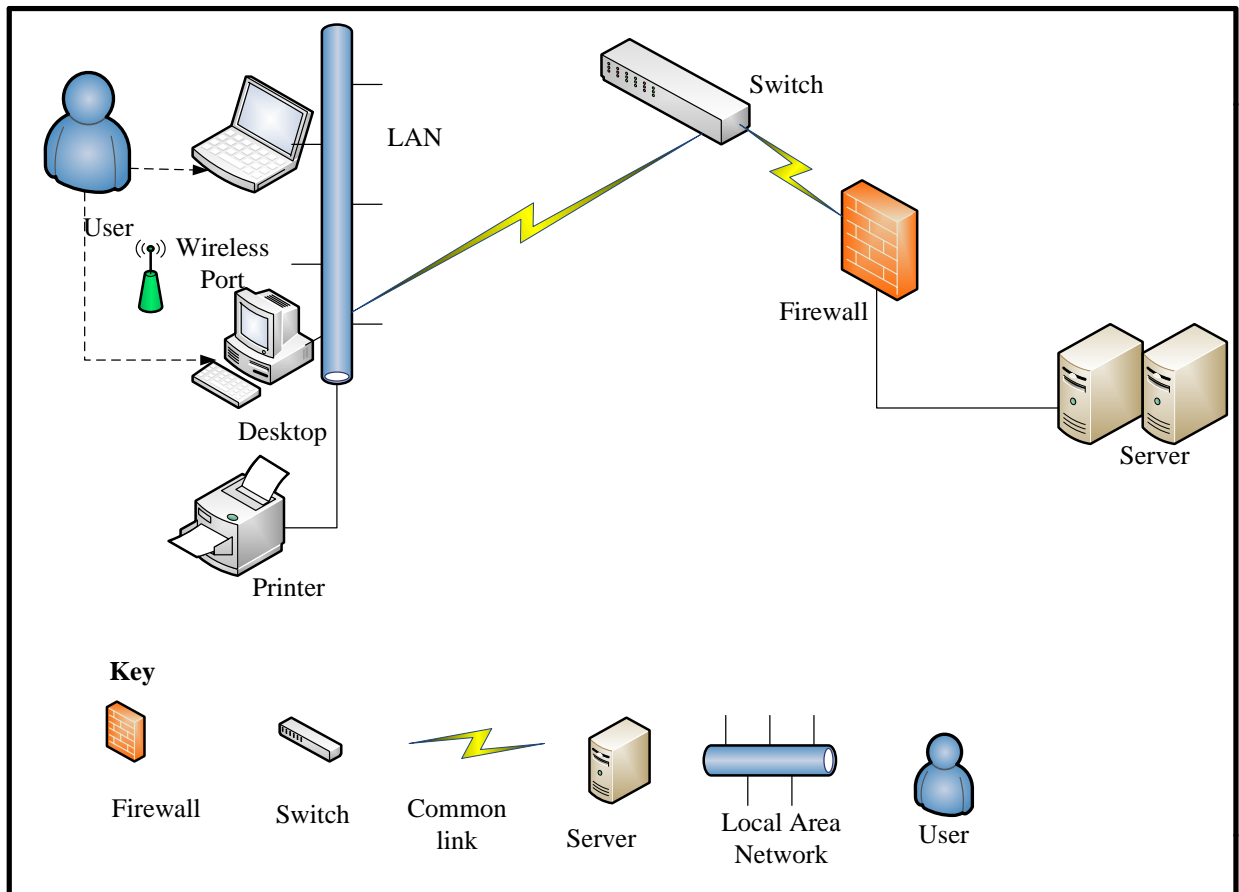### 4.4.2 Software requirements

➢ Windows 7/ 8/ 10 Operating Software
➢ Avira anti-virus software
➢ Google Chrome or Torch browser

Fig 4.4 Physical design of the proposed system.

4.5 Database design

Adams (2010) defines database design as an important aspect that describes and addresses how the database of a new proposed system is going to be designed. The structure of data thus the way in which the data is going to be stored and accessed is addressed in this section and a database management system (DBMS) is going to be used to ensure normalization, security and data item attributes.

4.5.1 Database architectural design

According to Howe (2001) the database architecture has got three distinct levels. There are objects that make up a data centric software framework that are shown by a database architecture and they feature the applications views data components (Muller 1999). The architecture design of the

database is the arrangement of the data in schemas and schemas can be referred to as the layers that are found inside a database. Howe (2001) names the three levels or layers of the database architecture as follows: physical layer, conceptual layer and application layer. This is diagrammatically represented as follows.

Fig 4.5 Architectural design of the database
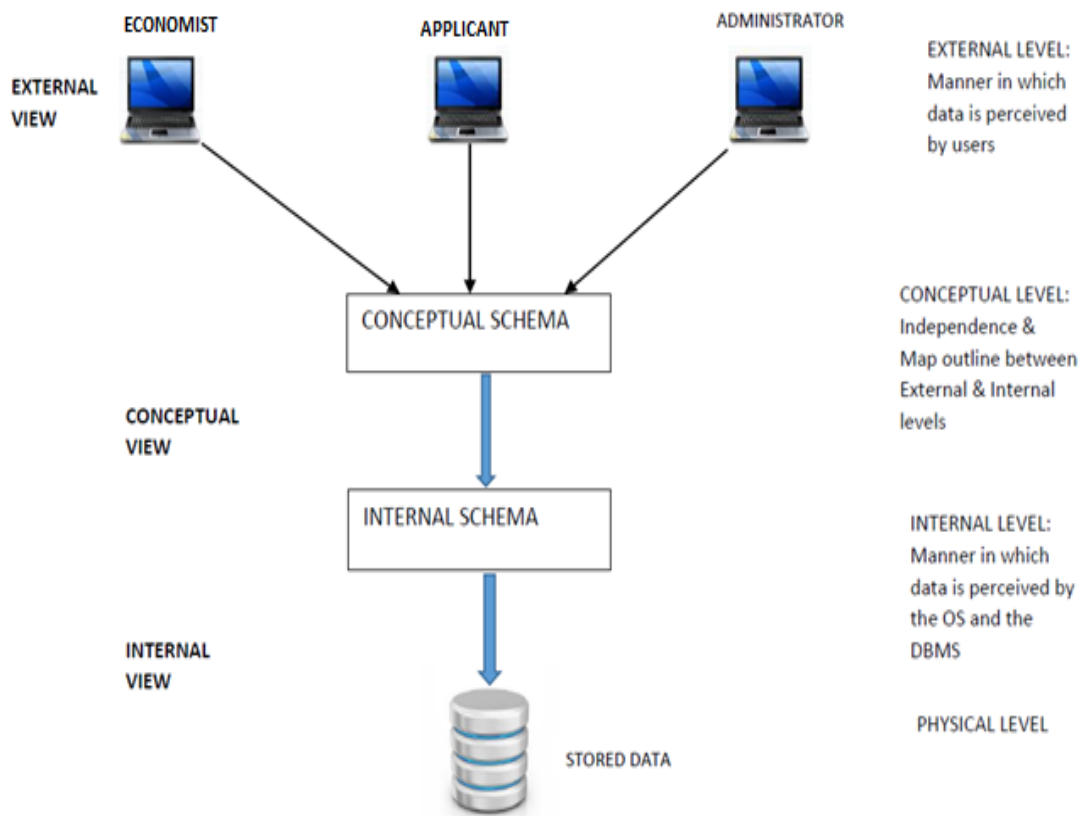
a) **External view**

According to Howe (2001) the external view represents the local presentation of the database that any database application might desire. Coronel and Morris (2014) agree that this level depicts the customers' point of view of the database through indexing information or data that is only relevant

to the client or customer. The system is usually related to in respect of how the end-user sees it physically, thus the external view also shows the graphical user interfaces (GUI) that the end user will make use of in accessing information within a database. In the external view, the user will only access the data or information which is only relevant to him/her thus this view is customized for each user. This maintains data security and integrity. An example in relation to the Imports and Exports Permits/Licenses Administration System will simplify this, a client will only view the records that he or she has applied while a system administrator can make recommendations pertaining the data stored in the database.

b) Conceptual view

Coronel and Morris (2014) state that the conceptual level concentrates more on the entities, data types, relationships, client limitations and operations in relation to the information that is stored in the database. Data that an organization is most likely going to be concerned with and the data that a database is going to store is described by the conceptual view (Howe 2001). This is the view in which the relationships among entities are addressed as they are viewed in the database also paying equal attention to the way in which these entities coexist or relate to each other within the database.

c) Internal view

Howe (2001) states that the internal view shows how data that has been stored in a database is diffused into that database at the level of storage. Thus, this view addresses how the machine interacts with data. Coronel and Morris (2014) states that the internal level is clearly distinct from other levels and has got its own mechanism that defines the actual physical structure of storage of the database. There are different methods that are used in the storage of records in terms of the storage contents and these defined in the internal level.

4.5.2 Logical design

Logical design of an information system is defined by Stair and Reynolds (2012) as a functional requirements description of an information system. The design of the entity relationship diagram for the proposed system was successfully done with the aid of creating a data model for the proposed system. Taking into consideration that the new system is a better modified version and simulation of the existing system, coming up with the entity relationship diagrams for the existing

system was not a difficult task. Mylopoulos and Brodie (1989) agree that entity relationship diagrams (ERD) are very useful when one is trying to bring together different data views. When constructing an ERD, the constructor will have to first identify the vital things (entitled entities) pertaining the information that will be stored in the database and also how these entities relate to each other (entitled relationships) since this is vital for the purposes of classification (Gelinas & Dull 2008). Below are the diagrams showing the logical diagrams for the new system.

4.5.3 Entity Relationship Diagram

Conger (1994) defines an entity relationship diagram as the graphical visual representation of entities together with their relationships, useful in computing where the relationship between data is to be shown during the development of an information system. The entities and relationships for the MAMID Imports and Exports Administration System have to be identified so that the data can be clearly ad accurately represented in the database. Below is the entity diagram for the new system where a pictorial view of all the entities is shown clearly showing the relationships among these entities.

Table 4.5 representation of the database of the proposed system

Applicant	Applicant name	This is the actual name of the administrator.	**Text (30)**
	Username	Unique number given to each government employee.	**Number.**
	Email address	A character string with a minimum of at least 8 characters and at least one digit.	**Text (30)**
Economist	Employee number	Unique number given to each government employee.	**Number.**
	Employee name	The name of the staff member using the system.	**Text (30)**
	Password.	A character string with a minimum of at least 8 characters and at least one digit	**Text (30)**
	Access level.	User's privileges in use of the system.	**Number.**
Application	Application number	Unique number generated for each application.	**Number.**
	Sender	The name of the applicant who sent the application.	**Text (30)**

	Date	The date and time on which the applications were sent.	**String (30)**
	type.	The category of the application.	**String (30).**
Permit	Permit number	Unique number given to each government employee.	**Number.**
	Applicant name	The name of the individual account that sent the application	**Text (30)**
	Type	The category of the application	**Text (30)**
	Date and time	The date and time on which the applications were sent.	**String (30)**
Notice	Notice number	Unique number generated for each notice generated	**Number.**
	Poster	The name of the staff member who posted the notice	**Text (30)**
	Date	Date and time for which the notice was posted	**Text (30)**
	Type	The type of the notice.	**String (30)**

Fig 4.7: Enhanced Entity Relational Diagram for the proposed system
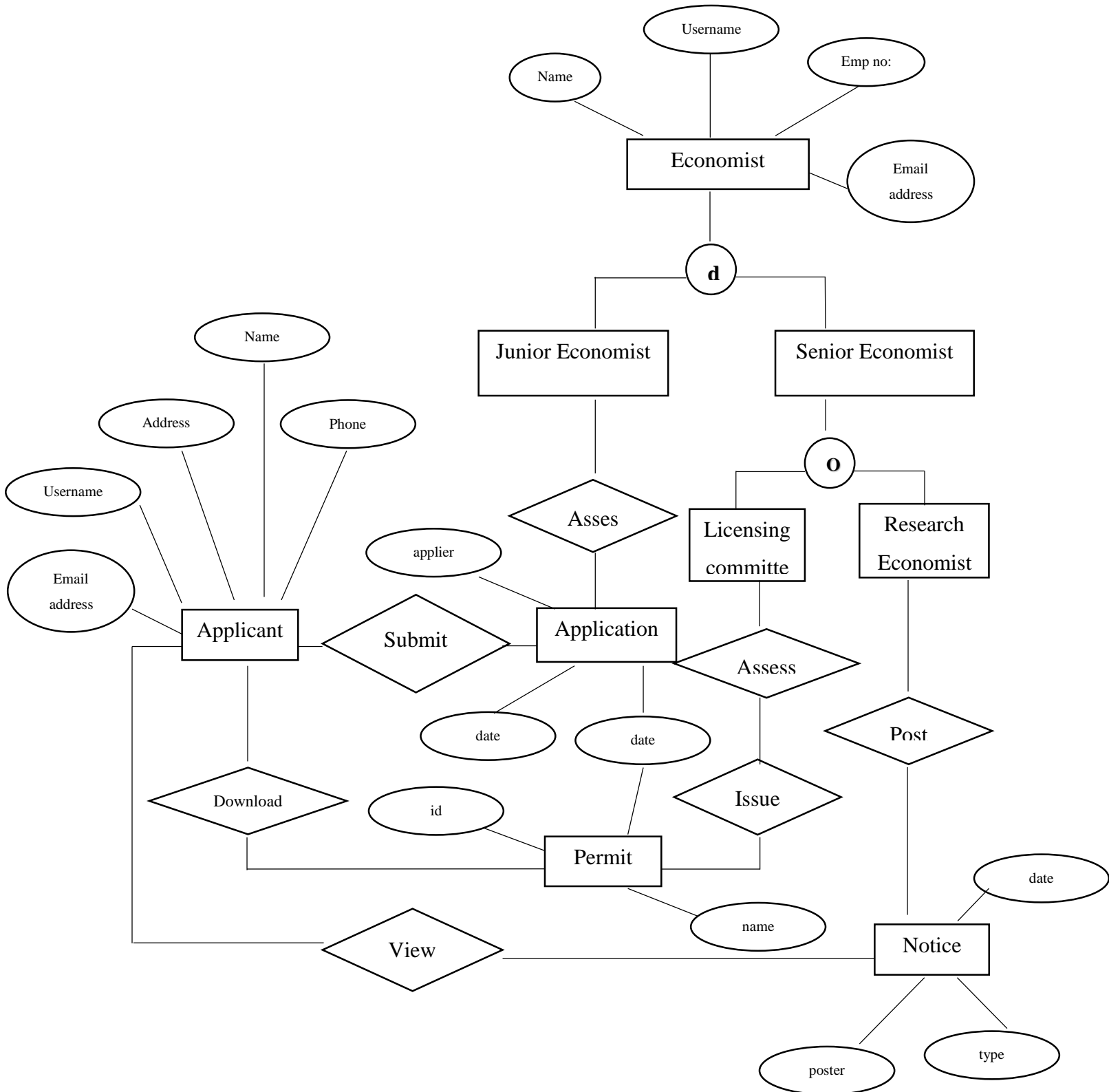
4.6 Program Design

Ulrich et al (2000) define program design as the design which includes functions, classes and modules of a new system that are all interfaced to the clients through the graphical user interface to provide the clients with the ability to perform execution of tasks. All components of the program design that is the package, sequence, activity and the interface must be clearly defined so that the system developer can develop a system that is user friendly and equipped with all the necessary modules that were clearly requested by the client during the user requirements gathering phase.

4.6.1 Package Diagram

Conger (1994) defines a package diagram as a unique graphical or diagrammatical representation of a system that highlights the composition of system modules and how they are connected. The different classes that compose the MAMID Imports and Exports Permits/Licenses Administration System are grouped into distinct bundles to reduce the complexity of the system whilst giving one a simple but yet detailed description of the system. The MAMID Imports and Exports Permits/Licenses Administration System provides and online platform for clients to apply for imports and exports permits/licenses using the internet. The applicants will input the necessary details for them to be granted a permit/license and the data will be recorded in the electronic database. The applicants (if granted) will receive their permits/licenses online on their user account without visiting the ministry's offices.

Fig 4.8: Package diagram
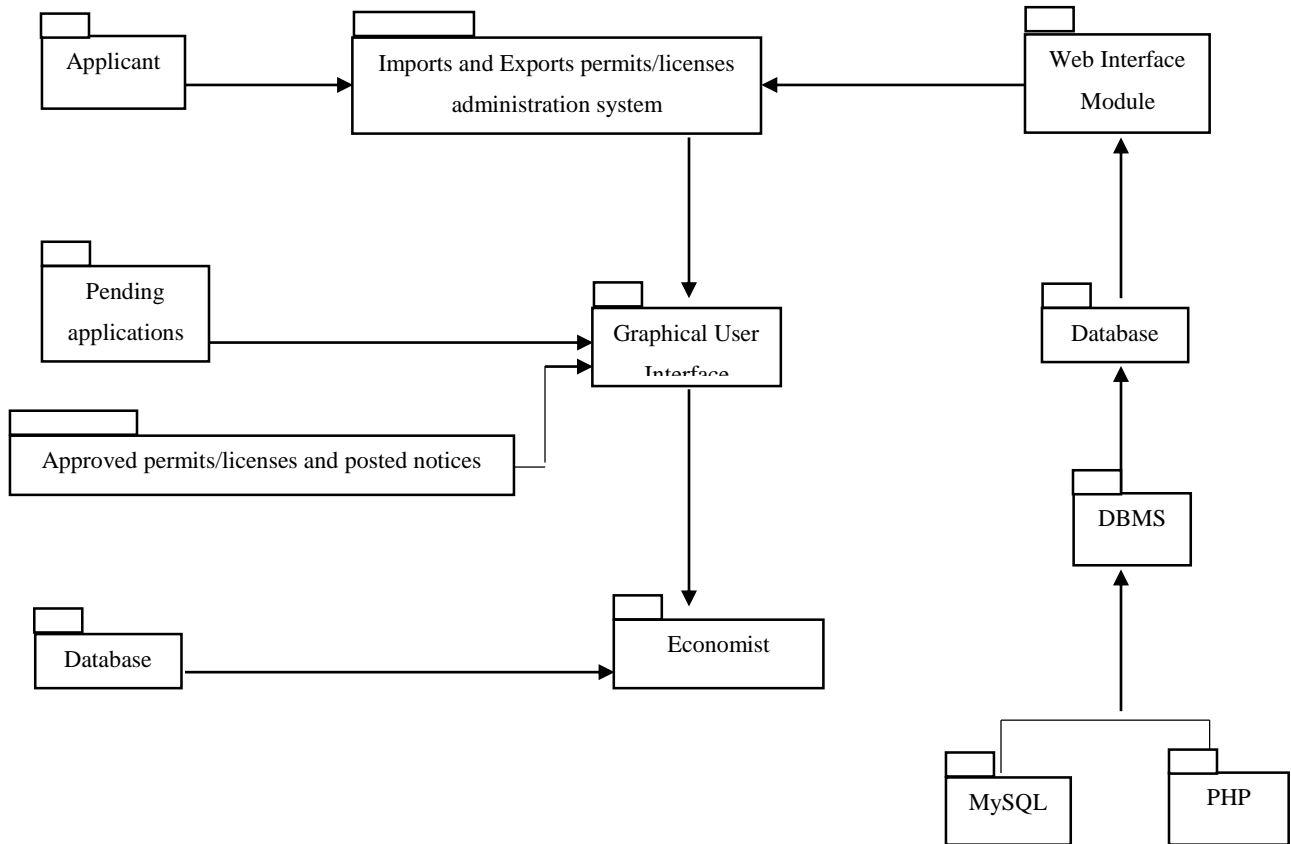
4.6.2 Class Diagram

Conger (1994) defines a class diagram as a graphical representation of the system clearly showing the connections between classes and the properties of these classes. Classes are connected in two ways which are inheritance and association. Inheritance can also be referred to as speculation and is a description of the relationships between the super class and a subclass. There are instances in every class and these instances are connected through relationships and these relationships are referred to as associations.

Fig 4.9: Class diagram
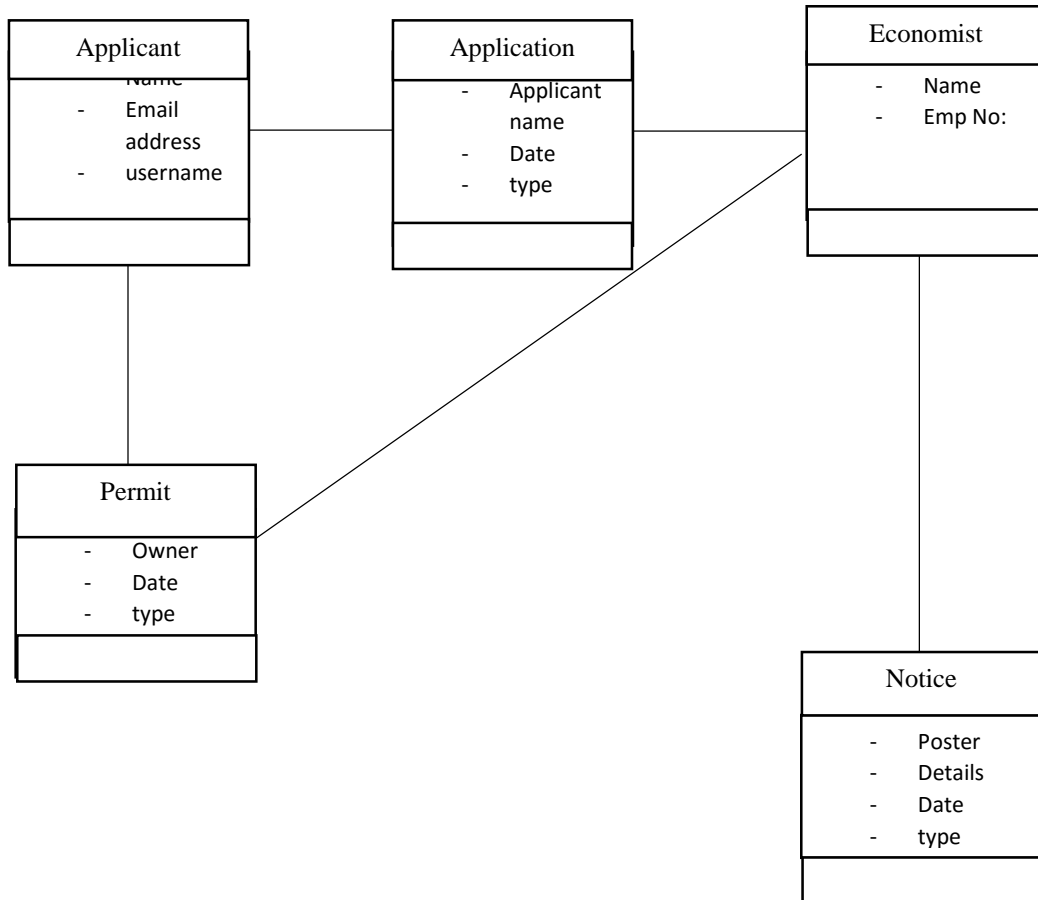
4.6.3 Sequence Diagram

A sequence diagram is more of an x-ray of the system that shows rationality of the internal composition of a system visually so that a comprehensive report can be drawn about the logic under validation, the design and also for the purposes of analysis. In short, sequence diagrams can be used when one wants to display the usage scenarios, the services and methods logic.

Fig 4.10: Sequence diagram
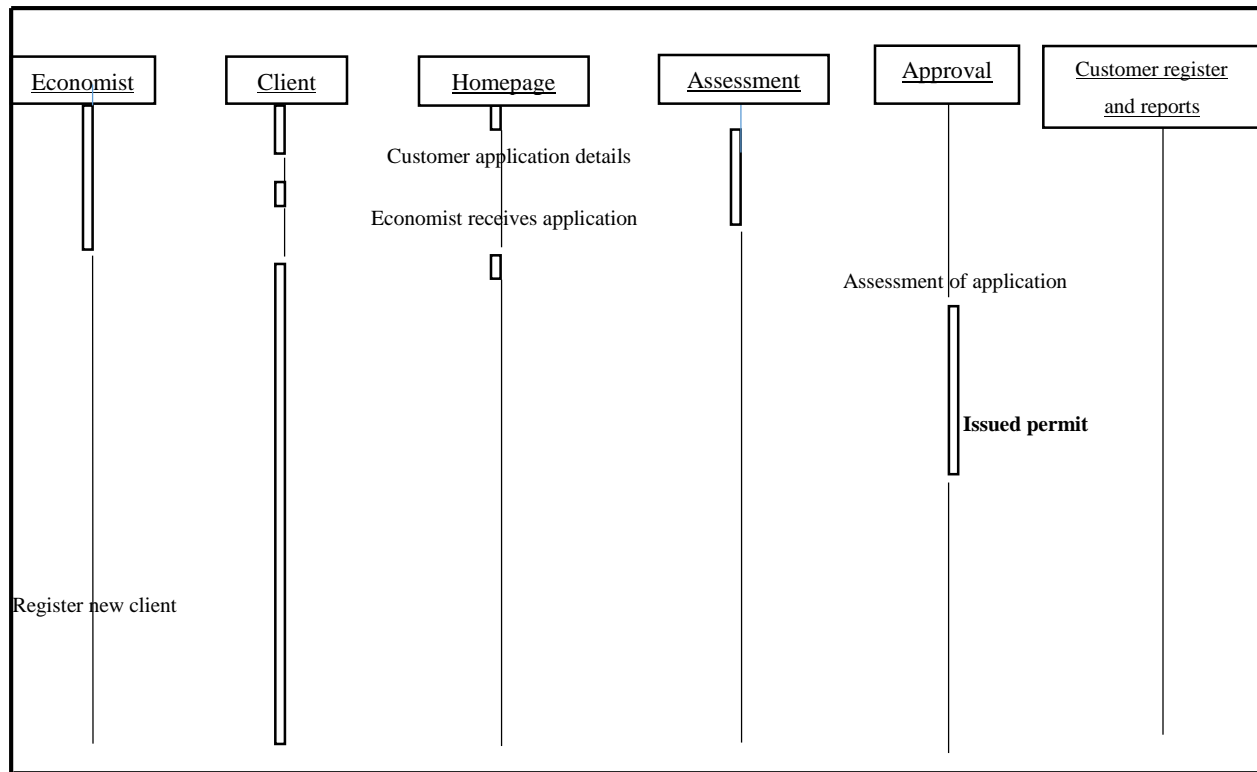
4.7 Interface design

Galitz (2007) suggests that several practices have been put into place pertaining the interface design. The interface design involves providing an early view of what the system will look like, and how the users will interact with the system. The everyday use of computers is largely dependent on the how the interface was designed in the first place (Stone et al 2005). Users of the system generally require a graphical user interface that is easy to operate. Hence this will focus more on the menus together with the data entry forms for the system giving a clear outline of how the system will be structured in terms of the format of the input and the output.

The developer set aside a considerable amount of time designing the interface for the users of the system. A user friendly graphical user interface for the system was designed to allow economists and the clients to easily navigate around the system.

4.7.1 Input design

The most important aspect in the design phase is probably the input design (Teixeira & Iradley 2003). Data is going to be fed into the system for it to be processed and an output will be given in return. The new framework will contain info pages that will permit the clients to enter all the important details of interest to utilize the system. The input design should be perfected so as to reduce or eliminate the human input errors (Rajaraman 2006). The input pages will have a return option where the users can either choose to return to the homepage of the system or completely logout of the system

a) **Account registration form**

Before the user can gain access and navigate within the system the user must first create an account, thus the registration process. In order for the client to successfully complete the registration process, all the registration required fields must be filled and submitted.

Fig 4.7.1 Account registration form

First Name	Last name
Email address	Username
password	Confirm password
Contact phone number	Physical address

Business or persona

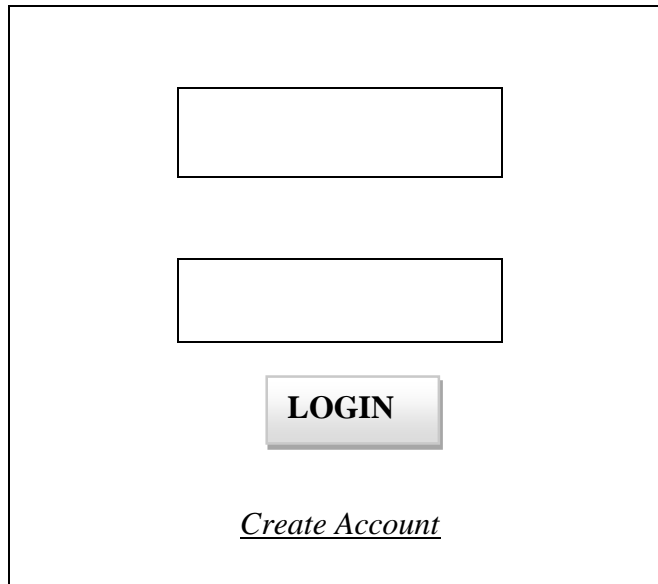State any previous Criminal Record if there is any

CANCEL   SUBMIT

b) **Login form**

In order to gain access into the Imports and Exports License/ Permits Administration System, the user must login with a login name and password they would have successfully used to

create an account. The provided login details will inform the system if the user is a staff member, management or an administrator and will give the user the appropriate functionality.

Fig 4.7.2 Login Form

```
┌─────────────────────────────────────┐
│                                     │
│      ┌───────────────────────┐      │
│      │                       │      │
│      │                       │      │
│      └───────────────────────┘      │
│                                     │
│      ┌───────────────────────┐      │
│      │                       │      │
│      └───────────────────────┘      │
│         ┌──────────────┐            │
│         │   LOGIN      │            │
│         └──────────────┘            │
│                                     │
│           Create Account            │
│                                     │
└─────────────────────────────────────┘
```

c) **Application form**

This is the form that the applicants will make use of to apply for the permits/licenses. The details that are filled onto this form are to be submitted after all the necessary text fields have been filled.

Fig 4.7.3 Application form

d) Search License/Permit form

This is the form where the clearing agents at the different border posts will make use of. Upon receiving a license/permit number from the different entities that would have been granted these permits, the agents can use this form to verify and validate the details of the applicants.

Fig 4.7.4 Search record form

Enter permit I.D   [   ]   Search

4.7.2 Output design

Whenever there is information that is fed into a system, output is also required for feedback and record keeping from that system in order to not violate the principles of communication (Joanne 2006). This simply means that the output design will facilitate an interface that the users will make use of in order to successfully communicate with the system since this is the platform that system will use for communication with the users. The output will be provided to the users and the users will be required in some cases to print out this output and this will be done by the printer.

a) MAMID IEAS Main Report form

This output design form is the point where all the major reports from the administrator's side are going to be generated that can be used by the system administrator or the management. This is the home panel of the administrator thus this is the first page that the administrator is going to see after successfully login.

Fig 4.7.2.1 Main report form
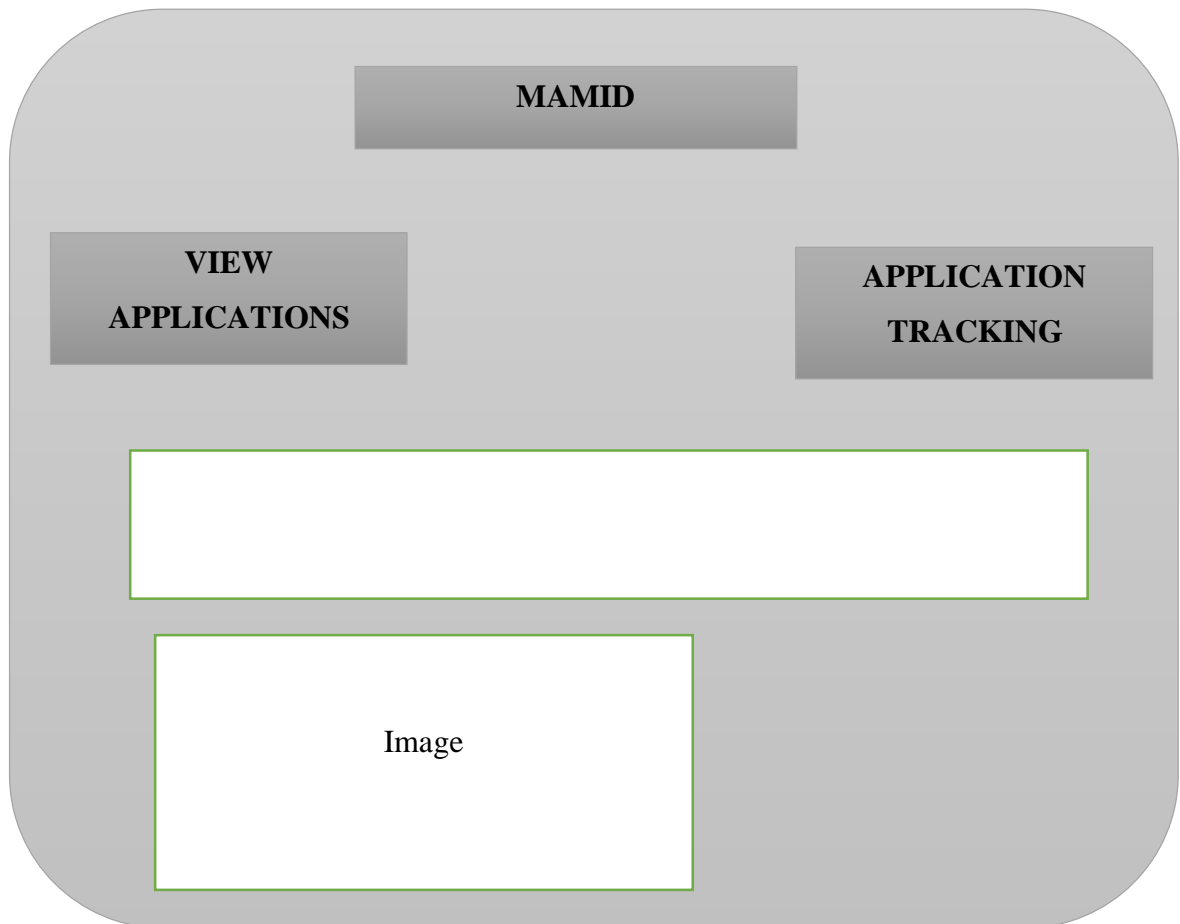
b) Application Approval Form

The applications submitted by the applicants will be viewed in this format by the economists who in turn are going to either accept or reject this application. This form will

enable only the economists to either approve or reject the application depending on weather they meet the required specifications or not.

Fig 4.7.2.2 View applications form

c) **License or permit document**

The issued license/permit is going to be accessed by the applicants on their online accounts where they can be printed from for use. The users can also choose not to print these permits but rather copy the permit number and provide the permit number on the border post where there is already a working system that is used for licenses and permits validation through querying the database of uploaded approved licenses where details will be retrieved.

Fig 4.7.2.3 Issued permit
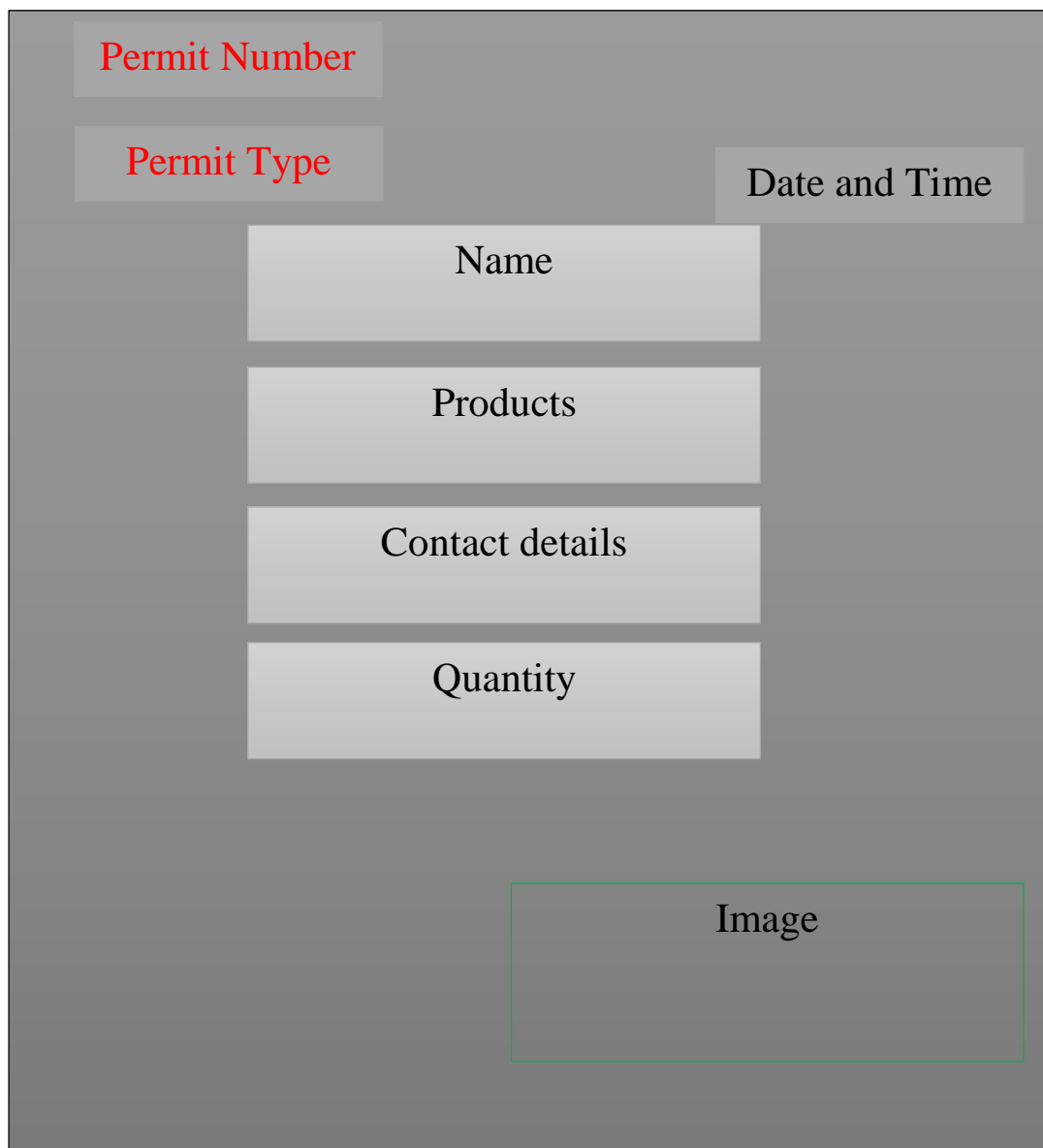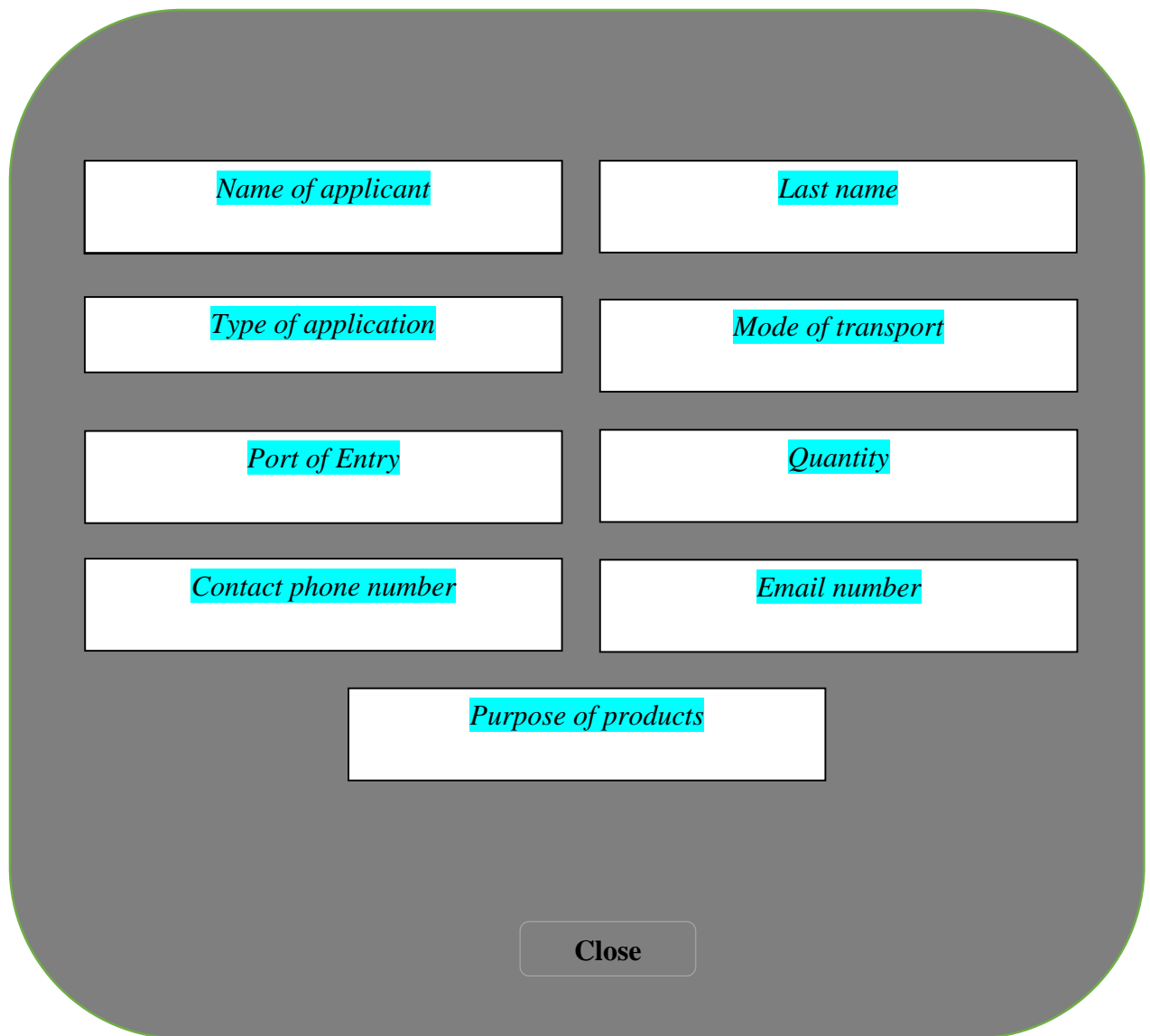
d) Retrieved database results form

This form will retrieve the details of a permit/license from the permits database. That is, the owner details of the permit holder, whether it has been paid for or not, and the details of the license itself. These results or form will be only accessed through making use of the search license/permit input form.

Fig 4.7.2.4 Records output form

4.8 Security Design

The MAMID Imports and Exports Permits/License Administration System will need to be protected from all computer security risks. A security danger is any occasion or activity that could bring about lost or harm to equipment, software, information, data, or the operations of a system. Pierce (1992) defines security design as a process found within hardware and software development that aims on freeing the systems from vulnerability to threats and attacks through various measures which include testing, database backup, authentication and other various programming aspects. Security design ensures that only those with the appropriate access details will access the system. The developer of the MAMID Imports and Exports Administration System has put in place programming algorithms that make use of access control methods such as views, access levels, usernames and passwords.

The Ministry of Agriculture's internal computers are all networked and assigned static IP addresses for security reasons. The new system will take advantage of this feature for security where the router will segment alongside the hub where access records are verified through matching the computer's IP address against that of those that are allowed to visit the administrator's login index and the economists' as well.

4.8.1 Physical security

Physical risks include fires, natural disasters, burglary, theft, vandalism, and terrorism. To secure the system countermeasures such as regular backups, securing the server room with high security locks and steel doors, using biometrics systems and amongst others will be employed. Physical security is frequently disregarded (and its significance underestimated) for more specialized and sensational issues, for example, hacking, infections or viruses, Trojans, and spyware. Be that as it may, breaks of physical security can be completed with next to zero specialized learning with respect to an assailant. Besides, mishaps and natural disasters are a piece of ordinary life, and in the long run, are inescapable.

There are three principle segments to physical security that will be put in place by the Ministry of Agriculture to protect the Imports and Exports Permits/Licenses Administration System. To begin with, such measures can incorporate various locks, fencing, dividers, flame resistant safes, and

water sprinklers. Second, reconnaissance and notifying systems can be set up, for example, lighting, heat sensors, smoke detectors, intrusion detection systems, cautions, and cameras. Third, strategies can be executed to catch assailants (ideally before any harm has been done) and to recoup rapidly from accidents, flames, or common fiascos.

4.8.2 Network security

System Security involves calling into action both the software and physical safeguard measures to shield the basic systems networking foundation from unapproved access, abuse, breakdown, modifications, demolition, or ill-advised divulge, in this manner operating environment for computers, clients and systems to play out their allowed basic capacities inside a safe domain (Pierce 1992). The evaluating procedure for the security of a network requires a check back on authorization measures to identify how well they have adjusted to the security arrangement. Auditing or evaluation promotes nonstop change by obliging organisations to consider the usage of their approach on a continuous basis. This the opportunity to organisations to conform their approach and authorization strategies in territories of advancing need.

4.8.3 Operational security

This is a procedure of distinguishing basic data and consequently examining cordial activities specialist to network improvement and permits/licenses issuing and different exercises to: a. recognize those activities that can be seen by different intelligence systems; b. decide markers that threatening intelligent systems may acquire that could be deciphered or sorted out to determine basic data so as to be helpful to other different systems; and c. chose and execute measures that take out or decrease to a worthy level the vulnerabilities of neighborly activities to foe misuse (Langer 2013).

4.9 Conclusion

The new system was viewed in a more practical way by going through the main aspects in the phases of its design and development. Different data representation tools which include dataflow diagrams and entity relationship diagrams were used to show how effective and efficient the system is going to be. The system has been successfully designed and developed, hence the need to implement the system into the working environment which is the Ministry of Agriculture.

CHAPTER 5: IMPLEMENTATION PHASE

5.1 Introduction

After successfully completing the design phase, there is need for the system to be tested for errors and bugs through validation and verification. Errors identified are to be rectified before the system is fully implemented. There is also need for user training so that the system can be fully utilized to the maximum capacity. This is the final phase of system development where the system will be introduced to the users for it to satisfy the objectives that were stated in the first chapter of problem identification. Stair and Reynolds (2013) state that implementation is the procedure by which technical, work force, and issues of administration are attended to. It also includes the audit of hardware and programming or software equipment, physical installation, documentation of procedures, and the preparation of the workforce that are going to use the system through training.

5.2 Coding

Ling and Xing (2004) state that the process of coding involves converting a plane text into a byte or syntax in which a fixed medium or channel can be used to transmit this code. Thus, coding is the process of converting the system's design phase into a series of organized code syntaxes that can be executed as a package to produce a working system and this involves the creation of a pseudo code. Agarwal et al (2010) define a pseudo code as false but more of an imitation of the instructions that are created in a programming code to simulate the real programming code and this is often referred to as the Structured-English or program-design-language. Pseudo code has the advantage of simplicity hence it is easier to understand and accommodates the use of any programming language of choice (Ling and Xing, 2004).

5.2.1 Pseudo code

Admin Login

Enter username and password

   If (username and password correct)

{

*   Go to admin home page*

}

Else

*   {*

*   Incorrect login details, Try Again*

*   }*

Connecting to database

Check if connection has been made

*   If not yet set then*

*   Set connection*

*   Else*
*   Ignore*

Updating data in the database

Get the key fields
Check if record does exist

If not then

    Report error

Else

    Validate all the information

If some of the input is invalid

    Report error

Else

    Using the established connection, save the record.

Searching and editing a record

Get the record ID

    Using the established connection, retrieve data

    If data has not been found then

      Report error

    Else

   *Display data*

      Allow user to edit

5.3 Testing

Fujita and Zualkernan (2008) quality assurance, estimation of reliability, verification and validation are all achieved or guaranteed through system testing. Ould and Unwin (1986) agree

that the vital areas of concern in system testing are the specifications of that system in subject hence the testing process should be equated to the real specifications of the system. Verification and validation is done in testing in order to ensure that the developed system is going to meet the required standards and specifications as per requested by the user. This also ensures that all the defects and the negative deviations are minimized as possible so that the system can be smoothly implemented. Testing is represented by the following diagram where this process is broken down into different steps.

Figure 5.1 Stages in Testing
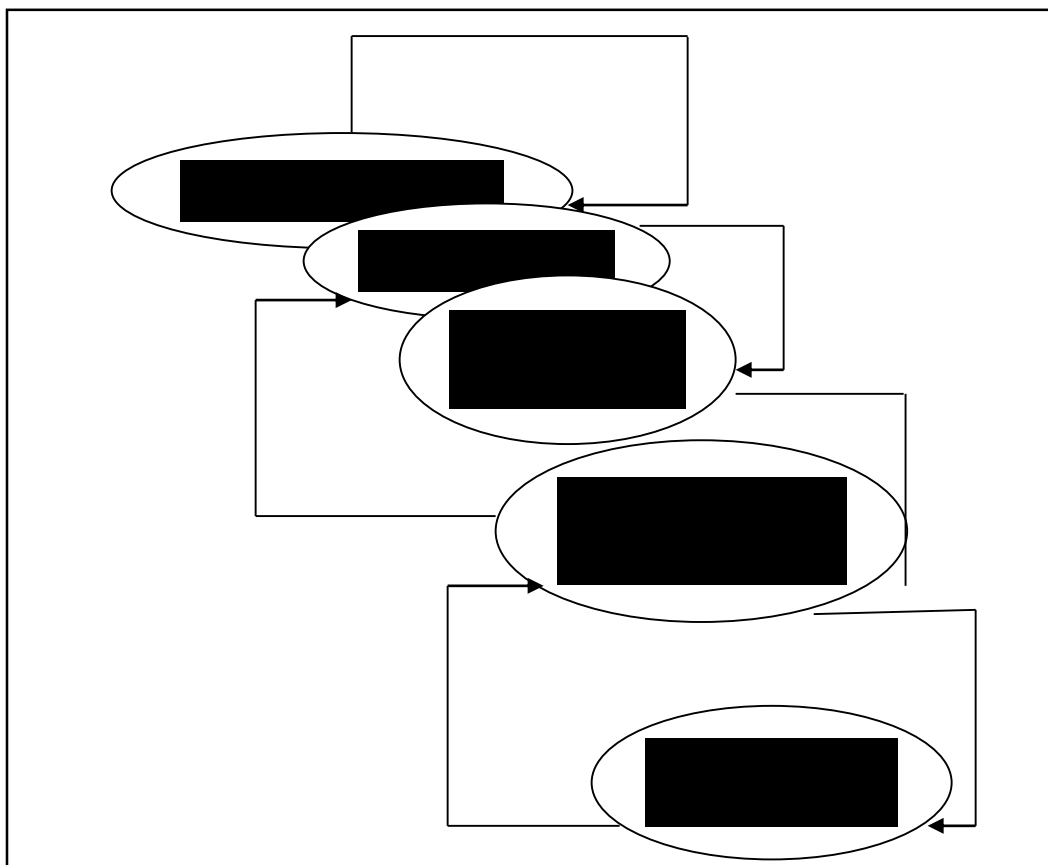
5.3.1 Unit Testing

Software is composed of small bits and these bits can be tested and tried and this is what we refer to as unit testing (Whitten, 2003). Thus, unit testing focuses more on the verification and validation of the smallest components of a software module. The unit testing is masterminded in a white-box

manner, and certain methods can lead into comparable various sections. The developer of this system successfully managed to carry out unit testing through assessing the client permit/license application unit. The specialist attempted to find out if the application unit created an error message after an application submission throughout to the permit issuing process. The message response was not an error output but rather gave along these lines it was fit to be associated with different modules.

5.3.2 Module Testing

This strategy consolidates related software capacities or units and are examined to verify whether the different between dependent units function admirably hand in hand as this is pivotal to the system.

5.3.3 Integration Testing

Testing conducted in which software elements, hardware elements, or both are combined and tested until the entire application has been integrated. The purpose of integration testing is to ensure that design objectives are met and ensures that the software, as a complete entity, complies with operational requirements.

that this type of testing as a way of testing each of the modules of a system can likewise be viewed as a precise strategy for developing the system while in the process conducting tests to reveal bungles or missteps connected with interfacing. During the initial stage of integration testing, it is foreseen that a tried out and finished request of unit tests is successfully completed. Using both differentiating box testing strategies, the developer checks for units that team up when they are combined into an extensive code base. The MAMID Imports and Exports Permits/Licenses Administration System developer did unit testing and attempted through testing unit fragment to figure out if the interfaces functioned of course when they were connected together.

5.3.4 System Testing

This technique assesses the execution of the whole system by consolidating the different sub-systems. Productivity of the system is measured and any mistakes that generally would trade off its execution are distinguished and altered at this stage. It includes two sorts of tests:

a) **Black box Testing**

This approach includes the usage of tests when the inside structures of the system or its source code are obscure to the analyzer (Saleh, 2009). It includes the analysis of the different segments of the system conduction for an assessment in relation to its outputs, functionalities and inputs pretty much as the client requirements indicates them (Limaye, 2009). This is a strategy for programming testing where inputs are controlled and yields are seen to check whether the subsequent outputs are the ones proposed.

b) **White box Testing**

It includes the conduction of tests when there is earlier information of the source code of the system, consequently the analyzer knows about the system's inside structures (Saleh, 2009). This way to deal with system testing tests the structures that are internal in a framework (Limaye, 2009). This is a strategy for programming testing that goes about as a glass-box test to assess the structure that is found within a system and check for blunders or problems that the black box test would have not identified earlier.

5.3.5 Acceptance Testing

Testing conducted to determine whether or not the e-farmer system satisfies acceptance criteria and to enable the customer to determine whether or not to accept the system. Acceptance testing will ensure that customer requirements' objectives are met and that all components are correctly included in a customer package. This technique at last decides the achievement or disappointment of the system since this is the stage where the system's future end to the client's view is classified in return the clients give their own perspectives pertaining that system all in all. It includes two sorts of tests:

a) **Alpha Testing**

This is an interior test of the new framework done by the system designers inside the development environment or association (Agarwal et al, 2010). This sort of acceptance test is carried out at the site of development (Craig and Jaskiel, 2002). The system is assessed through the use of information from the old system to evaluate how effective this new system is especially in error handling henceforth mistakes are identified and altered through.

This is a test conducted externally to some loyal clients (Agarwal et al, 2010). The site of the client is where this type of testing occurs (Craig and Jaskiel, 2002). The organisation for which the system has been designed for is given this system to permit the organisation's work force to pick up a clearer ordeal of this new system. This in turn permits them to check for imperfections and other outer mistakes or absence of usefulness with a goal to give these perceptions as criticism to the identified setbacks for correction.

System security testing.

After the completion of the interfaces that is after successfully carrying out integration testing then there is need for security testing. Whitten (1995) refers system security as one of the most essential aspect of system development. System security is crucial in determining the success or failure of a software. An insecure system is likely to fail and will be around for a short period of time whilst a better replacement is being sort after, on the other hand, a secure that serves its intended purpose is likely to excel and be around for a longer period of time. Thus, a system to be successful it should be properly equipped with all the necessary security mechanisms to guard against unauthorized access. The MAMID Imports and Exports permits/licenses administration system was developed using algorithms that enforce user authentication and use of access levels. The system will also be protected through the use of antiviruses and firewalls amongst other protection mechanisms which include the physical aspects such as burglar bars and the ministry's security guards. As a method of testing the security of the system, the system developer attempted to access protected object in the system without making use of the required access inputs and the system gave a feedback notifying the user to login first in order to make use of the system.

Different testing stages where conducted and positive results were yielded for this system

Screen shots of different test cases.

Invalid login

The below screen shot validates and authenticates a user before allowing the use of the system. Thus the user has got to have to appropriate access rights in order to access the system thus the correct username and password. Below the user entered incorrect login credentials hence the system revoked authority to this user.

Fig 5.2: Invalid login

Successful login

In order to access the main modules of the system a user has to be logged in and after successful login the following interface will appear for the economists where they will have different actions to apply to the received applications.

Fig 5.3: Login successful

Fill in missing fields

In order to successfully submit an application, the applicant has to fill in all the required fields otherwise the system will not submit the application for processing but rather prompt and assist the user to fill in a blank field step by step as shown by the screen shot below.

Fig 5.4 Fill in the required fields

Track application (Invalid email address)

In order for applicants to track their applications they can make use of the track application module without having to login where they can just simply enter their email address and the status of their latest application will be retrieved. There are built in algorithms that will validate whether if the entered email address that has been entered has the correct format of an email address or not and if not, the user will be asked to correct this error.

Fig 5.5 Track application
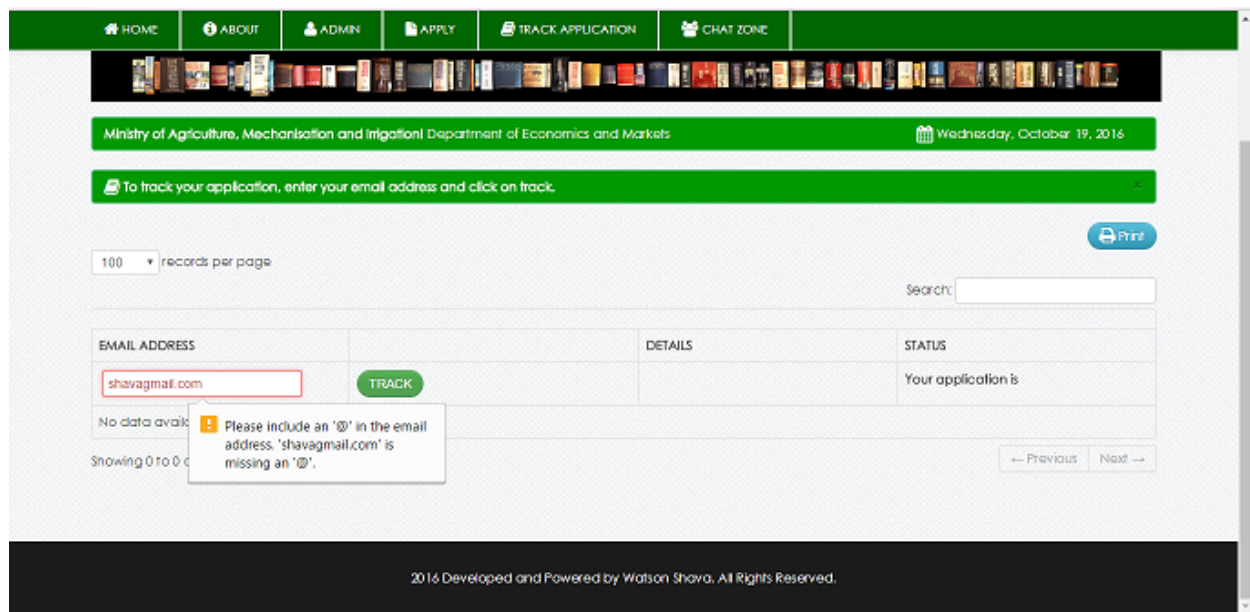
5.4 Installation

Wiley et al (2010) defines installation as the process of establishing a developed system into an organization for it to serve its intended purpose. Thus, the users of the old manual system at the Ministry of the Agriculture will be required to make use of the new computerized system. Establishment of new systems in numerous organisations is typically done by a different group of work force who bear the power to perform corrections to the production environment (Rozanski and Woods, 2012). Installation is most essentially the strategy of having the binaries of a system or incorporating a source as well as administration of this recently fused system with other consolidated system and all their conditions (Sommerville, 1996). This stage must be done after the whole system has been produced. Installation fuses the accompanying strategies: Training of the users and the changeover of the system.

5.4.1 User Training

This procedure is centered around the introduction part of the new system so as to allow the familiarization of it by the endorser. Laplante et al (1999) define training as a process of showing the clients of system how to make use of the modules and programs of the system that are relevant

to them. There are numerous ways in which this should be possible. Training is also another vital aspect of system development that determines the success of a project. Whenever there is installation of a new system, users should be trained so that the day to day activities of the organization will not be disturbed but rather improved. On account of this project, subsequent to the organisation for which the system is planned significant, the new system can just be exhibited before all the work force.

The developer of the MAMID Imports and Exports administration system successfully conducted training schedules that were arranged by the MAMID Human Resource department. The training workshop was a success, all the elements and modules of the new system were scrutinized demonstrating how to make use of each module before moving on to the next module. The users were all encouraged to ask questions and in some cases t-shirts and flash drives were provided by the Economics and Markets department as incentives to encourage participation. The management also got the chance to assess, approve how the system generated the reports and also evaluate on the flow of information. As earlier stated, training was very structured and at the end of the training workshop the developer was satisfied with how the end users of the system had quickly grasped how to make use of the system.

5.4.2 System Changeover

Now that the system has been successfully developed and tested to check and verify whether the system is going to satisfy the stated human requirements and this tests where all successful, hence now the need to introduce the system now to the real working environment through installation. System changeover has four alternate changeover methods which are as follows.

a) **Direct Changeover**

According to Lancaster (2001) this approach of changeover includes the full implementation of the system into the whole organization and the steps are followed or carried out in this installation strategy are not intermediate. Shelly and Rosenblatt (2011) agree that direct changeover involves the immediate switch to the new one from the old one immediately when the new system is ready for use. Thus, this approach involves completely phasing out the old system to make way and promote the use of the new system.

Assessment of direct changeover.

The data being processed by the old manual system is of paramount importance both to the Ministry of Agriculture and the national security of the country. Hence installing the new system using the direct changeover strategy possess a great risk to the data since this strategy demands the immediate seize in the operation of the old system, hence in the event that the new system fails then the ministry will not be able to revert back to the old manual system as a backup strategy. This might be the cheapest available changeover strategy but however, poses the greatest risk. For example, suppose the new system fails then still more clients will end up visiting the ministry offices to apply for permits/licenses then obviously the storage of data of these clients will be affected since we cannot revert back to the old manual system. Hence this strategy is not recommended in this case.

b) **Pilot Operation**

Lancaster (2001) defines pilot changeover as the process where the new system is implemented on a lower scale, thus to only a certain part of the organization introducing certain modules of the system relevant to that part of the organization. Just like direct changeover, this approach involves the switching immediately to the new system from the old system (Shelly and Rosenblatt, 2011). Thus, this method involves the complete phasing out of the old system as a result of the introduction of the new system.

Assessment of pilot conversion:

Even though this is a less expensive method as compared to the parallel conversion, the pilot changeover has got its own limitations that make it inappropriate for the new MAMID Imports and Exports administration system. The new system is not going to be installed into the whole organisation but rather the Economics and Markets department. Hence the developer does not recommend this changeover strategy for the installation of the MAMID Imports and Exports license/permit administration system since the new system and the old system are all relevant to a single particular department in the Ministry of Agriculture.

c) **Phased Operation**

This is the slowest but probably the safest changeover strategy. This involves a step by step approach whereby the new system replaces the old system module by module at any given time. Shelly and Rosenblatt (2011) state that this strategy allows for a stage by stage installation of the new system. This changeover strategy does not cripple the entire organization in the event of changeover failure but rather the failure will be on the subsystem or module.

Assessment of the phased operation.

Just like the direct changeover approach, if there is system failure then we cannot revert back to the old manual system of applying and administering licenses/permits at the Ministry of Agriculture. Hence this changeover strategy is not recommended as well since we will be risking the loss of data. Also the phased operation requires that the stuff should be trained in stages depending on how early the system is going to be introduced and this can lead to lengthy training sessions leading to increased installation costs. The MAMID Imports and Exports permits/licenses administration system should not be installed in modules but rather as a whole.

d) **Parallel Operation**

Lancaster (2001) defines phased changeover as a process where the new system is introduced into the environment and works concurrently with the old system until the old system is completely phased out after a certain period of time. Shelly and Rosenblatt (2011) state that it is mandatory that the new and old system are both simultaneously operated for a certain allowable period of time.

Assessment of parallel operation (Recommended).

This is the probably most expensive changeover strategy since both the old and the new systems will be simultaneously run leading to duplicated data, costs and more workload for the employees. However, this is the least risk changeover strategy since both the new and the old system will be used in comparison for a certain accepted period of time until both the management and the employees are satisfied that the new computerized Imports and Exports permits/licenses administration system operates correctly and more efficiently.

This is the safest and the recommended changeover strategy for the MAMID Imports and Exports permits/licenses administration system since in the event of system failure the old manual system can be used as a backup option.

5.5 Maintenance

Ramesh and Bhattiprolu (2006) state that these are solutions that are derived from the available and accepted stated tactics in the event that the product has failed to perform in a desired state. April and Abran (2008) agree that maintenance of software cannot be avoided especially in cases where the software is used on a daily basis. This is the stage where the system is routinely checked and monitored for errors and other deviations from the intended use in order to rectify these errors. This can be done in the following three ways.

a) **Corrective Maintenance**

Ramesh and Bhattiprolu (2006) define corrective maintenance as the process when reported problems or errors that are experienced during use by the clients are considered and attended to. Saleh (2009) states that this approach involves attending to errors and bugs that are reported by the customers and then put into action measures to moderate or mitigate them. This type of maintenance is mostly suitable during the early stages of implementation of the system where corrections from feedbacks can be easily accommodated hence the developer recommends that this type of maintenance should be carried out on the new Imports and Exports Permits/License administration system so that errors that would have not be earlier identified during the testing process can be attended to before the operation of the whole system is complicated.

b) **Adaptive Maintenance**

According to Saleh (2009) this approach to maintenance involves the enslaving of the system to the current software and hardware so that the system can be continuously successfully integrated into the working environment. Ramesh and Bhattiprolu (2006) state that adaptive maintenance sort of forces the new system to adapt to the current

operating environment making suitable changes that accommodate this. This is when various additions and subtractions for enhancements and modifications of the system's resources and components so that they can function and operate in the working environment without any problems. This type of maintenance is necessary especially if there are rapid changes in the industry of the hardware and software equipment.

c) Perfective Maintenance

This is an improvement of both the non-functional and functional areas of the system (Saleh, 2009). Perfective maintenance is done to make changes to the different functions of the system so that performance can be maximized in the most flexible way (Mall, 2009). The fundamental aspect of this approach is to continuously upgrade and improve the system so that it can be more user friendly, more efficient and overall more effective equipped with fine quality so that it can be clearly distinguished from the old system when it comes to the positive impacts against the negative impacts they have both contributed to the organization in order to justify its existence.

d) Preventive Maintenance

According to Saleh (2009) this approach is more pro-active, thus it focuses on the future of the system. The system is improved and patched as counter measures so that any future faults of the system are avoided. Leach (2000) states that preventive maintenance is process of maintaining the current system making changes and improvements as way of preventing problems that may occur in future before they occur in real time. This is a more difficult since most of the negative events are unpredictable but yet more clever than all the other types of maintenance. The developer of the new system recommends the Information and Technology department to be always pro-active rather than re-active through identifying potential threats that are likely to affect the new system and putting in place mechanisms to curb these threats such as downloading the new system updates and various patch up files that boost the security of the system.

5.6 Recommendations for future/further development

System development is an ongoing iterative process hence there is need to continuously dedicate enough time and resources to the new system so that it can excel in this dynamic environment. There is need for the Economics and Markets department to work with the other departments such as the AGRITEX department and the Information and Technology department so that the new system can be continuously improved. The developer recommends that the Imports and Exports permits/license administration system should be integrated with the AGRITEX Farmers Online Contracting System where farmers apply for farming inputs and the farmers might as well make use of new system to apply for permits/licenses to import farming materials and export their farming produce as well.

5.6 Conclusion

This was the last chapter demonstrating the success of the project named Imports and Exports Permit/License Administration System. All the vital techniques and procedures that were identified were carefully considered and executed to show how viable and functional the system is. To ensure the continuous success of the project, maintenance is to be done continuously so as to counter measure the continuously evolving technological environment additionally making room for updates and changes after some time. Be that as it may, this is an achievable mission as clearly stated in this document. All the files have been checked and the system is ready as well.

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List of Appendices

Appendix A: User manual

Imports and Exports permits/licenses administration system.

Introduction

The developer has created a user manual that will be used to assist the users on how to navigate around the system and how to make use of the available different modules.

Mandatory requirements of the system.

The internal users of the system have to be first trained before making use of the system since any changes that they initiate into the system will be permanent. After familiarizing with the system the system administrator will then create the accounts for these users.

To make use of the system a user is required to have the appropriate login details that is the email address and the password.

The system is based on the following technology:

PHP

MySQL

Xampp

Getting Started

Accessing the system

The system will be embedded onto the ministry's website (www.moa.co.gov) and users will need to access the site through their web browsers.

Home page

This is the page where the initial use of the system begins. The home page has the login panel which is explained below. Available at the homepage are different options which include; create account for a new user, login into the system and also password recovery options.
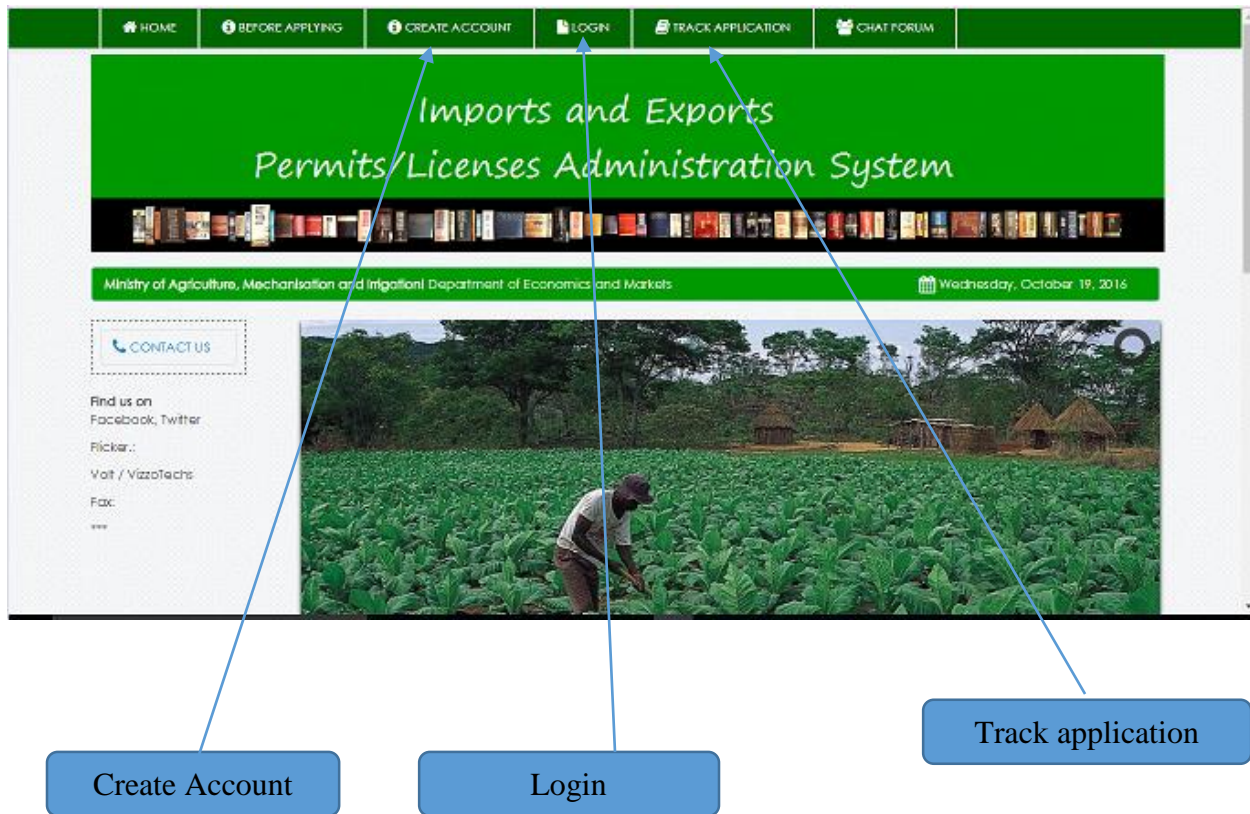
Fig A1 Homepage

Logging into the system

To gain access into the system, the user is required to provide the correct login credentials in the email and password textboxes which are shown below. In the event that the user forgets his/her username or password, there is a forgot password option where the user is to answer security questions so that the password can be revealed. If the user has never created an account before, then the user should select the register option from the home page and then create an account.

NB. The email address and the password are both case sensitive hence one should always take note of the caps lock key when entering the login credentials. When a wrong combination of the email address and the password has been entered, the system will generate an error message.
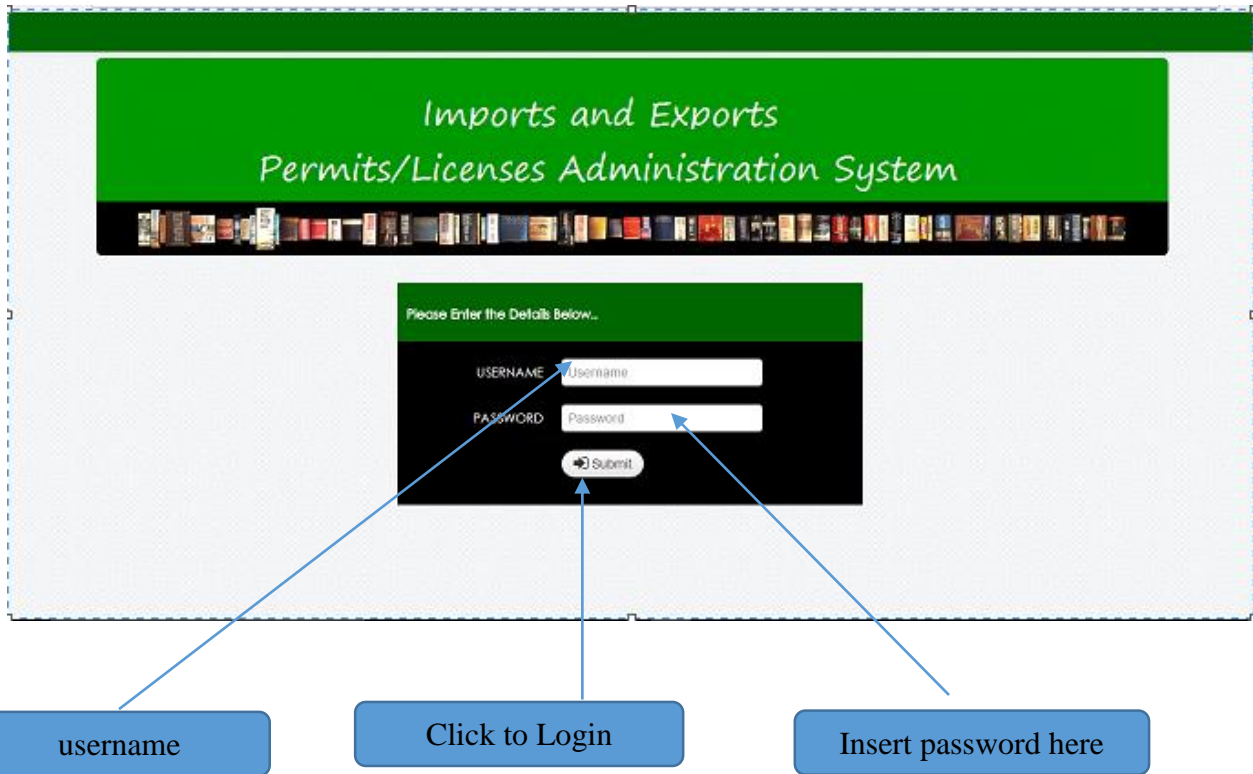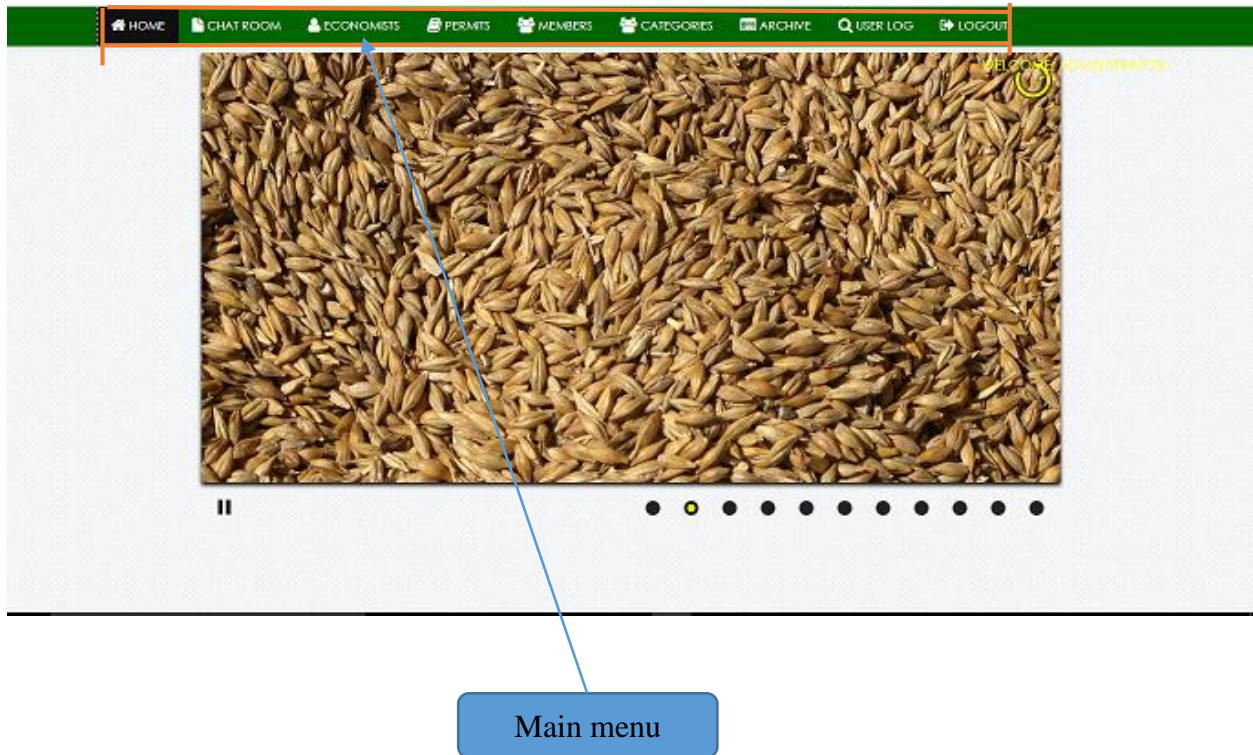
Fig A2 Login

A correct combination of the email address and password will allow the user into the system and the following page will appear for a system administrator. This is the main system form for the administrator where the administrator can perform various actions that are highlighted below as the main menu.

Main menu

Figure A3 Administrator's home page

How to add a new user into the system

The licensing committee who can either approve or reject the applications are to be added by the system administrator into the system. The system administrator has to first select the add economist option and then fill all the required details. After filling all the required fields of the add new user form, the system administrator will then have to click the submit button and then the system will capture these details and allow the new user to access the system.
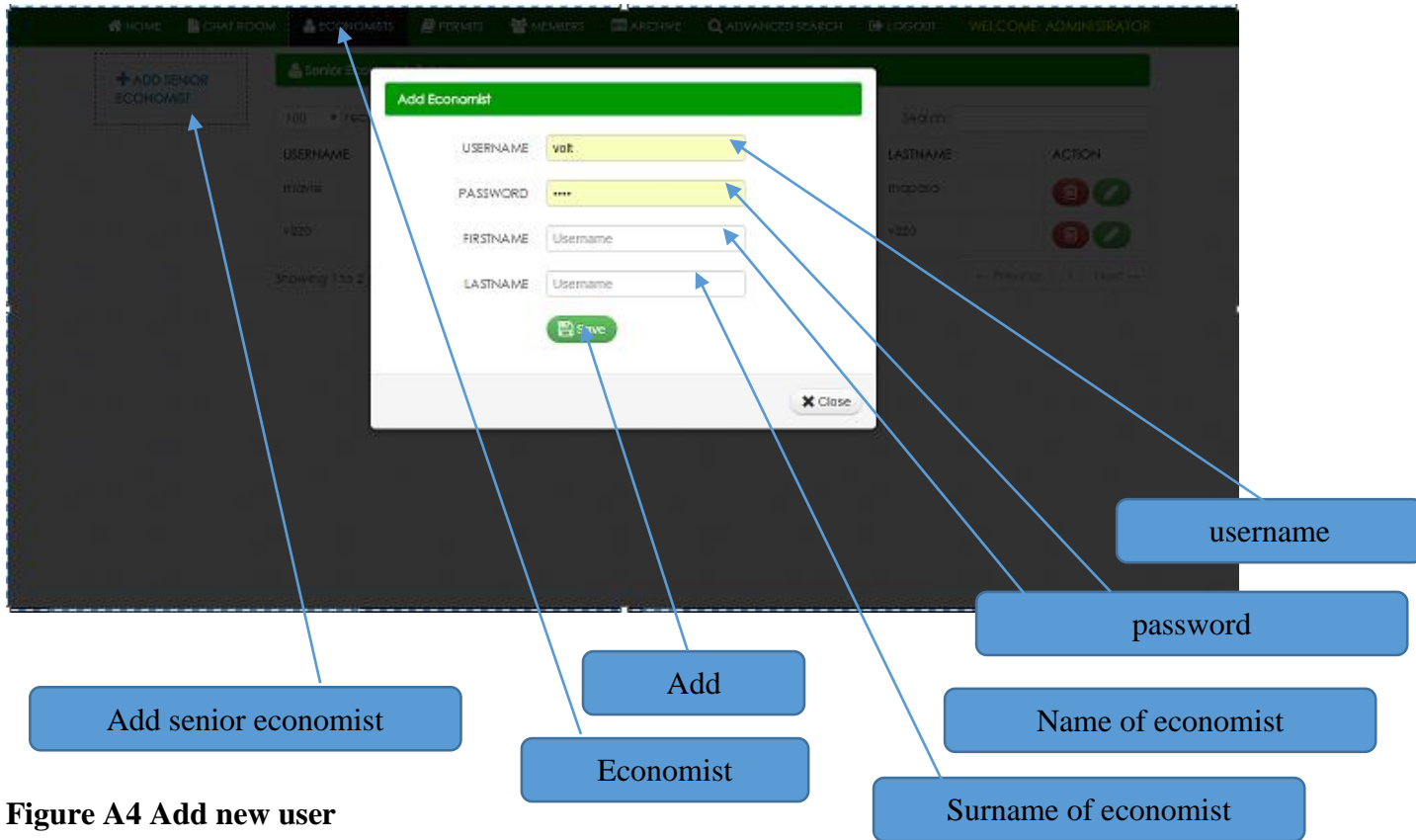
Figure A4 Add new user

Licensing committee main form

The committee members can only access the system after the system administrator have created accounts for them. After successful login, the following form will appear which is the main form where the basic operations of the system can be performed.

Figure A5 View submitted applications

View application.

This page enables the logged in user panel of senior economists to either issue or deny a permit for an application that was successfully processed by other economists that do not make up the licensing comittee. This page allows the economist to assess the application before applying the appropriate action. The action that is applied to each application will reflect automatically to the applicant and the system will also capture the details of the one performing the action for future reference.

Figure A6 Approve or reject application

Creating a user account.

A user can select the register option from the system's main menu form. A register form will appear where the user is requested to input the correct registration details including an email address that will be used for login. If the user is an organization, then a tax clearance document has to be attached in order to successfully create an account and a copy of national I.D for a general user.
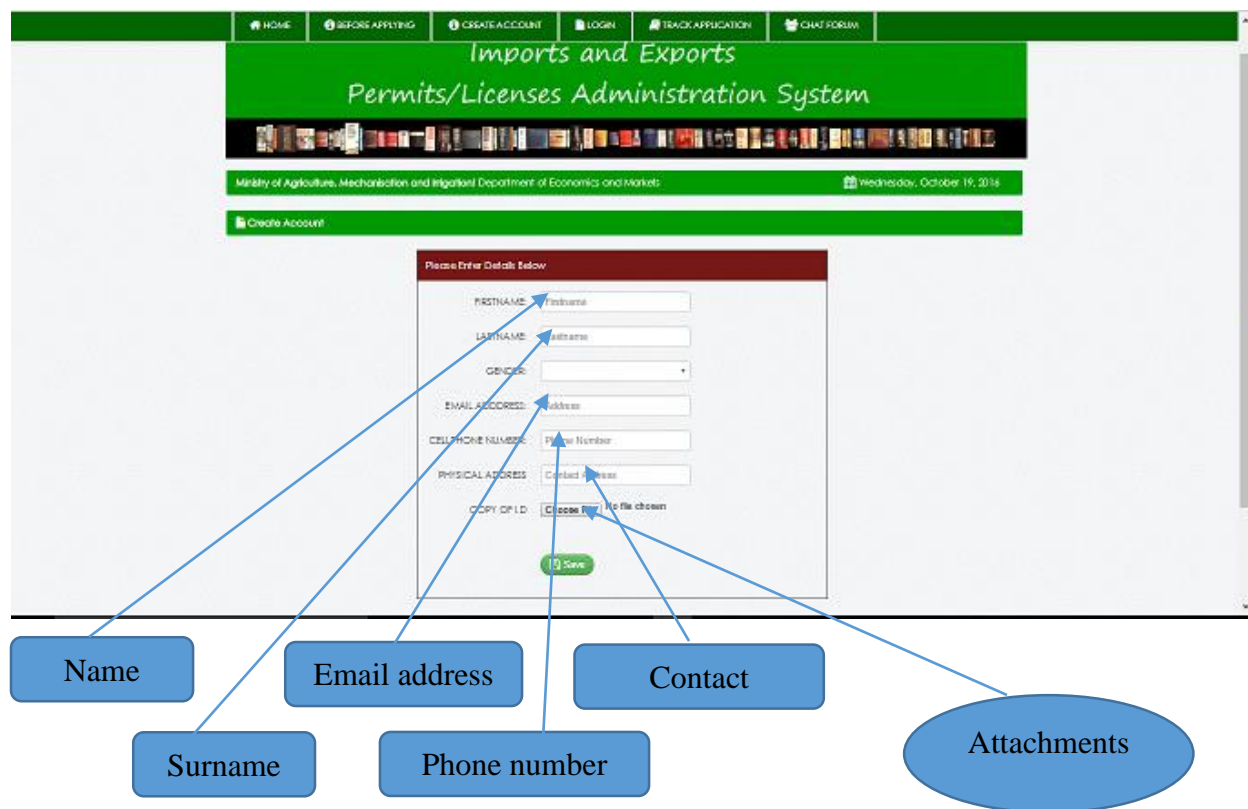
Figure A7 Register new user

How to apply for a permit/license

Select the apply option from the main form after a successful login and fill in all the required fields. All the fields with a red star (*) are required and are not to be left blank before submission. Depending of the type of user you are, upload the requested documents as indicated on the application form and then submit your application.

Figure A8 Apply for permit/license

Track application.

After submitting an application, a user can track the status of their application they submitted using an email address. The status can either be pending or approved and this tracking process does also require one to be logged in.
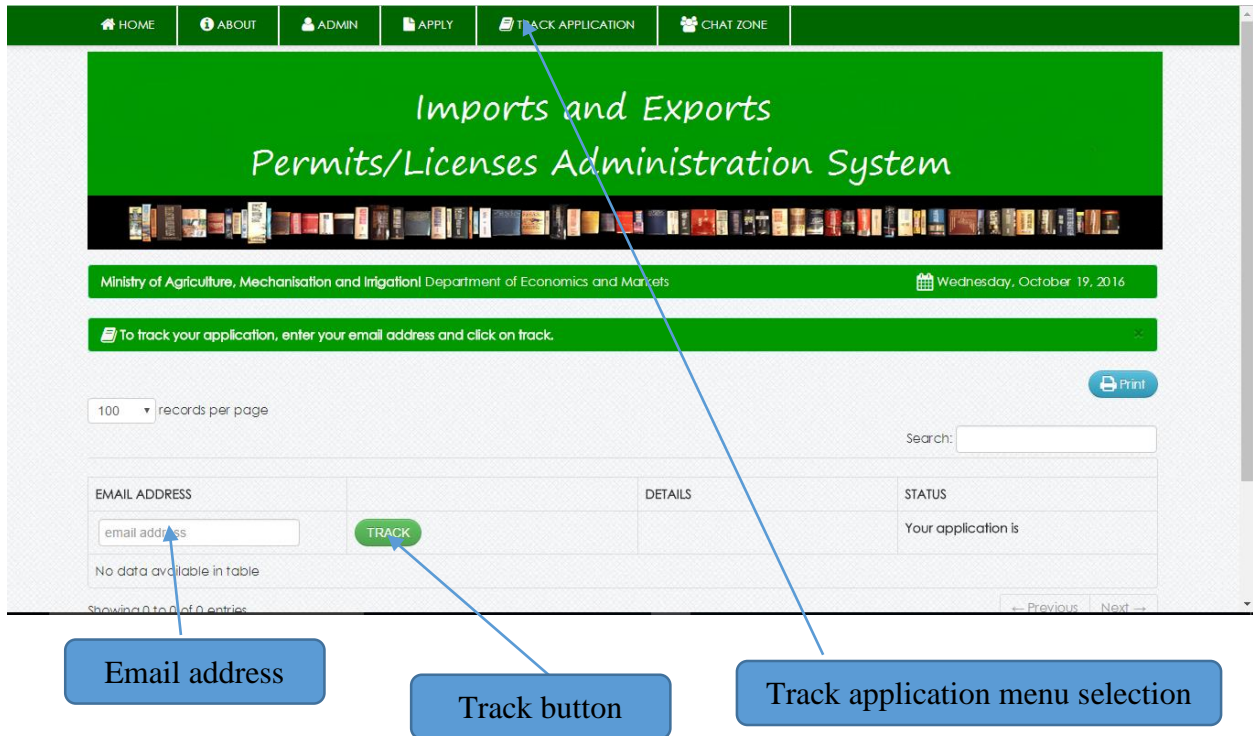
Figure A9 Track application

Logout

Logged in users are required to click this option before closing the system's pages after they have finished using the system. This option allows the users to exit the logged in user account from the system. The user has to select the logout option from the main menu and then click the "ok" button that pops out with a message box telling the user that they have logged out of the system, and the system will return to the homepage.
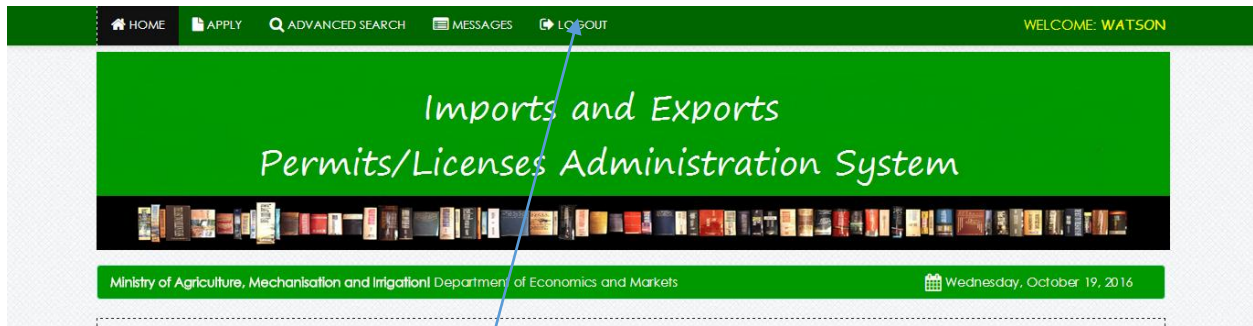
Figure A10 Logout

Appendix B Interviews

Interview checklist

The following is a sample of the inter questions that were asked to the stuff at the Ministry of Agriculture (economists).

1. How long does it take to process a received application and then issue back a permit/license to the applicant?

   ……………………………………………………………………………………………………

   ……………………………………………………………………………………………………

   ……………………………………………………………………………………………………

2. Referring to the current means of communication which includes the use of the organisation's notice board and the physical process of enquiring at the information desk, is it convenient, accurate and time conscious?

   ……………………………………………………………………………………………………

   ……………………………………………………………………………………………………

   ……………………………………………………………………………………………………

3. Besides posting notices and the customer manual information desk, do you have any other means of communicating and notifying the users? If there is any, please state them.

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   ……………………………………………………………………………………………………

   ……………………………………………………………………………………………………

4. Do you think the current manual process of administering the imports and exports permits/licenses should be improved through applying the use of information and technology?

   ....

   ....

   ....

5. Have you ever recently faced difficulties in accepting or adopting any new technology that was brought into the organization? If so, please state when and the type of the technology.

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

Date: ………………………………………………...........

Signature: …………………………………………………….

Interview checklist for clients

The following is a sample of the interview questions that were asked to the randomly selected clients at the Ministry of Agriculture's offices.

1. How long does it take for you to receive a permit/license after submitting the application at the ministry's offices?

   …………………………………………………………………………………………

   …………………………………………………………………………………………

   …………………………………………………………………………………………

2. Referring to the current means of communication which includes the use of the organisation's notice board and the physical process of enquiring at the information desk, is it convenient, accurate and time conscious?

   …………………………………………………………………………………………

   …………………………………………………………………………………………

   …………………………………………………………………………………………

3. Are you willing to accept the use of information and technology to improve the current manual process of applying and receiving the imports and exports permits? If no, please state your reason.

   …………………………………………………………………………………………

   …………………………………………………………………………………………

   …………………………………………………………………………………………

4. What effect do you think the introduction of a computerized system will have on the current process of administering permits/licenses?

   …………………………………………………………………………………………

   …………………………………………………………………………………………

   …………………………………………………………………………………………

Appendix D Observations

Imports and Exports permits/licenses online administration system

Observation Score Sheet

Date ……. /……. /…….

Time …………..

Observations

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Conclusion

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Table D1: Observation score sheet

Appendix D: Questionnaire

This is a sample of the questionnaire that was provided to the clients randomly selected at the Ministry of Agriculture.

SECTION A: Please draw a circle around your answer to indicate your choice

1. On average, how long does it take for you to receive your permit/license after submitting it at the ministry's offices.

   a) One week   b) two weeks   c) one month   d) two months.

2. Based on your above answer, how do you rate the current manual system?

   a) Good   b) average   c) below average   d) poor

3. What effect do you think the introduction of a computerized system will have on the current process of administering permits/licenses?

   a) Negative   b) positive   c) no effect   d) not sure

4. How would you rate the computer literacy rate of the users of the current manual system in your organization?

   a) Good   b) average   c) below average   d) poor

SEECTION B: Please tick your answer above to indicate your choice

1. Do you think the current manual system should be improved?

   Yes/ No

2. Do you believe the use of information and technology will improve the current manual system?

   Yes/ No

3. Basing on your experience and exposure into the organization, do you think that a new computerized system is going to be accepted by the users?

   Yes/ No

4. Do you possess any knowledge on the basic use of information and technology?

   Yes/ No

Appendix E: Code Snipet

<!--- apply for permit-->

```php
<?php

    $connection = new mysqli('localhost','root','','permits');

    $query  = "SELECT * FROM `category`  ORDER BY `name` ASC";

    $result = $connection->query($query);

    $rows   = $result->num_rows;

    for ($i = 0; $i < $rows; ++$i) {

      $result->data_seek($i);

      $row = $result->fetch_array(MYSQLI_ASSOC);

       //$name = $row['category']." - ".$row['category'];

       $category = $row['name'];

        echo "<option value='$category'>$category</option>";

    }

    ?>

?php

                                    $duration="2016";
```

```php
if (isset($_POST['apply'])){

$goods = $_POST['good'];

$category = $_POST['category'];

$quantity = $_POST['quantity'];

$country = $_POST['country'];

$transport = $_POST['transport'];


$fn = $_FILES['file']['name'];

$status= "PROCESSING";



$Today = date('y:m:d');

$new = date('l, F d, Y', strtotime($Today));




$fn = $_FILES['file']['name'];

 if (move_uploaded_file($_FILES["file"]["tmp_name"],"economist/upload/".$fn));
```

```php
$query = mysql_query("insert into applications
(id,name,email,paddress,tnumber,goods,quantity,country,duration,file,date,date_processed,categ
ory,transport,status,economist,user_id)


values(NULL,'$name','$email','$p_address','$tnumber','$goods','$quantity','$country','$duration','
$fn','$today',NULL,'$category','$transport','$status',NULL,$session_id)")or die(mysql_error());

 echo("<script language=javascript> alert('you have successfully applied, use your email address
to track your application'); location=('apply.php');</script>");



}
?>
<!--- approve application-->
<?php


$idd=$_GET['id'];

$qry=mysql_query("select * from applications where id='$idd'");

$rw=mysql_fetch_array($qry);


 if(isset($_POST['approve']))

  {
```

//$status = "APPROVED";

$query=mysql_query("update applications set permit='APPROVED', user_id=$session_id where id='$idd' ") or die(mysql_error());

echo("<script language =javascript> alert('Permit issued! Continue>>'); location=('home.php'); </script>");

}

if(isset($_POST['reject']))

  {

$query=mysql_query("update applications set permit='REJECTED',user_id=$session_id where id='$idd' ") or die(mysql_error());

echo("<script   language   =javascript>   alert('Permit   request   rejected.   Continue>>'); location=('home.php'); </script>");

}   ?>

<!---track application--->

<?php if(isset($_POST['track'])){

 $cemail=$_POST['email'];

 $connect=mysql_connect("localhost","root","") or die("could not connect to the database");

 mysql_select_db("permits",$connect) or die("could not locate the db");

 $qry=mysql_query("SELECT   *   from   applications   WHERE   email='$cemail'")   or die(mysql_error());

 $count=mysql_num_rows($qry);

```php
if($count==0)

 {

echo("<script language =javascript> alert('no application with this email address was submitted');
location=('track.php'); </script>");

 exit;

 }

 while($rows=mysql_fetch_array($qry))

{

$result=$rows['status'];

$cquantity=$rows['quantity'];

$cgoods=$rows['goods'];


}

 }

  ?>
```