JOMO KENYATTA UNIVERSITY

OF

AGRICULTURE AND TECHNOLOGY

DEVELOPMENT OF FOREST MANAGEMENT SYSTEM

BY

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DECLARATION

I Haron Mugo, hereby declare that this research project is my original work and has never been submitted before for any academic award either in this or other institutions of higher learning for academic publication or any other purpose. References used here from other journals or materials are indicated in the references section.

NAME: HARON MUGO NJONGORO

SIGNATURE…………………………. DATE……………………………...

SUPERVISOR APPROVAL.

This research project has been submitted for examination with my approval as a university supervisor.

NAME: MR. MUHANDE

SIGNATURE…………………………...DATE………………………………….

DEDICATION

I dedicate this work to the almighty God who has given me knowledge to do this research proposal. I dedicate this research to my parents, colleagues from where I received a great inspiration and boost to work on my project.

ACKNOWLEDGEMENT

This research was successful due to the immense support of a multitude of people who have guided me through the research.

First of all, I'm very grateful to the almighty God for showing love, mercy, wisdom and knowledge that has led me to work on my project.

Secondly, I thank my parents for the support and granting all their time, encouragement to pursue this course.

I wish to acknowledge my supervisor, Mr. Muhande for the guidance he has given me through the research of this project report. God bless you all.

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Contents

ABSTRACT

Every cooperate organization, institution or government agency requires data and good quality information to function effectively. It is not an over statement to say that many organizations, institutions or government agencies have become critically dependent on the use of database system for their successes especially in the industry of business. This project aims at developing an improved Forest management system using a functional- oriented design. This system will help to maintain the information on the timber like when it needs to ship, when it needs to bring back and where it can be used. Through this module, a manager can monitor overall activity going on with the product. The poor efficiency of the present manual management system in organizations today results from the inordinate length of time it takes to search for and locate client folders and the ineffective filing system adopted. Organization employees will benefit from the system by finding customers information easily. Therefore, the project offers an extensive knowledge regarding correct information management system from forest management system.

1   CHAPTER ONE

1.1   Background Information

Forest management is defined as the practical application of the scientific, technical and economic principles of forestry. Not a basic subject in itself, forest management is concerned with practical application of science, technology and economics to a forest estate for achievement of certain objectives. The subjects on which forest management is grounded are Silviculture, Ecology, Geology, Soil Science, Botany, Mensuration, Pathology, Economics, Finance etc.

From the earliest days of various forest agencies, they have held forest management as a primary focus. Protecting nation's forests from timber thieves and profiteers spurred the creation of the forest reserves. Since inception, the national forest systems have grown. Controversies and management challenges have often kept stride with this growing system, whether caused by fire policies, logging practices, road building, wilderness designations, wildlife or watershed protection, or countries asserting rights of ownership. Forestry activities were discussed on a worldwide scale for the first time at the 1972 United Nations Summit in Stockholm, where perceived environmental problems were discussed by leaders and decision makers. Subsequently, the "Brundtland Commission," established in 1983, prepared a report entitled "Our Common Future" in 1987, in which the concept of sustainable development was discussed for the first time (Dölarslan, 2007; Küçük & Güneş,2013).

Although the United Nations Summit of 1992 conducted in Rio de Janeiro is considered to be the actual birthplace of sustainable forestry, the first modern principle of sustainability in forestry was established at the beginning of the 1700s (Schmithüsen, 2013). As a result of discussions made under titles of "forest principles, combating desertification, convention on climate change, convention on biodiversity of Rio Declaration and Agenda 21", the requirement of regarding global principles in planning of forest resources emerged (Asan, 2010; Durusoy, 2002). The Rio Declaration sets out a country's rights and responsibilities in relation to the environment and development, the resulting Agenda 21 provides guidance for how activities are to be conducted by all countries and sectors that have an effect on the environment and economy in the twenty-first century. Resulting from this, the forest principles were developed, these are common principles in relation to management, protection, and development of forestry worldwide (Çavdar, 2012).

Agenda 21, Section 11, and the concept of Sustainable Forest Management (SFM) in the

context of the Forest Principles Report is defined as the sustainable management of all types of forests that will provide a range of both economic, ecological, and social benefits to generations today and in the future (United Nation [UN], 1992; Wijewardanal, Caswell & Palmberg-Lerche, 1997)

Worldwide, forests have played an integral role in economic development. During the colonial era in developing countries and war periods in the developed countries forests were mainly used as a source of fuel. In Kenya, forests continue to rank high among important resources and are an integral part of national development (NEMA, 2004). They play an important role in modulating hydrological cycles, preservation of water catchment areas, balancing of atmospheric conditions in the form of carbon sequestration, supporting biodiversity and control of soil erosion (Godoy et. al. 2002 as cited by Biota, 2005). The most cited socio-economic values of forests include sources of wood fuel for both domestic and small industrial use, provision of raw material for the pulp, paper and timber industries, tourist attraction sites and cultural and scientific research sites. More recently in scholarly discourse, forests are gaining importance as possible means of livelihood diversification for rural populations through exploitation of Non-Timber Forest Products (NTFPs) that profited a wide range of resources for variegated livelihood strategies (Chambers, 1997).

Kenya's policy in relation to sustainable forest management and conservation was first articulated in 1957 through Sessional Paper Number 7 of 1957 "Report of the Game Policy Committee". This Policy was subsequently restated by the Government of Kenya in 1968 through Sessional Paper Number 1 of 1968 which stated that the "forest estate of Kenya ranks high as one of the country's most important national assets in its protective aspect of climate, water and soil; as the source of supply of forest produce for all uses by the inhabitants of Kenya and as a revenue earner of high potential". This Sessional Paper came into existence after the enactment of the Forests Act, which was passed by the legislature in 1962. This was the principal legislation for the management, conservation and utilization of forests and forest products in Kenya. The new Forests Act 2005, delineates a policy of encouraging the use and improvement of the state's forests and natural areas while simultaneously conserving and protecting these resources. The Act contains many innovative provisions to correct previous shortcomings, including strong emphasis on partnership working and the engagement of local communities. The Act has clear provisions on the role of local communities in sustainable forest management and conservation. The new law opens up a major opportunity to address the inequalities of

the past and may improve the quality and sustainability of Kenya's forests if properly implemented.

The Kenya Forest Service is established under the Forests Act and is charged with the management, conservation and utilization of forests and forest products. Besides the Kenya Forest Service, other major institutions are the National Environment Management Authority which is established by the Environmental Management and Coordination Act, local government bodies and the private sector. The Forests Act, being the latest enacted statute in the area of environmental management in Kenya, should have harmonized and synchronized the institutional and legal mandates for forestry management within the framework for sustainable development.

One of the functions of Kenya Forest Service (KFS) is to develop programmes and facilities for tourism, recreational and ceremonial use of forests [The Forests Act 2005: 5(k)]. The organization manages 1.7 million hectares of gazetted forests that range from equatorial forests (e.g., Mt. Kenya), tropical rainforest (Kakamega forest), dryland forests (Matthews Range Forest), coastal forests (Arabuko Sokoke) and urban forests (Ngong forest). These forests are rich in plant and wildlife biodiversity, in addition to having numerous attractive features including panoramic views, lakes, craters, waterfalls, caves and hills.

Kenya is endowed with a wide range of forest ecosystems ranging from montane rainforests, savannah woodlands; dry forests and coastal forests and mangroves. The current forest cover of 6.99% of the land area of the country is still below the constitutional requirement of 10%. These forests have high species richness and endemism, which has made the country be classified as mega diverse. They rank high as the country's natural asset, due to their environmental, life supporting functions, and the provision of diverse good and services.

Figure 1: Distribution of Forests in Kenya
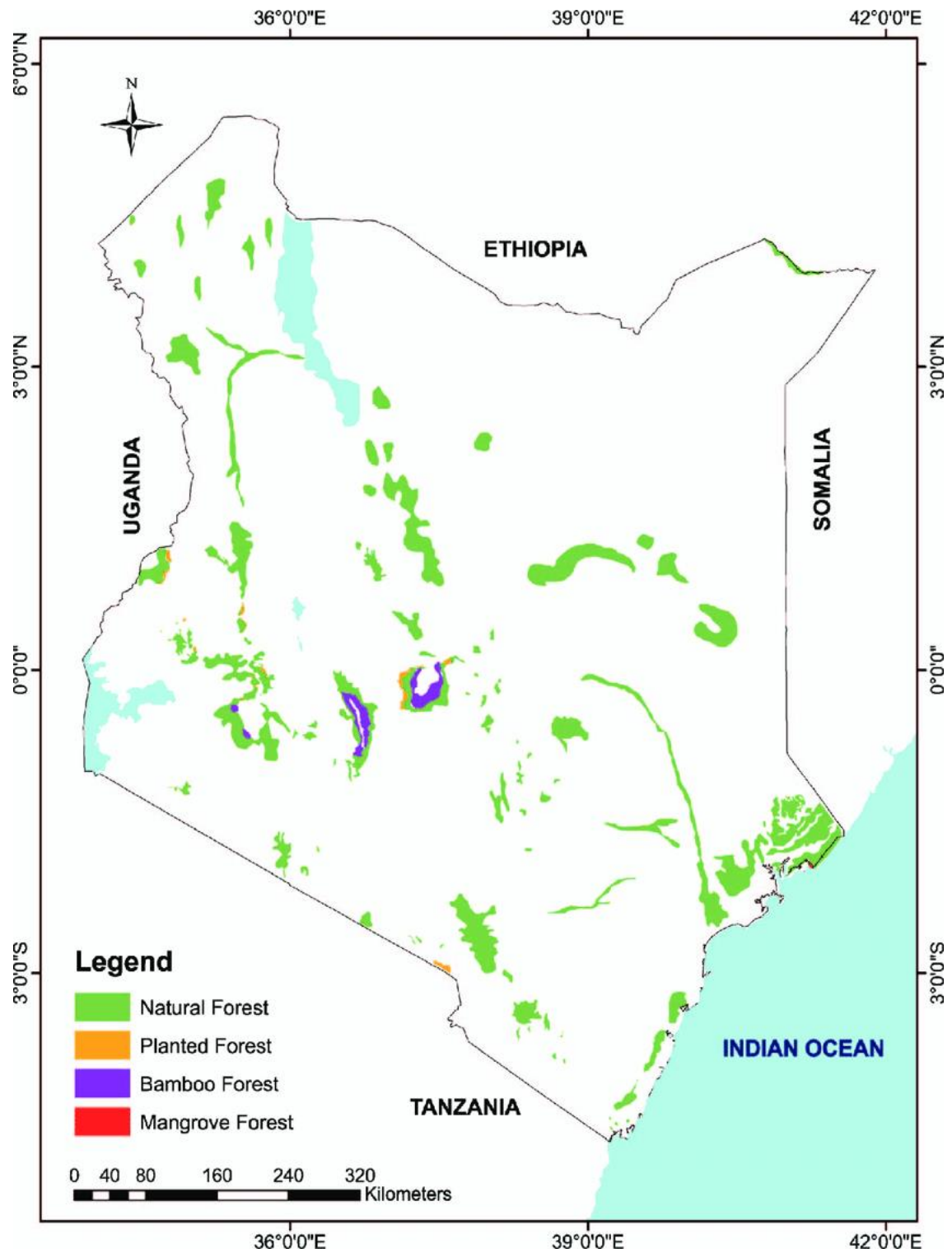
Source: Kenya Forest Service 2014

1.2   Statement of the Problem.

This study investigates the management and the conservation of forest resources in Kenya. In particular, the study investigates the various strategies that Kenya Forest Service applies in order to ensure that forest resources are used sustainably for the benefit of present and future generations of Kenyans

The rich diversity of Kenya's forests is in decline and traditional methods of conservation and management are no longer sufficient to ensure conservation. The Government's Taskforce on the Conservation of Mau Forests Complex noted that "over the last 15 years, the Mau Forest Complex has lost over 107,000 hectares, representing approximately 25% of its forest cover due to encroachment, ill planned and irregular settlements, as well as illegal forest resource extraction. Encroachment has occasioned the destruction of approximately 46,122 hectares of indigenous forests". This indicates that there is a problem either with the law or the manner in which it is enforced, and that there are other factors that impede the operation of Kenya's forest law. At the national level, there are concerns that some of the laws contradict, instead of complementing, each other and as a result, there has been an overlapping of mandates of various institutions, resulting into a disconnect between government initiatives and beneficiaries who are local communities.

In the existing Forestry Management System, the data is maintained on the paper as the worker don't know about the programming, they can't make a computerized system and buying the complete build system requires a high amount of money. Each forest has a manager who will monitor the sales of the timber and will maintain the information. As some forest is big enough and as the business so for maintaining this data is a very tedious process which sometimes gets wrong.

In the proposed Forestry Management System, the forest business will be maintained through the system. The order will be placed on the system and the manager of the forest will then send the timber to the plant. If the timber will be not good enough to be used, then it will be resent to the forest department. Where these will be sent to the wood mills for the carpentry. As all the operations is conducted from the Forestry Management System the forest manager will get all the information on business from the software. Which will make the system easy to maintain with the reduction in cost and time. The Forestry Management System will also contain the information of the customer so that it the manager can contact with them from the system to make the communication between the manager and the customer

1.3 Objectives.

1.3.1 General objectives

The overall aim is to establish an online forest management system for different forest services. To develop a web-based system that will help manage the forest business transactions.

1.3.2 Specific objectives

The objectives of the project include:

i. This module will help to maintain the information on the timber like when it needs to ship, when it needs to bring back and where it can be used. Through this module, a manager can monitor overall activity going on with the product.

ii. The system will contain the information of its customer. The details of the customers are stored in the system so that whenever the forest company will need the details, they can get by simply typing the name of the customer. The information will be like address, contact information

iii. The manager will do business with the customers on the contract basis, so the system will contain the details of contracts with each customer. The contract can be for a weekly, monthly delivery.

iv. To identify and review current websites for managing forest services.

v. To change from physical manual paper manipulation to a centralized computerized system.

1.4 Research questions

i. Which are the current existing Forest management systems?

ii. How can I design a website to facilitate interactions between user and service provider?

iii. What does Forest management entail and the challenges currently experienced?

iv. What are the gaps and improvements that can be made on the systems?

1.5   Justification

In the objectives, I aim to improve the Forest business market and I also consider to provide customers able to user easy way to make bookings. Example, customer can use internet access to web-based system to, looking for forest products or prices and so on.

- The system will save all customers details for feature references.
- Customers can save time, save cost, get information on the web-based and can access in any time any where
- More suitable to customer with administrator to communication on internet.

1.6   Scope.

A. Control of Growing Stock, its Structure and Composition:

- Site adaptation
- Choice of species
- Manipulation of stands
- Harvesting the produce
- Regeneration
- Protection.

B. Distribution and Marketing of produce:

- Transportation and communication.
- logging Plan
- Marketing data
- Sale of produce
- Revenue

C. Administration of Forest Property:

- Forest organization
- Management of Personnel
- Monitoring and control or works
- Labour management and welfare
- Financial control and economy efficiency
- Record for present and future reference

2   CHAPTER TWO
LITERATURE REVIEW

2.1   Introduction

The emergence of Information and Communication Technology (ICT) had completely changed the lives and operations of individuals and organizations respectively. ICT and Digital technologies had made great evolutionary development in finance, economics, operational costs (Slozko & Pello, 2015) and enhanced organizational performance (Ali, 2010). The era of ICT and digital innovations has come along with a dynamic change in the world business environment, whereby business transactions are constantly shifting from cash-based transactions to electronic-based ones (Mohamad, Haroon, & Najiran, 2009). Also, the global proliferation of the internet and its rapid use over the years had contributed much in facilitating electronic commerce in global business environment (Fernandes, 2013).

In the last two decades, electronic payment systems (EPS) have attracted much attention from researchers and information system designers due to their vital role in modern electronic commerce. This led to wide and in-depth researches that produced different perspectives on e-payment definitions among others. These definitions were mainly viewed from different perspectives ranging from scholars in the field of accounting and finance, business technology to those in information systems. For instance, Dennis (2004) defines e-payment system as a form of financial commitment that involves the buyer and the seller facilitated via the use of electronic communications. Also, Briggs and Brooks (2011) sees e-payment as a form of inter-connections between organizations and individuals aided by banks and inter-switch houses that enables monetary exchange electronically.

Focus groups and interviews revealed that staff were skeptical at baseline but at follow-up were positive about the system. Loggers were enthusiastic about the forest management system at all stages. The study shows that electronic payments can reduce loggers waiting times and enhance efficiency but may not be suitable for all loggers. Staff and loggers had different views, which converged with experience of the new system.

2.2   Forest Management System

Forest Management System means the State's suite of legislation, policies, codes, plans and management practices and processes, as amended from time to time, being as generally described in the 'Overview of the Victorian Forest Management System' published by the State (which is to be maintained by the State, and updated from time to time to reflect

amendments in legislation, policies, codes, plans and management practices and processes) "Victorian Statewide Assessment of Ecological Sustainable Forest Management" published by the Commonwealth and Victorian RFA Steering Committee in 1997 as varied by this Agreement.

The Forest Management system has complex structures because it is the platform on which electronic payments are done and transaction records stored. In this Forestry Management System project, we want to develop a system which can be used by them to manage all the data through the system. We will develop a cost-efficient system with a good user-friendly environment so that the forest department will not face any problem in accessing the system which will reduce the time and cost required to maintain the data. In the proposed Forestry Management System, the forest business will be maintained through the system. The order will be placed on the system and the manager of the forest will then send the timber to the plant. If the timber will be not good enough to be used, then it will be resent to the forest department. Where these will be sent to the wood mills for the carpentry. As all the operations is conducted from the Forestry Management System the forest manager will get all the information on business from the software. Which will make the system easy to maintain with the reduction in cost and time. The Forestry Management System will also contain the information of the customer so that it the manager can contact with them from the system to make the communication between the manager and the customer.

In so far as the policy dimension is concerned, various policy documents developed by the government of Kenya will provide the background upon which forestry issues have been handled by the government in the past. Key among these policy documents are those policies that were made after Kenya became independent, aimed at clearly stating the government's aims in this vital field of development. Subsequent policies examined various challenges inherent in the forestry sector among which are increased pressure to change forest land to other uses such as settlements and agriculture, overdependence on forests for timber and wood fuel, inadequate existing legislation as regards sustainable use of forest resources, lack of communal participation in sustainable forest management, lack of incentives and the need to review existing law and policy to achieve sustainable use, management, and conservation of forestry resources. They call for a policy and institutional reform for stricter enforcement to be able to achieve the objectives of Kenya Vision 2030. They propose to intensify the conservation of forests in a sustainable manner without compromising economic growth. They propose to achieve 10 percent forest cover by 2030 and propose to employ the use of market based

environmental instruments including selective incentives and disincentives to reward good practices and penalize harmful practices in environmental management.

2.3   Online Payment System

An online system is also known as a web-based system. A web is made up of page that is commonly known as web page or web site, and a web site is a computer program that runs a web server that provides access to a group of related web pages (Alex, 2000).

A system is a set of independent components working together to achieve a common objective. Therefore, a web-based system is a system that is accessible over the internet by a user in order to achieve a particular task for a given purpose. The Internet is a system that is use to connect computers and computer networks. It helps to link millions of computer networks all over the world and it allows the users to get information stored on other computers from a long distance (James, 1999).

The Kenyan forestry sector has developed into an important national programme that contributes to the growth of the national economy. For example, the estimated value of the production of forest products is Ksh 2.0 billion per annum, which is equal to about 10 percent of the country's agricultural Gross Domestic Product (KEFRI, 1999).

In the proposed Forestry Management System, the forest business will be maintained through the system. The order will be placed on the system and the manager of the forest will then send the timber to the plant. If the timber will be not good enough to be used, then it will be resent to the forest department. Where these will be sent to the wood mills for the carpentry. As all the operations is conducted from the Forestry Management System the forest manager will get all the information on business from the software. Which will make the system easy to maintain with the reduction in cost and time. The Forestry Management System will also contain the information of the customer so that it the manager can contact with them from the system to make the communication between the manager and the customer.

2.4   Existing Forest Management Schemes

In the existing Forestry Management System, the data is maintained on the paper as the worker don't know about the programming, they can't make a computerized system and buying the complete build system requires a high amount of money. Each forest has a manager who will monitor the sales of the timber and will maintain the information. As some forest is big enough and as the business so for maintaining this data is a very tedious process which sometimes gets wrong.

Most forest revenue comes from charges (royalties) on the production of major forest products (i.e., roundwood), especially from production in forest plantations. All of this revenue is submitted to the Treasury. In addition, a small amount of revenue is raised from operating license fees and charges on minor forest products (non-wood forest products and services), which is credited directly to the Ministry's budget. There are also a number of other taxes and charges paid by the sector to other parts of central and local government.

For roundwood production in forest plantations, forest charges are determined using the replacement cost method. This calculates the charges that would be necessary to recover all forest management costs. These charges should be paid by all producers, but the pulp and paper mill has been allowed to pay less in order to compete with imported products. In the natural forest, high levels of charges have been set to discourage the use of the resource and allow time for regeneration.

The forest department is the only institution that assesses and collects forest charges. The total amount of charges that should be paid is based on an assessment of standing volume and a detailed procedure is used to calculate this. In addition, ground scaling (assessment of felled volume) and weight are also occasionally used to assess charges. In general, there have been some problems with the under-reporting of assessed volumes and charges.

Total revenue collection has been less than expected, due to the low charges paid and underassessment of charges. In addition, there have also been some problems with arrears of charges. Total revenue collection has fallen from Ksh 216 million in 1993-94 to Ksh 128 million in 1999-00, due to the problems noted above and a decline in harvesting. The decline in harvesting has been due to a ban on production from the natural forest and the FD restricting production in forest plantations (due to a lack of funding for reforestation).

The total budget for the forest department has fallen from Ksh 1,076 million in 1993-94 to Ksh 883 million in 2000-01. Recurrent expenditure is funded by the government and has increased slightly over the period. However, development expenditure is funded largely by donors and this has declined in recent years. Currently, government funding is largely concentrated on salaries, but this is inefficient and imbalanced because staff to not have the necessary tools and equipment to implement operations. The other major government institution working in the forestry sector is the Kenya Forestry Research Institute and it has similar budget problems.

The forest revenue system in Kenya could be improved in a number of ways. First, the proper implementation of assessment and sales policies could increase revenue collection substantially. In addition, the full number of charges (royalties) should be collected and charges should be revised regularly to reflect the market price of products. Public auctions and competitive timber sales could help in this respect and improved data collection and information management would also assist with revenue collection.

Financial independence for the forest department is proposed as one way to increase the incentive to collect all forest revenue and improve efficiency. It is recommended that the forest department should be allowed to keep a proportion of the forest revenue collected, so that this can be reinvested in forest management. It is also suggested that there should be more partnership between the public sector and the private sector in forest plantation management and the development of farm forestry.

More generally, there is a need to increase the participation of other stakeholders in the sector if the goal of sustainable forest management is to be achieved. The forest department is working towards this with the implementation of new and revised forestry policies and legislation.

2.5   Proposed system

2.5.1   Digital or computerized system

Understanding the existing system and figuring out the problems, what I propose is a solution to launch website for loggers. The main objective is to provide contingency to users by showcasing different forest reserves and forest products. This new system will keep track of loggers, their documents and date of payments so that forest business can be beneficial for the organization. The transaction reports of the system can be retrieved as and when required. Thus, there is no delay in the availability of any information.

Digital system gives the following features;

Registration: In this system users has to become a registered user to purchase forest products. The user has to fill up his or her contact information in the registration form. After registering he/she gets a username and a password to login to the system.

Prepaid facility: The customer pays for forest products through the website.

Language mobility. Customer will be able access the system application in different languages allowing accommodation of user from any region.

3 CHAPTER THREE

SYSTEM DEVELOPMENT METHODOLOGY

3.1 Introduction

1. As developers of Forest Management System, we are striving to have a highly effective and efficient web application that will suit each user's needs.

2. We will be choosing design methodologies that are in line with the objectives of the proposed system and are up to date.

3. We will also undertake fact finding using various techniques so as to develop the software that meets the needs of our user's.

4. A feasibility study will also be conducted to determine if the project is worthy of being developed.

3.2 3.2 System Design Methodology

3.2.1 Waterfall Model

The waterfall approach was the first SDLC model that was used widely in software engineering to ensure success of the project. The waterfall methodology is about breaking down the project functions into continuing linear yet, sequential phases, where each particular stage relies on the deliverables of the previous step and matches to a specialization of responsibilities. The framework type of waterfall approach is linear and involves the following basic principles: Project is divided into sequential phases with some overlap and splash back acceptable between phases. Emphasis is on planning, time schedules, budgets and implementation of an entire system at one time. The management can see a timeline of events, hence I'll have a reasonable sense of how long every phase of the project is going to take. Waterfall project management is efficient in communicating the overall project scope, tasks and timeline but it also has its particular pitfalls.

3.2.2 **Phases**

i. Requirements. The first phase involves understanding what needs to design and what is its function, purpose. The specifications of the input and output are studied and marked.

ii. System design. The requirement specifications from the first phase are studied and system design is prepared. Helps in specifying hardware and system requirements.

iii. Development. With inputs from system design, the system is first developed in small programs called units, which are integrated into next phase.

iv. Testing. All units developed in the development phase are integrated into a system after testing of each unit. The software designed, needs to go through constant software testing to find out if they are any errors.

v. Deployment of system. Once the functional and non-functional testing is done, the product is deployed in the customer environment or released into the market.

vi. Maintenance. This step occurs after installation, and involves making modifications to the system or an individual component to alter attributes or improve performance.

3.2.3 Advantages of waterfall model

i. This model is simple and easy to understand and use

ii. It is easy to manage due to the rigidity of the model – each phase has specific deliverables and a review process. In this model phases are processed and completed one at a time

iii. Waterfall model works well for smaller projects where requirements are clearly defined and very well understood.

3.2.4 Disadvantage of waterfall model

i. High amounts of risk and uncertainty

ii. Not a good model for complex and object-oriented projects

iii.   Poor model for long and ongoing projects.

iv.   Not suitable for the projects where requirements are at a moderate to high risk of changing**.**

v.   Once an application is in testing stage, it is very difficult to go back and change something that was not well thought out in the concept change.

3.3   Fact Finding Techniques

Fact finding is the collection of information and data using methods such as interviews and reviewing existing documentation. I will be conducting interviews and reviewing of pre-existing records, procedures and documentation.

3.3.1   Interviews

This is a method used by systems analyst to collect data. It involves asking potential customers what they look for in for example a car hire mobile application.

We shall be asking questions that will help us determine the key features that will be present in our system. Responses from the potential customers will help us determine the front-end part of our system.

The interviews are conducted in one of two ways, this may be;

1. Unstructured interview – this is where the system analyst conducts question – answer session to acquire basic information of the system.

2. Structured interview – it has set questions which the system analyst will ask to the potential customer.

The response of the customer may be closed or open. Open is where the response is descriptive.

Advantages of use of interviews

1. Information can be easily validated and cross- checked.

2. It is ideal for handling complex subjects.

3. It is useful for those who do not communicate effectively in writing or don't have time to fill in questionnaires.

4. It minimizes chances of misunderstanding and misinterpretation.

5. It makes it easy to discover key problems through seeking opinions.

Disadvantages of the use of interviews

1. Conducting interviews can be very costly.

2. Conduction of interviews is time consuming.

3. Interviews do not provide anonymity which may affect the respondent's response.

4. Accessibility to respondents can be difficult as they can be anywhere in the world as opposed to mailed questionnaires.

5. Interviews can cause bias. This can be caused by an interviewer's race, age or class.

3.4   Feasibility Study

I will also be carrying out a feasibility study to determine the technical and financial requirements and also whether it will be possible to complete the system in the allocated time frame. The participation of our users towards the proposed system will also be taken into consideration.

A feasibility study is basically a preliminary study conducted to help the management determine whether the proposed system is feasible for development or not.

The steps taken in feasibility analysis include:

1. Forming a project team and appointing a project leader.

2. Developing systems flowcharts.

3. Identify the deficiencies of current system and set goals

4. Determine the potential candidate system to meet the set goals.

5. Determine the feasibility of each alternative.

6. Weigh the performance and cost effectiveness of each candidate system.

7. Rank the alternatives and select the best candidate system

8. Prepare a system proposal of final project directive to management for approval.

There are various types of feasibility studies. These includes:

Technical feasibility

1. It investigates the technical feasibility of each implementation alternative.

2. It analyses and determines whether the solution can be supported by existing technology or not.

3. The analyst determines whether current technical resources be upgraded or added it that fulfil the new requirements.

4. It ensures that the candidate system provides appropriate responses to what extent it can support the technical enhancement.

Operational feasibility

1. It determines whether the system is operating effectively once it is developed and implemented.

2. It ensures that the management should support the proposed system and its working feasible in the current organizational environment.

3. It analyses whether the users will be affected and they accept the modified or new business methods that affect the possible system benefits.

4. It also ensures that the computer resources and network architecture of candidate system are workable.

3.5 Requirements

3.5.1 Functional requirements

User login – The system provides facility to the log into the system. Enter username and password at user profile page.

Forgot password - the user can send rest link to mail id to reset password. Input email, output: reset link sent to email

Online reservations – Customers should be able to use the system to make booking and online reservations.

Feedbacks – It should provide means for customer to leave feedback.

3.5.2 non-functional requirements

i.   **Performance requirements –** The system should have high performance rate when executing user's input and should be able to provide feedback and responses within a short span.

ii. **Availability –** The system should always be available for access 24 hours, 7 days a week.

iii. **Safety requirements –** The details need to be maintained properly. Users must be authenticated. The database must be kept backed up.

iv. **Security requirements –**The system should provide a high level of security and integrity of the data held by the system; only authorized personnel of the company can gain access of the company's secured page on the system.

3.5.3   Hardware requirements

Requirements needed to design this system are as follows:

For effect operation of the application the following hardware requirements were recommended:

- Computer or laptop since the software built runs on computer.

- At least 4GB RAM

- Hard disk of at least 500GB capacity

- Dual core processor. Basic architecture and provides enough support for software.

Personnel requirement: - An android device with internet access.

3.5.4   Software requirements

- Windows 10 operating system

- Web browser, chrome

    Visual studio: A text editor with IDE functionality

- Database: MySQL

3.6   Conceptual framework

Provides an illustration of how the different illustrations in the system. The user input their details which are names, email id, phone number, and location during the registration. They then proceed to log in using their username and password. They select the particular forest products. They proceed to check total cost and make payment for the particular selections made. If selection is not made the system takes you back to cancel selection and log out.

Customer → Register to Forest management portal → Email Varification of Customer → Verify
- False → Reverify Email Address
- True → Registration Successfully

Search for intended forest products → Products found → Show product not available

List of all forest products available → Login to System

Login to System → Select forest product → Pay for selected forest products → Print receipt for purchsed products / Comment on selection andsale process

Customer / Admintrator → Online Forest Management System
- Forest products searching
- Forest products selection
- Price Calculation
- Payment report
- Manage content

Forest management system database