

**SCHOOL OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY**

**DEPARTMENT OF INFORMATION TECHNOLOGY**

**PROJECT TITLE:**

**DUMP HERE**

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**REGISTRATION NUMBER: C025-01-0947/2015**

**MONTH OF SUBMISSION: JUNE 2018.**

**DECLARATION**

I hereby declare that this proposal 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 at any other institutions or university by any other person

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**Abstract**

One of the stages in waste management is waste collection, and as global waste generation continues to increase year after year, the need for better and more efficient waste disposal, collection, recycling and management methods become more evident and urgent. Automated forms of waste collection are very expensive and far from being affordable in many low income communities, especially in the so called developing countries. To solve this dilemma, mobile technologies are considered for use in waste collection, recycling and disposing as a prospective means of improving waste management.

This project is an attempt to proffer a generic but yet concrete and efficient solution to the problems associated with waste collection, recycling and disposal by connecting the garbage collector and the recycling companies and disposal companies via the application of mobile technologies, firstly, by tackling the problems individually in form of subsystems and then, through integration of the subsystems together.

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# **CHAPTER 1. INTRODUCTION**

# 1.1 Background

One of the problems that have plagued mankind for a long time is improper waste disposal. Despite many initiatives taken to resolve the problems associated with wastes, waste generation and accumulation has continued to increase yearly. Garbage , which comprises of all sorts of discarded ‘everyday’ items like left-over food, containers, papers, faulty and no repairable electronic appliances from households, institutions and industrial sources. In the Kenya alone, there is documented record of unprecedented waste disposal and accumulation in the last half decade, and this is attributed partly to increase in population and waste per capita generation. The growth rate of waste in China over the last 20 years has exceeded that of other nations, in fact it is projected that China would produce twice as much waste as the USA by 2030, with over 1.5 billion tons of waste generated in urban areas alone yearly. The situation in the Kenya is not any different too. To reduce the effect of waste production on the environment, health, and quality of life (as they are all interconnected), different forms of waste management are being proposed

As defined in the ‘Waste framework Directive 75/442/EEC’, “Waste management is the collection, transportation, recovering and disposal of waste along with the supervision of such operations and after-care of the disposal sites”. Although definitions of waste management and the management practices may differ between rural and urban areas, residual and industrial regions, as well as between the so called developing and developed countries, they all include the component of waste collection which is an important part of the management process . Waste collection is the premier phase of waste management, involving the collection and transferring or transporting of waste from the site of generation to the treatment or disposal area. Typically during waste collection, the waste is usually put in the allocated container or bin on the collection day, then the waste workers move from house to house collecting the waste bins and emptying them into their waste collection vehicle or dustcart.

Kenya has a growing human population and an increase in urbanization. The urban centers have attracted a large population of informal settlements dwellers and the middle class. This urbanization and increased affluence has led to increased waste generation and complexity of the waste streams. This trend is compounded by growing industrialization of the Kenyan economy. Despite the existence of laws and policies guiding waste management, weak implementation and poor practices have led to towns and cities being overwhelmed by their own waste, consequently affecting public health and the environment.

Over the years waste management has been the mandate of the local Authorities. However, most local authorities did not prioritize the establishment of proper waste management systems and hence allocated meager resources for its management. Further the councils lacked technical and institutional capacities to manage waste. This has led to the current poor state of waste management which includes indiscriminate dumping, uncollected waste and lack of waste segregation across the country.

Most towns and cities have inefficient waste collection and disposal systems. For instance, a study done for Nairobi indicates that about 30-40% of the waste generated is not collected and less than 50% of the population is served. (Habitat s). In Nakuru, it’s estimated that 45% of the waste generated is collected and disposed at Giotto Dumpsite, 18% is recovered and the rest accumulate in the environmental.

The overall goal of urban solid waste management is to collect, treat and dispose of solid waste generated by all urban population groups in an environmentally and socially satisfactory manner using the most economical means available. Local governments are usually authorized to take responsibility for providing solid waste management services and most local government laws give them exclusive ownership over waste once it has been placed outside a home or establishment for collection. As cities grow economically, business activity and consumption patterns drive up solid waste quantities. At the same time, increased traffic congestion adversely affects the productivity of the solid waste fleet. Productivity loss is exacerbated by longer hauls required of the fleet, as open lands for disposal are further and further away from urban centers. The challenge is to rationalize worker and vehicle performance, while expanding services to a growing urban population.

In developing countries, it is not uncommon for authorities to spend 20-50 percent of their available recurrent budget on solid waste management. Yet, it is also common that 30-60 percent of all the urban solid waste in developing countries is uncollected and less than 50 percent of the population is served. In some cases, as much as 80 percent of the collection and transport equipment is out of service and in need of repair or maintenance. In most developing countries, open dumping with open burning are the main methods of waste disposal.

Today, world urban areas which are centers of economic development have become pollution hotspots. The UN conference on Sustainable Development at Rio de Janeiro 1992 popularly known as The Earth Summit called on countries to support social and economic development that takes into account environmental concerns. Heads of state from different countries pledged political support for the agenda and Kenya was well represented.

For Kenya, major gains have been made at policy level and enactment of legislations such as EMCA 1999 which enhanced formation of regulatory institutions like NEMA, ensures that precautionary principles are applied to mitigate or minimize negative impacts on the environment due to implementation of major projects. Some of these regulatory measures have been applied in many fields such as in the construction industry, manufacturing, mining and infrastructure development. On matters of waste management, a number of regulations have been formulated by different institutions and applied sparingly thus the impacts have been so minimal. Many municipalities, cities and towns continue to grapple with the problem of Solid Waste Management and the Kerugoya town in Kenya is no exception.

Looking at the vast number of mobile technologies available, the speed of development and the convenience their application is bringing to many different fields, coupled with the success reports of several solved refuse management problems, the world of possibility and prospective efficacy of the mobile technology will be further explored. This is intended to be achieved in this project by starting with a comparative analysis of their strengths and weaknesses and concluded by providing a generic solution to waste collection. Now having understood that some garbage can be recycled while else the rest can be properly disposed, the proposed approach entails creating systems that will provide a platform where the garbage collectors can post a picture, type and the payment details of the garbage at hand, the system will detect the location using GPS technology and broadcast this details to any recycling or disposing companies in the system ,any interested party can call pay via the system and pick the garbage. For disposal purposes the system will auto-detect any nearby registered garbage disposal point.

# 1.2 Problem Statement

It is significant to appreciate the fact that in Kenya as well as other developing countries, solid waste in mainly collected and disposed in open dumpsites. It is also important to note that the role of waste management has been relegated to Councils which are the local authorities for urban areas. With increasing urban populations, more waste is generated which strains existing capacity of local authorities to manage. Waste management is not a priority area among the urban poor dwellers, given that they have other urgent needs to address; poverty. Furthermore, in developing countries, waste handling is considered “below acceptable level of dignity”. Habitat, (1994). Poorly maintained equipment and inefficiencies in road design and urban settlement in informal settlements also impedes effective waste management.

Additionally, lack of sufficient funds to finance awareness campaigns to encourage waste minimization at source along with minimal workforce impedes municipalities’ efforts to achieve their vision. Other obstacles are poor cooperation between the public and private sectors, and inadequate coordination among stakeholders. Solid waste management is also a non-excludable good as it is difficult to beprotected by the general market forces. One way of managing non-excludablegoods or services is either by the internalization of costs (by levying charges forthe use of the services) or by following a command and control policy or acombination of both. Government intervention is necessary for this. Therationality of the government’s intervention can be judged when the costs ofproducing the good or service decline as more of the good or service isproduced and when production or use of the good or service results in"externalities" such as environmental pollution (McCauley and Walls, 1995; Jenkins, 1993). Thus, the major problem for solid waste management is theinternalization of costs of waste disposal.

The impacts of waste to the environment, especially non-biodegradables such as plastics cannot be overstated. Land quality is compromised by presence of wastes. Both terrestrial and marine lives are threatened by plastic wastes. Blocked drainage systems and overflowing/burst sewers are sources of diseases that wreak havoc to human health with abandon. The consumer is paying heavy medical bills for diseases which would have been kept at bay if wastes were properly disposed.

Given that government has a duty to protect its people; it has made efforts at policy level to safeguard our living environments together with our health. Nongovernmental organizations and individuals too have made attempts to manage waste on ground. So far, pockets of achievements have been made particularly in recycling some forms of waste; however, with accelerated development, the burden of waste management continues to swell proportionately in urban areas.

This study will evaluate attempts made by various institutions and individuals to address the problem of waste in urban areas, their successes and challenges and ultimately propose means and ways of sustainably addressing the problem in Kerugoya town.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name of town | Waste generated (tons/day) | % Waste collected | % waste Recovery | Uncollected waste |
| Nairobi | 2400 | 80% | 45% | 20% |
| Nakuru | 250 | 45 % | 18% | 37% |
| Kisumu | 400 | 20% | Unknown | Unknown |
| Thika | 140 | 60% | 30% | 40% |
| Mombasa | 2200 | 65% | 40% | 35% |
| Eldoret | 600 | 55% | 15% | 45% |

Table 1: Summary of wastes generation, collection and recovery status in major towns

Waste transportation is largely rudimentary using open trucks, hand carts, donkey carts among others. These poor transportation modes have led to littering, making waste an eye-sore, particularly plastics in the environment. However, some counties have adopted appropriate transportation trucks as stipulated by the Waste Management Regulations. In addition County Governments have privatized waste transportation through Private Public Partnership arrangements.

Disposal of waste in the country remains a major challenge as most of the counties lack proper and adequate disposal sites. The few towns that have designated sites practice open dumping of mixed waste as they lack appropriate technologies and disposal facilities. In an effort to address this situation NEMA directed all county governments to designate areas of waste disposal and undertake basic actions to manage the sites including fencing, manning and weighing of the waste

The traditional waste collection method had always been sufficient for collecting waste, but with continuous increase in the amount of waste generated and the number of people needing waste collection services this method has lost its efficiency and become rather tedious to manage. Some of the areas where problems have been encountered include report filling, clients and billing management, route scheduling and uncollected waste (possibly because the waste was not ready at the collection time or probably because it was unpicked by the waste workers). These problems and others have inspired other means of collection, such as Automated Vacuum Collection System or Pneumatic Refuse Collection System. Although the automated vacuum collection system is fully automated, requires less manpower, provides more favorable working condition for the refuse workers and is faster, it requires a very huge capital to procure, install and maintain [8], leaving it out of option for most resource-limited countries, small regions or areas and old communities.

# 1.3 Objectives

**MAIN OBJECTIVE**

The major purpose of project is to build a system that will help connect the garbage collectors, recycler companies and the companies managing the legal disposal points.

The garbage collectors can post the picture, type, weight/number of bags and payment details for any interested recycler companies to pick .

If the garbage isn’t recyclable then the garbage collectors can look for a nearby disposal point.

The proposed project Encourages and promote the development and progress of Online waste Collection system towards achieving in the field of computer sciences and technology for Theater applications both for recycling and disposal of waste in the urban.

The system will help to provide another way for the customer to giving the recyclable-waste material. The system will be an Android Internet based application that can be accessed throughout the Net and can be accessed by anyone who has a net connection. It is an automatic system, where we will automate the selling the waste material and enquiries about which waste equipment are collection.

After inserting the data to database, customers need not to worry about the orders received through the system and hence reduces the manual labor. One of the best features of the system will be to find any registered companies in the city. The system will also be used to identify any disposal point around

**SPECIFIC Objectives**

* To provide anytime anyplace service for the customer.
* To reuse recyclable waste material by recycling or deploy.
* To decrease the recyclable waste material from household.
* To provide a way of online buying of recyclable waste materials
* To provide awareness about any around legal disposal points

# 1.4 Time and place of Study

Kerugoya town is considered to be the largest town in Kirinyaga county with approximately 57 000 residents and the number is ever increasing .Garbage management is one of the major problem in this town, around the streets of the town you oftenly find the “*don’t dump here*” signs and at its outskirts you come across huge hills of accumulated garbage. With the ever increasing population we need an efficient way to manage the garbage either by recycling or dumping properly.

# 1.5 Scope And Limitations

The scope of the project is to provide approaches and strategies which have proved to be the suitable when accessing the recyclable-waste system of the defined region. This collection will reduce the e-waste from the household, company, industries, city, etc. The Environment pollution will reduce and the electronic, metallic and plastic waste will recycle or deployed.

The fundamental aims of the ***DUMP HERE***project are the control and reduction of hazardous waste and recycling where possible. This way we could prevent any disease associated with improperly dumped garbage.

This technique could eliminate waste disposal costs, reduce raw material costs and provide income from a salable waste.

**LIMITATIONS**

* Users need to be connected to the internet to access the services
* Wrong inputs by the user may cause the system to give the wrong information

# 1.6 Definition of Key terms

**EMCA**- Environmental Management and Coordination Act

**NEMA**- National Environment Management Authority

**NCC**- Nairobi City Council

**MSW** - Municipal Solid Waste.

**Local Authorities**- Councils charged with provision of services to urban areas.

They are classified into City, Municipality, Town and County councils.

**SWM** – Solid waste management

**Waste**- anything that the holder discards, intends to discard or is required to be discarded or di posed by the provisions of the Law.

**Solid Waste**- generally defined as hazardous and non-hazardous industrial, commercial and domestic refuses such as organic trash, institutional garbage, street waste, construction rubbles

**Stakeholders**- those who participate in decision making process including those potentially affected by the decision. It also includes those people who have specific concerns or roles to play in the decision of managing waste.

# **CHAPTER 2.LITREATURE REVIEW**

# 2.1 Introduction

This chapter reviews the literature of some of the municipalities in the world o strategies adapted to address the problem of waste management in urban areas. Further, an in-depth analysis of the strategies is undertaken to determine their effectiveness with an objective of coming up with the best practice that can be proposed for Kerugoya Town.

# 2.2 Country Situation Review

In most African cities, solid waste management policies and programmes were formulated and implemented by government agencies without significant public participation. This was the case until around 1980s. Political and social changes including the rise of civil society, NGOs and organized community based groups CBOs have fostered an increased awareness of environmental issues among the general public. The hierarchy ranks of participatory waste management methods prescribe that it is best to reduce the generation of waste at the source, then recycle and compost what cannot be reduced, and finally incinerate or landfill the remainder. Proposals to take waste management at consumer level have been made such as conducting public awareness and education at all levels of society. Further, enhancing waste management by starting to consider waste as an asset have been proposed. In the case of Rwanda’s fiscal decentralization policies USAID (2004), a lot has been achieved in Waste management. Some of the achievements outlined include; three associations in pilot districts in Kigali routinely collecting refuse from some 10,000 households, while collecting higher tariffs in association with City of Kigali, associations preparing and selling compost and fuel briquettes using recycled materials, decrease in solid waste sent to the landfill, expected decrease in deforestation as sale of cheaper briquettes reduces demand for charcoal The associations are on verge of achieving sustainability due to increased revenues from tariffs and sale of new products(USAID, 2004).

Waste Management challenges in Kenya’s urban areas are not different from other towns in Africa.

The ever increasing population in Nakuru town which has led to an increasing dumping of waste has made the town lose its former reputation of being the “cleanest town in East Africa” (Karanja et al, 2005). The demand for provision of basic services especially water supply, garbage collection and sanitation far exceeds the available supply due to rising urban population and the number of informal settlements. A number of actors need to come together to combine resources in order to address urban challenges including waste management (Karanja et al, 2005).

Inorganic waste in Nairobi is comprised of licensed waste dealers who buy from large groups of unregistered individual waste pickers and neighborhood based itinerant waste traders who sell in bulk to large scale waste recyclers (Baud et al,

2004). According to Karanja et al, (2005) waste picking in Nairobi is split into street picking- mainly in small open city waste sites, streets and dustbins; and waste dump pickers- pickers that operate at large formal or informal dumpsites mainly Dandora dumpsite. 20% of pickers and Dandora reside at the dump itself and the streets are home to a significant number of pickers who utilize garbage as a source of cash and non-cash income. Pickers and dealers earning a living off the recovery and sell of recyclables at the Dandora dumpsite alone number over 2000 (Karanja et al, 2005).Some of the challenges affecting waste management in Nairobi include; lack of physical capacity to manage waste and financial limitations.

Issues of waste management in Kisumu city are not different from other cities and urban areas in Kenya. According to UN Habitat (2010), about 500 tonnes of waste is generated per day, out of which 20% is delivered to dumpsites. The city lacks comprehensive response to solid waste management. Coupled with this, there is poor attitude towards waste management and low capacity to offer waste services management at Municipal Council of Kisumu.

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# 2.3 Present approaches to waste management in Kenya.

# 2.3.1 Controlled Dumping

The sanitation policy recommends controlled dumping with cover as the preferred option for all small towns and rural areas. In practice however, there are few good examples. In most communities controlled dumping sites are located on river banks and in depressed areas such as in borrow pits, surface mining areas, ravines, old quarries and valleys. Generally the standard of operation and maintenance on these landfills is inadequate. There is often no mechanical equipment for spreading and compaction of waste which means little reduction in waste volumes. Fly and rodent control are often neglected and there are serious problems with littering (Mensah A et al 2005).

**Major Weaknesses for this system:**

* Only a few numbers of waste pickers are aware of this controlled dump site since it isn’t registered online.
* There is no link between the waste pickers and the dump site workers
* Doesn’t provide an efficient way of collection and transportation of waste

# 2.3.2 Local Authorities

* Local authorities in various urban areas are responsible to ensure proper storage, collection, transportation, safe treatment and disposal of solid waste in those towns/ cities. Their main responsibilities as regards solid waste management are:
* (a) Provision of services for collection, transportation, treatment and disposal;
* (b) Regulating and monitoring the activities of solid waste generators;
* (c) Regulation and monitoring of private companies engaged in solid waste management activities;
* (d) Formulation and enforcement of relevant laws and regulations;
* (e) Formulation and implementation of MSW policies (Nairobi City, 2005).

**Major Weaknesses for this system:**

* Due to failure of some of these authorities to carry out their responsibilities, residential associations have evolved in many middle and high-income areas to supplement waste management services. Currently, an estimated 200 registered resident associations are operating in Nairobi city, concerned, among others, in improving city cleanliness. They contract, organize, and monitor private collection services (UNEP, 2005). As a result, private companies have assumed more of these responsibilities in major towns. This also continues to be the case in the future. Hence, the envisioning of such systems as recycling and composting is deemed necessary, which could be essential in source-reduction of waste and could also generate revenues to cover their operation costs (Girum Bahri, 2005).

# 2.3.3 The National Environment Management Authority (NEMA)

NEMA was established under EMCA (1999) and became operational in July

2002. Its duties are supervising and co-coordinating all matters related to the environment and serving as the principal agency in the implementation of all policies relating to the environment in Kenya (NEMA, 2005). NEMA is growing stronger by the day as more resources are being set-aside by the government for its activities. One critical area of improvement is securing sufficient trained manpower; this aside, it is capable of implementing environmental policy interventions (Girum Bahri, 2005).NEMA gained its root after implementing the burn of the non-degradable plastics bags in the year 2017

**Major Weaknesses for this system:**

* Only a few numbers of waste pickers are aware of this controlled dump site since it isn’t registered online.
* There is no link between the waste pickers and the dump site workers
* Doesn’t provide an efficient way of collection and transportation of waste

# 2.3.4 Kenya National Cleaner Production Centre (KNCPC)

KNCPC is an autonomous non-profit institution established in July 2000 as a project of the United Nations Industrial Development Organization (UNIDO) and the Kenya Industrial Research and Development Institute (KIRDI) (KNCPC, 2004,p.1). The Centre is mandated to build national capacity in preventive environmental management tools through a number approaches comprising, among others, technical support, policy advice and cleaner technology transfer (KNCPC, 2004, p.4).

One of the ‘priority sub-sectors’ ear-marked by the Centre for cleaner production strategy and implementation is the plastic industry. To this end, KNCPC is working with concerned stakeholders, especially with the plastic manufacturers to come up with a lasting solution to the plastic waste management problem in Kenya (Girum Bahri 2005).

**Major Weaknesses for this system:**

* Only a few numbers of waste pickers are aware of this controlled dump site since it isn’t registered online.
* There is no link between the waste pickers and the dump site workers
* Doesn’t provide an efficient way of collection and transportation of waste

# **CHAPTER 3. METHODOLOGY**

# 3.1 Spiral Model

The spiral model combines the idea of iterative development with the systematic, controlled aspects of the waterfall model. This Spiral model is a combination of iterative development process model and sequential linear development model i.e. the waterfall model with a very high emphasis on risk analysis. It allows incremental releases of the product or incremental refinement through each iteration around the spiral.

# Spiral Model - Design

The spiral model has four phases. A software project repeatedly passes through these phases in iterations called Spirals.

# Identification

This phase starts with gathering the business requirements in the baseline spiral. In the subsequent spirals as the product matures, identification of system requirements, subsystem requirements and unit requirements are all done in this phase.

This phase also includes understanding the system requirements by continuous communication between the customer and the system analyst. At the end of the spiral, the product is deployed in the identified market.

# Design

The Design phase starts with the conceptual design in the baseline spiral and involves architectural design, logical design of modules, physical product design and the final design in the subsequent spirals.

# Construct or Build

The Construct phase refers to production of the actual software product at every spiral. In the baseline spiral, when the product is just thought of and the design is being developed a POC (Proof of Concept) is developed in this phase to get customer feedback.

Then in the subsequent spirals with higher clarity on requirements and design details a working model of the software called build is produced with a version number. These builds are sent to the customer for feedback.

# Evaluation and Risk Analysis

Risk Analysis includes identifying, estimating and monitoring the technical feasibility and management risks, such as schedule slippage and cost overrun. After testing the build, at the end of first iteration, the customer evaluates the software and provides feedback.

The following illustration is a representation of the Spiral Model, listing the activities in each phase.

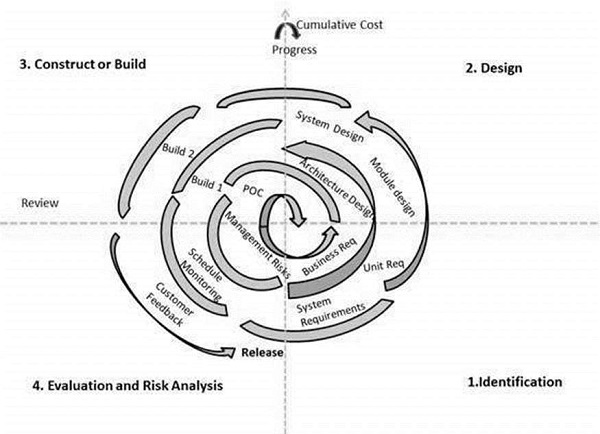


FIG1:Spiral Model

Based on the customer evaluation, the software development process enters the next iteration and subsequently follows the linear approach to implement the feedback suggested by the customer. The process of iterations along the spiral continues throughout the life of the software.

# Spiral Model Application

The Spiral Model is widely used in the software industry as it is in sync with the natural development process of any product, i.e. learning with maturity which involves minimum risk for the customer as well as the development firms.

The following pointers explain the typical uses of a Spiral Model −

* When there is a budget constraint and risk evaluation is important.
* For medium to high-risk projects.
* Long-term project commitment because of potential changes to economic priorities as the requirements change with time.
* Customer is not sure of their requirements which is usually the case.
* Requirements are complex and need evaluation to get clarity.
* New product line which should be released in phases to get enough customer feedback.
* Significant changes are expected in the product during the development cycle.

# Spiral Model - Pros and Cons

The advantage of spiral lifecycle model is that it allows elements of the product to be added in, when they become available or known. This assures that there is no conflict with previous requirements and design.

This method is consistent with approaches that have multiple software builds and releases which allows making an orderly transition to a maintenance activity. Another positive aspect of this method is that the spiral model forces an early user involvement in the system development effort.

On the other side, it takes a very strict management to complete such products and there is a risk of running the spiral in an indefinite loop. So, the discipline of change and the extent of taking change requests is very important to develop and deploy the product successfully.

The advantages of the Spiral SDLC Model are as follows −

* Changing requirements can be accommodated.
* Allows extensive use of prototypes.
* Requirements can be captured more accurately.
* Users see the system early.
* Development can be divided into smaller parts and the risky parts can be developed earlier which helps in better risk management.

The disadvantages of the Spiral SDLC Model are as follows −

* Management is more complex.
* End of the project may not be known early.
* Not suitable for small or low risk projects and could be expensive for small projects.
* Process is complex
* Spiral may go on indefinitely.
* Large number of intermediate stages requires excessive documentation.

# 3.2 Requirements

**Front End & Back End**

Front End Tools :

* Java,
* Firebase,
* XML ,
* Camera 2 API

Back End Tools :

* SQLite,
* SQLite Server

**Hardware Requirements**

|  |  |
| --- | --- |
| RAM | 512 MB |
| ROM | 20MB |
| Processor | 0.8GHz |
| Camera | 2.0 MP |

*Table 1.5.1: Hardware requirements*

Software Requirements

|  |  |
| --- | --- |
| IDE | Android Studio 3.0.1 |
| Development Platform | Kali Linux 2018.2 |
| Minimum Android | Android 4.0(Kit Kat) |
| GPS | Enabled |
| Internet | Enabled |
|  |  |

*Table 1.5.2: Software Requirement* s

# 3.3Evaluation and Risk Analysis:

 Risk Analysis includes identifying, estimating, and monitoring technical feasibility and management risks, such as schedule slippage and cost over-run. After testing the build, at the end of first iteration, the customer evaluates the software and provides feedback.

# 3.4 Project Planning

The purpose of project planning is to identify the scope of the project, estimate the work involved. Project planning begins with requirements that define the software to be developed. The project plan is then developed to the tasks that will lead to completion. Planning is the most important matter in any kind of work whether it is computerized or not. While for computerized system development, planning is very first and most important requirement.

I have planned for my project as per follows:

* Very first after deciding the topic for the project, I started to collect all the related information for the project.
* By collecting information, I decided about that and project is divided into specific time duration. So, timing is also most necessary requirement for planning.
* I also found different resources for gathering information about diamonds and all related tasks. And at last I will start to work as per the planning and all tasks are completed one by one.

#### Gant chat

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DURATION | May | June | July | August | September | October | November | December |
| TASK |
| FEASIBILITY STUDY |  |  |  |  |  |  |  |  |
| REQUIREMENTS  IDENTIFICATION |  |  |  |  |  |  |  |  |
| RESEARCH |  |  |  |  |  |  |  |  |
| REQUIREMENTS  ANALYSIS |  |  |  |  |  |  |  |  |
| DESIGN |  |  |  |  |  |  |  |  |
| DEVELOPMENT AND CODING |  |  |  |  |  |  |  |  |

FIG2: *Gnat chat*

# 3.5 System Analysis

# 3.5.1 Existing System

The existing system has one ways of waste collection system:

The waste collection system is offline which is done by the government, like the waste material with all the mixture with solid and liquid waste. The waste is send to the garbage factories for the deployment of the waste.

# 3.5.2 Weakness of Current System

The waste collection system is offline which is done by the government. The electronic and electric waste are deploy and recycling is less than 30%, the awareness between the public is none by the waste collection in the household. The proposed new system is online hence accessible everywhere any time and creates a direct link between the garbage collectors, recycler companies and dump sites workers

# 3.5.3 Requirement of New System

The waste collection system is now on online waste collection website. The public get the information about the e-waste material and aware about the waste. We will collect the household electronic and electric equipment form the public and which will recycle or deploy waste. The recycling waste will be used in the other equipment’s, and industries can use the recycling equipment’s for new material, etc.

# **3.6** Cost Estimation

The Constructive Cost Model (COCOMO) is algorithmic software cost estimation Model developed by Barry W. Boehm. The model uses a basic regression formula with parameters that are derived from historical project data and current as well as future project characteristics. Basic COCOMO computer software development effort (and cost) as a function of program size. Program size is expressed in estimated thousands of source lines of code

(SLOC, KLOC).

**COCOMO applies to three classes of software projects**:

* Organic projects - "small" teams with "good" experience working with "less than rigid" requirements
* Semi-detached projects - "medium" teams with mixed experience working with a mix of rigid and less than rigid requirements
* Embedded projects - developed within a set of "tight" constraints. It is also combination of organic and semi-detached projects.(hardware, software, operational, ...)

Intermediate COCOMO computes software development effort as function of program size and a set of "cost drivers" that include subjective assessment of product, hardware, personnel and project attributes.

### Budget

|  |  |  |
| --- | --- | --- |
|  | **Item** | **Price** |
|  | Computer | 50,000 |
|  | Internet | 10,000 |
|  | Research | 42,000 |
|  | Printing and binding | 5,000 |
|  | Software Licences | 20,000 |
| **Total** | **137,000** |

Table 1 stipulated budget

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