

**KARATINA UNIVERSITY**

**SCHOOL OF PURE AND APPLIED SCIENCES**

**DEPARTMENT OF COMPUTER SCIENCE AND**

**INFORMATICS**

**PROJECT TITLE:**

**SUGARCANE PROCESSING MANAGEMENT SYSTEM.**

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**THIS PROJECT IS SUBMITTED IN PARTIAL FULFILMENT OF REQUIREMENT FOR THE KARATINA UNIVERSITY AWARD OF BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY.**

**DECLARATION**

I hereby declare that this project report is based on my original work except for citations and quotations which have been duly acknowledged. I also declare that it has not been previously and concurrently submitted for any other degree or award at Karatina University

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I the undersigned do hereby certify that this is a true report for the project undertaken by the above-named student under my supervision and that it has been submitted to Karatina University with my approval

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

**DEDICATION**

Specially dedicated to

My beloved parents, brothers and sisters.

**ACKNOWLEDGEMENTS**

I would like to thank everyone who had contributed to the successful completion of this project.

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# ABSTRACT

Technology for the past several decades has been taking central in our day to day lives. It’s been revolutionizing all the aspects of our lives. Especially the use of computers is taking all. Agriculture is one of the corner stone of human existence, it is a part of great essence because through it we achieve food security. Sugarcane farming involves a large number of stakeholders: contractors, farmers, government etc. The contractors who provide inputs, extensions and market to the farmers have to keep track or trace of lots of data, which as per now the main method is use of pen and paper way and the use of spreadsheets which is faced with the challenge of presences large data leading to lots of errors furthermore it times consuming to generate simple reports because of the way data is stored. The project concerns about how the Transmara Sugar Company buys farm products (Sugarcanes) from farmers and also selling farm inputs to the farmers e.g. fertilizers. The Company requires a farmer to apply for a certain amount of fertilizer based on his or her farm acreage. The system will be able to notify the farmer that his or her application has been processed via text. The farmer is supposed to key in his or her correct details and location so that the farm inputs can be addressed to the farmer easily and also direct the farmer to the nearby pick up station. Also, the system will be able to show all the pick-up stations and the dates that the farmer is supposed to pick his or her farm inputs.

# CHAPTER ONE: INTRODUCTION

## 1.1 Background of the study

Over the past five decades, crop yields have grown at very different rates around the world. Most small-scale farming systems are much less productive and profitable than they could be. The reasons include their lack of access to inputs and credits, and their inability to bear risks. Another major challenge is the information and skills gap that constrains the adoption of available technologies and management practices, or reduces their technical efficiency when adopted. Public extension programs are often underfunded. They usually do not incorporate agricultural research, and contact to the farmers is often insufficient. A further problem is the lack of coordination along the agricultural value chain from farm inputs to food processing. This increases production costs and lowers the revenue for farmers. (James & Zikankuba, 2017)

Food security, as defined by the United Nations’ committee on World Food Security, “it exists when all people, at all times, have physical and economic access to sufﬁcient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (Napoli, de Muro, & Mazziota, 2015). With the ever-growing world populations implies that there’s need in coming up with the solutions in ensuring food security.

The ultimate objective of world food security should be to ensure that all people at all times have both physical and economic access to the basic food they need. Food security should have three specific aims, namely ensuring production of adequate food supplies; maximizing stability in the flow of supplies; and securing access to available supplies on the part of those who need them (Borena, 2009)

Agriculture is described as the back-bone of Kenya's economy contributing approximately 30% of the Gross Domestic Product (GDP) per annum and indirectly contributing about 27% of GDP through linkages with manufacturing, distribution and other related economic activities. The sector also contributes 80% of the country's employment in the rural areas, nearly 60% of total export earnings and 45% of government revenue. Approximately 75% of industrial raw materials for Agro-based industries are contributed the agricultural sector. Additionally, the sector produces all the country's food requirements except for wheat, rice, sugar and edible oils.

Developed processing factories are using Management System to assist different task for their end users or clients. Other than that developing processing factories have to provide proper management for their peoples who interested in Economy. For that we need management System to cater them for various ways. This Sugarcane Processing management system assist different users as Planters, investors, buyers, and Researchers. Narok County despite having an agricultural based economy, it does not have a Sugarcane processing management system of this nature.

## 1.2 Problem statement

Sugarcane processing involves a number of stakeholders mainly the financier (the contractor), the farmers, the government and many others. All the stakeholders are interdepended on each other.

The processing company should have the farmers’ data which include their names, ID numbers, their farm location size phone numbers, bank account details. In most cases all this information is available on paper files, spreadsheets in which case updating them is a challenge and moreover using this information for complex reports is a challenge too.

Furthermore, in some cases farmers are only identified by their names only which in the long run it could lead to confusions during payments and inputs delivery.

During the inputs delivery to farmers, collections of farm produce (produce purchases) and farmer recruitment lots of data is collected which are often in pen and paper way which is error prone and results to lots of intractability and lack of transparency issues.

Moreover, bookkeeping for hundreds of farmers without a proper system in place like the use of spreadsheets and physical books only. This results to lots of challenges and lots of work especially when accuracy, fast data is in play.

## 1.3 **OBJECTIVES**

### 1.3.1 General Objective

The main objective is to develop an online processing management system which will automate the efficient record management for farmers from Narok county to get farm inputs and to sell their farm produce to Transmara sugar processing factory.

### 1.3.2 Specific Objectives

1. To study the existing processing system and literature review on how farmers manage their produce, keep their records, how they get paid and extract better way of automating the processing activities.
2. To collect data and identify the system`s requirements.
3. To design secured and confidential sugarcane processing management system to enable farmers from Narok county to deliver sugarcane and get paid faster and secure.
4. To implement the system.
5. To test and validate the system.

## 

## 1.4 Scope

This Sugarcane processing management system is aimed to be used by Sugarcane processing-based companies as a solution to their day to day activities. For instance, Transmara Sugarcane Processing Company is to use this system in her sugarcane processing activities that is on sugarcane and processing scheme.

## 1.5 Problem Justification

Since agriculture is still the Kenya’s backbone and the ever-rising populations there will always be the need for more food productions to ensure food security furthermore the need to improve the livelihoods of small-scale farmers in rural areas. Sugarcane farming is the model to embrace. The revolutions in the technology need to be incorporated into it to ensure efficiency in sugarcane farming. Having proper management of farmer’s accounts, issuing of farm inputs, generating accurate reports and ensuring efficiency in issuance of incentives and collections of farm produces from the farmers once they are ready.

## 1.6 Project Risk and Mitigation.

Table 1. Risks and mitigation of the project

|  |  |
| --- | --- |
| RISK FACTOR | PREVENTIVE MEASURES |
| 1. Human error on part of staff | Employ the best people; rewards; team formation; training; peer reviews; adapt process to available know-how |
| 2. Unrealistic schedule and budget | Business-case analysis; incremental development; reuse of software; modification of schedule and budget |
| 3. Standard software, external components (inexperience, incompatibility, etc.) | Benchmarking; prototyping; review of reference installations; compatibility analysis; review of suppliers |
| 4. Requirements and developed functions do not match | Win-win agreements between parties concerned; business-case analysis; prototyping; application description in early phases |

## 1.7 Budget and Resources.

Table 2. Budget and resources of the project

|  |  |
| --- | --- |
| ITEM | Estimated cost (Ksh) |
| Laptop (Intel Pentium quad core processor N3520 2.42 Ghz,2M cache, 4.0GB RAM, 500GB Hard Disk,15.6\*HD Graphics, DVD-Super Multi DL drive | 40000 |
| Stationeries | 300 |
| Research cost | 4 000 |
| Computer storage devices | 1000 |
| Ink jet printer | 5000 |
| Blue stacks App player | Free |
| Android phone | 6 000 |
| Total estimate | 56300 |

## 1.8 Project Schedule.

Table 3. Schedule of the project

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Month | SEPTEMBER | OCTOBER | | | | NOVEMBER | | | |
| WEEK  ACTIVITY | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| PROJECT  PROPOSAL |  |  |  |  |  |  |  |  |  |
| FEASIBILITY  STUDY |  |  |  |  |  |  |  |  |  |
| REQUIREMENT  ANALYSIS |  |  |  |  |  |  |  |  |  |
| SYSTEM DESIGN |  |  |  |  |  |  |  |  |  |
| UI DESIGN |  |  |  |  |  |  |  |  |  |
| CODING |  |  |  |  |  |  |  |  |  |
| INTEGRATION AND TESTING |  |  |  |  |  |  |  |  |  |
| DOCUMENTATION |  |  |  |  |  |  |  |  |  |

# CHAPTER TWO: LITERATURE REVIEW

## 2.1 Introduction

Sugarcane farming and Technology has been here and actively improving for the past several decades there has been lots of research and solutions to the various challenges it is facing. This chapter therefore is aimed at exploring similar systems related to sugarcane farming and technology, brief descriptions, architectures and their implementations.

## 2.2 [FarmSoft packhouse processing software](http://farm-software.net/track-and-trace/)

The FarmSoft [packhouse processing software](http://farm-software.net/fresh-produce-software/) consolidates the entire fresh produce packing and processing enterprise into one easy to manage solution.  Managers can monitor the progress of orders, their fulfilment, & create work orders to deliver specific quality and specifications of produce for specific customer orders.

Packhouse supervisors and admin have all the documentation presented to them automatically when orders are ready to be shipped – ensuring that no one can ever forget to include a document with a shipment again.

Easily ensure standards are maintained with Quality control that standardizes quality tests, ensuring consistent and accurate classification of fresh produce, reducing incorrect categorization and presenting the opportunity to improve fresh produce handling processes. Pack shed / packhouse / factory managers can direct, order, and monitor work progress in real time, over multiple packhouses or sites if necessary.

Farmsoft packhouse processing software provides comprehensive labelling, inventory management, pallet control and other fresh produce tools to make every day business management easier(Software, n.d.).

. FarmSoft packhouse processing software is a good system in place but it cannot fit specifically to every company’s culture and their way of doing it, that`s it is more generalized hence specificity cannot be achieved.

## 2.3 Foods and Inns (Chittoor Division)

Foods & Inns is located in Chittoor in the state of Andhra Pradesh in the Southern part of India. The company is a leading producer of fruit pulp and is part of the SUSBIZ project on the recommendation of its Danish customer Orana.

The vast majority of the workforce at Foods and Inns is employed indirectly through contractors. The contract workers come every season; some of them are hired locally, but most are brought in from neighboring states, e.g. Tamil Nadu,

Foods & Inns is fully operational only for 3-4 months between April and June as the activities are dependent on the availability of mangoes. The operations begin with the purchase of fruits from the open market. The fruits are then received at the factory, weighed and checked for quality, and sorted to ensure uniform exposure to air to facilitate ripening and to prevent the fruits from rotting (Pradesh, Foods, & Nadu, 2009).

Foods and Inns is a good system in place but it cannot fit specifically to every companies’ culture and their way of doing it, thus it is more generalized hence specificity cannot be achieved.

## 2.4 Fair Trade Enterprises Ltd (TFE)

It’s a duly registered Social Enterprises based in Kenya, are a licensed Fresh Produce Exporter specializing in exporting French Beans, Snow Peas, Sugar Snap, Garden Peas, Avocados and Mangoes. They employ fair trade principles in their trading endeavors and their vision is to promote sustainable development in rural areas through Fair Trade farming and procurement of fresh horticultural produce from small scale farmers.

The company has its own farms in strategic localities and also works with approximately 100 contracted small-scale farmers. Their export targets per annum are approximately 600 tons of fresh produce in both loose and pre-pack. They have curved their own niche in the export trade as they seek to eliminate unfair trade practices by providing a win-win situation for both farmers and importers (Redfern & Snedker, n.d.).This company has a system in place for their fruit farming business but it is more bookkeeping and manual taking of records

## 2.5 Case 4: PepsiCo

PepsiCo is an Indian based company formed over 2 decades ago. It​ has been combining deep insights into Indian farming with its global technological expertise to transform the lives of farmers. PepsiCo is a non-profit organization​ ​that supplies smallholder farmers in India with asset-based financing and agriculture training services to reduce hunger and poverty.

Its model of partnership with farmers and currently works with over 24,000 happy farmers across nine states through the crop lifecycle by providing new varieties, technologies and sustainable farming practices. In PepsiCo, farmers truly have a friend and development partner. The association with PepsiCo India has not only raised the incomes of small and marginal farmers, but also their social standing. They have successful applied technology to its activities making farmers happy. Using a market-based approach, PepsiCo facilitates activities and transactions at various levels of the farming value chain, including seed sourcing and market support.

Her customer engagement team uses SMS to ensure everyone in the field stays connected. When a farmer makes a payment on her loan, she is sent a receipt via text message. When field officers are out in the field, texts keep them up-to-date on PepsiCo activities and let them know about important interdepartmental memos.

They often use SMS technology for their activities that is using the client database, the team prepares an Excel workbook based on the content of the message being sent. For example, in the client database, there are farmers who have received solar lights and those who haven't. When the team needs to send an SMS about solar lights, they will build an Excel workbook of only farmers who have received solar lights.

Next, two people from the customer engagement team double check the recipient list. If the list in the workbook is correct, it is sent to the external quality control team and the message requestor to triple check. Errors are corrected, and once everyone has agreed, the message is sent out.(*Annual Report*, n.d.)

It is a good system of fruit farming but it is specialized to the India farmers, it knows their needs.

## 2.6 Summary

With the above case scenarios and the researchers above, it vivid that technology and applications of ICT in sugarcane farming and processing is taking all, some are yet to implement like Fair Trade Enterprises. Some like [FarmSoft packhouse processing software](http://farm-software.net/track-and-trace/) is doing well but it is more general, it cannot easily fit to specificity of a given company in this case Transmara Sugarcane Processing company needs a tailor made one, unique to its culture and day to day activities.

Working on implementing a unique system tailored to Transmara Sugarcane Processing company to allow them streamline their day to day activities of sugarcane farming and processing.

# CHAPTER THREE: METHODOLOGY

## Introduction.

This introduces preferred methodology of a model/framework under which the proposal will be developed. It addresses at least the following areas such as the exact techniques used to collect facts and data, tools used to analyze the data and the processes, tools to implement and test the system and lastly time schedule and project cost.

The methodology preferred is waterfall model.

## WATERFALL MODEL

### DIFFERENT PHASES OF WATERFALL MODEL

The classical waterfall model is intuitively the most obvious way to develop software. Though the classical waterfall model is elegant and intuitively obvious, it is not a practical model in the sense that it cannot be used in actual software development projects. Thus, this model can be considered to be a theoretical way of developing software. But all other life cycle models are essentially derived from the classical waterfall model. Classical waterfall model divides the life cycle into the following phases:

1. Feasibility Study
2. Requirements Analysis & Specification
3. Design
4. Coding & Unit Testing
5. Integration & System Testing
6. Maintenance

### 3.1 Feasibility Study

The feasibility study is the important step in any software development process. This is because it makes analysis of different aspects like cost required for developing and executing the system, the time required for each phase of the system and so on. If these important factors are not analyzed then definitely it would have impact on the organization and the development and the system would be a total failure. So, for running the application and the organization successfully this step is a very important step in a software development life cycle process.

By making analysis with the requirement of the organization it would be possible to make a report of identified area of problem. By making a detailed analysis in this area a detailed document or report is prepared in this phase which has details like project plan or schedule of the project, the cost estimated for developing and executing the system, target dates for each phase of delivery of system developed and so on. This phase is the base of software development process since further steps taken in software development life cycle would be based on the analysis made on this phase and so careful analysis has to be made in this phase.

Though the feasibility study cannot be focused on a single area some of the areas or analysis made in feasibility study is given below. But all the steps given below would not be followed by all system developed. The feasibility study varies based on the system that would be developed.

* Feasibility study is made on the system being developed to analyze whether the system development process require training of personnel. This help in designing training sessions as required in later stage.
* If the system developed has scope for expanding or scope for switching to new technology later if needed in ease. In other study is made to find the portability of the system in future.
* The above feasibilities are analysis which helps in development of the system. But the scope of feasibility study does not end with this. Analysis or feasibility study also includes the analysis of maintenance stage. In other words, feasibility study is made to analyze how one would maintain the system during maintenance stage. This helps in planning for this stage and also helps in risk analysis. Also, the analysis helps in making analysis about what training must be given and how and what all documents must be prepared to help users and developers to face maintenance phase.

**Activities undertaken during feasibility study: -**

The main aim of feasibility study is to determine whether it would be financially and technically feasible to develop the product.

An understanding of what is required to be done by visiting the client side is developed the client in question is company. Study different input data to the system and output data to be produced by the system. The study also determines what kind of processing is needed to be done on these data and they look at the various constraints on the behavior of the system. After an overall understanding of the problem different solutions that are possible to it are investigated. Then examine each of the solutions in terms of what kind of resources required, what would be the cost of development and what would be the development time for each solution. Based on this analysis the best solution is picked and determine whether the solution is feasible financially and technically. Finally, the budget of the client who is the customer is examined whether it will meet the cost of the project.

### 3.2 Requirements Analysis & Specification

Activities undertaken during requirements analysis and specification: -

The aim of the requirements analysis and specification phase is to understand the exact requirements of the customer and to document them properly. This phase consists of two distinct activities, namely Requirements gathering and analysis, and Requirements specification.

### 3.3 Requirements Gathering.

The goal of the requirements gathering activity is to collect all relevant information from the customer regarding the product to be developed. This is done to clearly understand the customer requirements so that incompleteness and inconsistencies are removed.

The requirements analysis activity is begun by collecting all relevant data regarding the product to be developed from the users which includes the company and farmers who are involve in farming. This is best done through interviews and discussions. For example, to perform the requirements analysis of the processing required by the company, interview all the staff of the company to ascertain their requirements. The data collected from such a group of users usually contain several contradictions and ambiguities, since each user typically has only a partial and incomplete view of the system. Therefore, it is necessary to identify all ambiguities and contradictions in the requirements and resolve them through further discussions with the customer. After all ambiguities, inconsistencies, and incompleteness have been resolved and all the requirements properly understood, the requirements specification activity can start.

**Requirements specification.**

During this activity, the user requirements are systematically organized into a Software Requirements Specification (SRS) document. The customer requirements identified during the requirements gathering and analysis activity are organized into an SRS document. The important components of this document are functional requirements, the nonfunctional requirements, and the goals of implementation.

### 3.4 Design

Activities undertaken during design: -

The goal of the design phase is to transform the requirements specified in the SRS document into a structure that is suitable for implementation in some programming language. In technical terms, during the design phase the software architecture is derived from the SRS document. Two distinctly different approaches are available: the traditional design approach and the object-oriented design approach.

**Traditional design approach.**

Traditional design consists of two different activities; first a structured analysis of the requirements specification is carried out where the detailed structure of the problem is examined. This is followed by a structured design activity. During structured design, the results of structured analysis are transformed into the software design.

**Object-oriented design approach.**

In this technique, various objects that occur in the problem domain and the solution domain are first identified, and the different relationships that exist among these objects are identified. The object structure is further refined to obtain the detailed design.

### 3.5 Coding and Unit testing.

Activities undertaken during coding and unit testing: -

The purpose of the coding and unit testing phase (sometimes called the implementation phase) of software development is to translate the software design into source code. Each component of the design is implemented as a program module. The end-product of this phase is a set of program modules that have been individually tested. During this phase, each module is unit tested to determine the correct working of all the individual modules. It involves testing each module in isolation as this is the most efficient way to debug the errors identified at this stage.

### 3.6 System Testing.

Activities undertaken during integration and system testing: -

Integration of different modules is undertaken once they have been coded and unit tested. During the integration and system testing phase, the modules are integrated in a planned manner. The different modules making up a software product are almost never integrated in one shot. Integration is normally carried out incrementally over a number of steps. During each integration step, the partially integrated system is tested and a set of previously planned modules are added to it. Finally, when all the modules have been successfully integrated and tested, system testing is carried out. The goal of system testing is to ensure that the developed system conforms to its requirements laid out in the SRS document. System testing usually consists of three different kinds of testing activities:

**α – Testing:**  It is the system testing performed by the development team.

**β – Testing:** It is the system testing performed by a friendly set of customers.

**Acceptance testing:** It is the system testing performed by the customer himself after the product delivery to determine whether to accept or reject the delivered product. System testing is normally carried out in a planned manner according to the system test plan document. The system test plan identifies all testing related activities that must be performed, specifies the schedule of testing, and allocates resources. It also lists all the test cases and the expected outputs for each test case.

### 3.7 Maintenance.

Activities undertaken during maintenance: -

Maintenance of a typical software product requires much more than the effort necessary to develop the product itself. Maintenance involves performing any one or more of the following three kinds of activities:

**Corrective maintenance** - correcting errors that were not discovered during the product development phase.

**Perfective maintenance** - Improving the implementation of the system, and enhancing the functionalities of the system according to the customer’s requirements.

**Adaptive maintenance-** porting the software to work in a new environment. For example, porting may be required to get the software to work on a new computer platform or with a new operating system.

## 3.8 Conclusion

At the starting of the feasibility study, we try to understand what the actual problem is by visiting the client side. At the end of that phase they pick the best solution and determine whether the solution is feasible financially and technically.

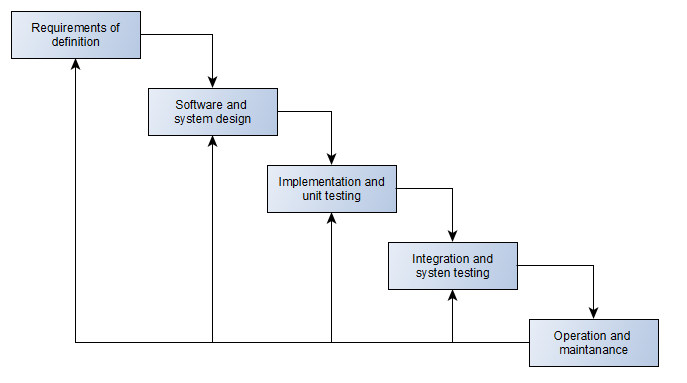
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Figure 1. Waterfall Model