

# GLADERCOM FREIGHT (PVT) LTD CONSIGNMENT TRACKING SYSTEM



**SHARON MUTSA**

**R154503J**

# GLADERCOM FREIGHT (PVT) LTD CONSIGNMENT



By

**SHARON MUTSA**

**R154503J**

Submitted in partial fulfilment of the requirements for the degree of

**BSc Honours Information Systems**

Department of Computer Science and Information Systems in the

Faculty of Science and Technology at the

**Midlands State University**

**Gweru**

**May 2019**

Supervisor:

**Mr. F. Madzikanda**

# ABSTRACT

The Gladercom Freight Consignment Tracking System is a web based progressive application that allows consigners to book and pay for shipment, and track it till it reaches consignee's destination. The consigner gains access to the system by using login details received via email. The administrator is responsible for viewing paid consignment that is awaiting delivery, drivers that have not been assigned delivery duties and assigning those drivers to deliver consignment. The driver acquires delivery details on the system and after delivery, confirms that consignee has received the goods. The administrator is also responsible for responding to client queries on the system. This system was developed as a result of problems associated with the manual system which are; physical record keeping was cumbersome and led to data loss, long queues for shipment booking and payment, unending phone calls from clients of shipment location, decentralized information sources. Interviews, questionnaires and observations are the information gathering methodologies which were used to acquire information pertaining to the old system. Inhouse development was selected among the evaluated alternatives as it proved to be the most appropriate. The tracking system proved to be feasible after a feasibility study was carried out in these areas, technological, operational, social and economic. The system was developed using PHP, XAMPP, Bootstrap, JavaScript and MySQL. Testing was done through unit testing, integration testing, system testing, acceptance testing, verification and validation, leaving the stem bug free. The system will be mostly maintained using adaptive maintenance, although corrective and perfective maintenance will be used when need arises. In future, there is need to include warehousing and customs clearance on the system so as to improve customer experience and consolidate business processes. Customer suggestions regarding updates should be taken into consideration.

# DECLARATION

I, **Sharon Mutsa**, hereby declare that I am the sole author of this dissertation. I authorize the **Midlands State University** to lend this dissertation to other institutions or individuals for the purpose of scholarly research.

Signature: ..... Date: .....

# APPROVAL

This dissertation, entitled “**Gladercom Freight (Pvt) Ltd Consignment Tracking System**” by **Sharon Mutsa** meets the regulations governing the award of the degree of **BSc Honors Information Systems** of the **Midlands State University**, and is approved for its contribution to knowledge and literary presentation.

Supervisor’s Signature: .....

Date: .....

# ACKNOWLEDGEMENTS

It was virtually impossible to have done his dissertation without any assistance, and for that reason I would like to thank to thank everyone who played a role in helping me complete this part o my final semester. Special mention goes to my supervisor, Mr. F Madzikanda who tirelessly directed me using his vast amount of experience he has gained over the years. I am indebted to him as he took his time to assist me. I owe the following my heartfelt gratitude for their unwavering support;

Mr. F Madzikanda (my supervisor)

Gladercom Freight (Pvt) Ltd

Midlands State University

Classmates and friends

Mutsa family

The above mentioned made it possible for me to develop the Tracking System and for that I am grateful.

# **DEDICATION**

This dissertation is dedicated to the Mutsa family for their unwavering support that is highly appreciated.

# TABLE OF CONTENTS

## Contents

ABSTRACT.....	i
DECLARATION .....	ii
APPROVAL .....	iii
ACKNOWLEDGEMENTS.....	iv
DEDICATION.....	v
TABLE OF CONTENTS.....	vi
LIST OF ACRONYMS .....	xi
LIST OF FIGURES .....	xii
LIST OF TABLES.....	xiv
LIST OF APPENDICES.....	xv
Chapter 1: Introduction.....	1
1.1 Introduction.....	1
1.2 Background of the Study .....	1
1.2.1 Background of the Organization.....	2
1.2.2 Organizational Structure .....	2
1.2.3 Vision.....	3
1.2.4 Mission Statement.....	3
1.2.5 Core Values.....	3
1.3 Problem Defination.....	3
1.4 Aim .....	4
1.5 Objectives .....	4
1.6 Instruments and Methods.....	4
1.7 Justification and Rationale.....	5



1.8 Conclusion .....	6
Chapter 2: Planning.....	7
2.1 Introduction.....	7
2.2 Business Value.....	7
2.3 Feasibility Study .....	7
2.3.1 Technical Feasibility .....	8
2.3.2 Economic Feasibility .....	10
2.3.3 Social Feasibility.....	15
2.3.4 Operational Feasibility.....	16
2.4 Risk Analysis .....	16
2.5 Stakeholder Analysis .....	18
2.6 Work Plan .....	18
2.7 Conclusion .....	20
Chapter 3: Implementation .....	21
3.1 Introduction.....	21
3.2 Information Gathering Methodologies .....	21
3.2.1 Interviews.....	21
3.2.2 Questionnaires.....	22
3.2.3 Observations .....	23
3.3 Analysis Of Existing System .....	23
3.3.1 Inputs.....	24
3.3.2 Processes .....	24
3.3.3 Outputs.....	24
3.4 Process Analysis .....	24
3.4.1 Activity Diagram .....	24
3.5 Data Analysis .....	25

3.5.1 Context Diagram .....	26
3.5.2 Data Flow Diagram.....	27
3.6 Weaknesses Of Current System.....	29
3.7 Evaluation Of Alternatives .....	29
3.7.1 Outsourcing.....	29
3.7.2 Improvement.....	30
3.7.3 Development.....	31
3.7.4 Alternative Selection.....	32
3.8 Requirements Analysis .....	32
3.8.1 Functional Requirements .....	32
3.8.2 Non-Functional Requirements .....	33
3.9 Conclusion .....	34
Chapter 4: Design .....	35
4.1 Introduction.....	35
4.2 System Design .....	35
4.2.1 Description Of The Proposed System.....	35
4.2.2 Context Diagram.....	36
4.2.3 Data Flow Diagram.....	36
4.3 Architectural Design .....	38
4.4 Physical Design.....	39
4.5 Database Design.....	39
4.5.1 Entity Relationship Diagram.....	41
4.5.2 Enhanced Entity Relationship Diagram.....	43
4.6 Program Design .....	44
4.6.1 Package Diagram .....	44
4.6.2 Class Diagram.....	45

4.6.3 Sequence Diagram .....	46
4.7 Interface Design .....	47
4.7.1 Menu Design .....	47
4.7.2 Input Design .....	48
4.7.3 Output Design .....	50
4.8 Pseudo Code.....	52
4.9 Security Design.....	54
4.9.1 Physical Security.....	54
4.9.2 Network Security .....	54
4.9.3 Operational Security .....	55
4.10 Conclusion .....	55
Chapter 5: Implementation .....	56
5.1 Introduction.....	56
5.2 Coding.....	56
5.3 Testing.....	56
5.3.1 Unit Testing .....	57
5.3.2 Integration Testing.....	59
5.3.3 System Testing.....	61
5.3.4 Acceptance Testing.....	61
5.3.5 Validation And Verification .....	61
5.4 Installation.....	68
5.4.1 User Training .....	68
5.4.2 Data Migration .....	69
5.4.3 Changeover Strategies .....	69
5.5 Maintenance.....	70
5.5.1 Corrective Maintenance .....	70

5.5.2 Adaptive Maintenance .....	70
5.5.3 Perfective Maintenance.....	71
5.6 Recommendations For Further Development.....	71
5.7 Conclusion .....	71
References.....	72

# LIST OF ACRONYMS

DFD	Data flow diagram
CPU	Central processing unit
DBMS	Database management system
SQL	Structured query language
ER	Entity relationship
EER	Enhanced entity relationship
HDD	Hard drive
HTML	Hypertext markup language
PHP	PHP hypertext preprocessor
RAM	Random access memory
GSM	Global System Mobile

# LIST OF FIGURES

Fig 1.1 Gladercom Freight Organizational structure.....	3
Fig 3.1 Activity Diagram.....	25
Fig 3.2 Context Diagram.....	26
Fig 3.3 Data flow Diagram.....	28
Fig 3.4 Use case Diagram.....	33
Fig 4.1 Context Diagram.....	36
Fig 4.2 Data flow Diagram.....	37
Fig 4.3 Architectural design of proposed system.....	38
Fig 4.4 Physical design of proposed system .....	39
Fig 4.5 Database architectural design.....	40
Fig 4.6 Entity relationship diagram.....	42
Fig 4.7 Enhanced entity relationship diagram.....	43
Fig 4.8 Package diagram.....	44
Fig 4.9 Class Diagram.....	45
Fig 4.10 Sequence diagram.....	46
Fig 4.11 Home page.....	47
Fig 4.12 Consignee home page.....	48
Fig 4.13 Admin home page.....	48
Fig 4.14 Driver home page.....	48
Fig 4.15 Consigner details page.....	49
Fig 4.16 Shipment booking.....	49
Fig 4.17 Payment page.....	49
Fig 4.18 Tracking page .....	50
Fig 4.19 Shipment delivery confirmation.....	50

Fig 4.20 Shipment approval page.....	50
Fig 4.21 Tracking results.....	51
Fig 4.22 Delivered consignment page.....	51
Fig 4.23 Report on consignment scheduled for delivery .....	51
Fig 5.1 Testing process flow.....	57
Fig 5.2 Shipment booking.....	58
Fig 5.3 Amount to be paid summary.....	59
Fig 5.4 Consigner register.....	60
Fig 5.5 Consigner login.....	60
Fig 5.6 Incorrect password format.....	62
Fig 5.7 No username.....	62
Fig 5.8 Incorrect email address format.....	63
Fig 5.9 Login details.....	64
Fig 5.10 Courier bill.....	64
Fig 5.11 Paynow platform.....	65
Fig 5.12 Successful payment.....	65
Fig 5.13 Tracking.....	66
Fig 5.14 Assignment to driver.....	67
Fig 5.14 Online communication.....	68

# LIST OF TABLES

Table 2.1 Hardware specifications.....	9
Table 2.2 Software specifications.....	10
Table 2.3 Development costs.....	11
Table 2.4 Operational costs.....	12
Table 2.5 Tangible benefits.....	12
Table 2.6 Intangible benefits.....	13
Table 2.7 Cost benefit analysis.....	14
Table 2.8 Work plan.....	19
Table 2.9 Gantt chart.....	20



# LIST OF APPENDICES

Appendix A: User Manual.....	76
Appendix B: Interview Checklist.....	85
Appendix C: Questionnaire.....	88
Appendix D: Observation Scoresheet .....	91
Appendix E: Code Snippet.....	92

# **CHAPTER 1: INTRODUCTION**

## **1.1 INTRODUCTION**

Gladercom Freight (Pvt) Ltd Consignment Tracking system is a progressive web application. Some of its users include the consigners, drivers and a branch administrator. This system caters for one of the three services offered by Gladercom Freight that is freight forwarding. A prospective consigner can request for shipment of their consignment. An email is sent to them containing account log in details. The consigner will then log in and track movement of their goods until they reach the consignee. Payment can be done on the system using the Paynow gateway, after the bill has been calculated. The company's administrator is responsible for overseeing all processes making sure that a respective agent is allocated to a shipment and if there is any pending shipment for delivery. The administrator is also responsible for viewing customer grievances and suggestions. The driver confirms receipt of the consignment by the consignee on the application.

## **1.2 BACKGROUND OF THE STUDY**

Factors driving the Courier, Express and Parcel (CEP), and consignment market comprise economic success and the growth of online commercial activity. Adversely, competition and has made market circumstances threatening and margins are under intense pressure (Lyon, 2007). To facilitate customers and at the same time be more competitive, courier companies are continually exploring ways to be leaner, lighter and more flexible. Businesses need to incessantly evolve in order to stay relevant (Editorial, 2018).

In Zimbabwe, the current economic situation is driving most people to begin entrepreneurial activities, leading to an increase in imports to the country. There is a rise in the number of companies specialising in courier and freight services. Those that are already in the industry are experiencing a vast increase in freight forwarding requests from customers. Automatically, it means documentation processes are on the rise too. There is therefore need for the company to constantly monitor goods being forwarded so that it is done accordingly to allow for transparency. Data about all activities has to be captured with no risks of loss of valuable information. With the rise of imports comes the introduction of many freight service providers, so for Gladercom Freight (Pvt) Ltd to be the market leader, they have to satisfy all their customers' needs. A customer must be able to pay for services regardless of their location and

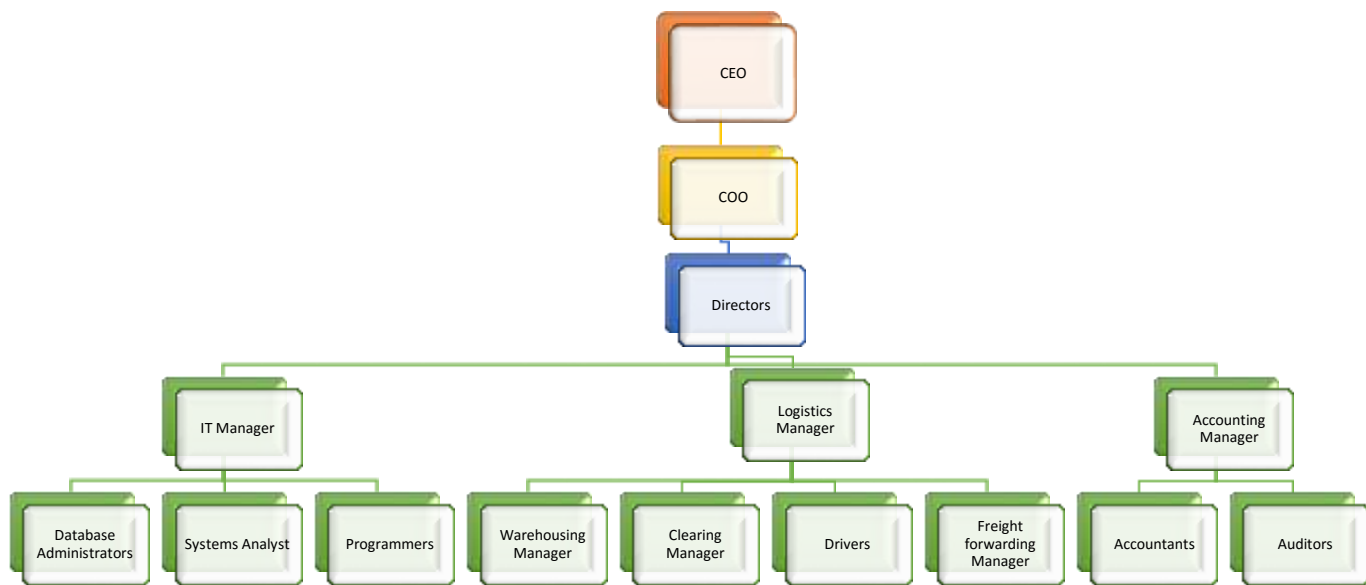
monitor movements of their consignment without having to call the branch. These customers need to be given an opportunity to air out their complaints, and suggest on improvements aiding in performance appraisal.

### **1.2.1 BACKGROUND OF THE ORGANIZATION**

Gladercom Freight (Pvt) Ltd is an organization which specialises in freight forwarding, warehousing and customs clearing and was started in 2005. Freight forwarding is a process of shipping goods all over the world up until they reach their ultimate destination. Warehousing is the performance of managerial and physical functions related to the storage of goods and materials (WebFinance Inc, 2019). Customs clearance is the preparation and submission of documents in order to ease imports or exports, representing a client on inspection, payment of duty and distribution of goods after clearance (MSG, 2008). Their head office is located at the Robert Gabriel Mugabe International Airport. Other offices are found all over the country, at major entry ports into Zimbabwe for example Beitbridge border post. The company has strategic partners in countries like the United Kingdom, South Africa, China and Switzerland. Gladercom Freight offers rail, air and sea freight forwarding facilities for bulk, break bulk and containerized cargoes through their global network of agents globally. They are a fully licensed clearing agent with the Zimbabwe Revenue Authority, with widespread knowledge in customs procedures and systems. With massive experience gained over the years in export of perishables, the company stands on a solid base, including a staff compliment that has valued experience in the freight industry.

### **1.2.2 ORGANIZATIONAL STRUCTURE**

An organizational structure outlines the techniques used to direct activities order to achieve organisational goals (Kenton, 2018). Gladercom Freight (Pvt) Ltd.'s organizational structure has been illustrated by Figure 1.1.



**Fig 1.1 Gladercom Freight Organogram**

### 1.2.3 VISION

To adhere to global best practices.

### 1.2.4 MISSION STATEMENT

To provide a highly reliable, personalized, professional and quality global freight logistics service.

### 1.2.5 CORE VALUES

Customer oriented – We value all our clients

Professionalism – We believe professionalism is fundamental to the growth of the business

Dedication and Passion – We are dedicated to give our clients a wholesome service

## 1.3 PROBLEM DEFINATION

- A consigner cannot track the status of consignment in transit. The current website has no tracking portal
- Customers must visit a Gladercom branch before they can pay for any of their services
- The company has no fixed way of allocating an agent to a job, the databases are decentralized. Information sources are decentralized and generally disorderly

- Keeping records of parcels and their delivery (proof of delivery) is carried out manually. In most cases records are misplaced such that when a client comes for parcel collection, they spend a lot of time than usual, waiting for parcel
- There is no platform for customers to air out their grievances and suggest for service improvement

## **1.4 AIM**

To develop a consignment tracking system for Gladercom Freight (Pvt) Ltd.

## **1.5 OBJECTIVES**

The Gladercom Freight tracking application should achieve the following objectives;

- To approve of consigner's request to access the system by sending log in details via email
- To calculate courier bill for consignment to be delivered
- To pay for consignment delivery by integrating with the Paynow gateway
- To track movement of goods by use of order number as the tracking variable
- To view consignment awaiting to be delivered, in order to assign delivery tasks to drivers
- To facilitate online communication in the event of customer query

## **1.6 INSTRUMENTS AND METHODS**

After a thorough examination of suggested system deliverables, these are the tools and methods to be used to development of the tracking system;

### **XAMPP**

XAMPP offers Apache web server, MYSQL database, Php and Perl and Apache modules all in one suite. XAMPP does not need any configuration in order for it to integrate with Php and MYSQL.

### **JavaScript and jQuery**

JavaScript is an object-oriented scripting language. It can be called the software development language for the internet. JavaScript can calculate, validate and manipulate data. jQuery is a JavaScript that eases JavaScript programming.

## **Bootstrap**

Bootstrap is a CSS framework for developing responsive websites. A responsive website automatically fine-tunes for different-sized screens and still functions impeccably.

## **HTML5**

Hyper Text Markup Language is a set of symbols and codes inserted into a file intended for the internet. It tells browsers the way in which a web page's words or images are to be displayed.

## **CSS3**

Cascading Style Sheets is a language that describes document presentation. CSS works together with HTML and JavaScript

## **Microsoft Visio**

This is an application which is part of the Microsoft Office software suit that is used to create diagrams. Flow charts, data flow diagrams and organizational charts can be drawn using Visio. An advantage of Visio is that it is easy to use and takes less time to come up with a proper, professional diagram.

## **Torch**

For testing purposes, the tracking application has to be accessed via a browser. Torch browser was developed by Torch Media. It handles internet related tasks like displaying websites, sharing websites and downloading media. For research purposes, this browser will also be used to gain access to the internet. Torch browser does not lag if used on a computer of any specification.

## **1.7 JUSTIFICATION AND RATIONALE**

This system is aimed at improving Gladercom Freight's image to the outside world and for the company to realise more revenue through improved transparency with clients on their consignment. Developing a new application will encompass the following benefits;

- There is better customer experience as they are able to trace their shipment on their own
- A quick solution will be derived for damaged goods as the company will be instantly notified
- It will become easy to view uncompleted tasks and allocate an agent to a job as there will be a centralized database

- The system will connect all branches to the central database so that information everywhere is the same
- Detailed documentation on history of transactions and delivered consignment can be easily produced
- There will be improved efficiency. The whole delivery process will be controllable and traceable.

## **1.8 CONCLUSION**

The tracking system was introduced together with the problems it aims to solve like the inability for customers to track their consignment in transit. A brief background of Gladercom Freight (Pvt) Ltd was looked at and emphasized by an organisational structure. Automation of proof of all documentation and better customer experience and are some of the benefits to be brought about by development of the tracking system. Various tools for developing the application were discussed, it will be developed using Php. Following is the planning phase. In order to resolve that a project should be considered, a feasibility study shall be conducted. Potential risks related to the project shall be identified, counter actions will be deduced. The project schedule will be elaborated by a work plan.

# CHAPTER 2: PLANNING

## 2.1 INTRODUCTION

Planning is a basic administration function which involves coming up with detailed approaches to achieve strike a balance between needs or demands and the existing resources (Web Finance Inc, 2019). Planning basically aims to reduce unknown future costs and maximize on the known benefits. An in-depth feasibility study will be conducted. It includes dwelling on technical, social, operational and economic feasibility independently, weighing possibility of development of a suggested system given the available time and resources also, having the costs outweigh benefits for it to be deemed viable. All risks associated with embarking on this project will be elaborated together with their counter measures. The work plan section will highlight a complete timetable of all activities compared to the time to be taken for them to be complete.

## 2.2 BUSINESS VALUE

Business value is the degree of a business' worth that involves intangible assets' assumed value and the predicted value of tangible assets(Farlex, 2012). Tangible and intangible benefits that will be realized if the tracking system is adopted at Gladercom Freight are as follows;

- Increased market share owing to the ease of tracking one's consignment in transit
- Increased goodwill through increased customer confidence
- Reduced manual labor costs as all documentation and processes will be mechanized
- Increased worker morale because their workload is lessened
- Structured database which safely keeps data and allows for up-to-date report generation when necessary

## 2.3 FEASIBILITY STUDY

A feasibility study is used to measure the capability and possibility to successfully complete a project given all applicable factors (Kenton, 2018). Factors such as economic, technological, legal and scheduling aspects must be catered for. The study will be partaken in the following sub-topics;

- Technical feasibility
- Economic feasibility



- Social feasibility
- Operational feasibility

### **2.3.1 TECHNICAL FEASIBILITY**

It is the process of confirming technology assumptions and product or project design (Spacey, 2017). It is meant to analyze if it is possible to develop the system given the current mechanical aspects. An analysis of technical expertise, hardware and software requirements is done to prove technical feasibility of the project.

#### **2.3.1.1 Technical Expertise**

This study seeks to determine if the project development team is technically capable of producing the stated system and will also determine system users' level of expertise. Fortunately, the I.T department at Gladercom is richly filled with programmers and system analysts. This means in-house development is ideal. The company boasts of an intellectual workforce that has proven from past introduced systems that they quickly grasp concepts. There will be need for minimal training in order to adopt the tracking system. A help manual will be found on the application in order to ease customer navigation.

#### **2.3.1.2 Hardware**

The following table will illustrate the required physical components necessary for the system development in their quantities and specifications:

**Table 2.1 Hardware Specifications**

<b>Item Name</b>	<b>Specifications</b>	<b>Number</b>	<b>Availability</b>	<b>Comment</b>
Samsung Laptop	4Gig RAM, Intel core i5 5 <sup>th</sup> gen, 540-700 Gig HDD	4	3 are available	There is need to purchase one more laptop
Printer	HP 2540 Laser Jet	3	2 are available	Management has agreed to buy the required printer
Network switch	12 port CISCO switch	1	Available	There is no need to buy more
Modem	Econet GSM modem	4	Available	All are available
Main Server	4 GHz Quad 4 16 Gig Ram 3 Terabyte HDD	1	Available	The server available is adequate
Connecting cables	25m long RJ45 Connectors	7	Available	The cables are readily available

### 2.3.1.3 Software

Table 2.2 shows software components needed for development of the tracking system.

**Table 2. 1 Software Specifications**

<b>Item Name</b>	<b>Specification</b>	<b>Availability</b>	<b>Comment</b>
Microsoft Office	MS Office 2016 with MS word and Visio for drawings	Available	Already installed
Operating System	Windows 10	Available	Installed
Antivirus	Avast 2016	Available	Already installed
XAMPP	With Php, MYSQL and Apache	Not available	To be installed at no cost
Sublime text editor		Available	Already installed
CSS, Bootstrap and HTML	CSS3, Bootstrap 3.3.7, HTML5	Available	Installed already

### **2.3.2 ECONOMIC FEASIBILITY**

Economic feasibility is the price and logistical viewpoint of a business venture (IAC Publishing, 2019). Before taking on a new project, most businesses conduct this study to ascertain if the cost of the potential project will in due course be lucrative to an organization. A project that is termed economically feasible is one that has its benefits outweighing the costs. Cost benefit analysis, payback period and return on investment will be used to determine the tracking system's economic feasibility as follows;

#### **2.3.2.1 Cost Benefit Analysis**

The company or a specialist sums all profits of a condition or action and deducts costs related to that exploit (Kenton, 2019). The first phase in the analysis is to come up with a full list of costs and benefits related to a project. Costs take into account direct and indirect costs, potential risk costs, intangible costs and opportunity costs. Benefits account for tangible and intangible benefits like improved worker morale. The last step will be to compare cost and benefits to see if the latter outweigh costs.

#### **Costs**

A cost is the amount of money that is needed to pay for or buy something (Merriam Webster Incorporated, 2019). They include development and operational costs.

***a) Development Costs***

This is the sum of costs suffered from commencement to project implementation (Web Finance Inc, 2019). Table 2.3 will show all development costs involved.

***Table 2. 2 Development Costs***

<b>Item</b>	<b>Amount in USD (\$)</b>
Samsung laptop	500
Printer	80
Development cost	1500
System development refresher course	200
Training for use of system	300
Food allowance during induction of system	100
Total development costs	2980

***b) Operational Costs***

Operational costs refer to the amount of running IT provisions on a daily basis (Rouse, 2008). They comprise internet service provider costs, stationery and system maintenance. Table 2.4 shows operational costs.

**Table 2. 3 Operational Costs**

<b>Item</b>	<b>Year 1 USD (\$)</b>	<b>Year 2 USD (\$)</b>	<b>Year 3 USD (\$)</b>
Operational labor	500	700	900
System maintenance	400	500	500
Hardware maintenance	100	200	300
Stationery	40	50	60
Total operational costs	1040	1450	1760

### **Benefits**

A benefit can be defined as anything that produces good or helpful results or effect or promotes welfare (Merriam Webster Incorporated, 2019). In relation to this project, benefits are what the company is going to gain from adopting the proposed system. These benefits are divided into tangible and intangible benefits.

#### ***a) Tangible benefits***

They are easily quantified, especially in money (Web Finance Inc, 2019). The following are the tangible benefits that will be realized from using a tracking system;

**Table 2. 4 Tangible Benefits**

<b>Benefit</b>	<b>Year 1(USD) \$</b>	<b>Year 2(USD) \$</b>	<b>Year 3(USD) \$</b>
Stationery cost reduction	100	150	200
Communication cost reduction	400	450	500
Labor cost reduction	650	700	750
Customer enquiry time reduction	200	400	600
Total	1350	1700	2050

### ***b) Intangible Benefits***

These benefits are not easily quantified in monetary terms (Web Finance Inc, 2019). These benefits are qualitative in nature. An estimate will be made as to the monetary value for each intangible benefit are to be experienced through use of the tracking system.

***Table 2. 5 Intangible Benefits***

<b>Benefit</b>	<b>Estimated amount year 1(USD) \$</b>	<b>Estimated amount year 2(USD) \$</b>	<b>Estimated amount year 3(USD) \$</b>
Improved worker morale	400	500	700
Increased goodwill	400	700	700
Increased customer satisfaction	500	700	800
Increase in market share	800	800	800
Total	2100	2700	3000

### **2.3.2.2 Summary of Cost Benefit Analysis**

Costs are deducted from forecasted benefits. If benefits outweigh costs, then this project is deemed worth partaking. If costs outweigh benefits, then the project cannot commence as it will be a loss to the company. Table 2.7 shows a summary of benefits and costs and computation for the difference.

**Table 2. 6 Cost Benefit Analysis**

	<b>Year 1 (USD)</b>	<b>Year 2(USD)</b>	<b>Year 3(USD)</b>
<b>Benefits</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
Tangible benefits	1350	1700	2050
Intangible benefits	2100	2700	3000
Total benefits	3450	4400	5050
<b>Costs</b>			
Development costs	2980	n/a	n/a
Operational costs	1040	1450	1760
Total costs	4020	1450	1760
Net benefits	(570)	2950	3840

The table clearly shows that benefits outweigh costs. In the first year, a loss is incurred but it is insignificant as it will be recovered in the years to come. It is wise to consider developing the tracking system as it yields significant benefits.

A project is deemed economically feasible if it is backed up by other analysis methods other than a cost benefit analysis. Payback period and return on investment shall compliment cost benefit analysis and assess if a tracking system is economically feasible for Gladercom Freight (Pvt) Ltd or not.

### **2.3.2.3 Payback Period**

This is the probable time it will take for a company to retrieve cash it invested in a project (Averkamp, 2019). For this project the development cost is \$2980, in the first year there is a loss of \$570, year 2 has a profit of \$2950 and year 3 of \$3840. The payback period will be calculated as follows;

Total profit is  $(4570) + \$2950 + \$3840 = \$6220$

Average profit per year is  $\$6220 / 3 = \$2073$

$(2073/2980) * 12$

The project will require approximately 1 year, 5 months to pay back investment outlay. The project is worth partaking as its payback period is less than 2 years. The less the payback period the more rewarding a project is.

#### **2.3.2.4 Return on Investment**

Return of investment measures business performance, as it evaluates the competence of the investment (Forex Guru, 2019). The following formula is used to compute return on investment;

$$\frac{\text{earnings from investment} - \text{investment cost}}{\text{cost of investment}} * 100$$

The calculation for the proposed system's return on investment is shown;

$$\frac{12900 - 7230}{7230} * 100$$

78.4%

Generally, any value which comes out of ROI equation as positive is a good return. The tracking system is worth venturing into as it has a return on investment of about 78% and this is a good percentage for a return.

#### **2.3.3 SOCIAL FEASIBILITY**

This is where people's acceptance is considered concerning a product that is yet to be released (Dhakal, 2017). The introduction of a new system's effect to users are described. The following are the impacts of the system to the community around Gladercom, which deem the project socially feasible;

- Corporate Social Responsibility (CSR) which will lead to infrastructure development as the company will have more money to give
- Work related learning opportunities to local I.T students who will maintain the system
- Self-esteem to the youths as they take pride in making use of technology in their daily routines
- Automation of business processes aids in Zimbabwe's reaching the global standards in technology



### **2.3.4 OPERATIONAL FEASIBILITY**

This is the degree of resolving problems using a new system (E Virtual Services LLC, 2019). Operational feasibility involves projecting and forecasting practicality of system usage when it has been fully implemented, using available human supply. Management should back the system so that it is operationally feasible. The system demonstrated to be viable as it addresses various issues as follows;

- The management fully supports the idea of development of a tracking system
- The company boasts of a knowledgeable workforce which has proven to be fast learners of new systems which have been introduced over the years
- The new system will come with a help manual to assist the users
- Private and sensitive information will only be accessed by the administrator
- An audit trail will be provided as all activities will be recorded on the system rendering them easy to track

After an intensive feasibility study, the suggested tracking system proves its viability and is worth developing. To complement the feasibility study, a risk analysis will be carried which will identify all potential threats to the project.

## **2.4 RISK ANALYSIS**

It involves recognizing and examining possible issues which can possibly adversely impact important business ventures so as to assist organizations in avoiding or mitigating these risks (Rouse, 2010). Some of the risks will be listed and possible solutions to them are discussed.

### **a) Requirements Change**

When users find out that a developer has the potential to develop a very good application, they tend to want to add more features to the system. It can also happen when all stakeholders were not fully involved from the onset of a project.

#### ***Counter Measure***

To mitigate this, the developers should make sure that all stakeholders are involved in coming up with system requirements and they all agree that there will be no alterations when the project begins.

### **b) Budget Underestimate**

Correct financing needs special attention in order to circumvent software risks. At times, management fails to draft a budget that is adequate for a project meaning there will be delays in trying to request for more money.

#### ***Counter Measure***

It is wise to add more money to what the budget requires. An excess is better than a deficit and it can always be returned to the finance department.

#### **c) Failure to meet deadline**

It is possible that the project can be completed later than expected. This is because of reasons like change in requirements, hardware failure and other unaccounted for factors.

#### ***Counter Measure***

This can be mitigated by developing a realistic work plan for the project and making sure every stakeholder stick to the plan. All system requirements should be finalized and gathered before the onset so that everything is in place for the project to begin.

#### **d) Compatibility Issues**

The software that will be used for this project might not be compatible with the hardware requirements.

#### ***Counter Measure***

It is therefore wise to conduct a compatibility test before the project can begin so that necessary amendments are done on time.

#### **e) Virus Attacks**

The software being developed might be attacked by a virus, delaying progress of the project.

#### ***Counter Measure***

To solve this, the developers need to make sure that the machine being used has a working antivirus installed. The developer then has to make sure that there are no drives inserted on the machine like a flash drive as they are mostly the carriers of viruses. Also, a backup of the system has to be kept elsewhere in case the machine crashes.

## **f) External Factors**

The world is always evolving. If market needs change, it is most likely that the system developed will no longer be in demand by the time of its implementation.

### ***Counter Measure***

A good business analyst has to be employed so that they monitor the market looking for the finest technique to lead project development.

## **2.5 STAKEHOLDER ANALYSIS**

This is whereby stakeholders are identified with all their needs being analyzed (Best Project Management Software Reviews, 2018). The following are the various stakeholders and their needs in relation to the tracking system.

### **a) Customer**

- To get bill quotation online
- To pay for consignment bill online
- To track consignment in transit
- To update personal details

### **b) Administrator**

- To view paid consignment ready for delivery
- To view pending consignment and allocate driver for delivery
- To view status of driver with consignment in transit
- To produce transaction reports
- To update company details

### **c) Driver**

- To view addresses of consignees
- To confirm delivered consignment
- To update personal details

## **2.6 WORK PLAN**

A work plan defines a venture that is to be undertaken and summaries the way it shall be undertaken (Reinbold, 2017). It keeps a project on course to meet timeline and budget

expectations. In order to precisely and resourcefully accomplish all this within a given time period, a time schedule vividly showing phase against time must be created. Table 2.8 depicts the project's schedule.

**Table 2. 7 Work Plan**

<b>Phase</b>	<b>Begins</b>	<b>Ends</b>	<b>Duration</b>
Introduction	07 March	21 March	2 weeks
Planning	23 March	30 March	1 week
Analysis	31 March	6 April	1 week
Design	7 April	14 April	1 week
Coding	15 April	29 April	2 weeks
Implementation	30 April	7 May	1 week
Maintenance	7 May	Ongoing	

A simple visual illustration of a work plan is depicted by a Gantt chart (Jewell, 2000). It is an especially convenient format for managers to use because it makes it easy to communicate stages and timeframes to other team members. Table 2.9 shows the project's Gantt chart.

**Table 2. 8 Gantt Chart**

Phase	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10
Proposal	■	■								
Introduction			■	■						
Planning					■					
Analysis						■				
Design							■			
Coding								■	■	
Implementation										■
Maintenance										
Documentation	■	■	■	■	■	■	■	■	■	■

## 2.7 CONCLUSION

Planning looked at the project’s business value which is what the company stands to benefit from this project. A feasibility study verified that the venture should be considered. Risks associated with the project with mitigation measures were outlined. A project schedule was devised showing its duration and it was supported by a Gantt chart. Following is analysis which will illustrate how the current system works identifying its weaknesses, justifying development of a new system. Visual representations like data flow diagrams will help explain the existing system operations.

# CHAPTER 3: IMPLEMENTATION

## 3.1 INTRODUCTION

In order to develop a better system than the existing one, a developer must be conscious of all information relating to the current system. If an analyst is not well versed with the current operations, it then becomes problematic to develop an acceptable product. The current system information was obtained through a number of data gathering methods which will later be elaborated. The study of the existing system will be portrayed using activity diagram, context diagram, data flow diagram and use case diagram. Weaknesses of the current system are to be highlighted justifying the need for a new system. All available alternatives will be evaluated in order to ascertain the most feasible alternative. A requirements analysis showing what the system should achieve will be carried out.

## 3.2 INFORMATION GATHERING METHODOLOGIES

These are approaches that were used to gather data from some of the existing system stakeholders. Ideally, the data attained enables a precise, and whole account of how a business operates with the people, functions and data involved. The varied information gathering methodologies exposed problems experienced with the existing system, justifying development of a new system (BrightHub, 2018). Interviews, questionnaires and observations are the approaches which were used to acquire data of how the current system operates at Gladercom Freight.

### 3.2.1 INTERVIEWS

An interview is a formal meeting between two people whereby one is asking questions with obtaining information from the other being the sole purpose (The Business Communication, 2018). The interviews were carried out with the forwarding manager, clearing manager, warehouse manager and the managing director and one of the customers who came in to request for customs clearing on their consignment. This information gathering technique had the following findings, benefits and drawbacks;

#### **Findings**

- Management could not come with up-to-date reports on all transactions
- Customers wanted their queries responded to in a short space of time
- There was consensus on the need for a new system

### **Advantages**

- Sufficient information was collected as the interviewer was capable of asking the interviewee any question relating to the current system
- Interviews revealed some fresh, new ideas for the new system that the interviewer had not initially thought of
- This technique involved the use of non-verbal gestures which clarified or emphasized what an interviewee would be saying

### **Disadvantages**

- Some of the responses from interviewees were biased as they feared losing their jobs by exposing the organization's weaknesses
- There wasn't adequate time to conduct all interviews as there were numerous interviewees conducted

## **3.2.2 QUESTIONNAIRES**

These are instruments for accumulating data, which practically always comprise asking a subject to answer a set of oral or written questions (Debois, 2019). These questionnaires were distributed among employees and customers in order to involve all stakeholders. Making use of questionnaires as a data gathering methodology had the following findings, advantages and disadvantages;

### **Findings**

- Manual documentation was strenuous to the employees
- It was costly for customers to always call and inquire of the status of their consignment

### **Advantages**

- Precise information was acquired because respondents were granted ample time to contemplate on a response before writing it down
- Respondent anonymity led to the acquisition of honest information from respondents without fear of losing their jobs
- More information was acquired as questionnaires reached more people in less time unlike interviews

### **Disadvantages**

- Some of the questionnaires were not after completion while others left some questions blank

- The results were subjective as there was no one to make sure that respondents had the same understanding of questions asked

### **3.2.3 OBSERVATIONS**

To observe is to take a good look at something, noting facts or taking measurements (Vocabulary.com, 2019). This method of information gathering involved observing the procedures at the workplace without affecting their work flow and attaining precise information. Just like any other information gathering methodology, observations came with their own findings, advantages and disadvantages which are as follows;

#### **Findings**

- There was too much pressure from customers who were paying or making enquiries on pricing
- Too much paperwork was involved
- It took a lot of time to locate relevant documentation for a customer and serve them
- Some of the paperwork had actually been misplaced

#### **Advantages**

- The researcher understood better the operations without asking anyone
- Information gathered was correct because recordings were of the definite activities taking place

#### **Disadvantages**

- There was an influenced conclusion as some of those under observation ended up noticing they were being observed and altered their behaviors
- The findings were not really accurate as they did not reflect the day-to-day scenario, people's actions are dynamic

## **3.3 ANALYSIS OF EXISTING SYSTEM**

The present system at Gladercom Freight (Pvt) Ltd is manual. A customer is supposed to go their offices and enquires of the services offered. The company provides three services namely freight forwarding, customs clearance and warehousing. Freight forwarding is done on the company's behalf by agents such as DHL or FedEx. Once a customer selects the service desired, documentation and bill processing commences. Documents for the consignment are kept in a file and a payment receipt is issued.



Warehousing requires less documentation except for details of the owner. The same applies to customs clearance which only requires more details like reason for import or export. Freight forwarding requires more processes and documentation. Packages for freight forwarding are categorized according to their destination and weight. Arrangement is made for their transportation down to their destination by delegating to the most suitable agent at the time. On arrival, these proof of delivery documents are distributed to the recipients and a manual record is prepared for every delivery. Many a times customers come to the offices to claim their parcel and a manual search operation is conducted to locate the customer's parcel.

### **3.3.1 INPUTS**

- Consigner request for shipment
- Delivery address

### **3.3.2 PROCESSES**

- Approval of consigner's payment by attendant
- Forwarding of delivery documents to driver
- Driver delivering consignment

### **3.3.3 OUTPUTS**

- Agent performance review
- Reports by management

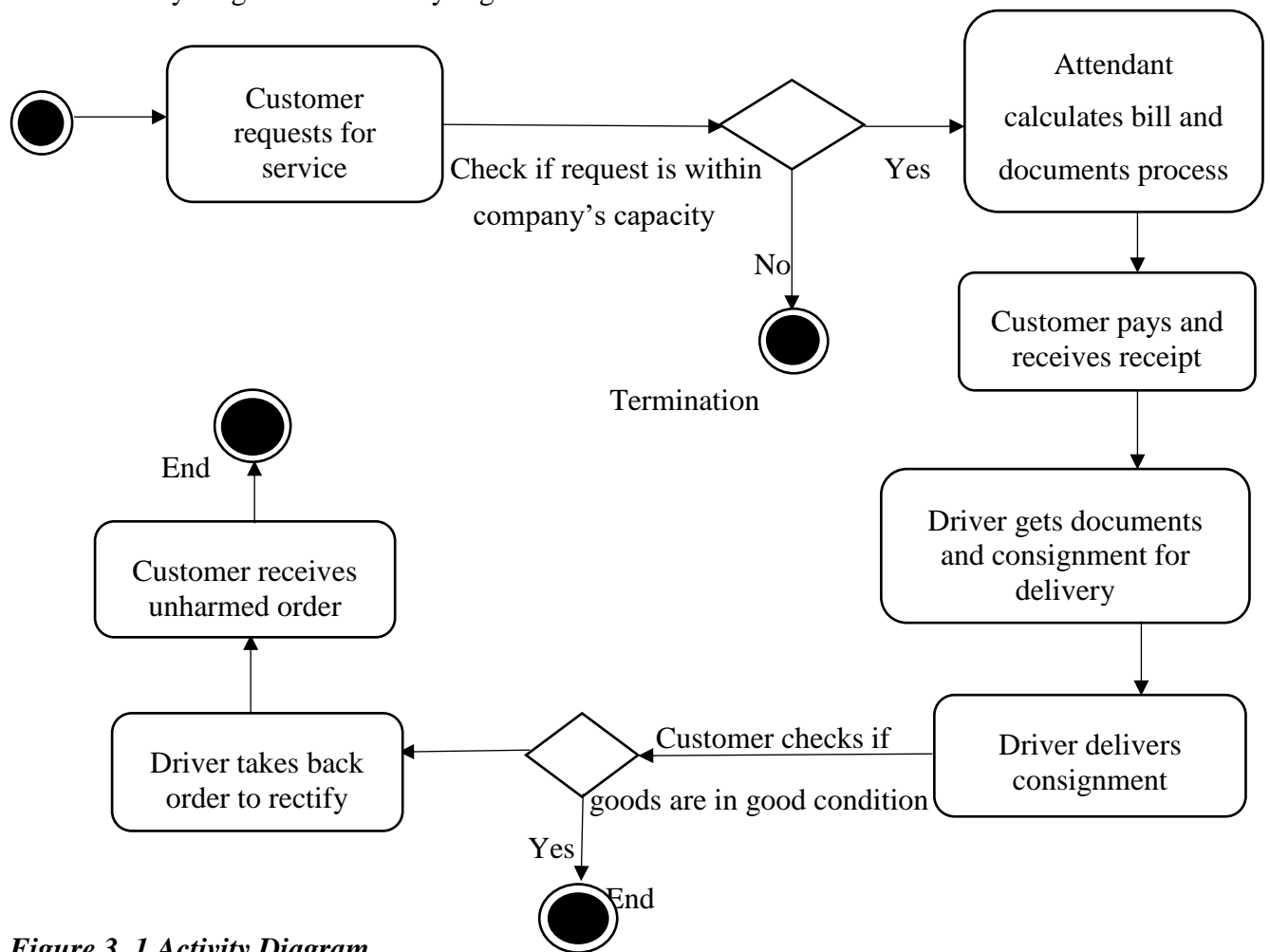
## **3.4 PROCESS ANALYSIS**

This is a breakdown of a project's stages, showing inputs, processes and outputs and actions that exist in every phase (WebFinance Inc, 2019). Process analysis thus concentrates on the progression of work from one person to another, describing the input and output, the separate stages and possibly also the use of resources. This may concern the examination of one concrete process or a composite analysis of all procedures within an organization.

### **3.4.1 ACTIVITY DIAGRAM**


Activity diagram is basically a flowchart that signifies the flow of activities. The activity is best described as system operation (Tutorials Point, 2019). An activity diagram is considered a behavior diagram as it describes what happens in the system. Activity diagrams assist people

on both business and development ends of an organization understand the same process and behavior through the use of ubiquitous language (Lucid Software Inc, 2019). The company's current activity diagram is shown by Fig 3.1.




**Figure 3. 1 Activity Diagram**

**Key for Activity Diagram**

 Ending or starting point

 Action flow

 Activity

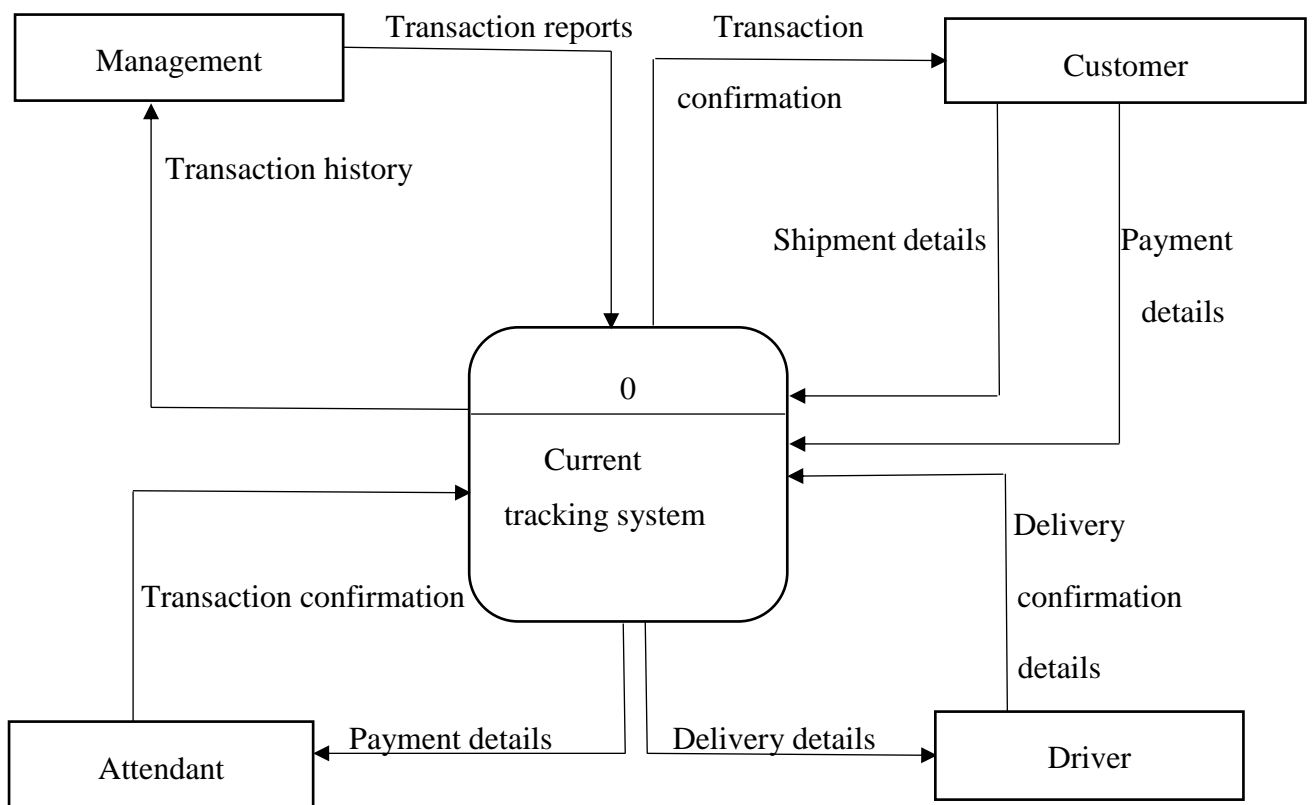
 Decision

**3.5 DATA ANALYSIS**

Data analysis comprises scrutinizing information to recognize likely patterns, interpret outcomes and make professional conclusions (Kokemuller, 2017). Companies use analysis for strategic management, marketing and sales, business development and human resources. In this context, data analysis will be done through data flow diagram and context diagram.




### 3.5.1 CONTEXT DIAGRAM

A context diagram summarizes the overall system in question (Lucid Software Inc, 2019). It is designed to show the system as a high-level process, showing its relationship to external entities. A context diagram must be effortlessly understood by an extensive audience which accounts for stakeholders, business analysts, developers and data analysts. Fig 3.2 shows a context diagram of all current system entities as well as the relationship of data and information sharing in the system.



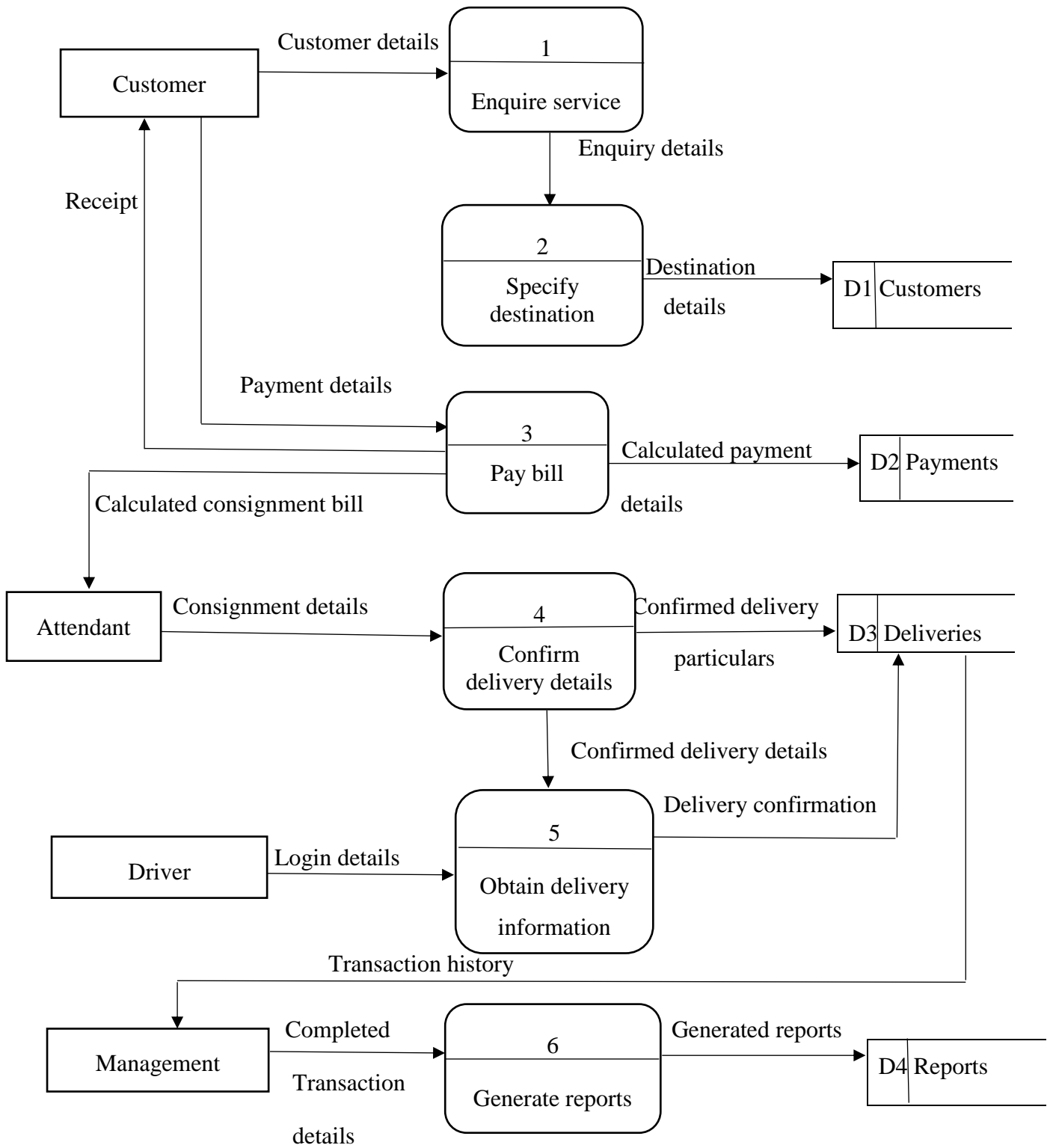
*Figure 3. 2 Context Diagram*

#### Key for Context Diagram

-  System
-  Data Flow
-  Entity

### **3.5.2 DATA FLOW DIAGRAM**

This diagram (DFD) shows the movement of information for any procedure or system (Lucid Software Inc, 2019). It is used to examine the present system or even a new one. The data flow diagram for the existing system is shown by Fig 3.3.



**Figure 3. 3 Data Flow Diagram**

### Key for Data Flow Diagram



## 3.6 WEAKNESSES OF CURRENT SYSTEM

A weakness can be likened to a vulnerability. The following are the current system's weaknesses that aim to be resolved using the new tracking system;

- Overcrowding of clients who come for service requests
- Delay in the processing of parcel files
- Preparation and organization of files is tiresome and demotivating to employees
- Misplacement of vital documents triggers data loss therefore the system lacks data security
- Illegal removal of files by fraudulent staff leading to insecurity
- Overworking workers due to high paper work usage
- High stationery costs
- Data redundancy and duplication of information.
- Generally, the current system operation is too sluggish because of lack of proper association among departments.

## 3.7 EVALUATION OF ALTERNATIVES

Whenever a project is proposed, it has to be backed by alternatives. An alternative can be defined as a choice, restricted to one or two opportunities, the selection of which precludes any possibility (Dictionary.com, LLC, 2019). Each alternative will be assessed so as to derive the best resolution for the current system. In this context, the alternatives are improvement, outsourcing, and development.

### 3.7.1 OUTSOURCING

In meek terms, outsourcing is the practice of acquiring goods and services from a foreign supplier (Lopez, 2017). This is most commonly used in businesses where there is either a scarcity of labor for certain positions or where the charge of labor is too high. It is particularly

common among software developers or designers. This alternative was weighed and some of the reasons for it not being the most appropriate are elaborated in the following section;

#### **3.7.1.1 Quality Issues**

An outsourcing company is determined to make profit from the services they provide. The outsourcing company are inspired by money, against specific measures that would be in place if the job was done in-house. The contract will fix the price and the only way for the contracted company to increase profit is to reduce expenses, thus compromising quality.

#### **3.7.1.2 Lack of Control**

Inasmuch as the company can provide direction with regards to system specifications, it is hard to uphold the level of control that would be anticipated, as the developer will be working offsite. The company loses the ability to quickly act on business environment changes because of an added extra layer of people and processes to work through.

#### **3.7.1.3 Impact on Employee Morale**

Outsourcing can undesirably impact company culture by offending personnel as they may possibly feel that they are being substituted. Other employees will be confused as to why some of the tasks are being outsourced, leading to retaliation, and this can negatively impact productivity.

#### **3.7.1.4 Security Issues**

Confidential information like payroll and medical records has to stay confidential. If this kind of information is transmitted to or used by a third-party developer, there is a danger that the confidentiality is compromised.

### **3.7.2 IMPROVEMENT**

This is the process of making something better (Cambridge Uni Press, 2019). The current manual system at Gladercom can be made better by adding some features to it. This however, is not ideal as it has the following drawbacks;

#### **3.7.2.1 Problem Inheritance**

Problem inheritance characterizes system improvement. This means in the long run, the existing problems will be faced by the company again as they will still be using a manual system.

### **3.7.2.2 Long Run Costs**

Repeatedly upgrading the system increases paper work actions and requests more employees consequently growing the organization's expenses. This will still demotivate all stakeholders as it is characterized by a lot of paperwork, which is costly at the end of the day.

### **3.7.3 DEVELOPMENT**

In this case, development would be the process by which software is developed using a specified programming language (Techopedia Inc, 2019). This alternative proved to be the most appropriate of the three. Developers under this alternative are also employees of Gladercom Freight therefore, it mandatory for those developers to develop the system without charging any extra amounts. In-house development was selected as it has the following advantages;

#### **3.7.3.1 Cost Saving**

In-house development is cost effective. As the product develops, an internal team will be accountable for maintenance and updates and, in the event of key changes will be supported by a remote team.

#### **3.7.3.2 Good Communication**

The system will be developed by the company's existing employees. These people are used to working around each other and understand each other better. Requirements will be quickly conveyed among team members leading to a rapid response to the development process.

#### **3.7.3.3 Clear System Requirements**

The development team has first-hand information on problems of a manual system. This means they appropriately know what the tracking system has to have in order to get rid of the current problems. Also, by involving all stakeholders, clear objectives are there from the onset of the project.

#### **3.7.3.4 Control**

The software is written to operate using the already existing business procedures. This is unlike third party software which often requires changes in business practices to conform to the way some developer thought business should be done, rather than the successful procedures the business has developed over many years of operating.



### 3.7.4 ALTERNATIVE SELECTION

After analysts had evaluated the available alternatives, it was unanimously decided that in-house development is the most suitable alternative. In-house development is the least costly, as it reduces costs even the system's lifetime. All project stakeholders will be actively involved and this will likely lead to product satisfaction. However, it is more time consuming to build a system than to buy one. Despite this drawback, it was still unanimously decided that in-house development was the most achievable alternative.

## 3.8 REQUIREMENTS ANALYSIS

User expectations for a system to be developed are defined (ReQTest, 2018). Requirements examination involves all tasks done to classify various stakeholders. These are categorized into functional and non-functional requirements.

### 3.8.1 FUNCTIONAL REQUIREMENTS

A functional requirement basically stipulates something that the system should do (ReQTest, 2018). It specifies a behavior or function. Some of the functional requirements for the tracking system are as follows;

**Payment.** The system must allow a customer to pay for delivery of consignment online.

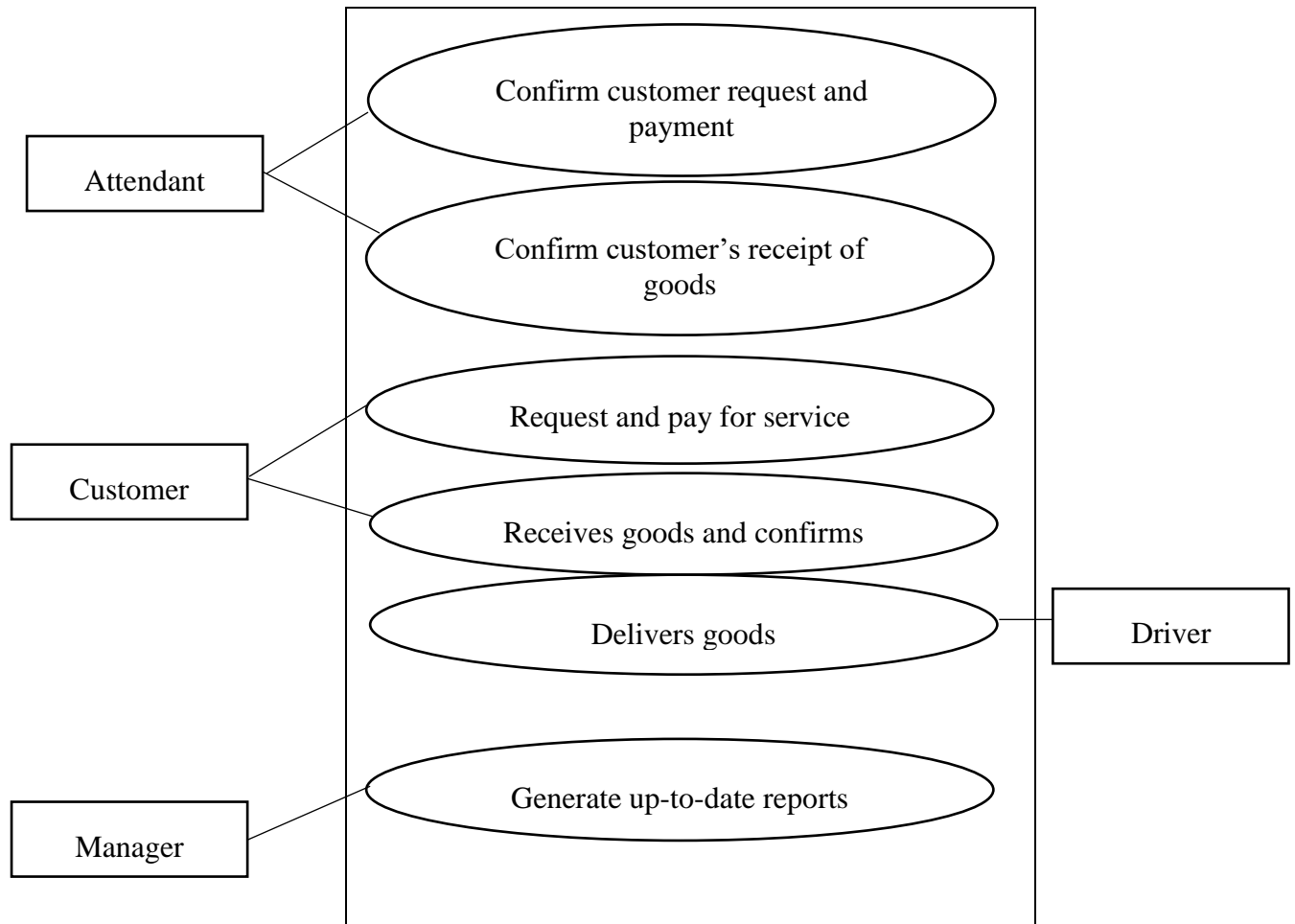
**Tracking.** The system must enable a customer to track consignment movement.

**Sharing of information.** Departments should be able to access and share information without it being duplicated.

**Documentation.** All processes should be documented in the system to reduce high usage of stationery and a high workload of paperwork to employees.

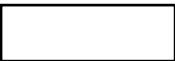


**Authentication.** The tracking system should restrict access to unauthorized users.

**Reports.** The system must generate reports when needed by management.



**Figure 3. 4 Use case Diagram**

**Key for Use Case Diagram**

-  Actor
-  Describes user-system interaction
-  Communication between user and use case

**3.8.2 NON-FUNCTIONAL REQUIREMENTS**

Unlike functional requirements, there requirements define how a system works (ReQTest, 2018). They essentially specify how a system must perform and that they are a constraint upon the system’s behavior. A non-functional requirement can be conveyed as a quality attribute for a system. The following the requirements for the tracking system;

**Maintainability.** The system should be modifiable with little effort from the in-house developers.

**Performance.** The system's time to respond to queries should be reasonable. Queries should be processed in a short period of time. Also, it must simultaneously process a number of requests at the same time.

**Reliability.** The tracking system should perform exactly as it is designed to and not fail the user.

**Usability.** It should not be difficult to learn and operate the system. It should come with a help manual.

**Portability.** It should require little effort to move the software to a different platform.

### **3.9 CONCLUSION**

A thorough scrutiny of how the current system operates was conducted, revealing its weaknesses. This was aided by questionnaires, interviews and observations whereby each technique had its benefits and drawbacks. The current system's operations were emphasized by illustrations such as a data flow diagram. Available alternatives were weighed and in-house development came out as the most suitable alternate. New system requirements were outlined and they were complimented by a use case diagram. Following is the analysis phase which will focus on the design of the new system and all its data representations. All the different design aspects of the proposed system will be shown.

# **CHAPTER 4: DESIGN**

## **4.1 INTRODUCTION**

The existing system was analyzed and its weaknesses were highlighted which justified development of a tracking system for Gladercom Freight (Pvt) Ltd. The design of the new system then commences. Context diagram and data flow diagram will demonstrate how the new system should operate. Illustrations like an entity relationship diagram (ER) will emphasize database design. Communication of software and hardware will be well-defined. The design particulars of software data structure, architecture, interface and components required for implementation of the tracking system will be explained in detail. Any decision made henceforth will have an impact on overall success of the tracking system project.

## **4.2 SYSTEM DESIGN**

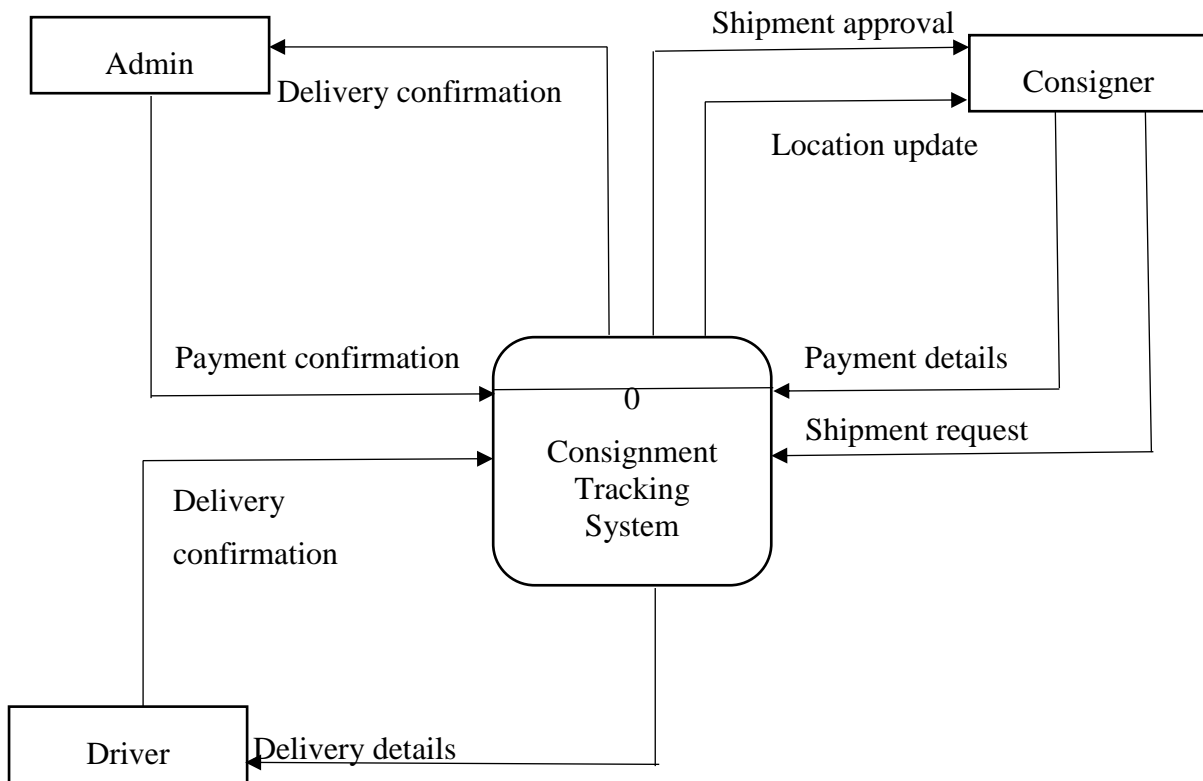
System elements such as the architecture, modules and components, the different interfaces of those components and data which goes through that system are designed (Odhiambo, 2018). System design bridges the gap between problem domain and the existing system in a controllable way (Tutorials Point, 2019). It focuses on the solution domain or in a nutshell, ways to implement the new system. The actual functionalities of the new system are elaborated.

### **4.2.1 DESCRIPTION OF THE PROPOSED SYSTEM**

The Gladercom Freight Consignment Tracking System enables a consigner to request for shipment, pay for it and have it delivered to the consignee's destination. While in transit, consignment can be tracked so as to know of its location at the current moment. The branch administrator approves the consigner's request, makes sure that the correct payment has been made and responds to customer queries online. The admin also views consignment in queue for delivery and allocates a respective driver for the delivery. The driver gets delivery information and confirms that the consignee has received the consignment, just after delivery. All transaction history is kept in the system providing an audit trail, making it possible for report generation and printing when required.

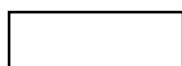
### 4.2.2 CONTEXT DIAGRAM

A context diagram exhibits anticipated input and output from a system, to and from various entities. A systems analyst is able to simulate what anticipated data is going to go into the system, after it has been handled by the system what information is returning to the external entities. Fig 4.1 shows the new system's context diagram.



*Figure 4. 1 Context Diagram*

#### Key for Context Diagram



Entity



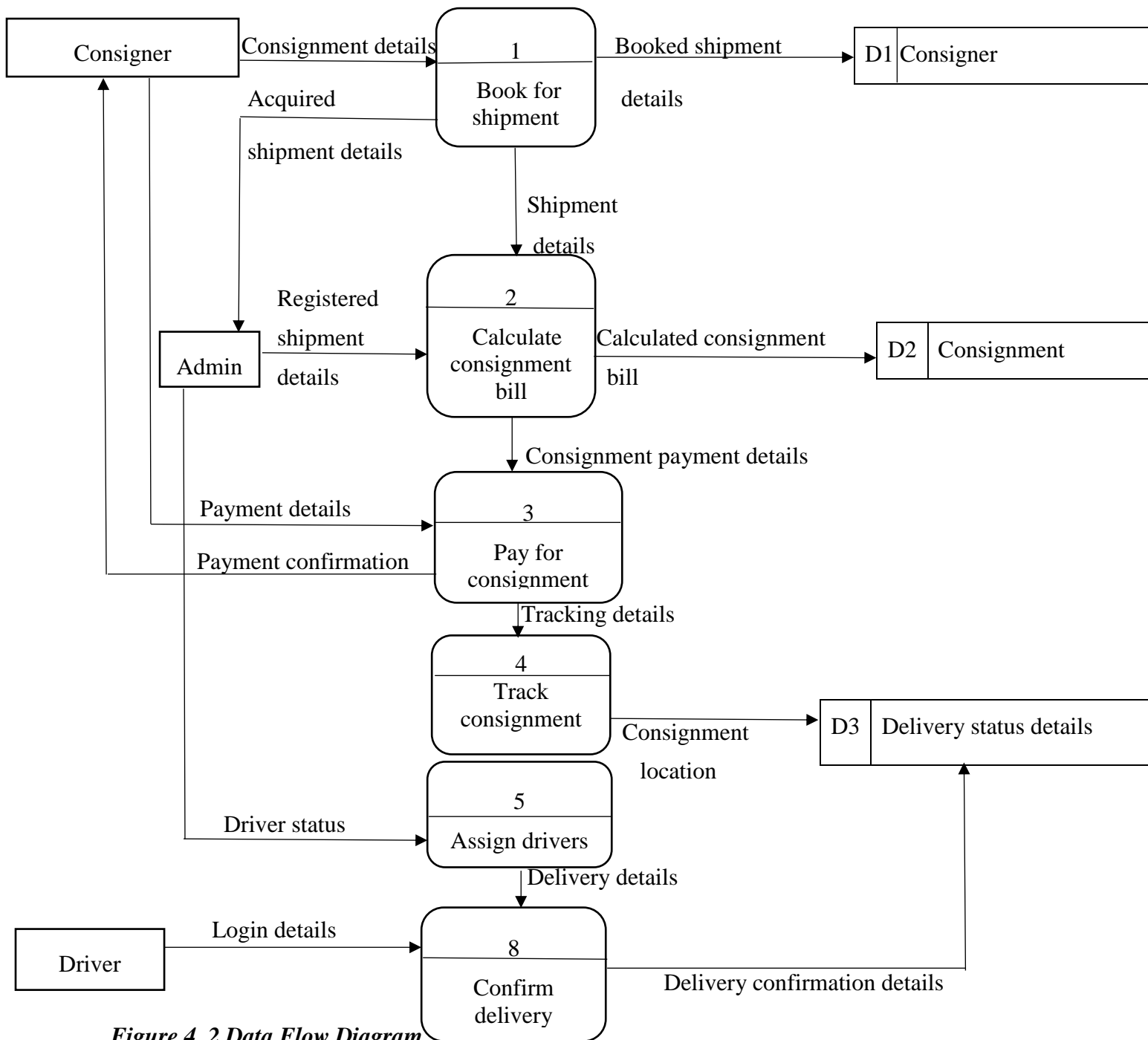
System



Data flow

### 4.2.3 DATA FLOW DIAGRAM


A data flow diagram is designed to denote the exchange of information. The new system is being analyzed, showing external entities, flow of data and data stores. The tracking system data flow diagram is shown in Fig 4.2.




**Figure 4. 2 Data Flow Diagram**

**Key for Data Flow Diagram**

 Entity

 Storage

 Process

 Data flow

### 4.3 ARCHITECTURAL DESIGN

Architectural design is a plan from which a system is developed. It can be defined as the process of identifying a group of hardware and software components and their interfaces to create the outline for computer system development (Thakur, 2018). Architectural design is of principal importance in software engineering whereby vital requirements such as reliability, cost and performance are attended to. Although architectural design is the developers' responsibility, it is important to include all stakeholders so as to minimize risks and errors. The new system build up will consist of the following;

#### Client Machines

These are communication interfaces between the user requiring a service and the server. Client machines will be used by the users to access the tracking system, collectively acquiring information from the server.

#### Server

A client machine's requests are provided by the server. Its purpose is to await and fulfil requests from clients. The database server stores all information in the organization. The graphic user interface (GUI) and web pages reside in the web server, and can be retrieved by a web browser.

#### Networking Cables

These are cables used to connect one device to other devices in a network, for the purpose of sharing resources.

#### Printers

For printing of reports and other documents when needed by management.

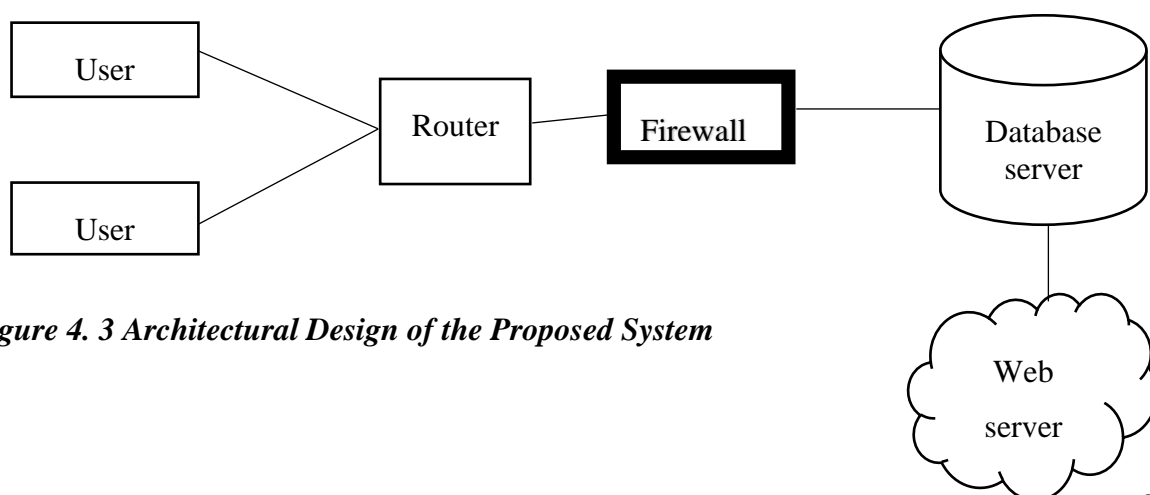
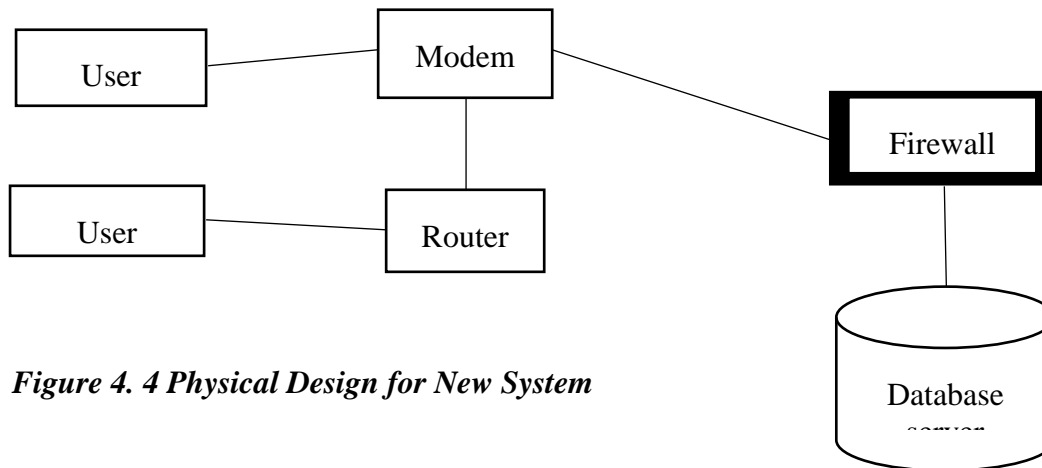


Figure 4. 3 Architectural Design of the Proposed System

## 4.4 PHYSICAL DESIGN

This defines arrangement of hardware and software required for the system. The interaction between software and hardware will allow clients to access a company' database through a local area network. A network-based firewall will secure the network by analyzing packet data from incoming and outgoing traffic. A switch shall connect an administrator to the server. A laser jet printer will ne connected for the purpose of document printing.

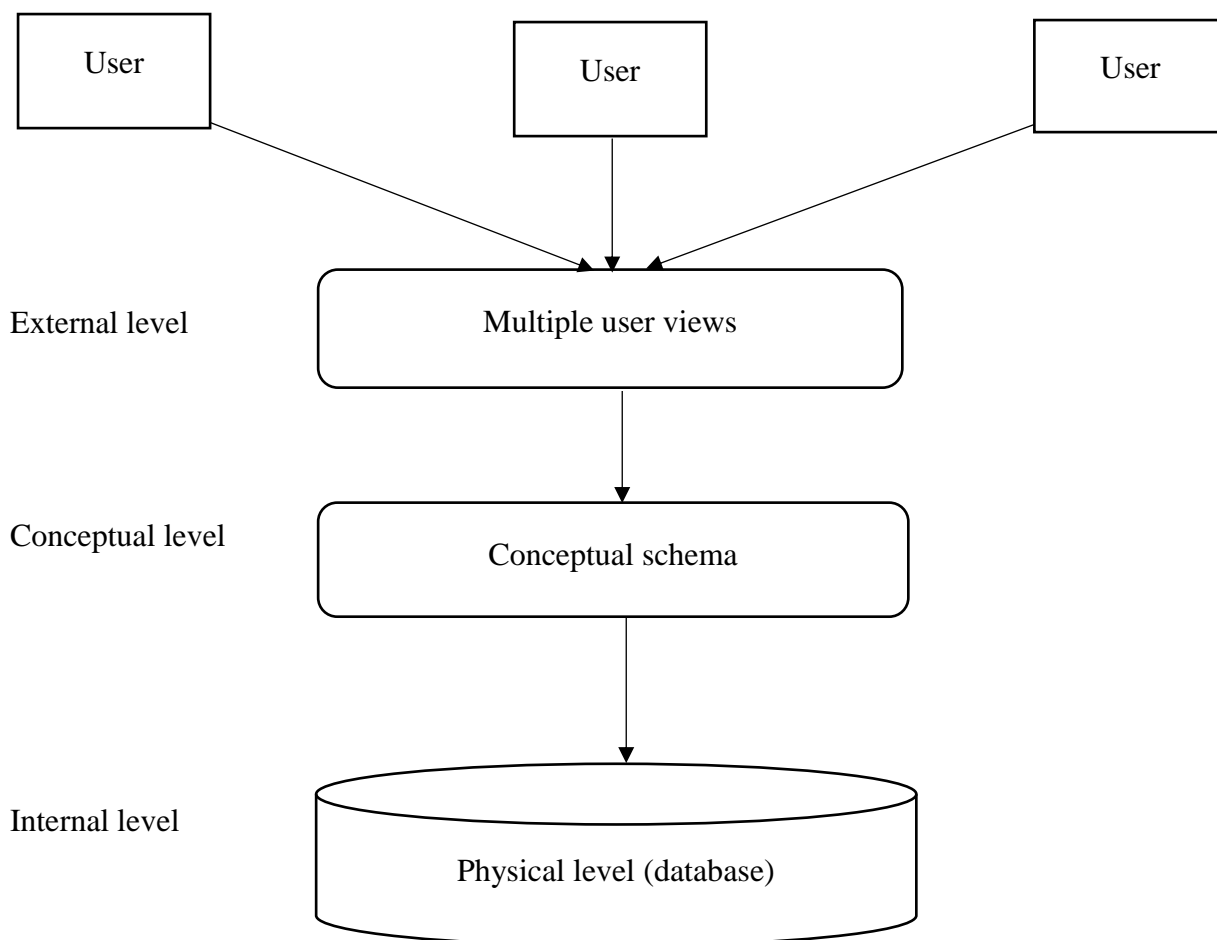


*Figure 4. 4 Physical Design for New System*

## 4.5 DATABASE DESIGN

Database design is a gathering of procedures that facilitate design, development, implementation and maintenance of organizational data management systems (Guru99, 2019). The diagram below shows the database architecture;





**Figure 4. 5 Database Architectural Design**

**External Level**

This is the only part that concerns the user. It is the highest level of abstraction and can also be called the view level. Diverse users concurrently require diverse views of a database and hence there will be many view level abstractions of the same database. In this case, the interface availed when a consigner will be different from the one availed to a branch admin, although the database is the same.

**Conceptual Level**

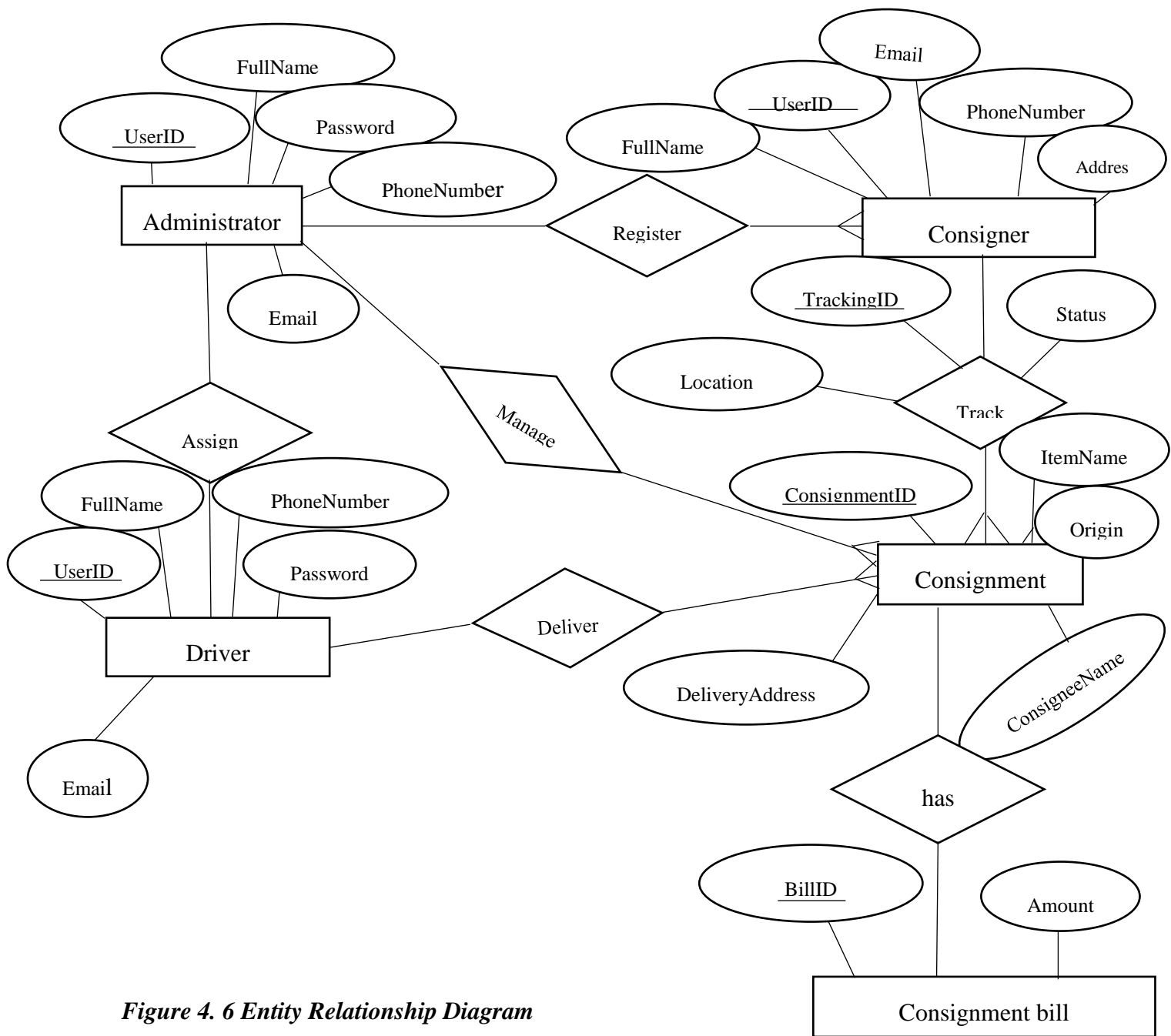
This level describes data kept in a database and relationships existing amongst the data. Database administrators and designers work together to decide what data is to be stored in the database. The new system will contain interconnected tables that will be storing varied data like the Tracking table will have attributes like order number and location while the Consigner table will have attributes like customer name and also the destination.

## **Internal Level**

It describes how data is actually stored in storage devices. Data compression and encryption techniques, if used, are dealt with in this level. The MD5 function will be used on user passwords.

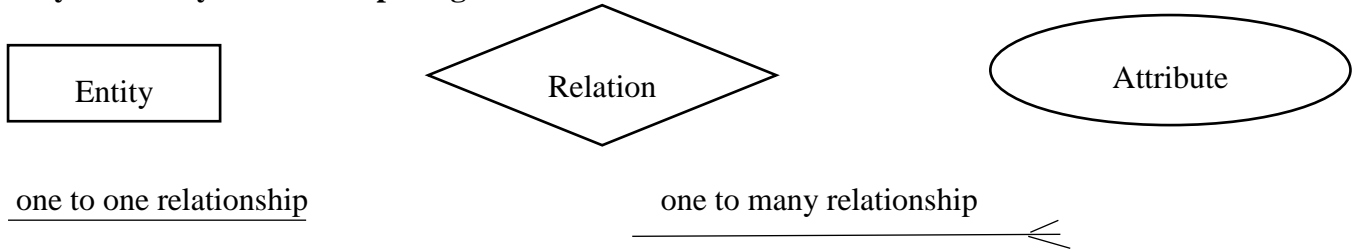
### **4.5.1 ENTITY RELATIONSHIP DIAGRAM**

This is a graphical depiction of a system that portrays the association among people, objects, places, concepts or events within that system (Rouse, 2010). It can help outline business processes and be used as the basis for a relational database. Entity relationship diagrams are the visual initial point for database design which can also be helpful when determining information system necessities in an organization. The entity relationship diagram for the new tracking system is shown in Fig 4.6.



**Figure 4. 6 Entity Relationship Diagram**

**Key for Entity Relationship Diagram**



#### 4.5.2 ENHANCED ENTITY RELATIONSHIP DIAGRAM

These are specialized entity relationship diagrams that can be extremely useful for modelling databases (Lucid Software Inc, 2019). The EER for the new system is shown in Fig 4.7.

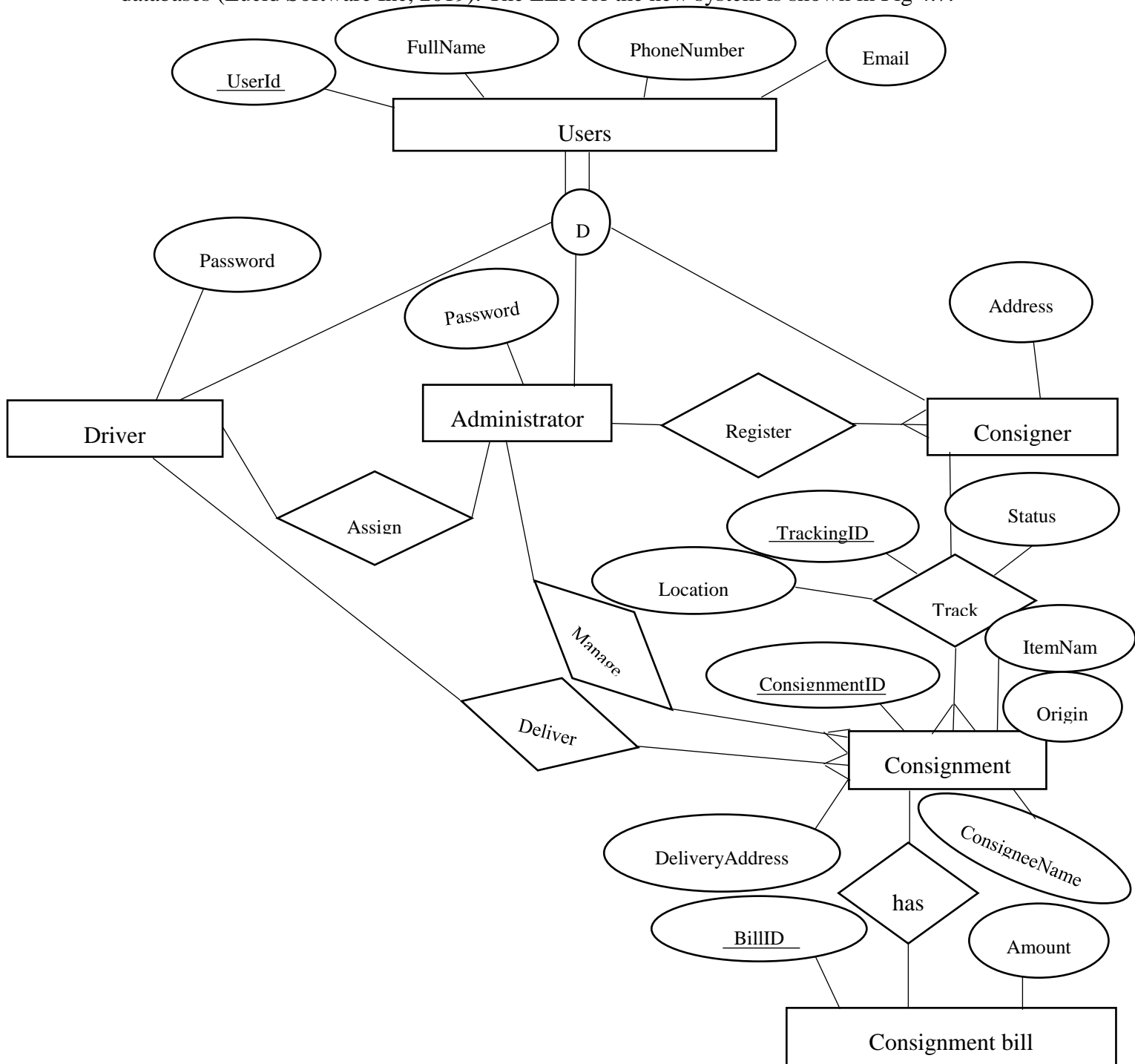
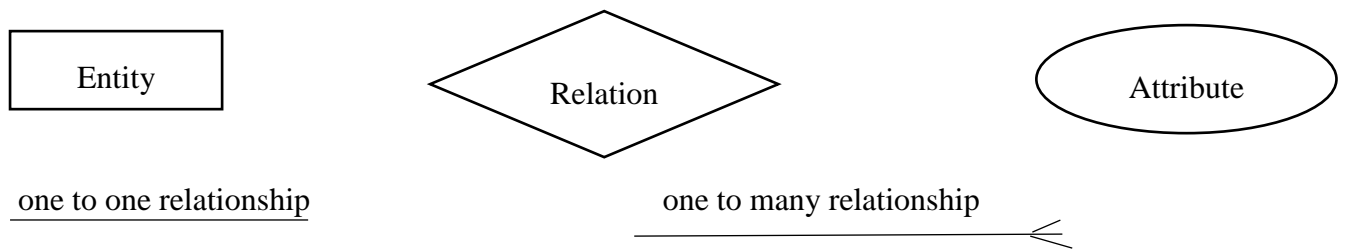


Figure 4. 7 Enhanced Entity Relationship Diagram

### Key for Enhanced Entity Relationship Diagram



## 4.6 PROGRAM DESIGN

This is the process by which there is creation of a specification of a software artifact, intended to achieve goals, using a set of original components and subjects to constraints. It involves the module design, classes design and functions design of the proposed system.

### 4.6.1 PACKAGE DIAGRAM

Package diagram is a diagram showing the arrangement and organization of model elements in a project (Visual Paradigm Online, 2019). Fig 4.8 shows the new system's package diagram.

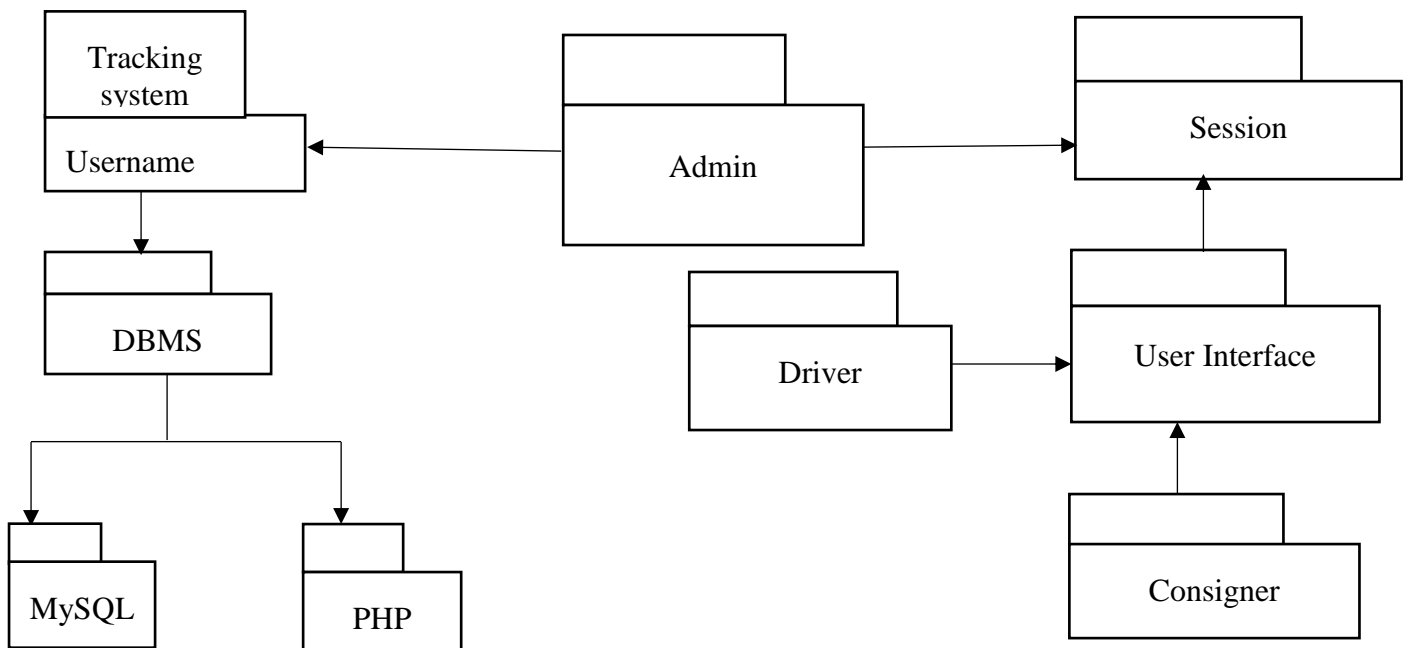
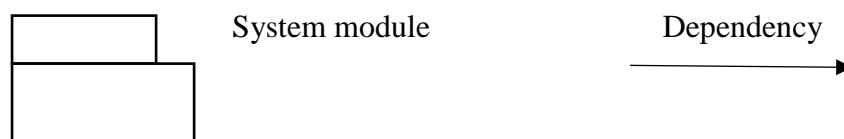


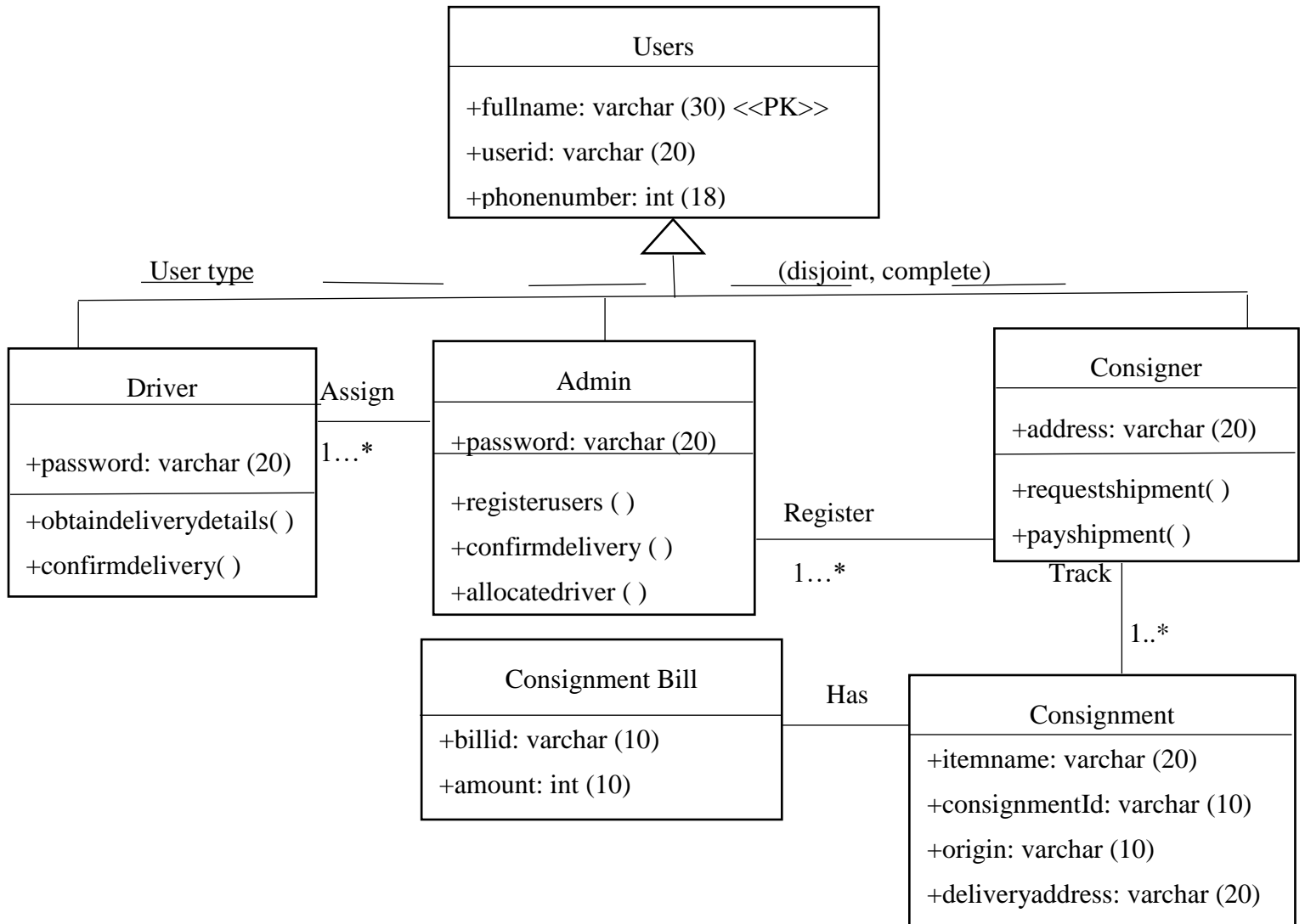
Figure 4. 8 Package Diagram for New System

### Key for Package Diagram



### 4.6.2 CLASS DIAGRAM

These undoubtedly show the assembly of a given system by demonstrating its classes, attributes, operations and relationships between objects. Fig 4.9 shows the class diagram for the new system.



**Figure 4. 9 New System Class Diagram**

#### Key for Class Diagram

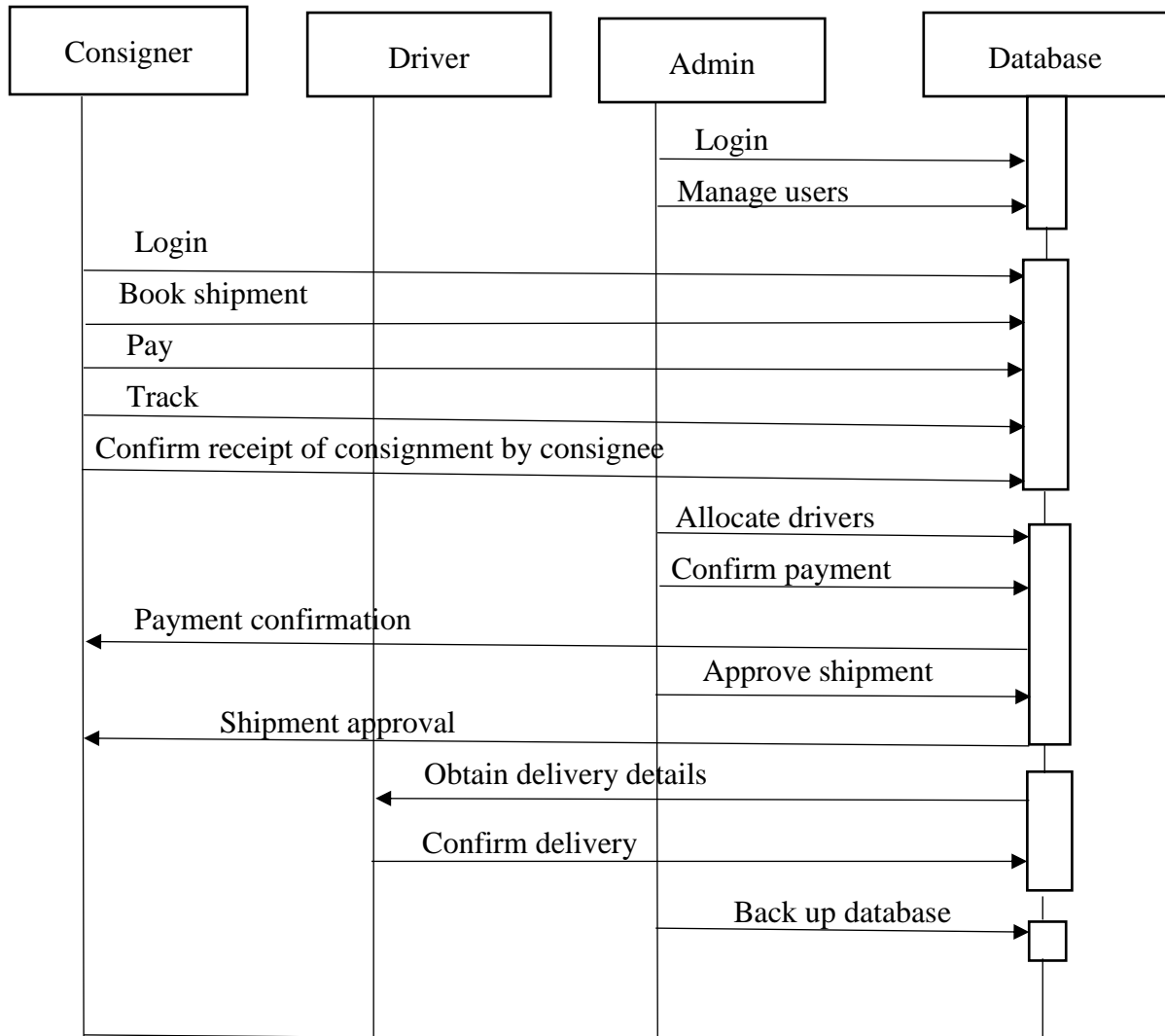
Class Name
Attributes
Methods

#### Relationship



### 4.6.3 SEQUENCE DIAGRAM

A sequence diagram shows the communication between objects in a chronological order (GeeksforGeeks, 2018). Sequence diagrams describe how and in what order the objects in a system function. They widely help the designer understand requirements for a new system. The tracking system's sequence diagram is shown in fig 4.10.



*Figure 4. 10 Sequence Diagram*

#### Key for Sequence Diagram



## 4.7 INTERFACE DESIGN

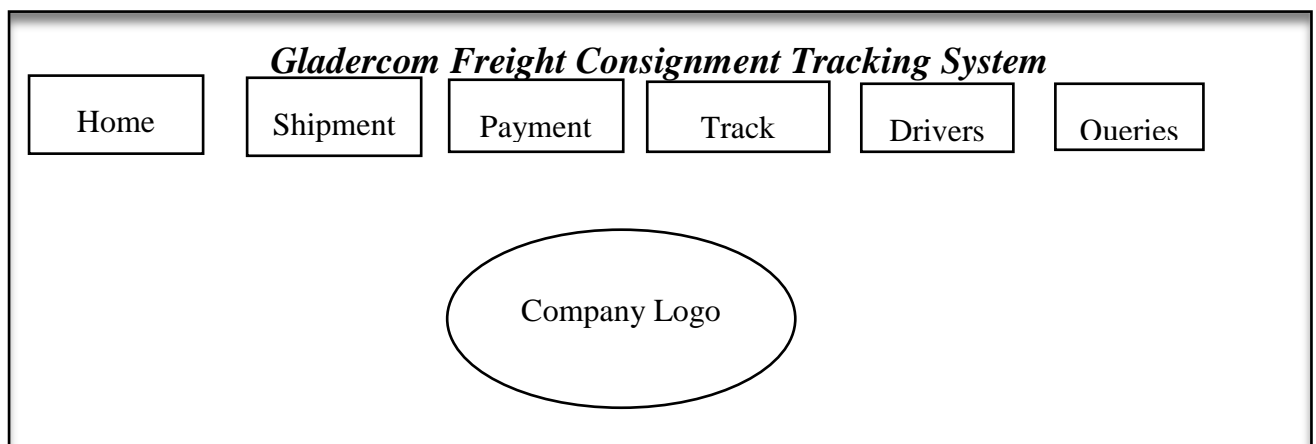
This is the process of generating interfaces in software with much focus on looks or style (Interaction Design Foundation, 2008). Designers aim to make interfaces that are easy to use and pleasurable. A user communicates with an application through the use of quite a number of interfaces within the system.

### 4.7.1 MENU DESIGN

A menu is a set of choices offered to a computer application's user to help them find information or execute a program function. It holds a set of user actions that are normally hidden, and are accessible by a button, key or gesture. Menu design consists of designing the graphical user interfaces (GUI) that enforce the user to enter and retrieve data when using the system.

#### 4.7.1.1 Main Menu

The main menu can be defined as a starting to any navigation or usage of an application. It is also known as the home page. The main menu has access to the whole system inform of buttons, callouts, title bars etc.

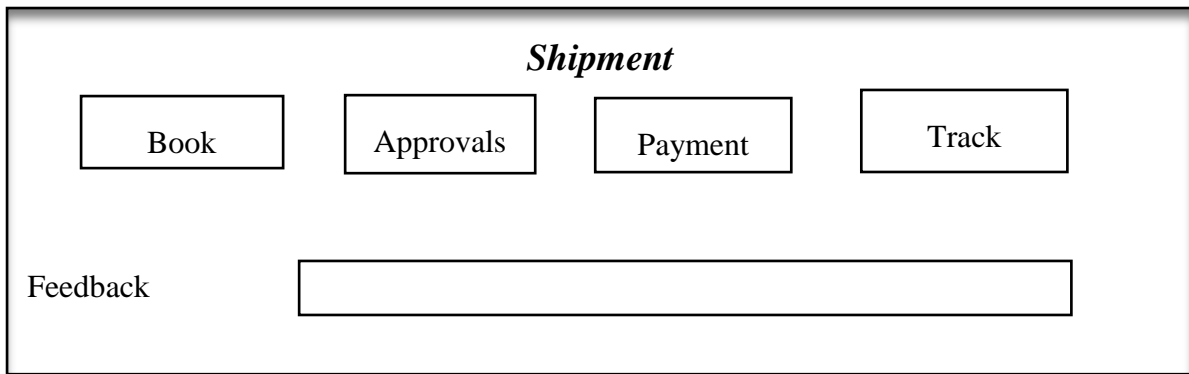


*Figure 4. 11 Home Page*

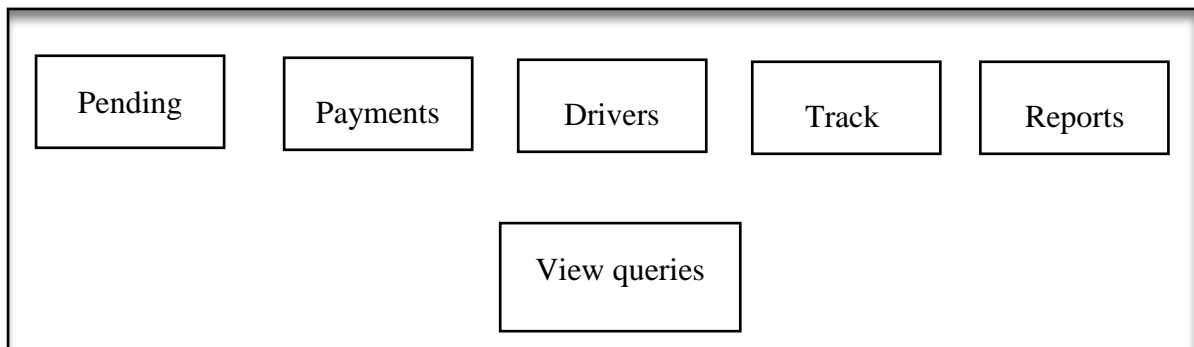
#### 4.7.1.2 Sub Menus

This is a secondary menu which is derived from the main menu. Sub menus are user specific. The users for the new system will include consigner, driver and administrator. These users will have a submenu created to meet their needs when using the tracking application.

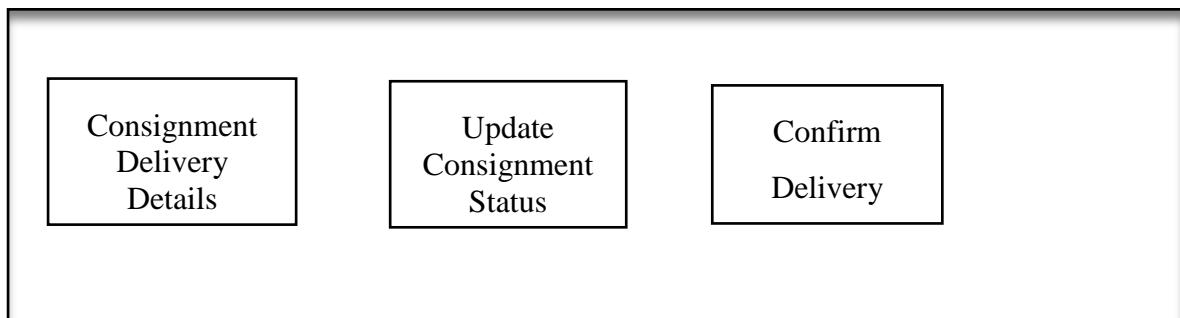




**Figure 4.12 Consignee Home Page**



**Figure 4.13 Admin Home Page**



**Figure 4.14 Driver Home Page**

#### **4.7.2 INPUT DESIGN**

Input design is the designing of forms that will accept input from a user in order to produce results. User credentials are validated in order to prevent unlawful users from accessing the system. A new consigner will not be having login credentials hence they should click the link where it says ‘Don’t have an account?’. This is where all their details are taken down and login details are sent by email.

Full name	<input type="text"/>	Email Address	<input type="text"/>
ID number	<input type="text"/>		
Address	<input type="text"/>		
Phone Number	<input type="text"/>		

**Figure 4. 15 Consigner Details Page**

Once access has been gained, the consigner can request for shipment of consignment to consignee's destination.

Origin	<input type="text"/>	Destination	<input type="text"/>
Weight	<input type="text"/>	Service Type	<input type="text"/>
Receiver Name	<input type="text"/>		
Phone number	<input type="text"/>	Sender Phone Number	
	<input type="text"/>	Receiver Phone Number	

**Figure 4. 16 Shipment Booking**

The consigner then pays for shipment of the consignment.

Consignment ID	<input type="text"/>
Weight	<input type="text"/>
From	<input type="text"/>
To	<input type="text"/>
Amount to pay is \$000	

**Figure 4. 17 Payment Page**

While in transit, consignment can be tracked.

Consigner Name	<input type="text"/>
Tracking Number	<input type="text"/>

**Figure 4. 18 Tracking Page**

When the consignee has received consignment, consigner should confirm in in the system.

Consignment was received	<input type="button" value="Yes"/>	<input type="button" value="No"/>
Was it in good condition?	<input type="button" value="Yes"/>	<input type="button" value="No"/>
Tell us what you think about our service	<input type="text"/>	

**Figure 4. 19 Shipment Delivery Confirmation**

### 4.7.3 OUTPUT DESIGN

Output design is determined with how information or results are shown to a user. After consigner has booked and paid for shipment, a menu appears to show the number to be used when tracking consignment.

Booking and payment have been approved. The tracking number is <u>01234656</u> .			
<b>Sender Details</b>		<b>Receiver Details</b>	
Client Name	<input type="text"/>	Receiver Name	<input type="text"/>
Phone Number	<input type="text"/>	Address	<input type="text"/>
City	<input type="text"/>	Phone Number	<input type="text"/>

**Figure 4. 20 Shipment Approval Page**

Consignment tracking by a user will show the following output;

Tracking ID <u>01234656</u>			
<u>Updated on</u>	<u>Location</u>	<u>Status</u>	<u>Time</u>
01/01/19	Beitbridge		00.05
01/01/19	Mvuma	Held	05.00
01/01/19	Harare	Delivered	10.29

**Figure 4. 21 Tracking Results**

The admin can view delivered shipment so as to see which shipment is left for delivery and allocate respective drivers.

<b><i>Delivered Consignment</i></b>		
<u>Order Number</u>	<u>Destination</u>	<u>Delivered by</u>
01234	Harare	John Banda
5678	Sweden	William Shakespeare
785797	Namibia	Towanda Tagwirei
5746545	Gweru	Sharon Mutsa

**Figure 4. 22 Delivered Consignment Page**

The admin can query the system to get all deliveries to be done on a certain day and the following is the output.

<b><i>Date</i></b>	<b><i>Order number</i></b>	<b><i>Status</i></b>	<b><i>Consigner</i></b>	<b><i>Consignee</i></b>	<b><i>Weight</i></b>	<b><i>Receiver address</i></b>
10/04/19	12345	Delivered	Sharon Mutsa	Lilian Mutsa	5kg	192 Westgate, Harare
10/04/19	78969	In transit	Passmore Moyo	Mukudzei Taurai	2kg	4968 Mkoba 15 Gweru
10/04/19	463586	Delivered	Alley Express	Lawson	10kg	34 Bata Estates

**Figure 4. 23 Report on Consignment Scheduled for Delivery**

## 4.8 PSEUDO CODE

According to Rouse (2005), this is a set of rules procedures which can be shown in a readable format. It looks like the actual code but is simplified so that the persons can comprehend without too much difficulties. Below is a pseudo code for the system;

### **Admin Login**

GET Username

GET Password

IF (Username == EnteredUsername && Password == EnteredPassword) THEN

    Login Successful

ELSE

    Login Failed

ENDIF

### **Consigner Register**

GET Name

GET Surname

GET Gender

GET PhoneNumber

GET Email

GET Password

IF (Name AND Surname AND Username AND Gender AND PhoneNumber AND Email AND Password == Valid) THEN

    Registration Successful

ELSE

    Registration Unsuccessful

ENDIF

### **Consigner Books Shipment**

GET Date

GET Time

GET Weight

GET ItemName

GET Amount

IF (Date AND Time AND Weight AND ItemName AND Amount == Valid)

THEN TrackingNumber

Shipment Booking Successful

ELSE

Shipment Booking Unsuccessful

ENDIF

### **Consigner Tracks Parcel**

GET TrackingNumber

IF (EnteredTrackingNumber == GeneratedOrderNumber OR EnteredDate ==  
GeneratedDate) THEN

Track Shipment

ENDIF

### **Consigner Prints Invoices**

GET Date OR

GET InvoiceNumber

IF (EnteredInvoiceNumber == GeneratedInvoiceNumber OR EnteredDate == GeneratedDate)

THEN

Print Invoice

ENDIF

### **Consigner Confirms Shipment Delivery**

```
IF Shipment Successful THEN
GET Confirmation
IF (Confirmation== Valid) THEN
Send Confirmation
ENDIF
```

### **Driver Confirmation of Shipment Delivery**

```
IF Shipment Successful THEN
GET Confirmation
IF (Confirmation == Valid) THEN Send Confirmation
ENDIF
```

## **4.9 SECURITY DESIGN**

Security design seeks to make systems as free of vulnerabilities and impervious to attack as possible through such measures as continuous testing, authentication safeguards and adherence to best programming practices (Rouse, 2010). It is not advisable to fix errors as they are found after implementation and is not as effective as designing systems to be as secure as possible from the onset. Security is emphasized in the tracking system in the form of physical security, network security and operational security.

### **4.9.1 PHYSICAL SECURITY**

This is the protection of hardware, software, networks and data from physical threats that have the potential to cause serious harm, loss or damage (Rouse, 2010). It includes protection from fire, flood, natural disasters, burglary, theft or vandalism. This type of security consists of three important components which are access control, surveillance and testing. Obstacles should be enacted against potential invaders and physical locations must be hardened against accidents, attacks or environmental disasters. In this case, surveillance cameras, heat sensors and smoke detectors will be used to protect the hardware and all the other components.

### **4.9.2 NETWORK SECURITY**

This is an activity designed to protect the usability of network and data (CISCO, 2019). This includes both hardware and software technologies. Network security targets threats and prevents them from spreading in a network. SMADV 2018 antivirus and antimalware software

will be used to scan malware upon entry and continuously track files afterward, removing malware and fixing damage. A firewall will be enacted as a barrier between the internal and outside networks.

### **4.9.3 OPERATIONAL SECURITY**

This is an important mechanism in developing protection mechanisms to safeguard sensitive information and preserve essential secrecy (Federation of American Scientists, 2019). In this context, the access a user has will be limited to the minimum access required for a user to do their job. All users of the system will be required to enter username and password provided by the company, which they will receive through an email. The administrator will only have the rights to add or remove users from the system, and generating the audit trail for all transactions.

## **4.10 CONCLUSION**

Design of the system helped in overallly defining the proposed system functionality which bears a huge impact on the project's success. System design described how the tracking system will function and this was emphasized by a data flow diagram and context diagram which collectively helped identify system entities, flow of information, system processes and data stores. Architectural design consisted of defining hardware and software mechanisms and their interfaces with the purpose of establishing a computer system development framework. Database architecture exposed all its levels with each level's purpose explained in detail. An entity relationship diagram depicted the relationships existing among system stakeholders while the enhanced ERD had the sole purpose of database modelling. Modules, classes and functions of the proposed system were elaborated using of package, class and sequence diagram. All menus and sub menus were shown, including input and output forms. Pseudo code was used to assist one to comprehend the actual code without too much difficulty. Security design sought to make the system bug free and impervious to attack as much as possible. Next is the implementation phase whereby testing will be done to the new system to make sure it is free from errors. Installation strategies will be outlined together with maintenance recommendations. Recommendations for future development will be explained where the designer will highlight other functionalities to be added to the system in future.



# **CHAPTER 5: IMPLEMENTATION**

## **5.1 INTRODUCTION**

Implementation entails all procedures involved in anything working appropriately in its atmosphere, like analyzing requirements, installation, configuration, customization, running, testing, systems integrations, user training, delivery and making necessary changes (Rouse, 2010). Various testing methods will be thoroughly exercised on the Consignment Tracking System to ensure that it is error free before being released for use. Training will be conducted for system users so that they are familiarized with the system whereby exercises will be carried out to ensure that they are familiar with the system. Changeover strategies will be discussed, with the strategy bearing much benefits being selected for application on the new system. Maintenance strategies to be used on the new system will be pointed out. If there is room for more functionalities to be added to the system, some suggestions will be mentioned for consideration.

## **5.2 CODING**

This is the basic art of writing a script that can be interpreted by a computer, using a programming language (BitDegree.org, 2018). If the code is right, a script will instruct the computer to behave in a certain way, to do something and perform actions as it should. The tracking system was developed using PHP, HTML, CSS and JavaScript. The development team for the tracking system was made up of programmers, researchers, system end users and system analysts. A code snippet is shown in the appendix section.

## **5.3 TESTING**

Testing is an activity that checks if actual results match the expected result. (Guru99, 2019). The main aim is to ensure that a system is free from any defects. Errors, gaps or anything in contrary to actual requirements are identified during testing so that they are rectified before releasing an application for usage. There are various types of testing which can be used to ensure that code is working properly. Validation and verification are also involved. Validation aims to regulate if an established system meets end user specifications while verification ensures that a system is functioning as expected. Testing was done using white box and black box testing which are explained;

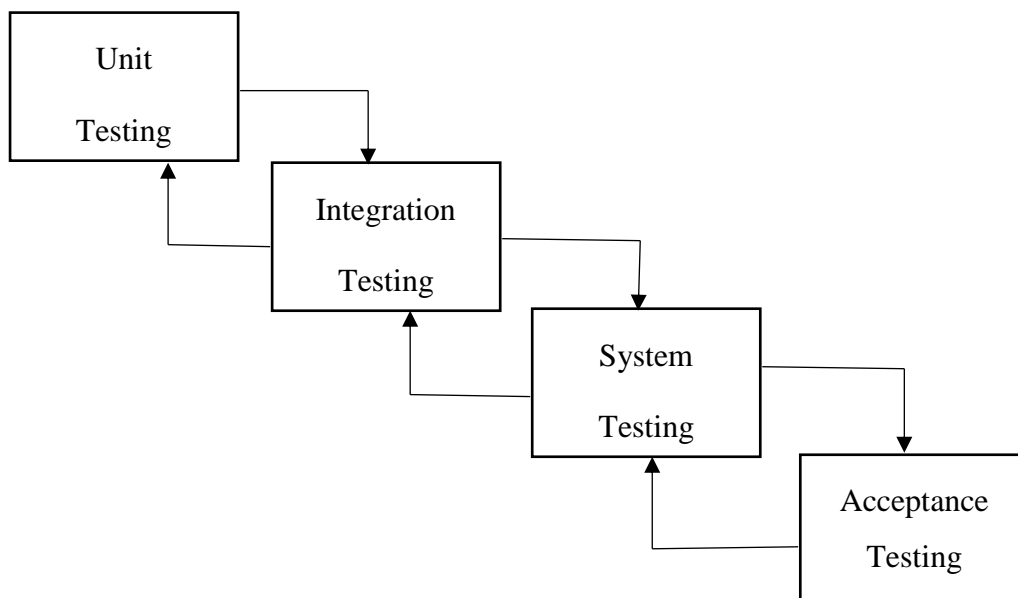
## Black Box Testing

Black box testing scrutinizes the functionality of an system based on given specifications. The internal structure of the item being tested is unknown to the tester. Black box testing therefore focuses on whether the developed Consignment Tracking System is producing expected from the given input and is also used for validation.

## White Box Testing

The internal structure of the item being tested is known to the tester. It is testing beyond the user interface and into the finer details of the system. White box testing principally focuses on improving design, usability and system security. System developers participated during white box testing as they had the programming knowhow.

The tracking system was tested in stages and they are depicted by Fig 5.1.



*Figure 5. 1 Testing Process Flow*

### 5.3.1 UNIT TESTING

This focuses in the smallest unit of software design whereby an individual unit is tested (GeeksforGeeks, 2018). Sample input is used while corresponding output is observed for any errors. Unit testing simply verifies that individual units of code are working as expected. The output is usually as simple as a console output. White box testing was used to recognize errors

within the units being tested and essential corrections were made. For black box testing, shipment was booked and the amount to be paid showed up as expected.

**SHIPMENT BOOKING**

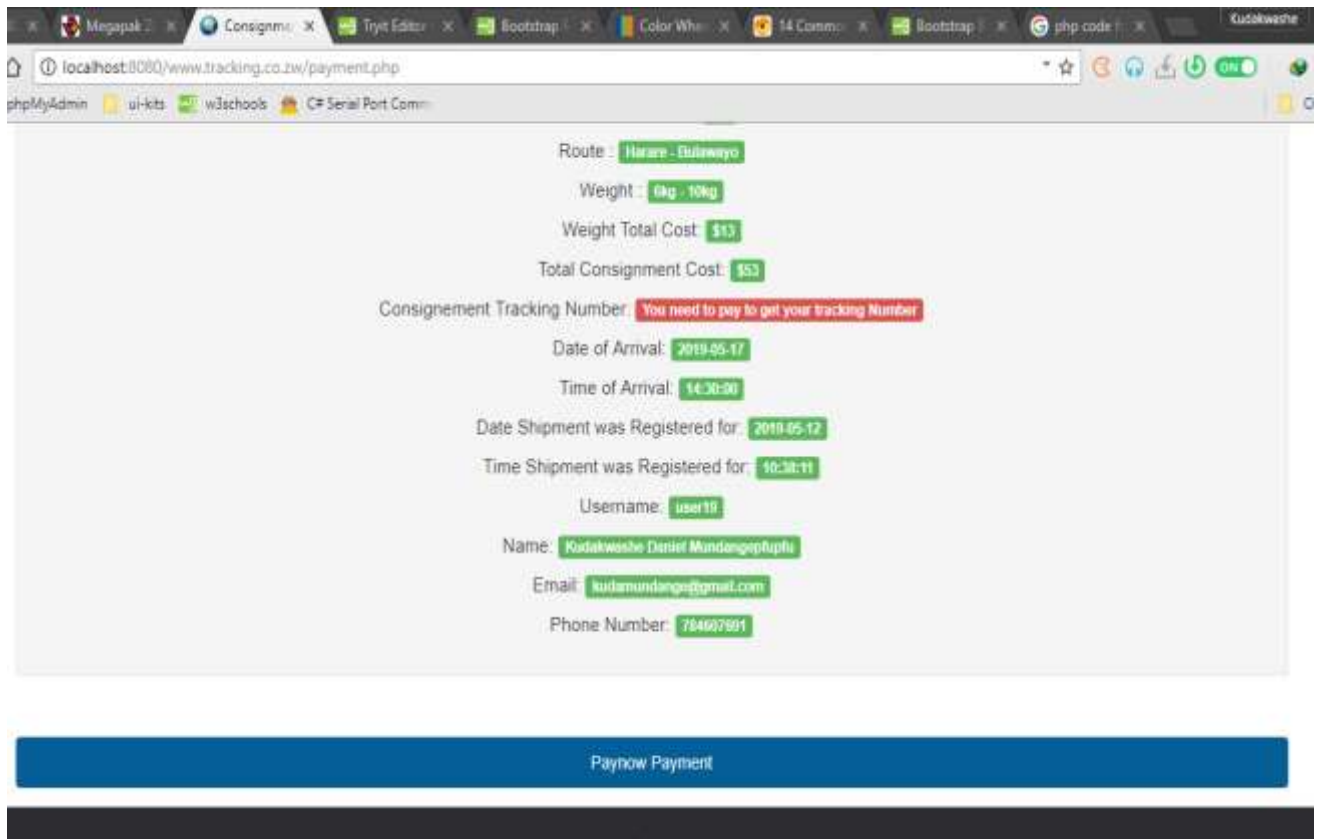
On this platform, you can book for your shipment. We charge our rates according to routes and weights of the parcel to be delivered. Below are the routes and wait rates we now offer, more routes are still coming.

<p style="text-align: center;"><b>ROUTES</b></p> <ul style="list-style-type: none"> <li>Harare - Bulawayo [RTGS \$40]</li> <li>Harare - Gweru [RTGS \$25]</li> <li>Harare - Mutare [RTGS \$60]</li> <li>Harare - Masvingo [RTGS \$70]</li> <li>Harare - Hwange [RTGS \$90]</li> <li>Harare - Chirundu [RTGS \$100]</li> </ul>	<p style="text-align: center;"><b>WEIGHTS</b></p> <ul style="list-style-type: none"> <li>0kg - 5kg [RTGS \$10]</li> <li>6kg - 10kg [RTGS \$13]</li> <li>11kg - 20kg [RTGS \$15]</li> <li>21kg - 30kg [RTGS \$20]</li> <li>31kg - 50kg [RTGS \$25]</li> <li>51kg - Above [RTGS \$30]</li> </ul>	<p style="text-align: center;"><b>Shipment Services</b></p> <p>We are the designated agency held responsible for handling your shipments and cargo, and your general interests, at ports and harbors worldwide, on behalf of ship owners, managers, and charterers.</p>
---	--	---

<p><b>Parcel:</b></p> <input type="text" value="sdsdsdssd"/>	<p><b>Receiver's Cellphone Number:</b></p> <input type="text" value="0784607691"/>	<p><b>Receiver's National ID Number:</b></p> <input type="text" value="sdsd"/>
<p><b>Routes:</b></p> <input type="text" value="Harare - Gweru"/>	<p><b>Receiver Name(s):</b></p> <input type="text" value="ssdsd"/>	<p><b>Date of</b></p> <input type="text" value="05/06/2019"/>
<p><b>Weight:</b></p> <input type="text" value="11 - 20 kg"/>	<p><b>Receiver's Address:</b></p> <input type="text" value="ssd"/>	<p><b>Time of Arrival:</b></p> <input type="text" value="03:43 AM"/>

[Register](#)

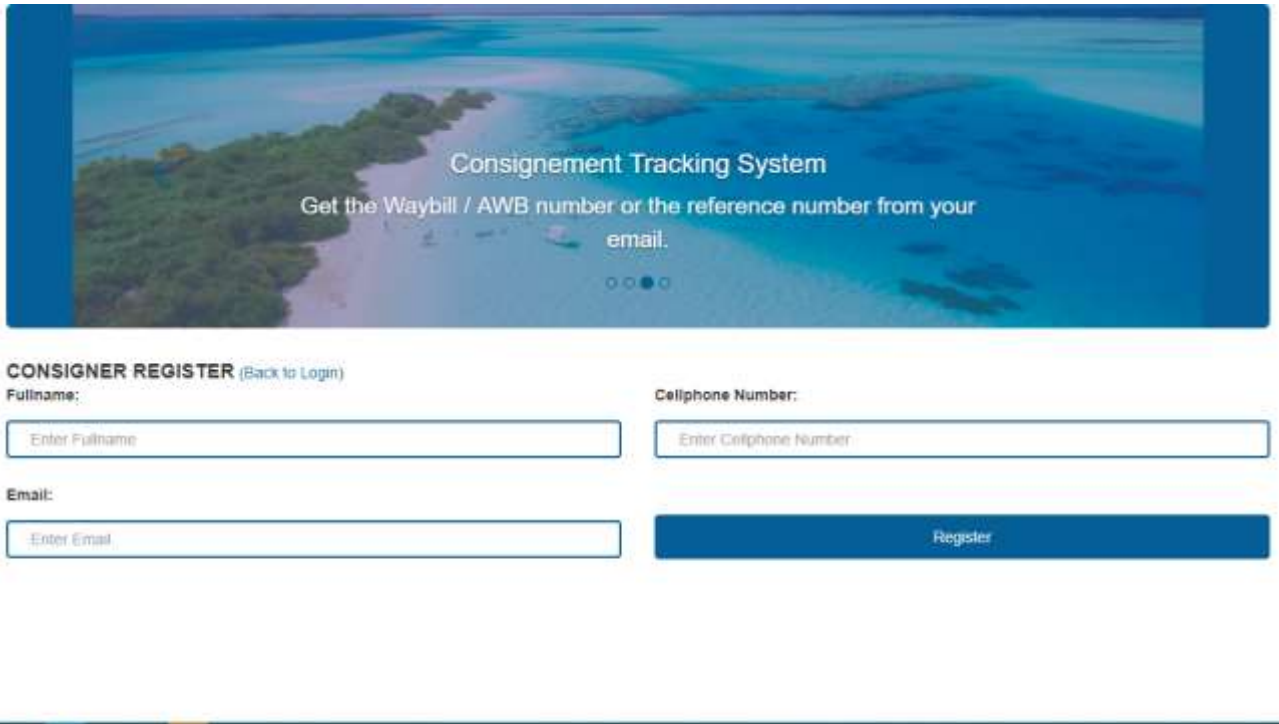
*Figure 5. 2 Shipment Booking*



*Figure 5. 3 Amount to be Paid Summary*

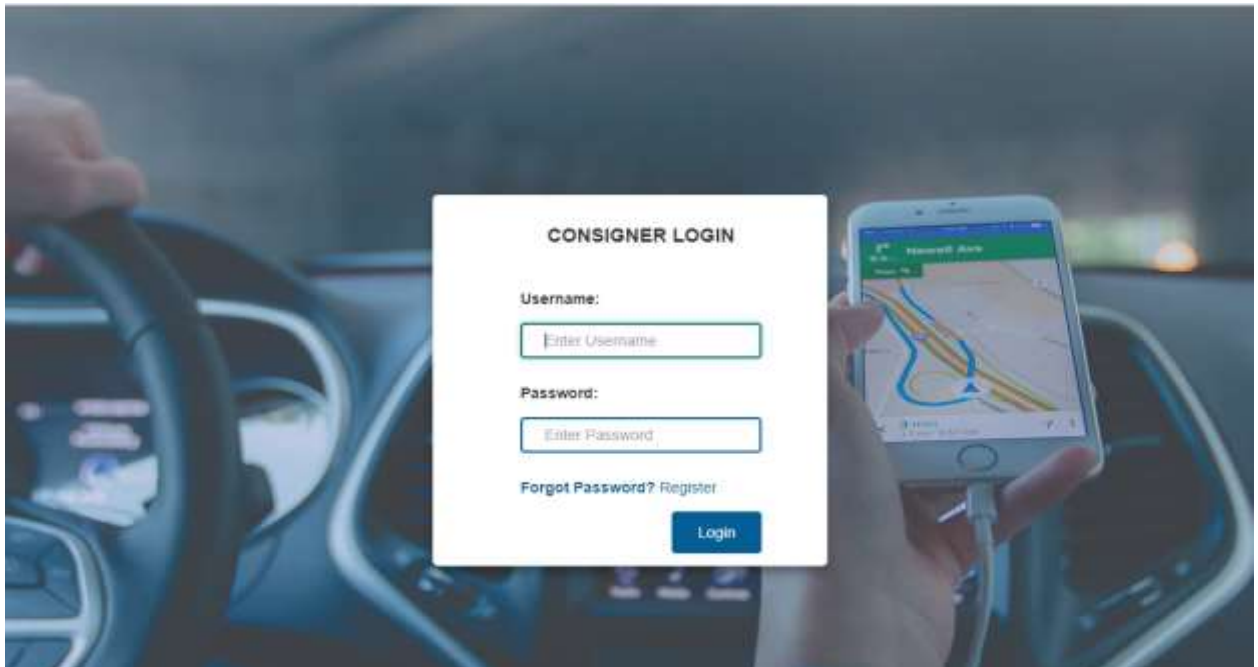
### 5.3.2 INTEGRATION TESTING

Individual software units are rationally joined and tried as a cluster. At the time of component development, user requirements are bound to change. It is possible that these new requirements could not have passed through unit testing hence integration testing becomes a necessity. White box testing was used to see if there were any integration errors and black box testing checked to see if component communication was as expected. In this case, a consigner entered required details on the system, an email was sent to them with login details and they logged in with the given details.



**Figure 5. 4 Consigner Register**

An email was sent to the consigner with login details which were to be used to access the tracking system.



**Figure 5. 5 Consigner Login**

### **5.3.3 SYSTEM TESTING**

This is the testing of a fully combined application. It is done in order to evaluate if system is complying with given requirements. Usually, system testing is completed by independent testers to make sure there is no bias involved. In this case, after login, a user is redirected to the Homepage whereby they can select a service they want. This was done successfully.

### **5.3.4 ACCEPTANCE TESTING**

This is a testing method related to user needs, necessities and business procedures which is conducted to ascertain whether or not the system pleases acceptance standards to enable authorized entities to determine whether or not to accept the system. Black box testing method was used and the results showed that the new system's end users accepted and were keen to start using the developed system.

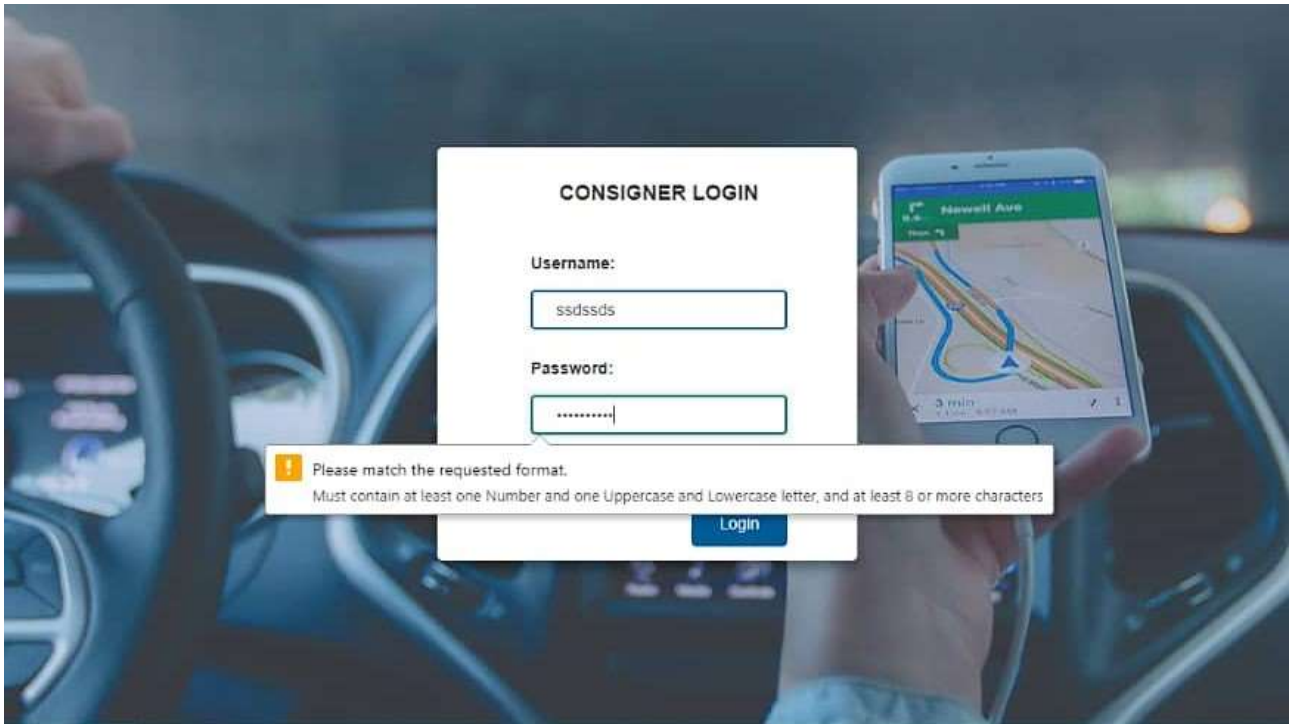
From all tests that were conducted, the results proved the tests to have solved all identified bugs and the tracking system can be installed and start functioning.

### **5.3.5 VALIDATION AND VERIFICATION**

Validation and verification are methods used to ascertain if the right system was developed and in the right way.

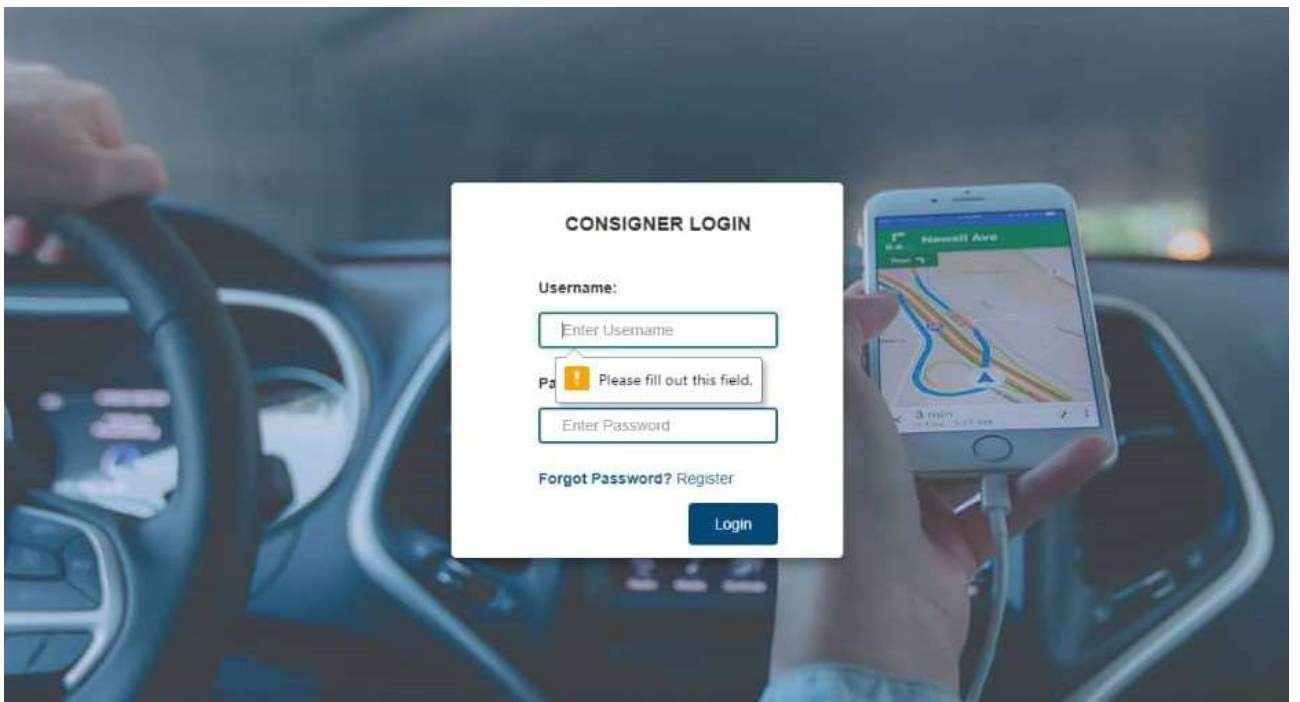
#### **VALIDATION**

This is an activity which ensures that the final product stakeholders' true needs and expectations have been met. The system would notify a user if improper data was passed for instance, wrong password and username. The system would request for entering of correct credentials. only approved people are allowed to access the system and the admin is the only with rights to add or remove users. Some of the validations done on the system are as follows;



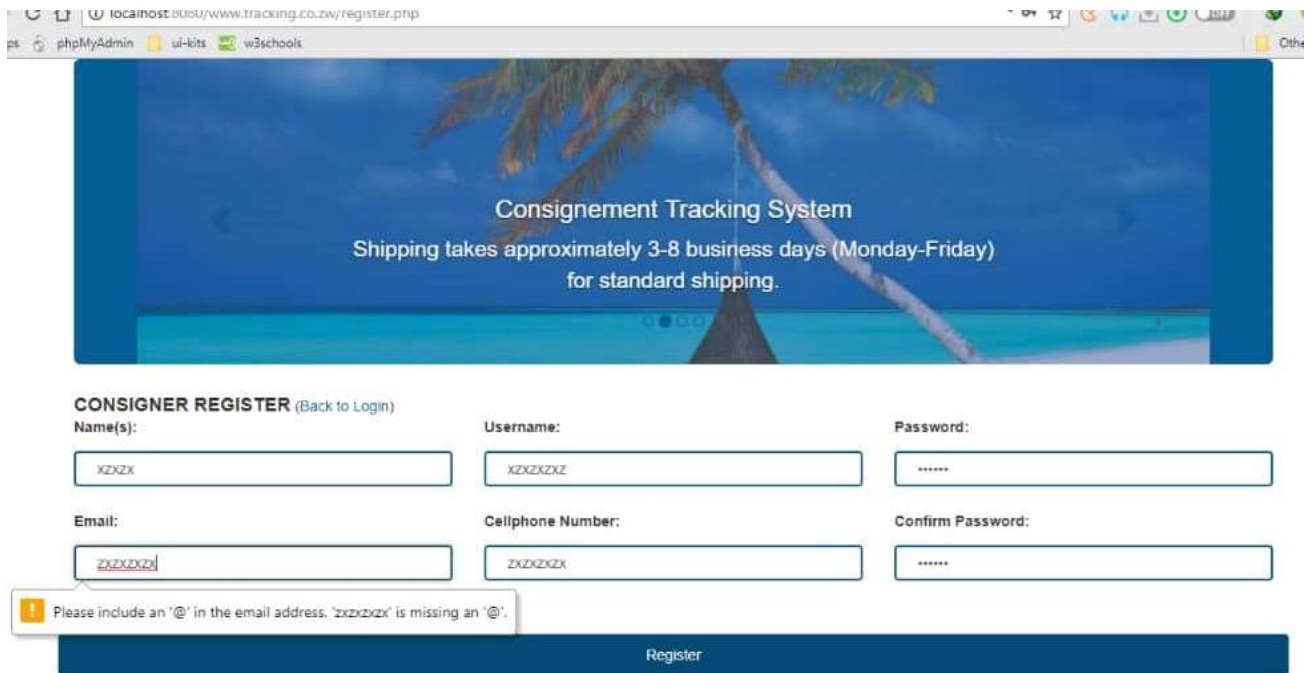
**Figure 5. 6 Incorrect Password Format**

A username is mandatory for system access.



**Figure 5. 7 No Username**

An email address should be registered in the correct format.



*Figure 5. 8 Incorrect email address format*

## Verification

This is a system test that is set to prove that all specified requirements have been met (Packer, 2019). It helps ensure that system objectives are met as required. Verification of the Consignment Tracking System was done to make sure that the system corresponded to specified objectives. A demonstration of the system performance versus given objectives is shown as follows;



Objective 1. To approve consigner’s request to access the system by sending login details via email

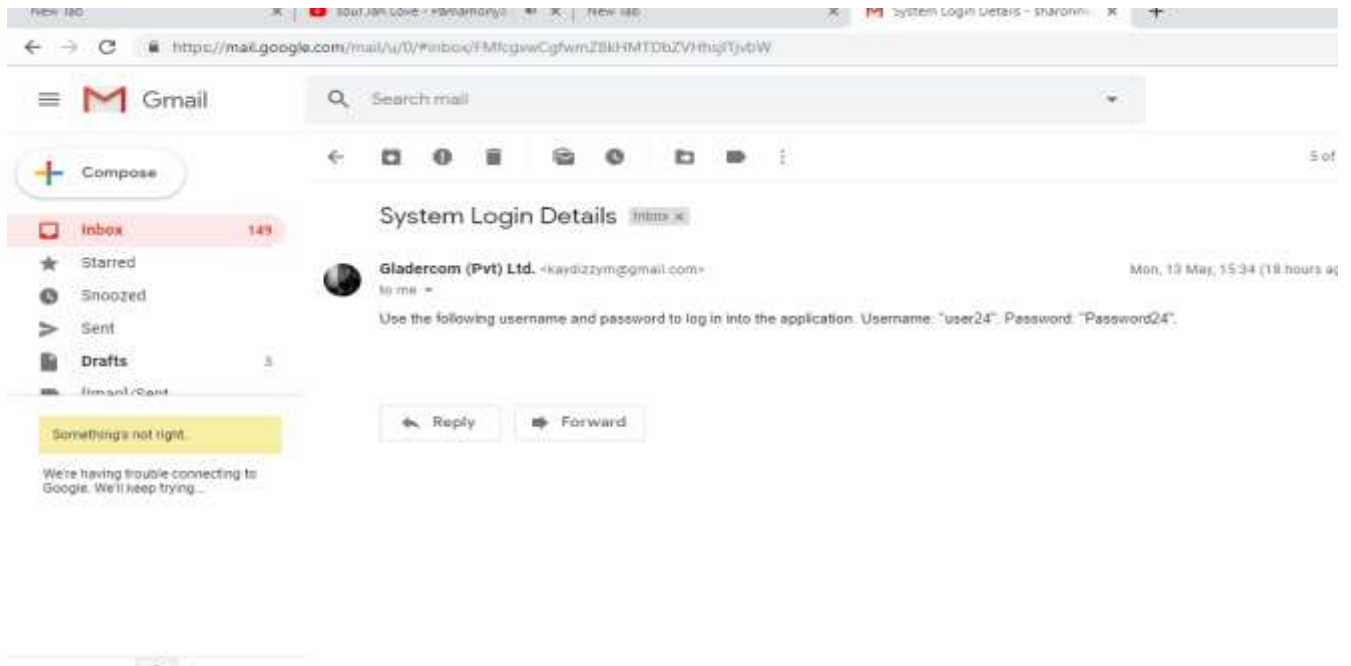


Figure 5. 9 Login Details

Objective 2. To calculate courier bill for consignment to be delivered

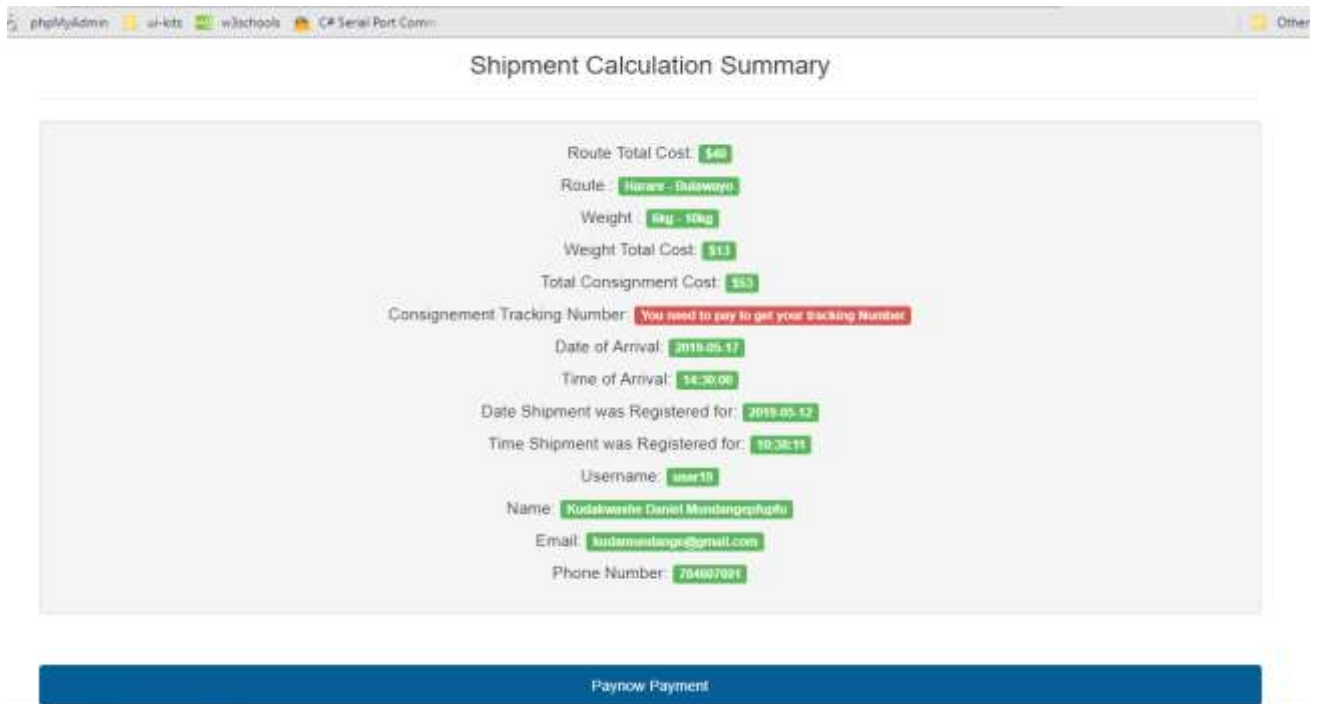


Figure 5. 10 Courier Bill

Objective 3. To pay for consignment delivery by integrating with the Paynow gateway.

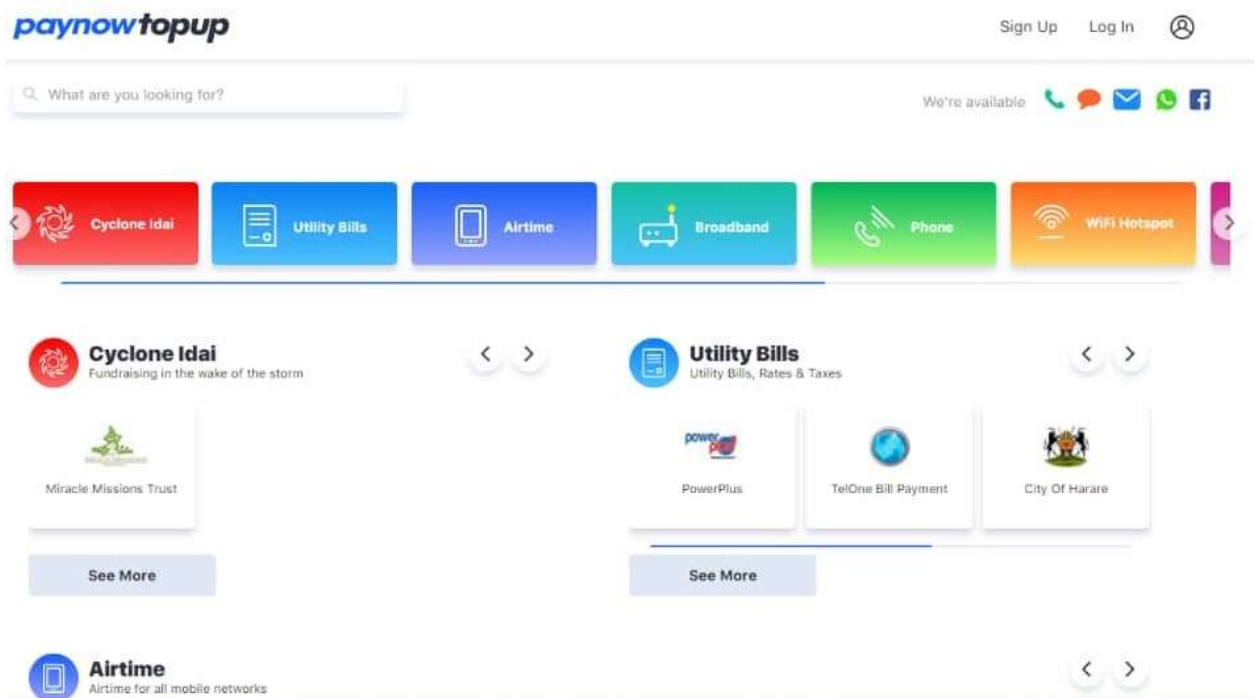


Figure 5. 11 Paynow Platform

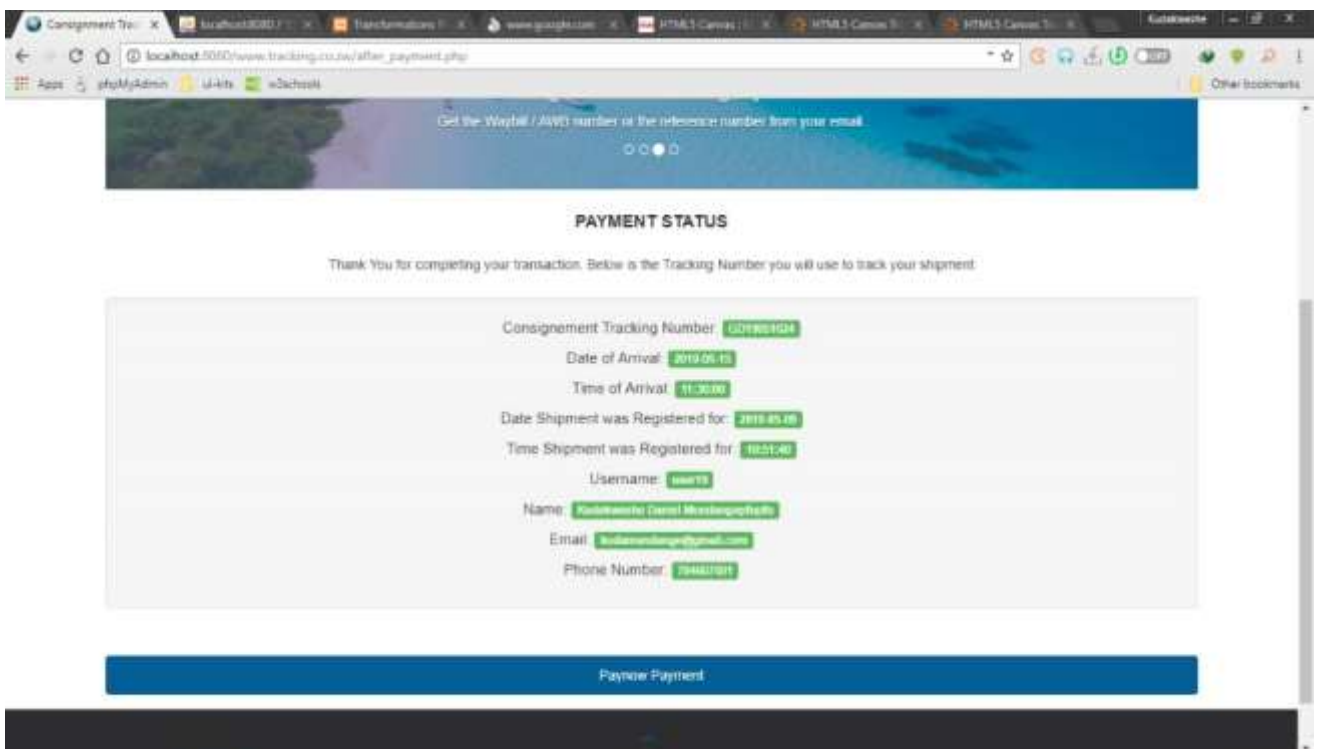


Figure 5. 12 Successful Payment

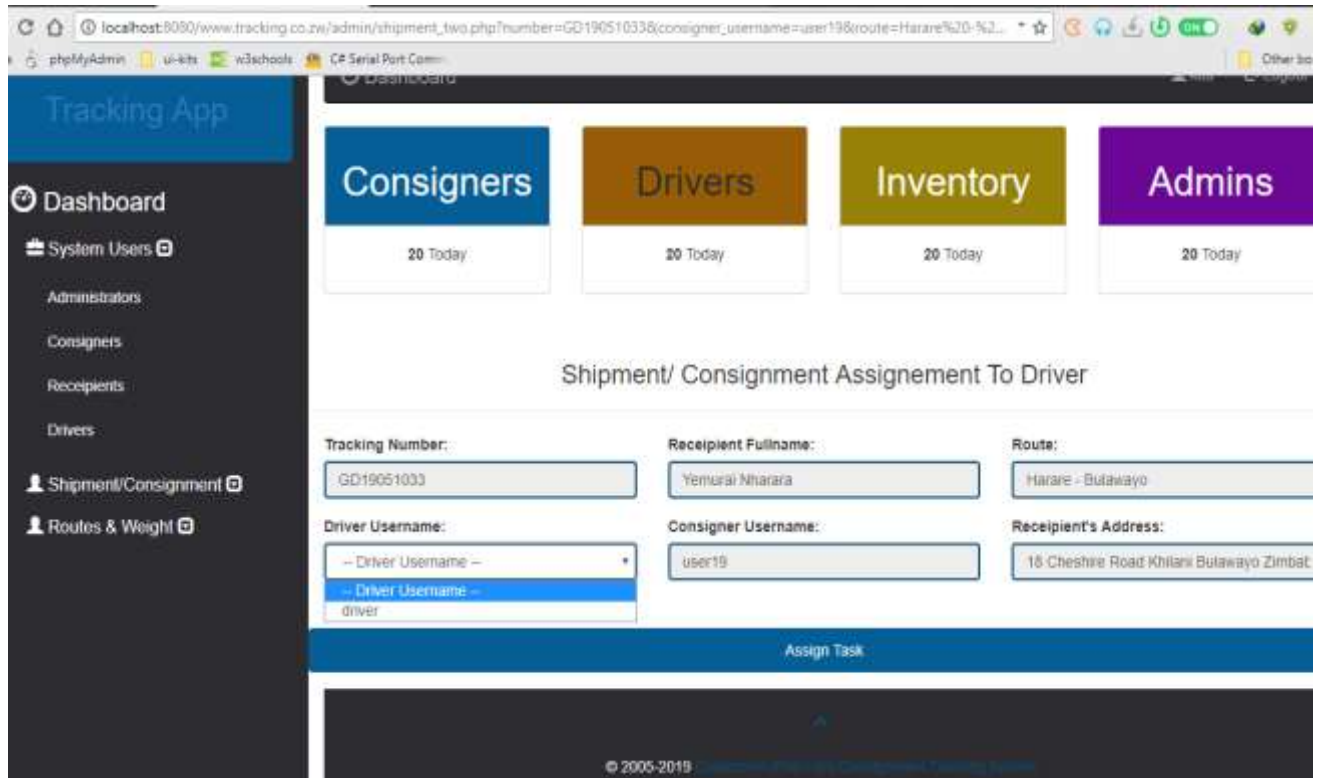
Objective 4. To track consignment movement.

The screenshot shows a web browser window with several tabs open: 'phpMyAdmin', 'u-lets', 'wilschools', and 'CP Serial Port Comm'. Below the browser tabs is a form for updating shipment status. The form has three input fields: 'Consigner Username' (containing 'user19'), 'Location' (containing 'Enter Location'), and 'Comment' (containing 'Comment'). Below the form is a blue button labeled 'Shipment Status Update'. Below the button is a table titled 'Shipment Status Update Table'. The table has 12 columns: TrackingNumber, DriverUsername, ConsignerUsername, RecipientName, StatusUpdate, Location, Route, Address, Comment, DatePosted, and TimePosted. The table contains one row of data: TrackingNumber: GD19051033, DriverUsername: driver, ConsignerUsername: user19, RecipientName: Yemural Nharara, StatusUpdate: In Transit, Location: Kwekwe, Route: Bulawayo - Harare, Address: 2215 Mt Pleasant Heights Harare Zimbabwe, Comment: Still Driving, DatePosted: 11:24:31, TimePosted: 2019-05-09. Below the table is a dark footer bar with the text '© 2005-2019'.

TrackingNumber	DriverUsername	ConsignerUsername	RecipientName	StatusUpdate	Location	Route	Address	Comment	DatePosted	TimePosted
GD19051033	driver	user19	Yemural Nharara	In Transit	Kwekwe	Bulawayo - Harare	2215 Mt Pleasant Heights Harare Zimbabwe	Still Driving	11:24:31	2019-05-09

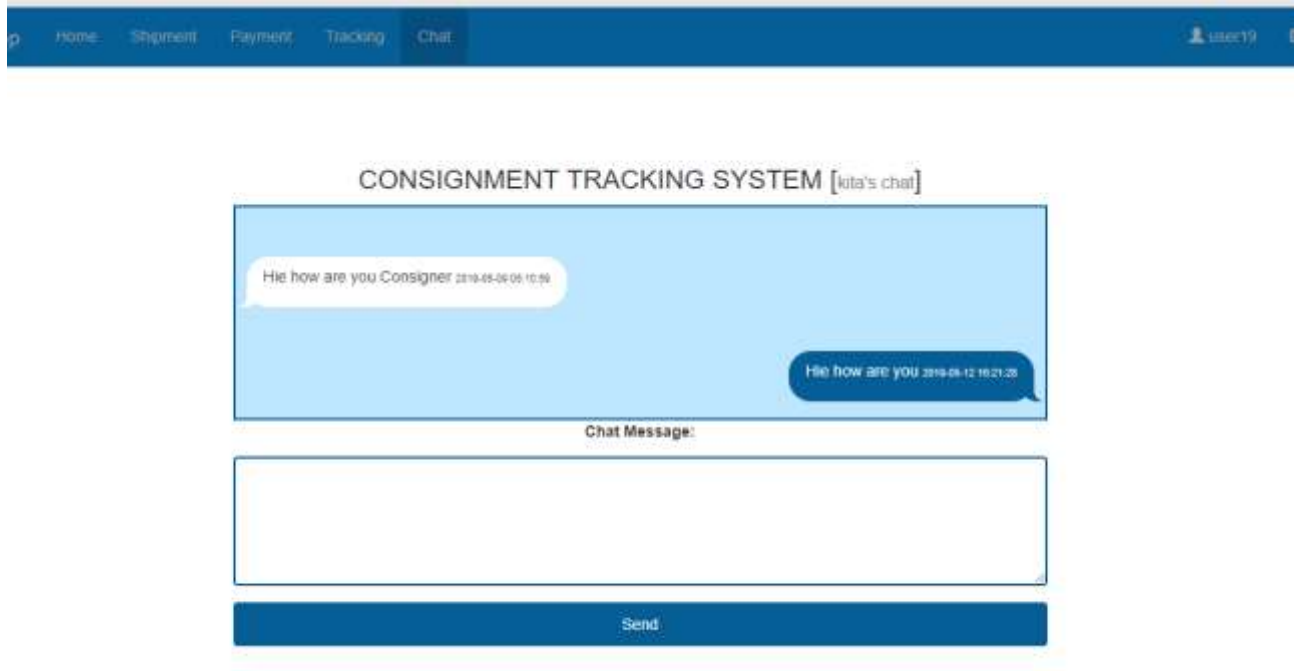
Figure 5. 13 Tracking Results

Objective 5. To view consignment awaiting to be delivered, in order to assign delivery tasks to drivers



*Fig 5.14 Assignment of delivery task to driver*

Objective 6. To facilitate online communication in the event of customer query



*Figure 5. 15 Online Communication*

## 5.4 INSTALLATION

This is where hardware and/or software is made ready to use (Techopedia Inc, 2019). It is generally the shift from the existing system to a new one. During this stage, it is important that data entry has been accurately done to ensure accuracy of business operations. In order to fully equip users with knowledge of a new system, user training will be conducted. Important information will be migrated from where it was once stored to the new system's database. The most suitable conversion strategy will be selected for the tracking system.

### 5.4.1 USER TRAINING

This is the coaching of system users on how to use a system. User training is important as it allows businesses to realize benefits that come with new system implementation. It helps curb resistance from employees who are hesitant to change. User manuals will be used to familiarize users to the tracking system. Also, a power point presentation will be prepared and presented to users with actual system screenshots, showing step-by-step usage. After training, each user will be given an exercise so as to see if they are ready to adopt the system.

## **5.4.2 DATA MIGRATION**

This is the movement of data from one location to another, one format to another or one application to another (NetApp, 2019). To move applications and data to more beneficial environments, ‘disentangling’ data and applications as a way to overcome data gravity is recommended. When this broken down or disentangled data has been migrated and consolidated in the tracking system, it will be verified to ensure it has been correctly entered and it meets the system requirements.

## **5.4.3 CHANGEOVER STRATEGIES**

Changeover selection strategy differs from company to company depending on the risk it bears to the company. The main changeover strategies are parallel, phased, direct and pilot.

### **5.4.3.1 Parallel Changeover**

This is a situation whereby the old and new system are used simultaneously, in order to compare productivity and dependability of the new system. If anything is to go wrong, the new system is aborted and everything is reverted to its original state. However, running both systems at the same time is both time consuming and expensive.

### **5.4.3.2 Phased Changeover**

The new system is applied in phases whereby that part of the complete system that needs changing is changed first. Problems or errors faced are isolated to the changed phase only. Once the system has been changed fruitfully in one area, the other phases can follow, with problems faced during the preliminary changeover ensuring overall changeover success. However, this implementation method is time consuming because phases are implemented separately.

### **5.4.3.3 Direct Changeover**

The old system is completely abandoned and a new system becomes live. This method of changeover is the riskiest because if anything goes wrong, returning back to the old system is at most times impossible. Apart from it being the riskiest, direct changeover is the cheapest, quickest and fastest method of changeover.

#### **5.4.3.4 Pilot Changeover**

The new system is tried out at a test site before being launched company-wide. A system can be tested at one branch. This means the old and new system are both running at the same period though at a smaller scale, allowing for comparison between the two.

#### **5.4.3.5 Recommended Changeover Strategy**

After analyzing the four strategies, it was unanimously decided that direct changeover is the best strategy for adopting the tracking system. This allows stakeholders to quickly get rid of the manual way of doing business. Direct changeover is the cheapest, fastest and also riskiest changeover strategy. In order to eliminate risks of new system failure, the system was rigorously tested and bugs were immediately fixed.

### **5.5 MAINTENANCE**

This is an unending process of activities like removing program and design errors, update and documentation and updating user support (Thakur, 2018). The evolution of software is influenced by numerous motives like keeping it up and running, upgrading to the latest version, enhancing features or reworking system for future maintainability (Quezada, 2019). There are three classes of maintenance strategies namely perfective, adaptive and corrective maintenance.

#### **5.5.1 CORRECTIVE MAINTENANCE**

This type of maintenance is about removing bugs that are found in the system possibly because of faulty designs or wrong assumptions in a program. Corrective maintenance deals with these errors and faults that could otherwise affect various software areas like code, logic or design. Whenever an error is reported on the tracking system, corrective maintenance is used for rectification.

#### **5.5.2 ADAPTIVE MAINTENANCE**

This is prompted by changes in the environment that a system resides in. Changes in the operating system, hardware, software or even business guidelines trigger adaptive maintenance. In the event that there has been a change to the environment that the tracking system will be residing, adaptive maintenance will occur.

### **5.5.3 PERFECTIVE MAINTENANCE**

This is the addition of new programs or modification of present programs to improve performance of an information system. Users' extra needs which can be because of changes within or outside the organization are responded to via perfective maintenance. Perfective maintenance also includes removing unnecessary features which do not affect the end-goal of a system. Perfective maintenance will be carried out whenever a request for functionality addition on the tracking system has been approved by management.

## **5.6 RECOMMENDATIONS FOR FURTHER DEVELOPMENT**

Developers can also look at the following for further development;

- The system must include other services offered by the company which are customs clearance and warehousing
- The system should be consolidated with the company website to reduce misunderstanding among users
- A payment system has to be developed instead of doing it using Paynow
- Users' changing requirements should lead to system updates

## **5.7 CONCLUSION**

System testing was done for different test cases, corrections were made where necessary and the tracking system ended up being bug free. User training methods which are to be used to familiarize them to the new system were mentioned. The best way to migrate data without altering or destroying it was discussed. System changeover strategies were pointed out and direct changeover was nominated for the tracking system. Perfective, adaptive and corrective maintenance strategies will be used for maintaining the new system during its lifetime. In the event that there is future development to the system, recommendations were suggested on the functionalities to be added like including customs clearance and warehousing services on the system. The system will be closely monitored to ensure that users' needs are being met satisfactorily.



# REFERENCES

- Averkamp,H., 2019. *Accounting Coach*. [Online] Available at: <http://www.accountingcoach.com> [Accessed 11 March 2019].
- Best Project Management Software Reviews, 2018. *Project Management*. [Online] Available at: <http://project-management.com> [Accessed 2 March 2019].
- BitDegree.org, 2018. *BitDegree Tutorials*. [Online] Available at: <https://www.bitdegree.org> [Accessed 25 April 2019].
- BrightHub, 2018. *Toolbox*. [Online] Available at: <http://www.brighthubpm.com> [Accessed 10 March 2019].
- Cambridge Uni Press, 2019. *Cambridge Dictionary*. [Online] Available at: <https://dictionary.cambridge.org> [Accessed 21 March 2019].
- CISCO, 2019. *CISCO*. [Online] Available at: <https://www.cisco.com> [Accessed 15 April 2019].
- Debois, S., 2019. *Survey AnyPlace*. [Online] Available at: <http://surveyanyplace.com> [Accessed 10 March 2019].
- Dhakal, A., 2017. *Quora*. [Online] Available at: <http://www.quora.com> [Accessed 20 March 2019].
- Dictionary.com, LLC, 2019. *Dictionary.com*. [Online] Available at: <http://www.dictionary.com> [Accessed 21 March 2019].E Virtual Services LLC, 2019. *E Virtual Services*. [Online] Available at: <http://www.evirtualservices.com> [Accessed 22 March 2019].
- Editorial, 2018. *The New Spaces*. [Online] Available at: <https://www.thenewspaces.com> [Accessed 19 March 2019].
- Farlex, 2012. *Financial Dictionary*. [Online] Available at: <http://financialdictionary.com> [Accessed 5 March 2019].
- Federation of American Scientists, 2019. *Intelligence Threat Handbook*. [Online] Available at: <https://fas.org> [Accessed 15 April 2019].
- Forex Guru, 2019. *Forex Brokers Review*. [Online] Available at: <http://www.forex.in.rs> [Accessed 20 March 2019].

GeeksforGeeks, 2018. *Geeks for Geeks*. [Online] Available at: [www.geeksforgeeks.org](http://www.geeksforgeeks.org) [Accessed 20 April 2019].

Guru99, 2019. *Database Design Tutorial*. [Online] Available at: [www.guru99.com](http://www.guru99.com) [Accessed 15 April 2019].

HRZone, 2019. *HRZone*. [Online] Available at: <http://www.hrzone.com> [Accessed 29 April 2019].

IAC Publishing, 2019. *Reference*. [Online] Available at: <https://www.reference.com> [Accessed 10 March 2019].

Interaction Design Foundation, 2008. *Interaction Design Foundation*. [Online] Available at: <https://www.interaction-design.org> [Accessed 20 April 2019].

Jewell, B. R., 2000. *An Intergrated Approach to Business Studies*. 4th ed. Essex: Longman.

Kenton, W., 2018. *Investopedia*. [Online] Available at: <http://www.investopedia.com> [Accessed 5 March 2019].

Kenton, W., 2018. *Investopedia*. [Online] Available at: <http://ww.investopedia.com> [Accessed 5 March 2019].

Kenton, W., 2019. *Investopedia*. [Online] Available at: <https://www.investopedia.com> [Accessed 11 March 2019].

Kokemuller, N., 2017. *BizFluent*. [Online] Available at: <http://bizfluent.com> [Accessed 21 March 2019].

Lopez, J., 2017. *Coders Link*. [Online] Available at: <http://medium.com> [Accessed 21 March 2019].

Lucid Software Inc, 2019. *Lucid Chart*. [Online] Available at: <http://www.lucidchart.com> [Accessed 21 March 2019].

Lyon, F., 2007. *Business Wire*. [Online] Available at: <https://www.businesswire.com> [Accessed 19 March 2019].

ManagementMania, 2016. *Management Mania*. [Online] Available at: <http://managementmania.com> [Accessed 21 March 2019].

Merriam Webster Incorporated, 2019. *Merriam Webster's Unabridged Dictionary*. [Online] Available at: <https://www.merriam-webster.com> [Accessed 11 March 2019].

MSG, 2008. *Management Study Guide*. [Online] Available at: <http://managementstudyguide.com> [Accessed 5 March 2019].

NetApp, 2019. *NetApp*. [Online] Available at: [www.netapp.com](http://www.netapp.com) [Accessed 20 April 2019].

Odhiambo, D., 2018. *The Andela Way*. [Online] Available at: <https://medium.com> [Accessed 10 April 2019].

Packer, D., 2019. *Plutora*. [Online] Available at: <http://www.plutora.com> [Accessed 25 April 2019].

Quezada, N., 2019. *Endertech*. [Online] Available at: [endertech.com](http://endertech.com) [Accessed 2019 April 2019].

Reinbold, J., 2017. *Bizfluent*. [Online] Available at: <http://bizfluent.com> [Accessed 5 March 2019].

ReQTest, 2018. *ReQTest*. [Online] Available at: <http://reqtest.com> [Accessed 21 March 2019].

Rouse, M., 2008. *TechTarget*. [Online] Available at: <https://whatIs.techtarget.com> [Accessed 11 March 2019].

Rouse, M., 2010. *Tech Target*. [Online] Available at: <http://searchsecurity.techtarget.com> [Accessed 2 March 2019].

Spacey, J., 2017. *Simplicable*. [Online] Available at: <http://www.simplicable.com> [Accessed 6 March 2019].

Techopedia Inc, 2019. *Techopedia*. [Online] Available at: <http://www.techopedia.com> [Accessed 21 March 2019].

Thakur, D., 2018. *EComputerNotes*. [Online] Available at: [ecomputernotes.com](http://ecomputernotes.com) [Accessed 15 April 2019].

The Business Communication, 2018. *Business Communication*. [Online] Available at: <http://thebusinesscommunication.com> [Accessed 10 March 2019].

Tutorials Point, 2019. *Tutorials Point*. [Online] Available at: <http://www.tutorialspoint.com> [Accessed 21 March 2019].

Visual Paradigm Online, 2019. *Visual Paradigm*. [Online] Available at: <https://www.visual-paradigm.com> [Accessed 20 April 2019].

Vocabulary.com, 2019. *Vocabulary.com Dictionary*. [Online] Available at:  
<http://www.vocabulary.com> [Accessed 10 March 2019].

Web Finance Inc, 2019. *Business Dictionary*. [Online] Available at:  
<http://www.businessdictionary.com> [Accessed 5 March 2019].

WebFinance Inc, 2019. *Business Dictionary*. [Online] Available at:  
<http://www.businessdictionary.com> [Accessed 5 March 2019].

## APPENDIX A: USER MANUAL

A user manual is intended to give assistance to people using a particular system. It is usually written by a technical writer, although user guides are written by programmers, product or project managers, or other technical staff, particularly in smaller companies. This user manual incorporates all the steps that are needed to use this system. Whenever the user is facing challenges about the system should refer to this manual for guidance. The Gladercom Freight Consignment Tracking System can be navigated in the following ways;

For a consigner to gain access to the system, there are some details that are required from them.

Consignment Tracking System  
Get the Waybill / AWB number or the reference number from your email.

**CONSIGNER REGISTER** (Back to Login)

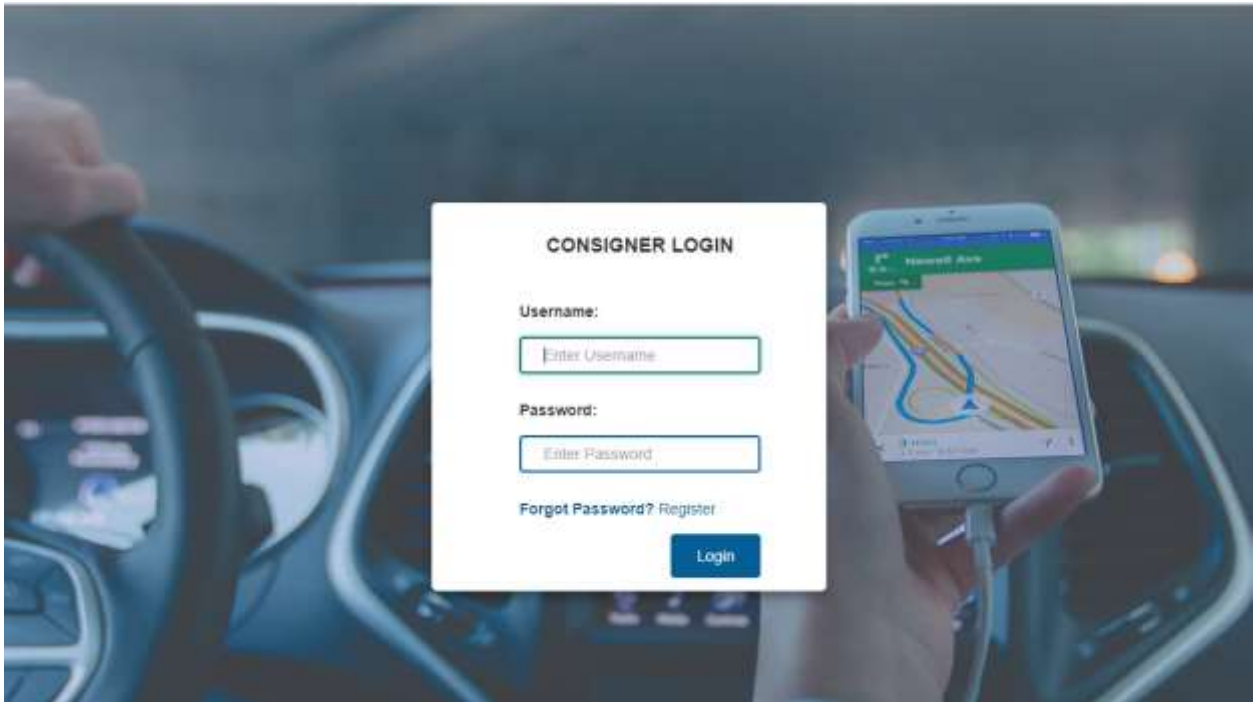
Fullname:

Cellphone Number:

Email:

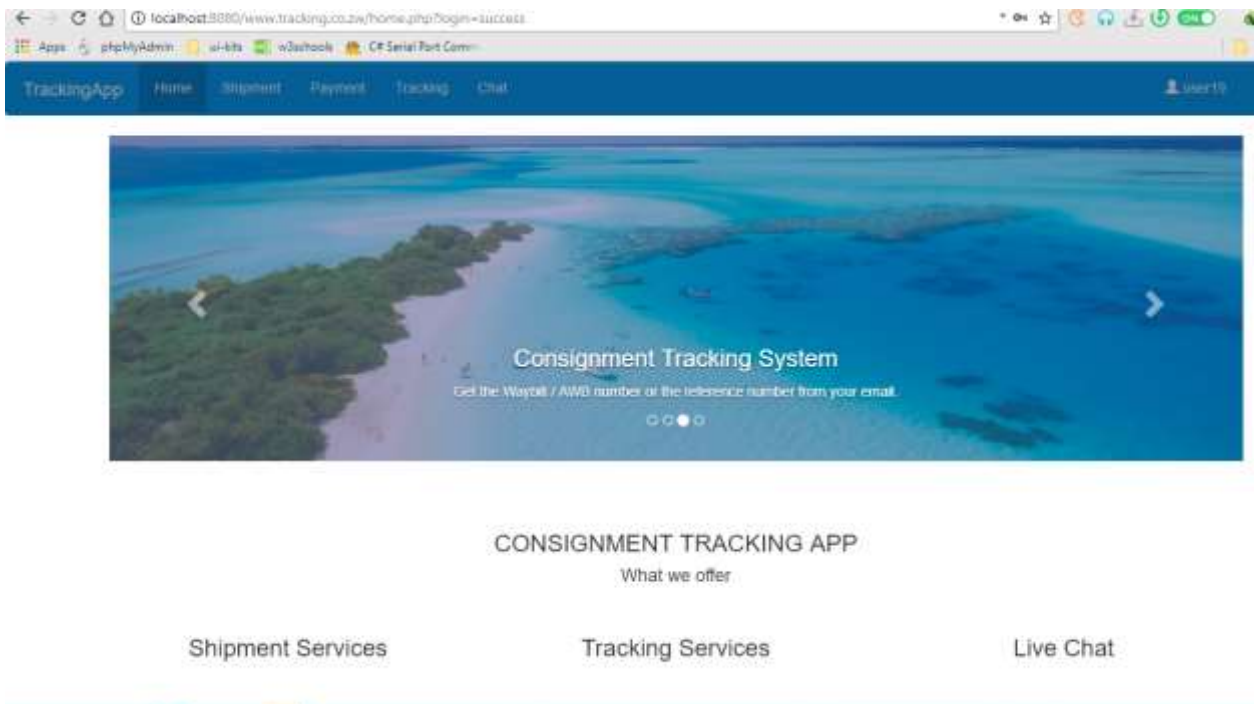
***Fig A1 Consigner Register***

After entering the details, login details are sent by email to the consigner and they are used to gain access to the tracking system. The login details are entered on fig A2.



***Fig A2 Consigner Login***

Once access has been gained, the home page appears as follows;



***Fig A3 Home Page***

If the consigner selects Shipment Services, then they are redirected to the Shipment Booking page.

**SHIPMENT BOOKING**

On this platform, you can book for your shipment. We charge our rates according to routes and weights of the parcel to be delivered. Below are the routes and weight rates we now offer, more routes are still coming.

<p><b>ROUTES</b></p> <ul style="list-style-type: none"> <li>Harare - Bulawayo [RTGS \$40]</li> <li>Harare - Gweru [RTGS \$30]</li> <li>Harare - Mutare [RTGS \$60]</li> <li>Harare - Masvingo [RTGS \$70]</li> <li>Harare - Hwange [RTGS \$90]</li> <li>Harare - Chinandu [RTGS \$100]</li> <li>Bulawayo - Gweru [RTGS \$10]</li> <li>Gweru - Mutare [RTGS \$90]</li> <li>Mutare - Bulawayo [RTGS \$120]</li> <li>Bulawayo - Hwange [RTGS \$70]</li> </ul>	<p><b>WEIGHTS</b></p> <ul style="list-style-type: none"> <li>0kg - 5kg [RTGS \$10]</li> <li>6kg - 10kg [RTGS \$13]</li> <li>11kg - 20kg [RTGS \$18]</li> <li>21kg - 30kg [RTGS \$20]</li> <li>31kg - 50kg [RTGS \$25]</li> <li>51kg - Above [RTGS \$30]</li> </ul>	<p style="text-align: center;"><b>Shipment Services</b></p> <p style="font-size: small;">We are the designated agency held responsible for handling your shipments and cargo, and your general interests, at ports and harbors worldwide, on behalf of ship owners, managers, and charterers.</p>
--	--	---

<p><b>Parcel:</b></p> <input type="text" value="Enter Parcel Item Name"/>	<p><b>Receiver's Cellphone Number:</b></p> <input type="text" value="Enter Cellphone Number"/>	<p><b>Receiver's National ID Number:</b></p> <input type="text" value="Enter ID Number"/>
<p><b>Routes:</b></p> <input type="text" value="- Shipment Routes -"/>	<p><b>Receiver Name(s):</b></p> <input type="text" value="Enter Receiver's Name"/>	<p><b>Date of Arrival:</b></p> <input type="text" value="mm/dd/yyyy"/>
<p><b>Weight:</b></p> <input type="text" value="- Shipment Weights -"/>	<p><b>Receiver's Address:</b></p> <input type="text" value="Enter Receiver's Address"/>	<p><b>Time of Arrival:</b></p> <input type="text" value="--:--"/>

**Fig A4 Shipment Booking**

As per entered details, consignment bill is calculated and shown to the consigner.

Route : **Harare - Bulawayo**

Weight : **6kg - 10kg**

Weight Total Cost : **\$13**

Total Consignment Cost : **\$53**

Consignment Tracking Number : **You need to pay to get your tracking Number**

Date of Arrival : **2019-05-17**

Time of Arrival : **14:30:00**

Date Shipment was Registered for : **2019-05-12**

Time Shipment was Registered for : **10:38:11**

Username : **user19**

Name : **Kudakwashe Daniel Mundungeppfifi**

Email : **kudamundunge@gmail.com**

Phone Number : **784607891**

**Paynow Payment**

**Fig A5 Consignment Bill**

amount to pay

What are you looking for?

We're available



**Cyclone Idai**  
Fundraising in the wake of the storm



See More

**Utility Bills**  
Utility Bills, Rates & Taxes

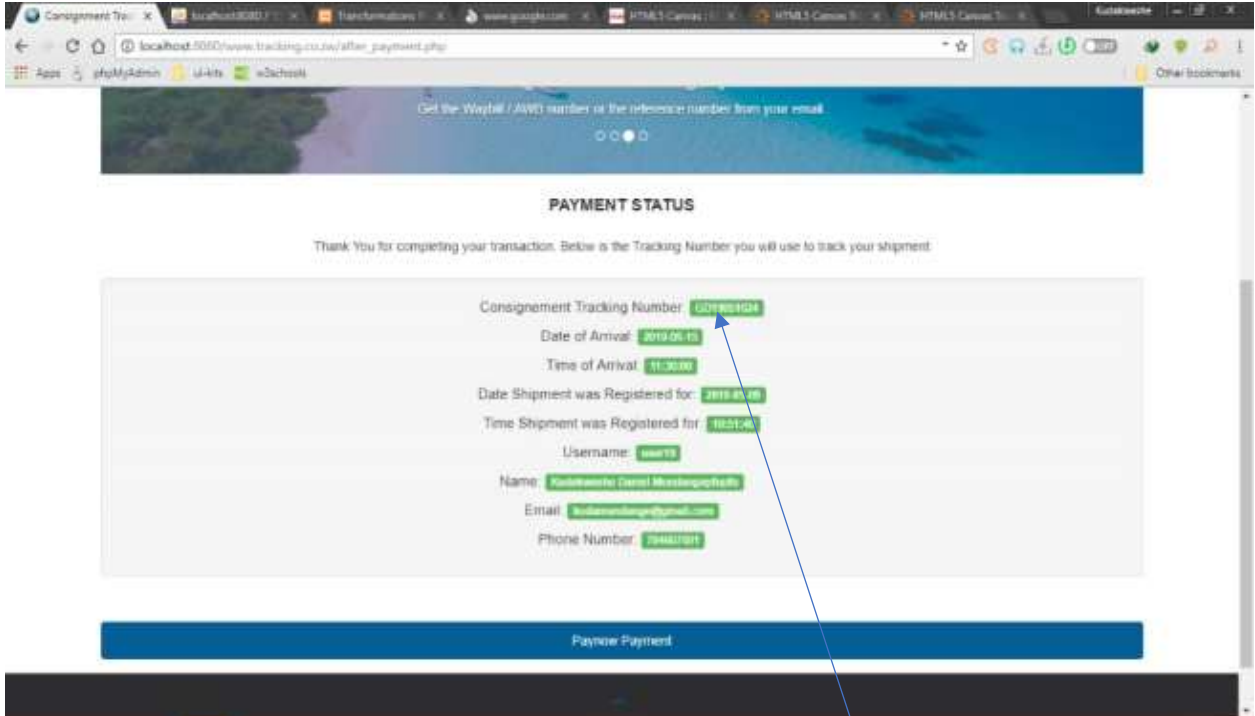


See More

**Airtime**  
Airtime for all mobile networks

**Fig A6 Paynow Platform**

Payment is confirmed and the consigner receives a tracking number. This number when entered on the system will show consignment location and status.

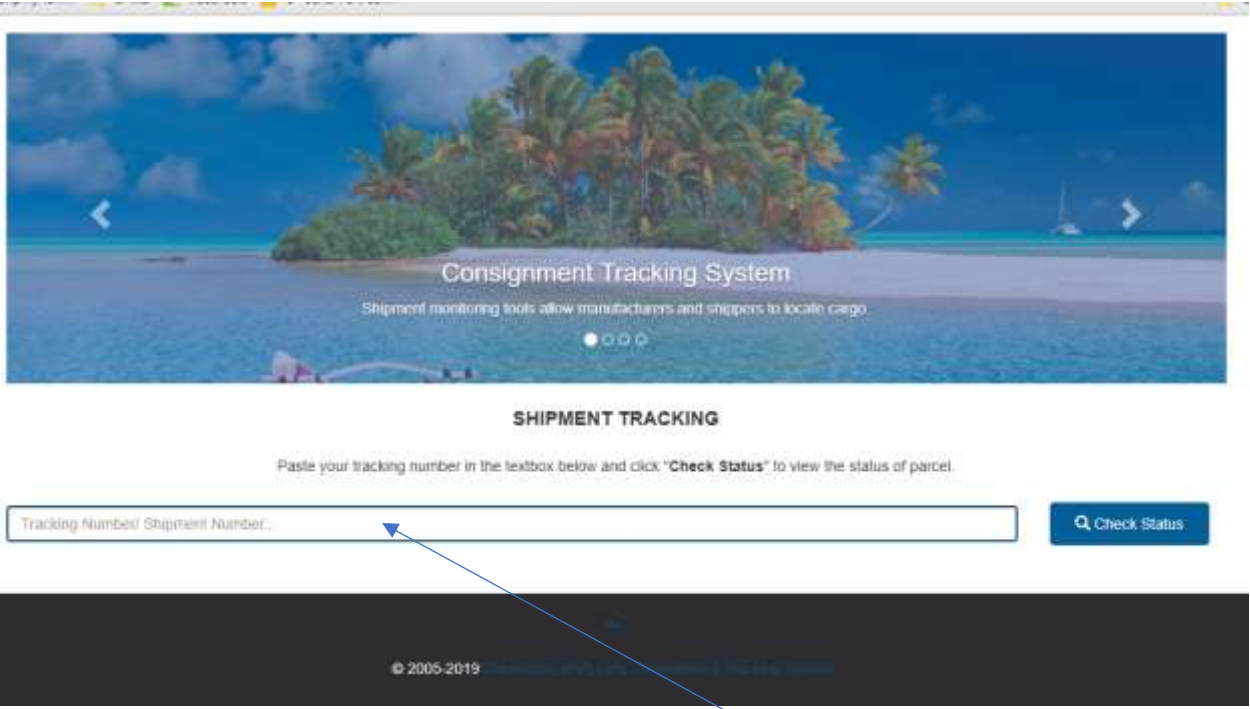


**Fig A7 Payment Confirmation**

tracking number

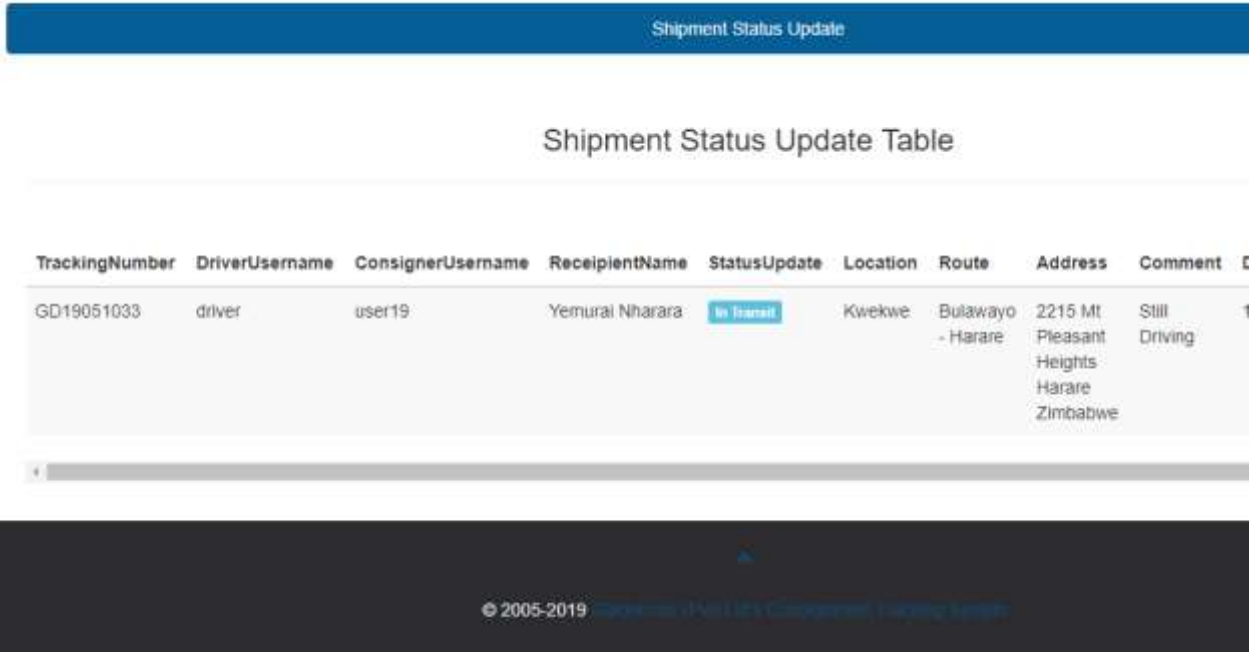
Using the tracking number, a consigner is able to view consignment location at any given time.





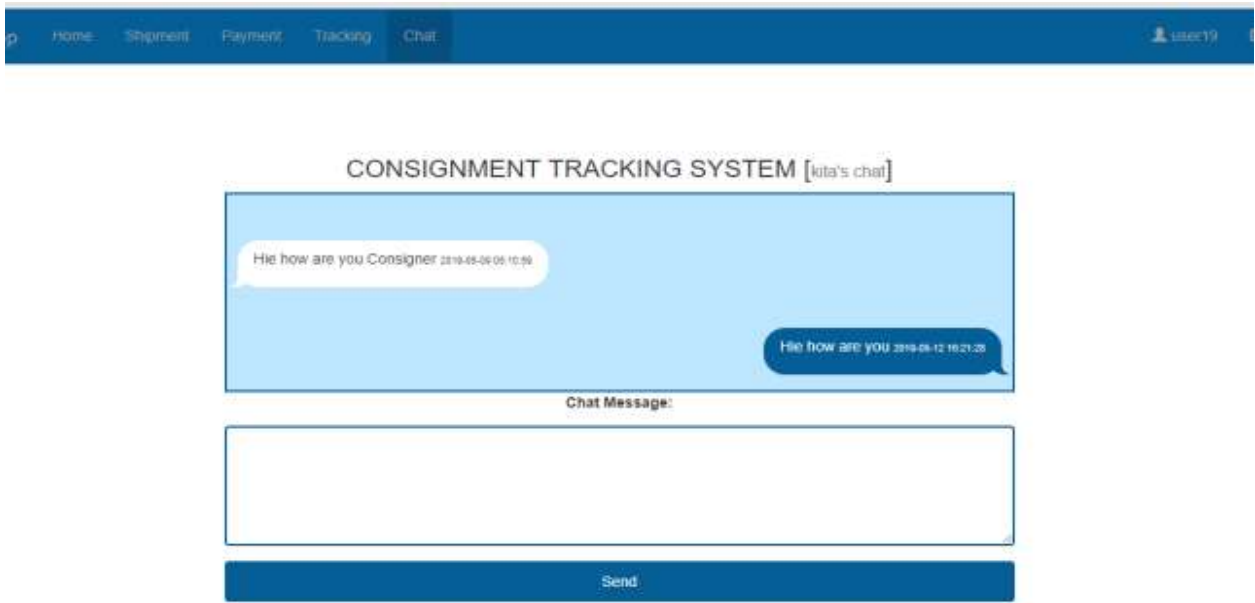
**Fig A8 Tracking**

Enter tracking number



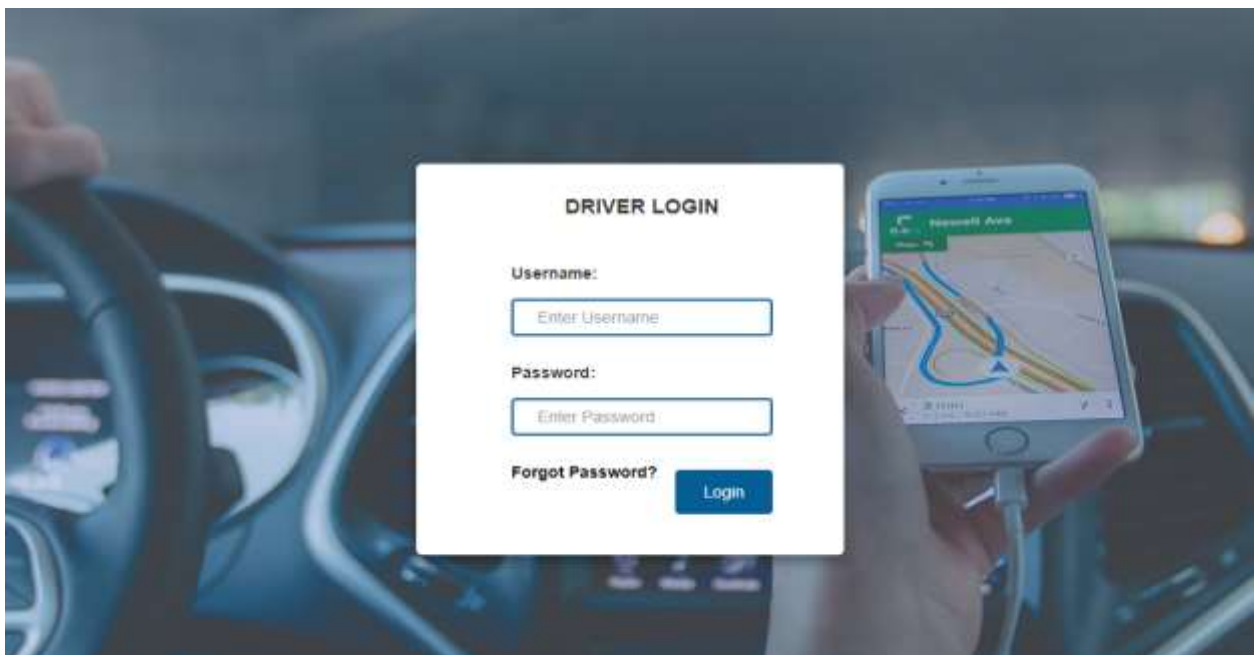
**Fig A9 Consignment Location**

The consigner can also chat with a company representative, maybe when they have a query towards service delivery.



**Fig A10 Feedback**

The driver has the same login platform like the consigner.



**Fig A11 Driver login**

Once they have viewed tasks allocated to them, delivery commences, whereby the driver updates location every now and then.

localhost:8888/www.tracking.co.zw/driver/shipment\_status.php?number=GD19051033&consigner\_username=user19&driver\_username=driver

### SHIPMENT STATUS UPDATE PANEL

Driver updates shipment status on this platform:

Tracking Number:

Recipient Fullname:

Route:

Driver Username:

Routes:

Recipient's Address:

Consigner Username:

Location:

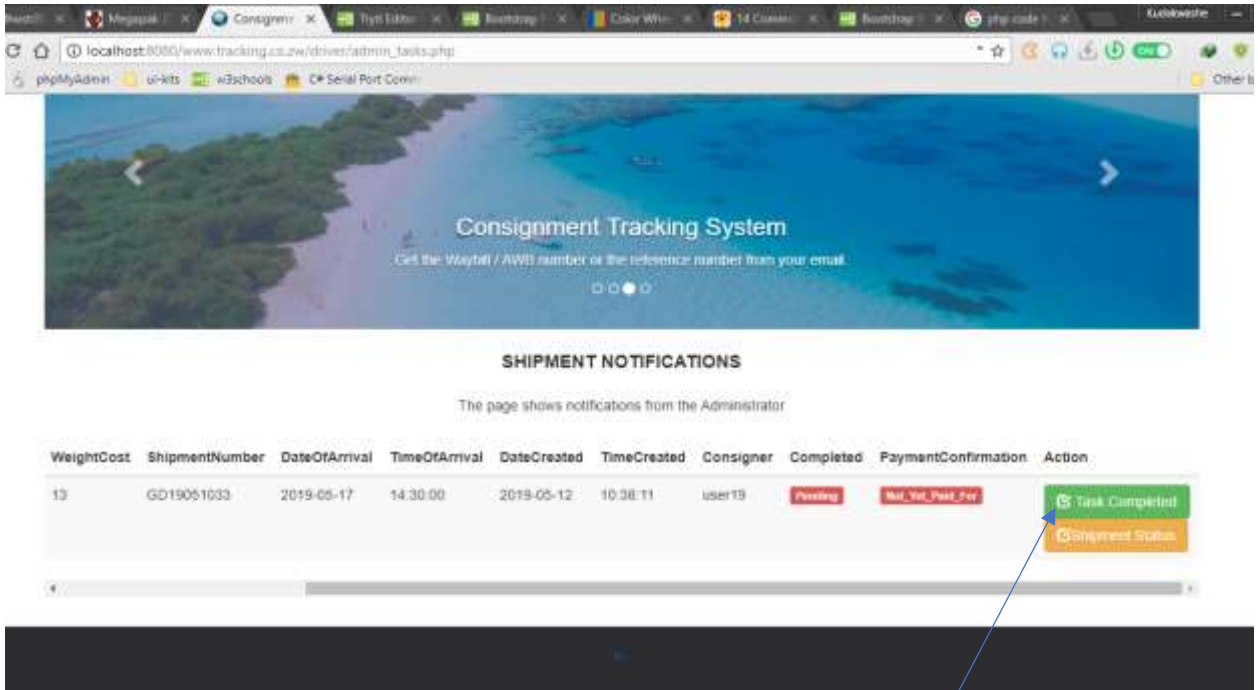
Comment:

### Shipment Status Update Table

TrackingNumber	DriverUsername	ConsignerUsername	RecipientName	StatusUpdate	Location	Route	Address	Comment	DatePosted	TimePosted
GD19051033	driver	user19	Yemurai Nharara	In Transit	Kwekwe	Bulawayo - Harare	2215 MI Pleasant Heights	Still Driving	11:24:31	2019-05-09

**Fig A12 Driver Update Location**

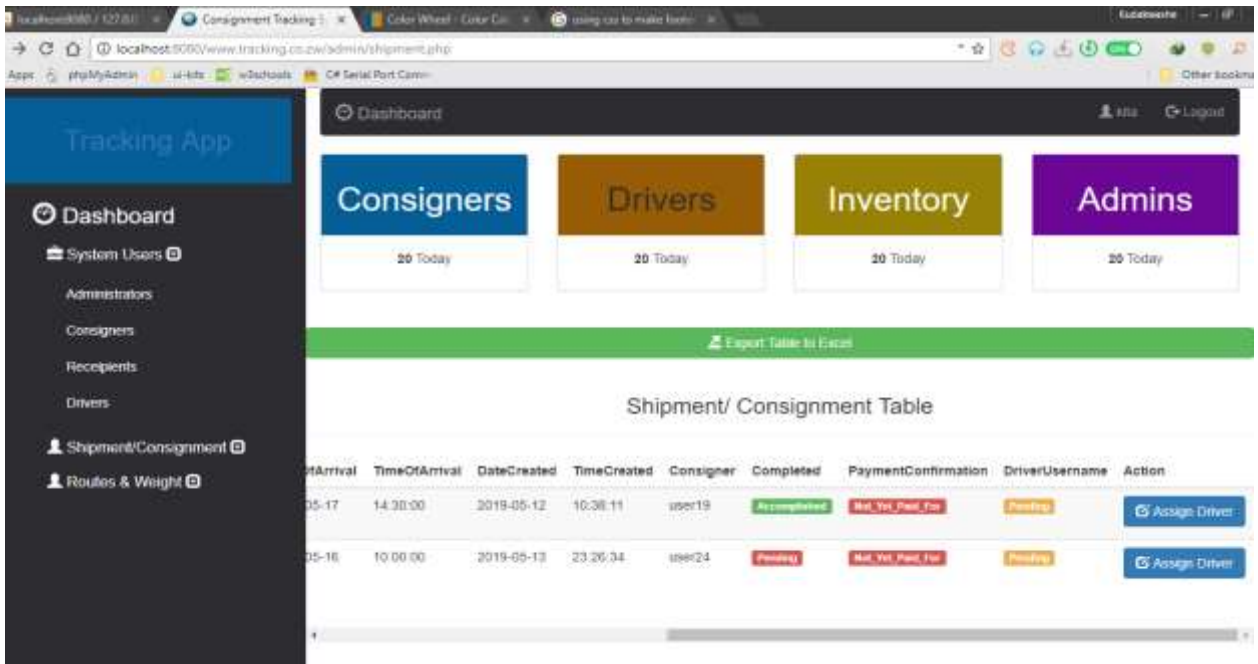
Upon delivery, driver confirms that consignment has been delivered.



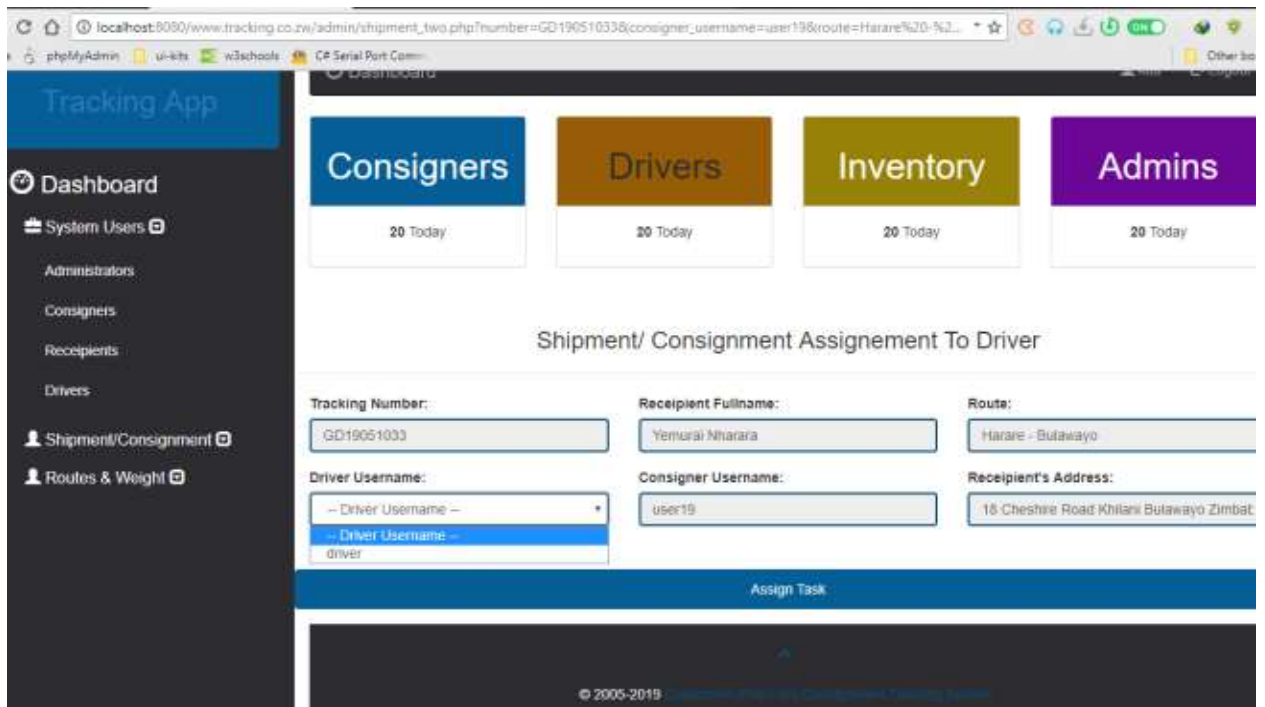
**Fig A13 Driver confirms Delivery**

Confirm delivery

When there is consignment to be delivered, an admin is responsible for allocating a driver to that consignment.



**Fig A14 View Pending Deliveries**



**Fig A14 Assign Driver**

**APPENDIX B: INTERVIEW CHECKLIST**

**Attendant**

1. How do you assign delivery tasks to drivers?

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....

..... 2. How do you manage queries from clients? Are there any problems that you are encountering with the current system?

.....  
.....

..... 3. How do you manage the long queues of clients who want to book for shipment?

.....  
.....  
.....  
.....

..... 4. Are there any precautions in place to safeguard against unauthorized access of customer sensitive information?

.....  
.....

.....5. How do you rate your current system?

.....  
.....

.....  
..... 6. Do you wish to shift from the current system to a new one?  
.....  
.....  
.....  
.....

**Driver**

1. How do you acquire delivery information?

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....

..... 2. How are you coping with the current system? Are there any problems that you are encountering with the system?

.....  
.....  
.....

..... 3. How do you rate the system performance?

.....  
.....  
.....  
.....

..... 4. Are customers satisfied with the current system?

.....  
.....

.....

.....5. Do you support the idea of automating business processes?

.....

.....

.....

..... 6. What are you expecting from the new system?

.....

.....

.....

.....

**Customer**

1. How do you take it when you are required to call and ask for shipment location?

.....

.....

2. For how long do you stand in line awaiting service?

.....

.....

3. What would you recommend for improvement in terms of service?

.....

.....

.....

.....



**APPENDIX C: QUESTIONNAIRE**

January 2019

Dear Participant

I Sharon Mutsa, am a Midlands State University student studying Information Systems Honor’s degree. I wish to work with your organization in partial fulfilment of my final year project to acquire information on how your consignment booking and tracking system operates. I have attached a questionnaire to this cover note and hereby request for your time to assist me with the information required in the questionnaire. You are assured that any information collected will be maintained on private and confidential basis and will be used only for academic purposes.

I am looking forward to receiving your favorable response. For any additional information or queries feel free to contact us on the details below.

Contact details:

sharonmutzar@gmail.com  
(supervisor)

+263775160181

Mr. F. Madzikanda

+26377.....

**Management**

1) How does the shipment booking, payment and delivery process go about?

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....

.....  
.....  
.....  
.....  
.....  
.....

2) What challenges are being faced with the existing system?

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....

3) Tick where applicable

a) Do you think the current system is reliable, efficient and contributing to your organizational objectives and goals effectively?

Excellent system

Fair

Ineffective

b) Do you often experience very busy days and big workloads during your operations?

Very often

Infrequently

All the time

c) Are you satisfied with the existing system?

YES

NO

If NO suggest the reasons and recommendations.

.....  
.....

..... 4)  support the idea of developing an Online Consignment Tracking System?

YES

NO

If NO give reasons.

.....  
.....

..... 5) Would you think the above idea will help to solve current system problems and meet organization goals?

.....  
.....  
.....  
.....  
.....

DATE..... TIME.....

**Customers**

1. How do you rate services provided by Gladercom Freight (Pvt) Ltd?

Good  better  worst

2. Is your information secure with the current system?

Insecure  secure  need for improvement

3. Do you wish the system to be changed so as to offer more security features?

Yes  No

4. How do you recommend your information to be more secured and kept privacy and confidential?

.....  
.....

5. What do you think the organization should do about the performance of the current system

.....

.....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....

DATE..... TIME.....

**APPENDIX D: OBSERVATION SCORE SHEET**

Date\_\_\_\_\_ Observer\_\_\_\_\_ Time\_\_\_\_\_

Department\_\_\_\_\_

Observation \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

-----  
-----  
-----  
-----  
-----  
-----

Conclusion\_-----  
-----  
-----  
-----  
-----

Signed by Observer: -----

Date: \_\_\_\_\_

**APPENDIX E: CODE SNIPPET**

**Login**

```
<?php  
session_start();  
if (isset($_POST['login'])) {  
  
    include '../config/connection.php';
```

```

$username = mysqli_real_escape_string($connect, $_POST['username']);
$password = mysqli_real_escape_string($connect, $_POST['password']);

if (empty($username) || empty($password)) {
    header("Location: ../index.php?login=empty");
    exit();
}
else{
    $encryptedPassword = md5($password);
    $farmersLoginSql = "SELECT * FROM consigners WHERE
con_username = '$username' AND con_password = '$encryptedPassword'";

    $queryResult = mysqli_query($connect, $farmersLoginSql);
    $queryRowCheck = mysqli_num_rows($queryResult);
    $queryTableFetch = mysqli_fetch_assoc($queryResult);

    if ($queryRowCheck == 0) {
        header("Location: ../index.php?login=error");
        exit();
    }
    else{
        if ($queryTableFetch) {
            $_SESSION['username'] =
$queryTableFetch['con_username'];
            $_SESSION['email'] = $queryTableFetch['con_email'];

```

```

                header("Location: ../home.php?login=success");
                exit();
            }
            else{
                header("Location: ../index.php?login=fetcherror");
                exit();
            }
        }
    }
}
else{
    header("Location: ../index.php?login=ultimateerror");
    exit();
}
mysqli_close($connect);
?>

```

## Registration

```

<?php
session_start();
require '../phpmailer/PHPMailerAutoload.php';
require '../config/connection.php';
if (isset($_POST['register']))
{
    /*Generating Username*/
    $usernameQuery = mysqli_query($connect, "SELECT * FROM `username`");
    $userFetched = mysqli_fetch_assoc($usernameQuery);

```

```

$userNumber = $userFetched['user_number'];

$userNumber = $userNumber + 1;

$updateUserNumberInDb = mysqli_query($connect, "UPDATE `username` SET
`user_number` = $userNumber");

$finalUsername = "user".$userNumber;

/*Generating Password*/

$passwordQuery = mysqli_query($connect, "SELECT * FROM `password`");

$passFetched = mysqli_fetch_assoc($passwordQuery);

$passwordNumber = $passFetched['pass_number'];

$passwordNumber = $passwordNumber + 1;

$updatePassNumberInDb = mysqli_query($connect, "UPDATE `password` SET
`pass_number` = $passwordNumber");

$finalPassword = "Password".$passwordNumber;

$name = mysqli_real_escape_string($connect, $_POST['name']);
$email = mysqli_real_escape_string($connect, $_POST['email']);
$phone = mysqli_real_escape_string($connect, $_POST['phone']);
$subject = "System Login Details";

$message = 'Use the following username and password to log in into the application.
Username: "'.$finalUsername.'" Password: "'.$finalPassword.'"';

if (empty($name) || empty($email) || empty($phone)) {
    echo"<script>
        alert('Fill in all fields. ');
        location = '../register.php?register=empty';
    </script>";
}

```



```

        exit();
    }
    else{

        $encryptedPassword = md5($finalPassword);

        $selectConsigner = mysqli_query($connect, "SELECT * FROM
consigners WHERE con_email = '$email'");

        $rows = mysqli_num_rows($selectConsigner);

        if ($rows > 0) {
            echo"<script>
            alert('Email already exists. ');
            location = '../register.php?register=user_exists';
            </script>";

            exit();
        }
        else{

            $mail = new PHPMailer();

            //$mail->SMTPDebug = 4;

            $mail->isSMTP();

            $mail->Host='smtp.gmail.com';

            $mail->SMTPAuth='true';

            $mail->Username='kaydizzym@gmail.com';

```

```

$mail->Password='kaydizzy2';

$mail->SMTPSecure='tls';

$mail->Port=587;

$mail->SetFrom('admin@gladercom.staff.co.zw', 'Gladercom
(Pvt) Ltd.');
```

```

$mail->addAddress($email);

$mail->addReplyTo('noreply@gladercom.staff.co.zw', $name);

$mail->Subject=$subject;

$mail->Body=$message;

if ($mail->send()) {

    $userDetailsQuery = mysqli_query($connect, "INSERT
    INTO consigners (con_name, con_email, con_phone, con_username, con_password,
    date_created, time_created) VALUES ('$name', '$email', '$phone', '$finalUsername',
    '$encryptedPassword', CURDATE(), CURTIME());

    echo "<script>

        alert('Thank You for choosing Gladercom. Your
    LOGIN DETAILS have been sent to your email address that you registered with us.');
```

```

        location = '../index.php?consigner=success';

    </script>";
}

```

```
        exit();
    }
    else{
        echo "<script>
            alert('There has been an error in sending your
email!');

            location = '../register.php?consigner=failed!';
            </script>";
            exit();
        }
    }
}
}
}
mysql_close($connect);
?>
```

### **Paynow integration**

```
require_once('./paynow/vendor/autoload.php');

$paynow = new Paynow\Payments\Paynow(
    'INTEGRATION_ID',
    'INTEGRATION_KEY',
    'http://example.com/gateways/paynow/update',

    // The return url can be set at later stages. You might want to do this if you want to pass
    data to the return url (like the reference of the transaction)
```

```
'http://example.com/return?gateway=paynow'  
);  
  
# $paynow->setResultUrl("");  
# $paynow->setReturnUrl("");  
  
$payment = $paynow->createPayment('Invoice 35', 'melmups@outlook.com');  
  
$payment->add('Sadza and Beans', 1.25);  
  
$response = $paynow->send($payment);  
  
if($response->success()) {  
    // Redirect the user to Paynow  
    $response->redirect();  
  
    // Or if you prefer more control, get the link to redirect the user to, then use it as you see fit  
    $link = $response->redirectLink();  
  
    $pollUrl = $response->pollUrl();  
  
    // Check the status of the transaction  
    $status = $paynow->pollTransaction($pollUrl);
```

```
}
```

## Chat

```
<?php
```

```
error_reporting(0);
```

```
    session_start();
```

```
    if (!isset($_SESSION['username'])) {
```

```
        header("Location: index.php?login=invalid");
```

```
    }
```

```
    require 'config/connection.php';
```

```
    $username = $_SESSION['username'];
```

```
    $username_receiver = $_GET['begin_chat'];
```

```
?>
```

```
<!doctype html>
```

```
<html lang="en">
```

```
<head>
```

```
    <meta charset="utf-8" />
```

```
    <link rel="apple-touch-icon" sizes="76x76" href="assets/images/icon.png">
```

```
    <link rel="icon" type="image/png" href="assets/images/icon.png">
```

```
    <meta http-equiv="X-UA-Compatible" content="IE=edge,chrome=1" />
```

```
    <title>Consignment Tracking System</title>
```

```
    <meta content='width=device-width, initial-scale=1.0, maximum-scale=1.0, user-  
scalable=0' name='viewport' />
```

```

    <!-- Fonts and icons -->

    <link rel="stylesheet"
href="https://fonts.googleapis.com/icon?family=Material+Icons" />

    <link rel="stylesheet" type="text/css"
href="https://fonts.googleapis.com/css?family=Roboto:300,400,500,700" />

    <link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/font-
awesome/latest/css/font-awesome.min.css" />

    <!-- CSS Files -->

    <link href="assets/css/bootstrap.min.css" rel="stylesheet" />

    <link href="assets/css/new.css" rel="stylesheet" />

    <!-- Core JS Files -->

    <script src="assets/js/jquery.min.js" type="text/javascript"></script>

    <script src="assets/js/bootstrap.min.js" type="text/javascript"></script>

    <!-- jQuery library -->

    <script
src="https://ajax.googleapis.com/ajax/libs/jquery/1.12.0/jquery.min.js"></script>

    <!-- Latest compiled JavaScript -->

    <script
src="http://maxcdn.bootstrapcdn.com/bootstrap/3.3.6/js/bootstrap.min.js"></script>

    <!-- End of JS files -->

</head>

<style type="text/css">

</style>

```

```

<body>
<nav class="navbar navbar-inverse" style="color: white">
  <div class="container-fluid">
    <div class="navbar-header">
      <button type="button" class="navbar-toggle" data-toggle="collapse" data-
target="#myNavbar">
        <span class="icon-bar"></span>
        <span class="icon-bar"></span>
        <span class="icon-bar"></span>
      </button>
      <a class="navbar-brand" href="home.php">TrackingApp</a>
    </div>
    <div class="collapse navbar-collapse" id="myNavbar">
      <ul class="nav navbar-nav">
        <li><a href="home.php">Home</a></li>
        <li><a href="shipment.php">Shipment</a></li>
        <li><a href="payment.php">Payment</a></li>
        <li><a href="tracking.php">Tracking</a></li>
        <li class="active1"><a href="chat.php">Chat</a></li>
      </ul>
      <ul class="nav navbar-nav navbar-right">
        <li>
          <a href="#"><span class="glyphicon glyphicon-user"></span>
          <?php echo $_SESSION['username']; ?>
        </a>
      </li>
    </ul>
  </div>
</nav>

```

```

</li>
<li>
  <a href="includes/logout.inc.php"><span class="glyphicon glyphicon-log-
out"></span>
    Logout
  </a>
</li>
</ul>
</div>
</div>
</nav>

```

```

<div id="modules" class="container text-center">
  <h3>CONSIGNMENT TRACKING SYSTEM [<small><?php echo
$username_receiver;?'s chat</small>]</h3>
  <div class="col-sm-2"></div>
  <div class="col-sm-8">
    <div class="chatbox">
      <?php
        if (!empty($username_receiver)) {

          $message = mysqli_real_escape_string($connect, $_POST['message']);

          if($message=="")
            {

```



```

    }

    else

    {

        $insertMessageQuery = mysqli_query($connect, "INSERT INTO messages
(sender_username, receiver_username, message, date_posted, time_posted)
VALUES('$username', '$username_receiver', '$message', CURDATE(), CURTIME())" ) or
die("failed");

    }

    $getMessageQuery = mysqli_query($connect, "SELECT * FROM messages
ORDER BY time_posted ASC");

    while($message_row = mysqli_fetch_assoc($getMessageQuery))

    {

        $sender = $message_row['sender_username'];

        $receiver = $message_row['receiver_username'];

        $messagez= $message_row['message'];

        $message_sent="";

        $message_receipt="";

        if($sender==$username && $receiver==$username_receiver )

        {

            $message_sent=$messagez;

        }

        elseif($receiver==$username && $sender==$username_receiver)

        {

            $message_receipt=$messagez;

        }

    }

```

?>

<?php

```
if(!empty($message_sent))
```

```
{
```

```
?>
```

```
<div class="mine messages">
```

```
<div class="message last">
```

```
<p><?php echo $message_sent. " <small style='font-size: 65%;'>".
```

```
$message_row['date_posted']. " ". $message_row['time_posted'] ."</small>"; ?></p>
```

```
</div>
```

```
</div>
```

<?php

```
}
```

```
?>
```

<?php

```
if(!empty($message_receipt))
```

```
{
```

```
?>
```

```
<div class="yours messages">
```

```
<div class="message last">
```

```
<p><?php echo $message_receipt. " <small style='font-size: 65%;'>".
```

```
$message_row['date_posted']. " ". $message_row['time_posted'] ."</small>"; ?></p>
```

```
</div>
```

```

        </div>

        <?php
        }
        ?>

        <?php
            }
        }
        ?>

</div>

<div class="messagebox">
    <form role="form" method="post" action="">
        <div class="form-group">
            <label for="sel2">Chat Message:</label>
            <textarea class="form-control" name="message" rows="5" id="sel2" style="margin-
top: 8px; padding-bottom: 8px;"></textarea>
        </div>
        <button type="submit" class="btn btn-success btn-block" name="send">Send</button>
    </form>
</div>

</div>

<div class="col-sm-2"></div>

</div>

<!-- Footer -->

<footer class="text-center">

    <a class="up-arrow" href="#myPage" data-toggle="tooltip" title="TO TOP">

```

<span class="glyphicon glyphicon-chevron-up"></span>

</a><br><br>

<p>&copy; 2005-<?php echo date("Y");?> <a href="#" data-toggle="tooltip" title="Visit  
Gladercom.">Gladercom (Pvt) Ltd's Consignment Tracking System.

</footer>

</body>

</html>