The International Journal of Multi-Disciplinary Research

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

Design of a Traffic Fines Management System

(Conference ID: CFP/599/2018)

Chikondi Jonathan Nali
chikondinali@yahoo.com
Student: School of Engineering.
Information and Communications University

ABSTRACT

With the daily advancement in technology is it almost inexcusable that the Traffic Department of the Zambian Police still uses a manual way of traffic fines management. All the Police stations across the country are involved in manual activities in the capture, storage, processing and transmission of data and information as well as in the actual production of reports. This increases on the cost of stationary, making work difficult for report generation by the officers in charge of compilation of station or country wide accident reports and statistics. More valuable time is also taken up from concerned officers when compared to using computerized and automated systems.

The work contained in this project therefore gauges the advantages of developing a web-based road traffic fines management system to be used by the Zambia Police traffic section specifically and the Zambia Police service as a whole to enhance the working style and provision of cost-effective method of computer connectivity in the delivery of services to the Zambian people.

The research consists of six chapters presented in a structured way as follows:
Chapter one introduces the project and highlighting the problems faced by the Zambia Police Traffic and how they can be solved by the proposed system, the objectives that the research seeks to achieve and finally gives the significance and scope of study.
Chapter two discusses published information on computer-based systems and ICT (literature review) and also shares similar studies of the proposed system.
The third chapter talks about the research methodology used by the research to collect data, the target population and other element related to the research methodology.
The fourth chapter shows the collected data, gives the analysis and conclusions based on the data and the analysis.
Chapter five discusses and interprets the findings to access the views of users for both the old and proposed system.
Finally, chapter six concludes and gives the implications and recommendation of the registration and reporting system.
The appendix gives complimentary documents such as: source code, the Systems Development Life Cycle (SDLC) and the user manual for the proposed system for those interested in further development concerning the system.
The entire project was built using HTML, CSS, PHP, and MySQL. The system required several months of research and coding to be brought to completion.

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

ACKNOWLEDGEMENT

I would like to thank the following people for helping with this research project:

Mr Nebert Phiri, my Supervisor and lecturer, for his patience, support and open-mindedness.

Wellington Chanda for his continued support on database management and workflows.

Senior Superintendent George Malama, Provincial Traffic Officer, who assisted me with the current document flows of road traffic fines.

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

Contents

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

List of Figures

List of Tables

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

List of Acronyms

API	Application Programming Interface
CP	Central Police
DBMS	Database Management System
DSS	Decision Support System
ESS	Executive Support System
HTML	Hypertext Markup Language
ICT	Information and Communication Technology
KBS	Knowledge Based System
KWS	Knowledge Work System
MIS	Management Information Systems
RTSA	Road Traffic and Safety Agency
SDLC	System Development Life
TFMS	Traffic Fines Management Systems
TPS	Transaction Processing system
ZP	Zambia Police

The International Journal of Multi-Disciplinary Research

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

CHAPTER 1

Introduction

The continuous increase of motor vehicles in Zambia is a growing concern to both the citizens as well as the government. On a daily basis, hundreds of drivers are booked on the road for one reason or the other. Whether it is driving without a licence or over speeding or driving an unlicensed vehicle, each day a traffic offence is committed. The traffic police however, need a way to store all those bookings for proof and future reference.

A traffic offence can be defined as any violation of a traffic ordinance of a city, municipal or Quasi-Municipal Corporation, except ordinances governing parking of vehicles. Therefore, if a driver does not follow the traffic regulations of a particular city or country then he or she is a traffic offender. Traffic offences can be separated into 2 categories:

a) Impoundable offences

These are traffic offences that require the driver's car to be taken or tolled to the nearest police station until the offence is cleared either by fine or sentence. The purpose of such action is mainly for the protection of the driver as well as other road users that may be put in danger.

b) None impoundable offences

These are offences that can be cleared by paying a fine. Every offence has a particular fine attached to it. All fines are required to be paid only at the Central Police. Other countries do however; have third party companies that handle fines.

Traffic fines, in a way, help to ensure road safety. Without them there would be chaos.

The total amount of a traffic fine is made up of amounts required to be paid by state laws as well as county and city ordinances, which vary by jurisdiction. There are three levels of severity of traffic violations: infractions, misdemeanours, and felonies. Most traffic violations are infractions, but some, like vehicular manslaughter, are felonies.

Infractions are not punishable by jail or prison and not subject to trial by jury; the punishment is a fine. The more common traffic infractions including speeding and running a red light or stop sign. Drivers stopped for moving violations are usually released after they sign a Note to Appear, printed on the ticket, agreeing to appear at a set date and time. The traffic ticket provides information about when to appear in court.

Drivers charged with an infraction who wants to admit guilt can avoid a court appearance by paying the fine in person or by mail. If drivers do not pay the traffic fine within the authorized time, their driver's license may be suspended or a warrant of arrest may be issued. Usually they also will not be able to renew their vehicle registration until they have paid all outstanding parking tickets and administrative costs in full.

Drivers who plead not guilty and request a trial may be required to post bail or sign a written document to appear in court. If they fail to appear, they will be charged with the additional

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

misdemeanour of violating their agreement to appear. In this case, a warrant may be issued for their arrest and their driver's license may also be suspended.

Upon receipt of a traffic citation, a driver may have the following options:

The traffic fine may result in points being assessed upon a driver's license, which may affect risk of driving privilege suspension and higher insurance rates. In some jurisdictions, points may be waived upon completion of a driver's improvement course. Local laws should be consulted for the specific requirements in your area.

The Zambia Police mission statement commits the institution to providing high quality service, by upholding and applying the law fairly and firmly to all. It also commits the institution to applying pro-active methods to prevent crime and improve service delivery.

The Zambian Traffic Police currently have no way of storing traffic offences or having digital records of traffic fines that are pending, overdue or have been cleared. All traffic offences are recorded on the road on paper and then taken to the Central Police. The traffic department office is always filled with stacks of paper holding random offences from random dates.

The use of technology in institutions has become an important element and useful tool for competitive advantage. According to Wikipedia, (free online encyclopaedia), technology is the making, modification, usage, and knowledge of tools, machines, techniques, crafts, systems, and methods of organization, in order to solve a problem, improve a pre-existing solution to a problem, achieve a goal, handle an applied input/output relation or perform a specific function.

Overall this project is aimed at solving the problem of disorganization of traffic fine records by building a Traffic Fines Management System. The system will also help keep an account of all the fines that have been paid as well as those that haven't. When it comes to fighting corruption, this system can only go so far.

1.2. Problem Statement

The traffic police under Central police was created to regulate traffic and ensure that road safety and regulations of the roads are followed. Monitoring and regulating of these safety regulations should be effected to ensure safety of the nation at large. The traffic police do try to keep the peace but are still using the old non-technologically evolved methods.

The traffic police do not have a TFMS where important traffic crime data can and should be stored and used as reference if the need arose. Tracking traffic crime can help reduce road carnage. At the moment the traffic police save the all their data on paper and this makes it difficult to track past traffic crime.

The world is changing at a very fast pace and it is the duty of leaders to help their people to move with the times; it is also the duty of its citizens to do their part in helping the country move forward. An alarming number of police officers are not computer literate. The design of a TFMS will force current employees to learn some basic IT in order to work with the system.

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

Payment of fines is still done manually which is highly inconvenient for many. Other countries such as Dubai and South Africa have this option. Hiring companies can also check a driver's track record to see whether he or she can be hired.

A major challenge would be that should a TFMS be implemented; it would mean that traffic crime will be stored. This also means that the local courts will at some time or another be involved. It would also mean that the court record system would have to be integrated with the TFMS.

A web-based Traffic Fines Management System (TFMS) is required to be built for the traffic police. There are several currently existing Traffic Fines Management Software Systems available. The traffic police cannot always afford to use software from external sources. They also require this system to be tailored to their special needs. First of all, the system needs to serve the purpose of providing a web portal which would ease the communication and time management between traffic field officers and the traffic department at the Central Police. This will allow the users to log in to their accounts and, depending on their role (admin, accountant or officer), perform particular actions, which include:

- Adding users to the database;
- Adding an offence to a driver;
- Search drivers;
- Conducting payment of fines;
- Viewing driver fines;
- Viewing officer activity;
- Viewing the amount of money in fines collected.

Secondly, it is very important for the system to be built as a web Application Programming Interface (API). A web API is an interface that is defined in terms of a set of functions and procedures, and enables a program to gain access to facilities within an application. The use of such facilities enables users to customize the application for their own purposes and to integrate the application into a customized development environment (Butterfield & Ngondi, 2016). In short, API is not complete software designed for users, it is a set of methods that access the database to view, insert, update and delete data from it, that software developers can use and extend by building client applications for it. However, this is where the beauty of API lies – any possible user interface can be built for it, varying from choice of programming languages, platforms, operating systems, technological solutions, up to the application design itself. More than one user interface can be plugged into the API, allowing the same program functionality on both desktop and mobile platforms. It is even possible for distinct software applications to call only one or more specific functions of the API as a part of its process, which cannot be completed by the program alone. Figure 1 illustrates the definition of API - a core system that provides functionality for external applications.

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

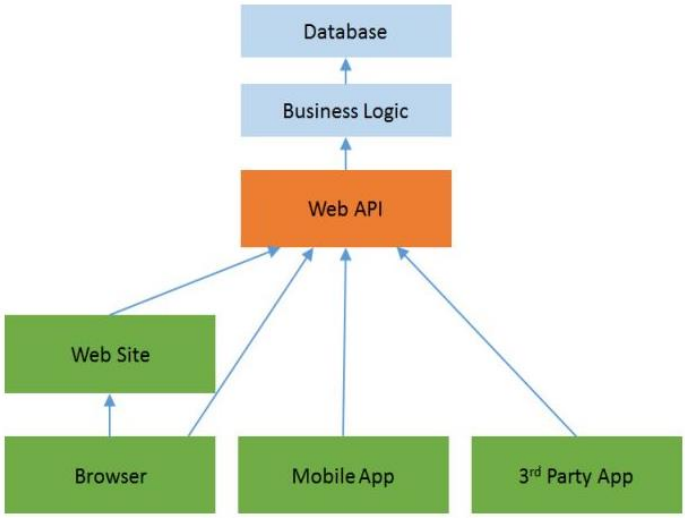


Figure 1. Web API – the core system that provides functionality for external front end applications. (Miller, 2014)

The definition also reflects reasons for the client to require an API solution: The Central Police may want to integrate other existing systems such as that of RTSA together with this one, having an API will allow them to do this efficiently. It will also be possible to use the built API for future systems and integrations (for example, an upcoming mobile app). In order to store the system's data, there is a requirement to build a database for it. The database needs to follow common standards, and be designed in such a way that future system improvements could be implemented easily. As sensitive business data is going to be handled while using this Traffic Fines Management System, the deliverables have to be secure and thoroughly tested.

1.3. Aims and objectives

The objectives of the project are as follows:

I. To design a TFMS for the traffic police;
II. To design and deliver a secure database for storing data, entered into the system;
III. To design and deliver an API system with following functionalities:
    a) An administrator to oversee all the actions of the field officers;
    b) And accountant profile that will be collecting the fines;
    c) Addition of fines with time deadlines;
    d) View pending and overdue fines;
    e) View how much money has been collected over a specific period.

1.3.1. General Objectives of the study

The aim of this project is to design a Traffic Fines Management system to help the traffic police store, retrieve, update and search traffic offence. The system will have a growing database of

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

road crimes and will also calculate how much money has been collected over a selected period of time.

1.3.2. Specific objectives

i. To develop a computer based system for Traffic department of the Zambia Police;
ii. To develop a system that will be connected to a central database;
iii. To develop a system that will be accessed/updated by authorised traffic officials remotely countrywide;
iv. To develop a system that will store data with a minimum of duplication of data.

1.4. Methodology

A qualitative data collection and analysis approach was used to understand the current system and to formulate a new system that will be able to solve the problems with the current system.

The vision of the research and other related processes is to design and develop a system that will eliminated the problems that the Zambia Police Traffic section are currently facing in traffic fines' management, data, and statistics.

To achieve this vision several activities was undertaken:

Requirement Gathering and Analysis

- Brainstorming
- Feasibility Analysis to check how much of the idea can be put into action
  - ✓ Observations (Activities, reports)
  - ✓ Interviews

System Analysis

- Analyse various processes of the current system
  - ✓ Observations (Processes, reports)
  - ✓ Interviews
- Logical Definition of entire system in detail.

System Design

- Physical design

Coding

Testing

Implementation

- Users run new system

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

1.5. Scope of Study

This investigation was conducted to determine the possibility of eliminating the challenges faced with the manual Road Traffic Fines Management by the Zambia Police service, by introducing a computer biased system. The aspects considered the shortfalls in operations when using the manual system and to determine the improvements that a computerized web based system can make.

General purpose: To identify the problems faced with the current manual system and determine how a computerized web biased system can solve the problems.

System name: Traffic Fines Management System

Locale of the study: Zambia Police

Period of the study: November 2016 – October 2017.

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

CHAPTER 2

2.1. Literature Review

2.1.1. Lusaka Urban District

Lusaka is the capital and largest city of Zambia. It is one of the fastest-developing cities in Southern Africa. As of 2010, the city's population is about 1.7 million. It is the centre of both commerce and government in Zambia and connects to the country's four main highways heading north, south east and west. English is the official language of the city, but Nyanja and Bemba are common. Lusaka province has seven districts, one of which is the Lusaka district. Lusaka district is divided into Lusaka Urban, and Lusaka Rural, with most of the population concentrated in the urban area. As of the 2000 Zambian Census, the district had a population of 1,084,703 people (Wikimedia, 2006). Lusaka district dominates the country's urban system and accounts for 32% of the total urban population in the country (Nkhuwa, 2008).

Lusaka district is experiencing typical urban problems associated with developments such as population growth, high levels of urbanization and unemployment, high cost of imports (especially IT equipment) and a slow approach into the implementation of E-government. Due to the fact that data has not been stored in databases across the country as well as across ministries, digitization of information may prove to be a lot of work since certain information may require the collaboration of two or more ministries. For example, the traffic police may at times need to work hand in hand with the local court and share information. This would demand that both parties have the same of similar platforms.

2.1.2. RTSA

The Road Transport and Safety Agency (RTSA) was established through an Act of Parliament, the Road Traffic Act No. 11 of 2002.

Its functions are to:

i. To regulate traffic;
ii. To manage road transport through regulation;
iii. To manage road safety engineering;
iv. To conduct road safety campaigns through education and publicity;
v. To register and licence drivers, motor vehicles and commercial vehicle operators;
vi. To licence and register driving schools and driving instructors;
vii. To conduct physical and technical examination on motor vehicles to ascertain their physical details and road worthiness;
viii. To implement international treaties and protocols on road transportation within Zambia and across its territories; and to regulate cross boarder transportation

Regardless of all these functions that RTSA performs, handling traffic fines is not one of their duties. The duty solely falls in the hands of the traffic police.

2.1.3. Traffic fines management in other countries

A. South Africa

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

South Africa has two different ways of handling traffic fines:

i. Through the traffic fine central police portal

Civilians have access to a portal where they can check if they have outstanding fines they can also pay for their fines by using a credit card. This becomes a problem when certain civilians own businesses with a lot of cars and just don't have the time to go around settling fines.

ii. Traffic fines management through private companies

South Africa has several companies that handle traffic fine for companies that own huge fleets of cars. Examples of such companies in South Africa and around the world are Mekaish, AVIS Fleet and Dubai Traffic Management System.

"The trend to date of South African motorists has been one of noncompliance with traffic regulations and non-payment of offences due to a poor judicial system which has been unable to effectively deal with volumes of traffic infringements.

In the past, all traffic fines were administered in terms of the Criminal Procedure Act, however in 1998 Parliament approved The Administration and Adjudication of Road Traffic Offences (AARTO) Act, No. 46 of 1998. The idea was to create an act that linked the law enforcement and adjudication process in a more effective and efficient manner.

Not only does AARTO bring with it a sense of accountability and encourage road users to take traffic offences and fines seriously, the Act has also been designed to improve fine collection and therefore efficiently open a revenue stream that would ultimately be used to improve road safety." ~ AARTO

Zambia has a similar Act that justifies and encourages fine collection which was pasted on the RTSA page:

"Parliament has set the maximum penalties for road traffic offences under the Road Traffic Act No. 11 of 2002. The seriousness of the offence is reflected in the maximum penalty. It is for the courts to decide what sentence to impose according to circumstances." ~ RTSA

Although fine collection has been encouraged, the Zambian police has no method of accountability nor does it have a record keeping system that will tell them whether an individual had been fine before for the same crime or a different crime altogether.

There are many differences between the way traffic fines are handled in Zambia and other countries and one of the reasons for this difference is the state laws differ from country to country.

Fine Collection

"The deputy inspector general (DIG) of the Karachi traffic police made reforms in the traffic management system by introducing an automated fine collection system on Wednesday.

DIG Ameer Ahmed Sheikh told The News that technology had solved many problems of public and private enterprises.

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

Following the tradition, said Sheikh, the traffic police decided to develop and implement an automated fine collection system based on transparency, accountability and public facilitation for its lifting/towing operations." ~ The News, December 25, 2014

Many countries have already seen the implication of unstructured fine collection and are taking advantage of growing technologies to improve their service delivery as well as reduce the number or road carnage. Karachi, the capital of Sindh, province of the Pakistan made the implementation towards the end of 2014. There are many other countries that have taken the initiative to automate traffic fines collection; however the point being put across here is that it is high time that Zambia did so as well.

In the USA, as we mostly see on television, a traffic officer will collect the driver's licence and then radio in and ask the operator to check the details on the given name. They also have surveillance street cameras to help with gathering evidence of said offences. They also have cameras strapped to their uniforms to ensure that all their activities are monitored.

A TFMS basically is a system that stores all traffic related offences connected to a particular driver. It helps keep records available and organised. More importantly, all collected fines are accounted for and recorded.

2.2. Theoretical framework

2.2.1. Computer

A computer is an electronic device that manipulates information, or data. It has the ability to store, retrieve, and process data (GCFLearningFree 2011). The two principal characteristics of a computer are: it responds to a specific set of instructions in a well-defined manner and it can execute pre-recorded lists of instruction i.e. a program (webopedia 2015).

2.2.2. Internet

The Internet, sometimes called simply "the Net," is a worldwide system of computer networks - a network of networks in which users at any one computer can, if they have permission, get information from any other computer (TechTarget 2014). It is a super network that joins together millions of computers, which are scattered, around the world. The backbone of the Internet is a set of high-speed data lines that connect major networks all over the world. This enables many millions of computer users to globally share and exchange information, as a computer user is linked with computer users on the other side of the world.

2.2.3. Information systems

An **information system** is defined as the software that helps organize and analyse data. So, the purpose of an information system is to turn raw data into useful information that can be used for decision making in an organization (study.com 2015).

Basically an Information System handles the flow and maintenance of Information that supports a business or some other operation. It contains information about significant people,

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

places and things within the organization or in the environment surrounding it. Information is derived from meaningful interpretation of data.

A system which assembles, stores, processes, and delivers information relevant to an organization (or to a society), in such a way that the information is accessible and useful to those who wish to use it, including managers, staff, clients and citizens. An information system is a human activity (social) system, which may or may not involve the use of computer systems. Also, in addition to supporting decision-making, information systems help workers and managers to analyse complex problems, to develop new products and to integrate the various modules and departments. Moreover the 'transmission losses inter-departmental communication are reduced considerably leading to better coordination and improved transparency (information sharing) within the organization as a whole.

According to Laudon (2013), the purpose of computer-based information systems is to provide managers and various categories of employees with the appropriate kind of information to help them make decisions. The six major types of information systems corresponding to each organizational level (the four levels shown in figure above) are:

1. **Transaction Processing Systems (TPS):** serve the operational level of an organization. It is a computer-based information system that keeps track of the transactions needed to conduct business. It records day-to-day transactions such as customer orders, bills, inventory levels, and production output. It also helps to generate databases that act as the foundation for the other information systems.
2. **Knowledge work systems (KWS)** is also known as Expert systems (ES). Expert system is a set of interactive computer programs that help users solve problems that would otherwise require the assistance of a human expert. It is also known as knowledge based system (KBS).
3. **Office automation systems (OAS)** to serve the knowledge level of an organization. It is a computer-based information system intended for workers or employees of all levels 23 which combines various technologies to reduce the manual labour required in operating in an efficient office environment.
4. **Decision-support system (DSS)** is a computer-based information system that provides a flexible tool for data analysis. It helps in predicting changes that may influence the data in the future. It simply analyses data. It helps to analyse a wide range of problems, such as the effect of events and trends outside an organization. Like the MIS, the DSS draws on the detailed data of the transaction processing system.
5. **Management information systems (MIS)** serve the management level of the organization. It is a computer-based information system that produces standardized reports in a summarized structured form.
6. **Executive support systems (ESS)** serve the strategic level of an organization. It is an easy-to-use system that presents information in a very highly summarized form. It helps

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

in developing strategic plans and decision making. It is also known as executive information system.

2.2.4. Management Information Systems

A management information system (MIS) is a broadly used and applied term for a three-resource system required for effective organization management. The resources are people, information and technology, from inside and outside an organization, with top priority given to people. The system is a collection of information management methods involving computer automation (software and hardware) or otherwise supporting and improving the quality and efficiency of business operations and human decision making. A MIS requires a database management system (DBMS) that integrates the database of the different departments. Middle managers need summary data often drawn from across different functional areas.

Inputs consist of processed transaction data such as bills, orders, and pay checks, plus other internal data. Outputs consist of summarized, structured reports; budget summaries, production schedules etc. A MIS is intended principally to assist middle managers – specifically to help them with tactical decisions. It enables them to spot trends and get an overview of current business activities. Managers at this level usually receive information in the form of several kinds of reports:

i. Summary reports;
ii. Exception reports;
iii. Periodic reports;
iv. Demand reports.

2.3. Research variables arising from theoretical framework

Various writers have defined computers, Information Technology, and computer biased Information Systems, types of Information Systems, functions of Information Systems, the World Wide Web and the Internet. From the definitions and functions of the above, it can clearly be seen that use of computers and related technologies, traditionally eliminates or reduces the problems that are associated with using manual means to data and information handling.

Conclusion

Zambia Police will continue to suffer the effects of using a manual system that does not only fail to embrace its mission but also which has a lot of problems in the capture, storage, transmission and production of reports unless it adopts a computer biased system for traffic fines management, it The use of the internet and the web (web biased) will further improve

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

communications among the various stations countrywide and also drastically reduce costs which may otherwise been borne if dedicated communication or networks were installed.

The use of the internet and the web (web biased) will further improve communications among the various stations countrywide and also drastically reduce costs which may otherwise been borne if dedicated communication or networks were installed.

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

CHAPTER 3

3. PROJECT METHODOLOGY

3.1. Research Approach

A qualitative approach was undertaken and required gathering relevant data from the specified documents and compiling checklists in order to analyse the material and arrive at a more complete understanding and historical reconstruction of the experience of users and other stakeholders of the system. I had to shed more light on the research objectives and expanded the research question as follows:

- What problems (if any) do systems users face?
- What problems (if any) do other systems stakeholders face?
- What is it that can be done to get rid of these challenges?
- What are the inputs to the system?
- What reports are produced from the system?
- How possible is it to come up with a web based computerized Traffic Fines Management System?

3.2. Research Strategy

The research involved the use of the following data collection tools:

Case Studies

A detailed description of a process, experience, and structure at a Central Police Lusaka Traffic department was carried out in order to answer a combination of 'how', 'what' and 'why' questions.

Interviews

Detailed individual interviews (one-on-one) as well as group interviews were conducted. The purpose of the interviews was to probe the ideas of the interviewees about the current and new system.

Checklists

Checklists were used to structure my observation and evaluation of performance. Theses where simple lists criteria that were marked as present or absent and I then used that checklist to build the system.

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

Observation

Most of the data about the current system was collected through observations. This was done by observing the officers perform and the paperwork lifecycle from the time it is created to the time it reaches the fine is either paid to taken to court.

3.3. Operationalization of research variables

As a result of the research approach being qualitative, the following techniques where adopted for the operationalization of the variable:

- Self-Report;
- Checklist observation;
- Expert observation.

3.4. Sampling

The research involved one Zambia Police Traffic station and Head Quarters as a representative sample. The users and stakeholders to the system are well represented in this sample.

3.5. Sampling Techniques

A stratified systematic sampling technique was used in the analysis and design of the system. The whole Zambia Police Traffic population was divided into two known groups, i.e. a regular police station and traffic headquarters. Each group was then sampled using a systematic approach, i.e. picking users of the system with different complementing system roles.

3.6. Data collection techniques

As mentioned earlier, from primary sources data was collected by me as the researcher, Data was gathered through case studies, interviews and observations. However for secondary sources (data collected, compiled and written by others), i.e. books, journals and any other references have been acknowledged in this report.

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

CHAPTER 4

4. DATA ANALYSIS

In order to come up with an alternative from the manual way of doing things a qualitative data analysis approach was used to understand the current system and to formulate the new system.

The vision of the research and other related processes was to design and develop a system that should eliminated the problems that the Zambia Police Traffic section are currently facing in collection, analysis & reporting of road traffic fines data and statistics.

The researcher collected data in three different ways:

Observations - first observed the manual reports from the offices, the activities concerning the road fines recording and reporting process at Lusaka central police.

Structured Interviews – 30 police officers from both the police station and headquarters were interviewed to get their views about the current system and get their perception on the proposed system.

Case studies - Case studies involving multiple cases within collected data from observations and interviews were used to build upon theory, to produce new theory, to dispute or challenge theory, to explain a situation, to provide a basis to apply solutions to situations, to explore, and to describe an object or experience. The scenario begins on the road block when the offer stops a car:

- Officers inspect cars and the drivers behind the wheel for faults, (unpaid road tax, expired fitness, out-dated insurance, and condition of the car etc..);
- If an issue is found and the driver has to be fined the officer asks the driver to park on the side of the road where he will write down the offence charge;
- This happens without even checking the record history of the offender;
- When the fine is recorded it is taken to central police for storing, the offender is asked to pay the fine within 7 days (or depending on the nature of the offence);
- When the duration passes and the fine is not paid, the details of the offence are taken to court when the rest will be handled.

4.1. Results of structured interviews

The following questions constituted the structured interview together with the results of the interview:

Question 1. How much time is required to compile raw data on traffic fines and driver history at the road block?

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

Response	Number of Responses	Percentage
Less than 5 minutes	0	0%
6 – 15 minutes	0	0%
16 – 30 minutes	2	6.667%
30 – 60 minutes	9	3%
Can't tell	19	63.3%
Total	30	100%

Table 1 – Time required to compile report (source: structure)

Fig. 2 Time required compiling driver offence history (source: table 1 data)

Explanation: The chart above (fig. 1) clearly indicates the percentages for current system users on how much time on average they could take to compile a statistical report. Only about 6.667 % of the users felt they can take less than 30 minutes and about 3% of the users felt they might take 30 to 60 minutes. 63.3% of the users however could not tell as it was next to impossible or usually more than 60 minutes.

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

Question 2. How do you describe at the process of manually compiling data?

Response	Number of Responses	Percentage
Easy	6	20%
Tedious	24	80%
Total	30	100%

Table 2 Data compilation process (source: structured interview)

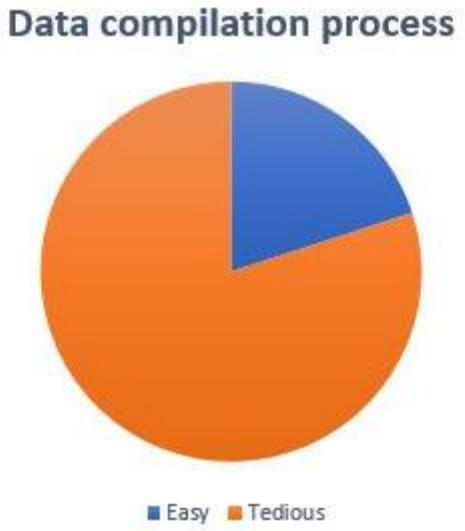


Fig.3 Data compilation process (source: table 2 data)

Explanation: The chart above (fig. 2) clearly indicates the percentages for current system users on how they fell about the process of data compilation on the current system. 20 % of the users felt the process is easy and manageable while 80 % were not happy about the process as it was tedious and time consuming.

Question 3. How often do you encounter human data compilation errors?

Response	Number of Responses	Percentage
Never	3	10%
Occasionally	9	30%
Usually	18	60%
Total	30	100%

Table 3 user mistakes with current system (source: structured interview)

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

Fig. 4 user mistakes with current system (source: table 3 data)

Explanation: The chart above (fig. 3) clearly indicates the percentages for current system users on how they felt about their likelihood (or how often they made mistakes) during the manual compilation of data. Only 10 % of the users felt they can never make mistakes while 30 % admitted that they occasionally made mistakes due to the manual data processing. 60% of the users pointed out that they usually made human error mistakes.

Question 4. How much time do you need to transmit data from a station to HQ?

Response	Number of Responses	Percentage
Less than 5 minutes	0	0%
6 – 15 minutes	3	10%
16 – 30 minutes	5	16.67%
30 – 60 minutes	8	26.67%
Depends on number of offenders	14	46.67%
Total	30	100%

Table 4 time needed to transmit report (source: structured interview)

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

Fig. 5 - time needed to transmit report (source: table 4 data)

Explanation: The chart above (fig. 4) clearly indicates the percentages for current system users on how much time on average they would take to transmit a statistical report using a radio message or otherwise physical delivery. 10% of the users felt they can take less than 15 minutes and about 16.67% of the users felt they needed 30 to 60 minutes. The remaining 26.67% of the users however could not tell as it was dependant on the number of offences recorded. The more offences, the more time required.

Question 5: How much space on the filling cabinet is needed to store the manual receipts?

Response	**Number of Responses**	**Percentage**
Low	4	13.33%
High	21	70%
Not Sure	5	16.67%
Total	30	100%

Table 5 - current system storage space requirements (source: structured interview)

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

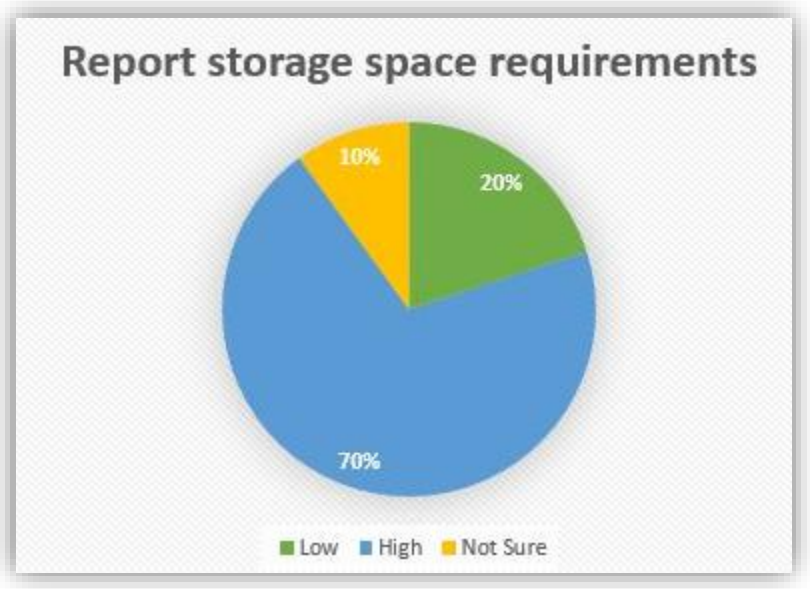


Fig. 6 - current system storage space requirements (source: table 5 data)

Explanation: The chart above (fig. 5) clearly indicates the percentages on how users of the system felt about the current system's manual file storage space requirements on filling cabinets. Only 16.67% of the users said they were not sure as to indicate whether they categorize the requirement as high or low. 13.33% felt the storage requirements were Low. 70% High and 16.67 Not sure.

Question 6: What do you think should be done to solve problems identified with the current system?

Response	Number of Responses	Percentage
Employ more personnel	4	13.33%
Send users for training	8	26.67%
Computerize the system	18	60%
Total	30	100%

Table 6 - Action required in eradicating problems (source: structured interview)

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

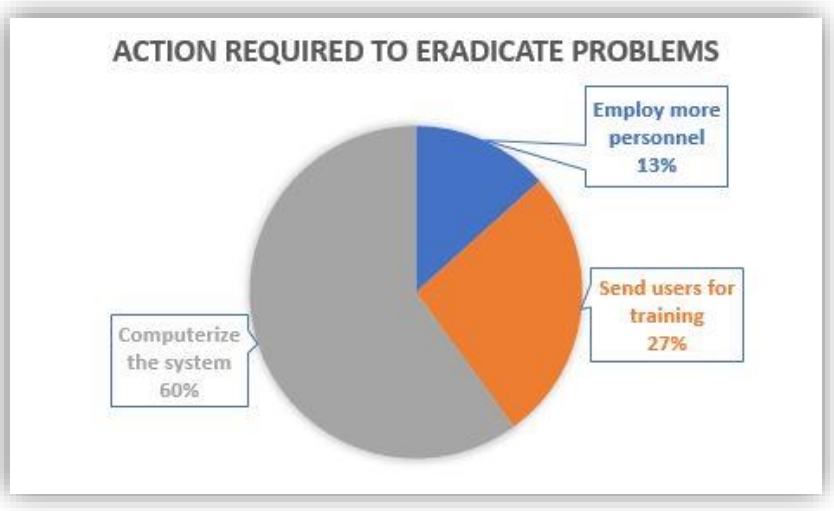


Fig 7 - Action required in eradicating problems (source: Table 6)

Explanation: The chart above (fig 6) clearly indicates the percentages on the feelings of the current system users about the action needed to eradicate obvious problems with the system. 13% of the users felt that employing more personnel would solve the problem with the current system. 27% thought sending users for training could help them be more conversant with the system and thereby eradicate the problems. While the remaining 60% thought they needed a computerized system to fully eradicate the problems with which they're facing in the current system.

Question 7: Can a computerized system help improve service delivery?

Response	Number of Responses	Percentage
Yes	20	66.67%
No	8	26.67%
Not sure	2	6.67%
Total	100	100%

Table 7 - Can a computerized system help improve service delivery? (Source: structured interview)

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

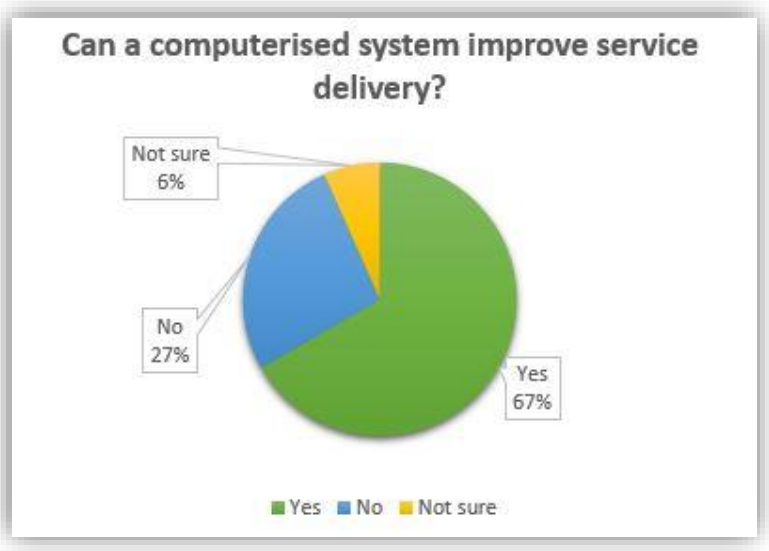


Fig 8 - Can a computerized system help improve service delivery? (Source table 7)

Explanation: The chart above (fig7) clearly indicates the percentages for current system users on how they fell about computerizing the system. 6% of the users were not sure if computerizing the system could improve service delivery. 27% believed service delivery was a function of personnel and that computerizing the system could have no positive effect. 67% of the users however felt a computerized system could reduce the problems with the current system and thereby improve service delivery.

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

CHAPTER 5

5. DISCUSSION OF FINDINGS

The observations and structured interviews conducted reveal the following:

Question 1: considerable amount of time is required to compile the required reports.
Question 2: The process of manually compiling the data is very tedious.
Question 3: A lot of mistakes are made as a result of the manual compilation of data.
Question 4: The vocal transmission of data over the communication radio or deliveries to HQ takes too much time.
Question 5: The manual reports and charge sheets take up too much space on the filing cabinets.
Question 6: users believe that the manual system has limitations that result in a number of problems which can be eradicated by the computerised new system.
Question 7: The Zambia Police's service delivery could greatly be improved by a computerised system.

The procedures and actions in the recording, reporting traffic offences as well as collecting and compiling overdue fines' details and statistics in the current system does not involve any use of computers or any form of Information Technology in which case the contribution of computers would be to process and communicate information much more quickly and accurately than a person could.

Although there is an information system, the current system does not involve itself in the use of Information Technology and therefore we can say that the system is completely manual. The three activities that provide the information that organization need, i.e. Input, Processing and Output are all done by individuals working at various stations and Zambia Police headquarters. At a glance, this means that the system is slow and inaccurate when compared to a computer-based information system.

Traffic Police officers also have to put in extra effort to produce:

- ✓ **Summary reports**
- ✓ **Exception reports**
- ✓ **Periodic reports**
- ✓ **Demand reports**

As may be required from any Management Information system as each report may have to be compiled and recompiled when parameters such as level of detail or date range requirements change.

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

In general, possible problems with the current system may include:

i. Human error in computation of driver history;
ii. Human error by the computation staff at headquarters that may omit data from any traffic station. (recording data manually with a pen while listening from a communication radio);
iii. Each report with different period requirement has to be manually computed;
iv. The time taken to manually produce a report may be overwhelming;
v. The duration for which a fine needs to be cleared before it's taken to court is usually incorrect;
vi. Storage of compiled fines and reports may be cumbersome and space consuming;
vii. Manual hard copy reports may not be readily available to remote stakeholders. (Need for physical movement of paper);
viii. The degree of accuracy in the resulting information is somewhat degraded as there is likelihood that some data items may be duplicated or missed altogether;
ix. The processing of data is extremely slow especially when volumes are high.

The problem statement can therefore be phrased as "***The Zambia Police manual traffic fines management system is unreliable in terms of processing speeds, accuracy and availability of the desired reports.*** "

The research question: "***How does the current system affect the operations of the Zambia Police Traffic with Fines management and what improvement can a computerized web based system make?"*** is thereby partly answered and will completely be answered when we analyse the benefits the new system will bring.

To mitigate the problems with the current system a new is perceived to be the following:

1. A computer based system for Traffic Section of the Zambia Police;
2. A system that will be accessed/updated by authorised traffic officials remotely countrywide;
3. A system that will be connected to a central database;
4. A system that will store data with a minimum of duplication of data so as to provide a consistent and controlled pool of data stored therein;
5. A system that will be controlled by a Systems/Database Administrator at Traffic headquarters;
6. A system that can be accessed by the general public and other stake holders for Motor Accident reports and related information;
7. A system that will process data in the reporting of Motor vehicle accidents fast, reliably, economically and cost efficiently;

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

8. A system that can be queried for any kind of Motor Accident statistics for any given period of time;
9. A system that will reduce the efforts in information gathering, data storage and report generation.
   a) A client server system with Local Area Networks (LANs) at each station interconnected through leased communication lines to make a Wide Area Network (WAN) with a central database server at ZP traffic headquarters.

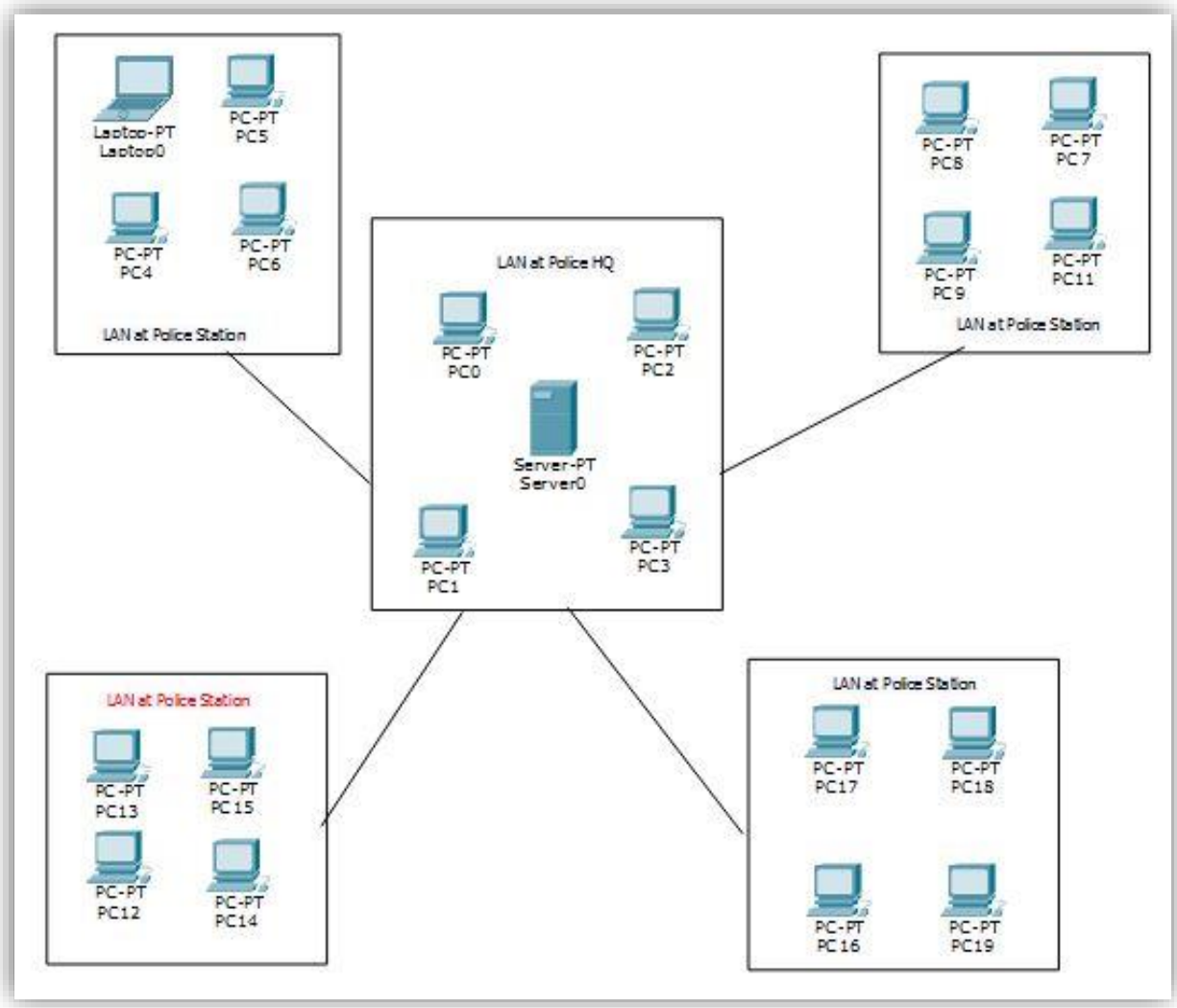


Fig 9 – ZP Road Traffic Accident Registration & Reporting alternative solution

b) A web based database system hosted by Microlink and accessible to users with internet connection countrywide;

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

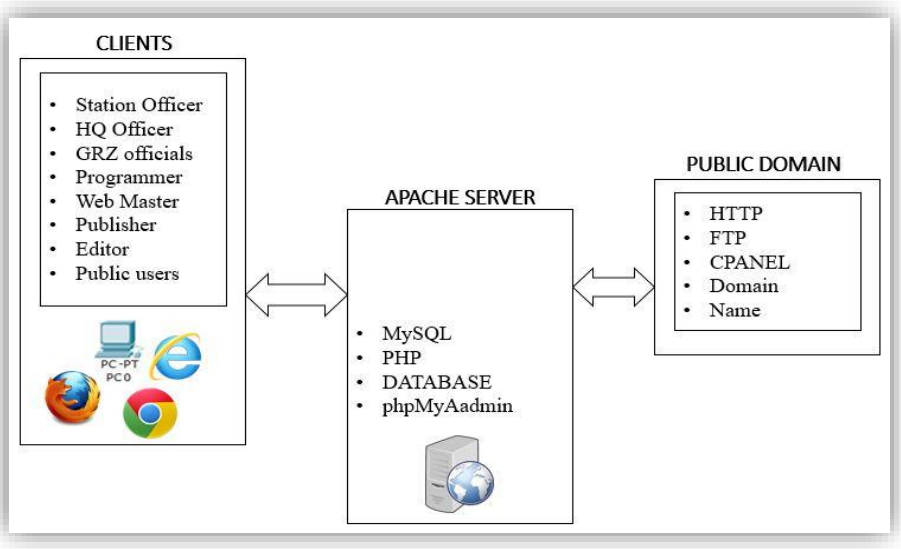


Fig. 10 – ZP Road Traffic Accident Registration & Reporting preferred solution

The first solution to the problem which consists of a WAN that uses leased communication lines might be very expensive for the Zambia Police in terms of acquisition of computers, network equipment, and setup, maintenance costs.

The second solution is preferred as it uses public internet for interconnection of computers on the network and thereby being more cost effective.

Below is the connectivity diagram for the second solution:

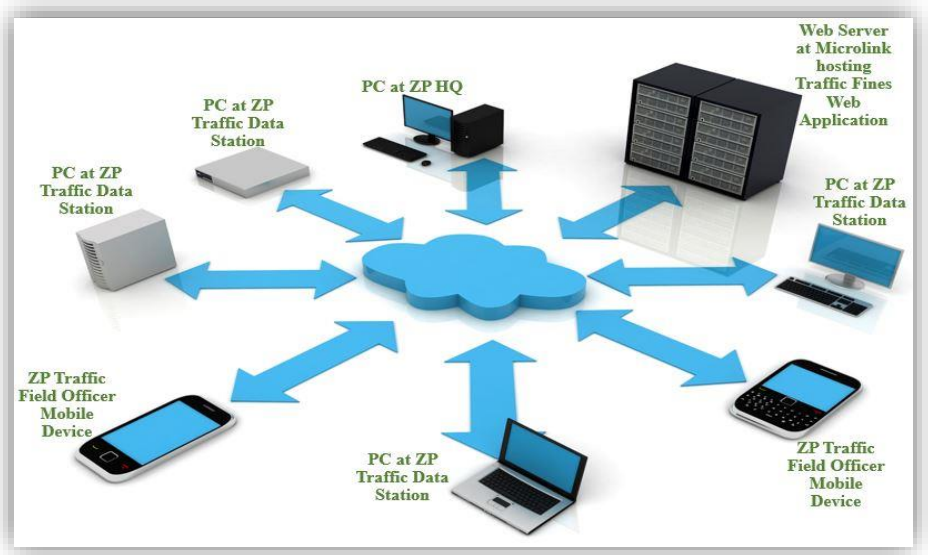


Fig 11 – ZP Road Traffic Accident Registration & Reporting preferred System - Connectivity

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

CHAPTER 6

6. CONCLUSIONS AND RECOMMENDATIONS

Life has become highly dependent on the technology that people have developed. Technology has advanced with years and it has changed the way we purchase products, the way we live, the way we communicate, the way we travel, the way we learn and so many of these continuous technological advancements have about brought many other changes. As people's demands and life style change, the demand for advancing the type of technology we use is high. Almost everything we use has been innovated to better standards, a good example is the" Mobile Phone", the type of mobile phones we had in 1995 are no longer on demand in this century, the demands of mobile phone users have changed greatly, and this has resulted in the advancement of mobile phone technologies.

Users of mobile phones demand simplicity and more functionality, which has forced mobile phone manufactures to develop computer minded smart phones, which are so easy to use, but also, they come with more functionality compared to the type of mobile phones we used to have in the past.

Technological advancements have helped businesses and organizations save time and cost of production, which has been an advantage to all business, they manage these advancements to gain competitive advantage. A good example is the 3G / 4G broadband, small businesses have taken advantage of this super-fast internet to reach target markets with less costs of operation.

6.1. IMPLICATIONS

For the Zambia Police Traffic department, setting up any computerized system implies acquiring every aspect of the system from hardware to software as currently an ordinary officer specifically those charged with the responsibility of capturing and compilation of traffic offence data do not have access to a computer.

6.2. CONCLUSIONS

The Ministry of Home affairs through the Traffic Department of the Zambia Police Service and in collaboration with the Road Transport and Safety Agency (RTSA) have a duty to reduce the number of road traffic accidents that occur on the roads of Zambia and one of the ways to do that is to enforce fine payment. Their efforts include sensitization of road users on safe road usage, vehicle inspection and mounting of road blocks, speed humps, among others. These efforts can however only be appreciated if there is a good traffic fines management system to store and retrieve driver traffic fines data to ensure their effectiveness.

6.3. Recommendations

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

It is recommended that the Zambia Police seriously addresses the issues raised in this study by implementing the computerized web based Road Traffic Fines Management System as designed.

6.3.1. Future suggestions

As for future works, however, the system can be enhanced to provide more features in the following ways:

- Adding multimedia capabilities such as the ability to store digital photographs (speed traps);
- A public access section for civilians to report any road violation;
- A public access section for civilians to check their fines (if any);
- Connection with the judiciary such that passed due fines are immediately sent to the court without having to physically carry them;
- Integration with RTSA database;
- Bar code scanner to scan drivers' licences and see driver history.

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

APPENDIX A

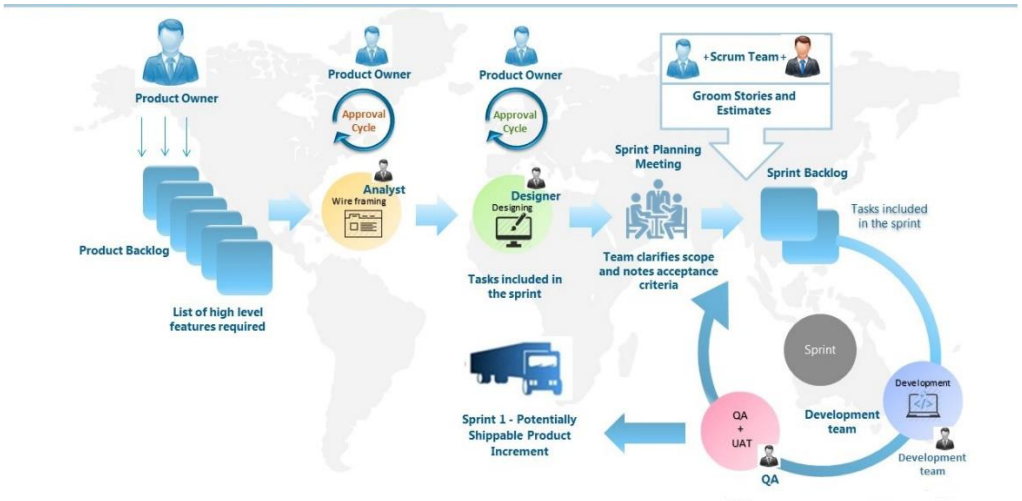
System Development Life Cycle (SDLC)

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

Systems Development Steps, Tools, and Techniques

A Systems development life cycle (SDLC) is a structured step-by-step approach for developing information systems. A framework that describes the activities performed at each stage of a software development project is referred to a System Development Life Cycle Model. In this project, the scrum model was adopted mainly because:

- Scrum methodology enables project's where the business requirements documentation is hard to quantify to be successfully developed.
- Fast moving, cutting edge developments can be quickly coded and tested using this method, as a mistake can be easily rectified.
- It is a lightly controlled method which insists on frequent updating of the progress in work through regular meetings. Thus there is clear visibility of the project development.
- Like any other agile methodology, this is also iterative in nature. It requires continuous feedback from the user.
- Due to short sprints and constant feedback, it becomes easier to cope with the changes.
- Daily meetings make it possible to measure individual productivity. This leads to the improvement in the productivity of each of the team members.
- Issues are identified well in advance through the daily meetings and hence can be resolved in speedily
- It is easier to deliver a quality product in a scheduled time.
- Agile Scrum can work with any technology/ programming language but is particularly useful for fast moving web 2.0 or new media projects.
- The overhead cost in terms of process and management is minimal thus leading to a quicker, cheaper result.



ISSN: 3471-7102, ISBN: 978-9982-70-318-5

Fig. 12 - Agile Scrum

Projects get different feature requests from customers, executives or other team members. In scrum features are written from the perspective of the end user. These features and known as user stories. A collection of these user stories is called a product backlog. A backlog can be likened to a wish list of all the things that would make a product great. After making the product backlog, the next step would be to choose which user stories to begin with.

The scrum methodology requires one or more people to make it work.

i) Product owner

This person helps make sure that the right features get included in the backlog by presenting the users and customers of the product. Basically, helps set the direction of the product

ii) Scrum Master

This team member helps to ensure that the project is progressing smoothly and that every member of the team has the tools to get the job done. He sets up meetings, monitors the work being done and facilitates release planning. The role is similar to that of a project manager.

iii) Team members

The team consists of developers and testers. Testers test the product after release.

- **Release planning**

In order to plan a release, the team begins with the product backlog and they identify the user stories they want to put into this release. These user stories then become part of release backlog. The team then prioritizes the user's stories and estimates the amount of work involved for each item. Sometimes larger user stories are broken into smaller more manageable chunks. The collect of all the estimates provides a rough idea of how long the entire project will take.

- **Release backlog**

With a prioritized list of user stories and the estimated amount of work at hand, the project is now ready to conduct several sprints to get the work done. Sprints are short duration millstones that allow teams to tackle a manageable chunk of the project and get it to a ship-ready state.

Sprints general range from 2 day to about 30 days in length, depend on th products release cycles. The shorter the release cycles the short each sprint should be. It's advisable to have a minimum of 2 to a maximum of 12 sprints in a given release.

At this point we can take the release backlog and splint it into sprint backlogs. The goal oif each sprint is to get a subset of the release backlog to a ship-ready state. Therefore, at the end

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

of each sprint we should have a fully tested product with all the feature of the sprint that are 100% complete.

- **Burndown chart**

This is used to monitor the release of each sprint to ensure that there are no late releases. A burn down chart is a graphical representation of work left to do versus time.

Project	Task	Total Hour	3/2/2017	3/3/2017	3/4/2017	3/5/2017	3/9/2017	3/10/2017	3/11/2017	3/12/2017	3/24/2017	3/25/2017	3/26/2017	4/7/2017	4/8/2017	4/9/2017	4/14/2017	4/15/2017	4/16/2017	4/22/2017	4/23/2017	4/29/2017
TFMS	design database	5	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TFMS	design interface	4	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TFMS	create users	5	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TFMS	create user profiles	5	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TFMS	create user privledges	3	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TFMS	create login page	4	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TFMS	enable user to create user accounts	8	0	0	0	0	1	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0
TFMS	enable user to veiw profiles	4	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0
TFMS	enable user to search profiles	3	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0
TFMS	enable users to check balance	4	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0
TFMS	create the "paid" and "Not Paid" functionality	5	0	0	0	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0
TFMS	create list of offences	4	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0
TFMS	create "print reciept" function	3	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0
TFMS	create "Add offence" function	7	0	0	0	0	0	0	0	0	0	0	1	4	2	0	0	0	0	0	0	0
TFMS	create zones	9	0	0	0	0	0	0	0	0	0	0	0	0	2	4	3	0	0	0	0	0
TFMS	create user reports	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	0	0	0
TFMS	create offence reports	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0
TFMS	create "exceeded time" reports	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3	0
TFMS	create "total amount collected" reports	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2
TFMS	refine interface	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	3
Deal Remaining Hours		106	100.7	95.4	90.1	84.8	79.5	74.2	68.9	63.6	58.3	53	47.7	42.4	37.1	31.8	26.5	21.2	15.9	10.6	5.3	3.37508E-14
Actual remaining Hours		106	4	4	9	5	4	6	7	4	5	5	5	4	4	4	6	3	6	8	8	5

Fig. 13 - Burn down chart in excel

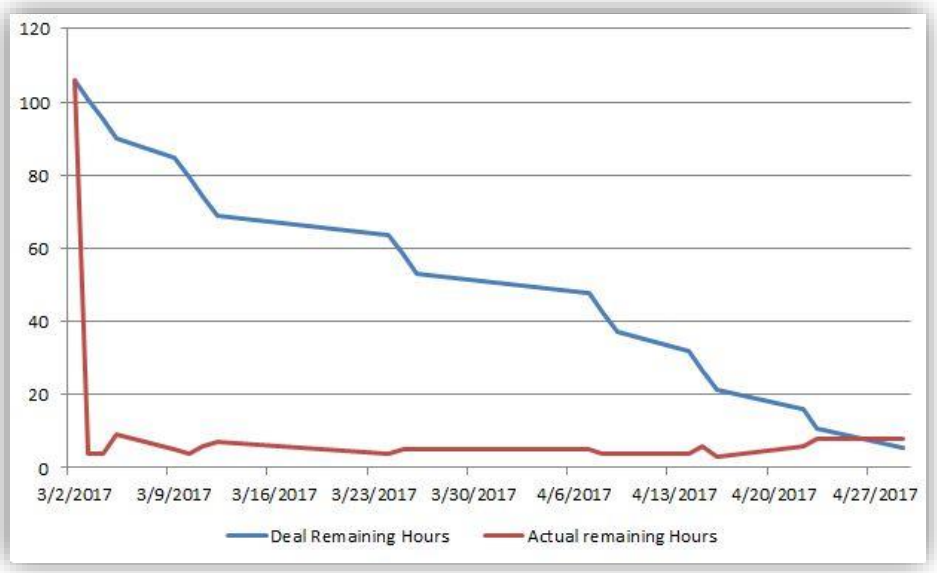


Fig. 14 - Burn Down chart

The Agile Scrum methodology is famous for its preciseness and speed as well as estimation of when the work will be done.

Below is the work breakdown structure for the project:

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

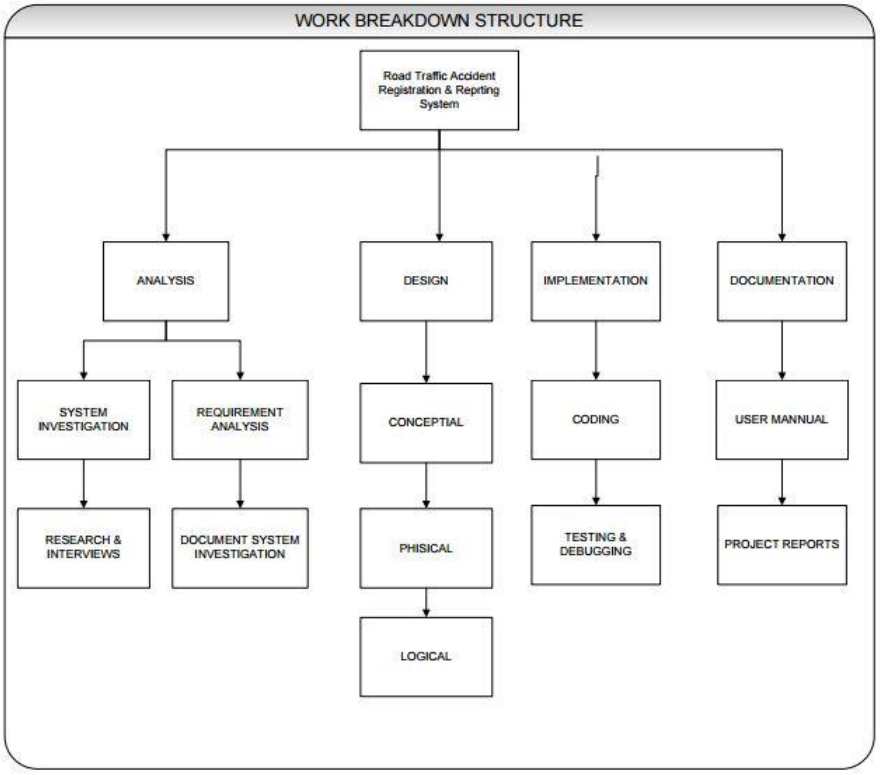


Fig. 15 - Work Break Down structure

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

APPENDIX B

User Manual

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

User Manual

Before the user can use the system, the following minimum system requirements should be adhered to:

- Computer with Windows 7 operations system or better;
- Google Chrome (internet browser);
- Internet connection with reasonable speed for internet browsing;

With the above minimum system requirements, the user can operate the system as follows:

1. . The user to the system begins by typing the URL of the website hosting the system in the web browser. For the purposes of this documentation, the URL is **//localhost/traffic**

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

A) Administrator interface

The administrator is a super user that has more privileges than any other type of user in the system. He or she can create other users and assign privileges to them. He or she is also able to approve registration requests from companies.

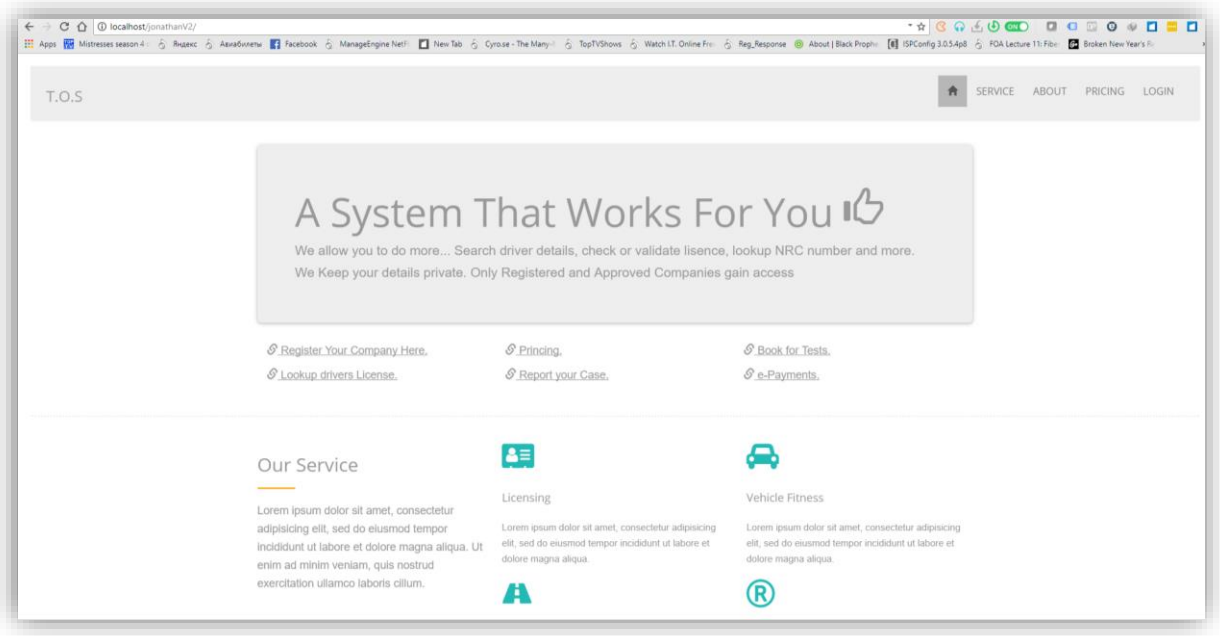


Fig. 16 – Website – Front-End

2. The authorized or registered user can now log on with the appropriate username and password. *Registered users* include all Traffic officers involved in the input, analysis and reporting of Road traffic offences and offenders at Zambia Police Traffic stations and Traffic Headquarters. The site is mobile friendly which means that traffic offices can update details while in the field. For the purpose of this documentation the following credentials are used:

   Username: admin@mail.com
   Password: admin

   Upon clicking ‘login’ on the top right the user is presented with the login screen.

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

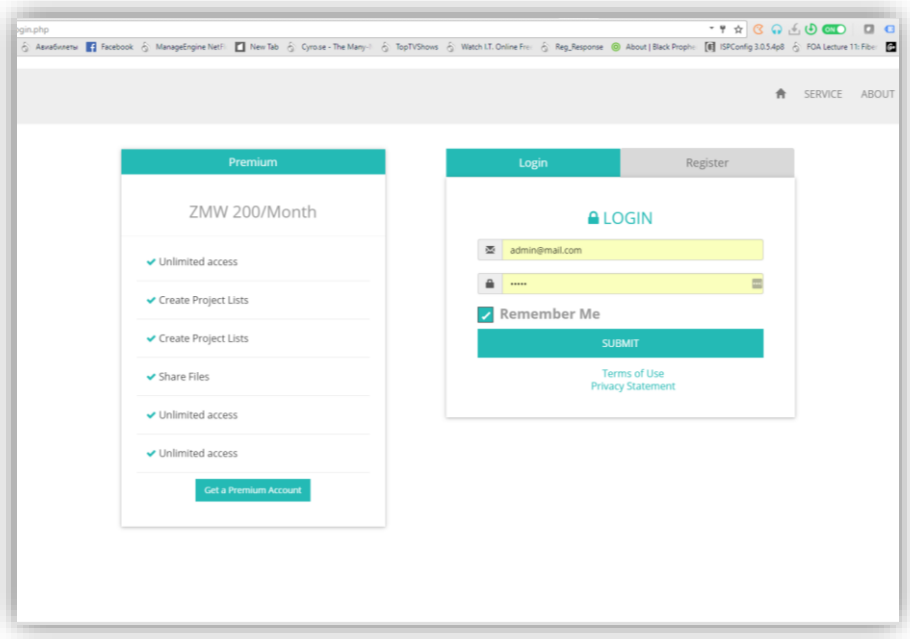


Fig. 17 – Login page

3. On this page the user will enter their credentials. In this case the user is a super user (admin).

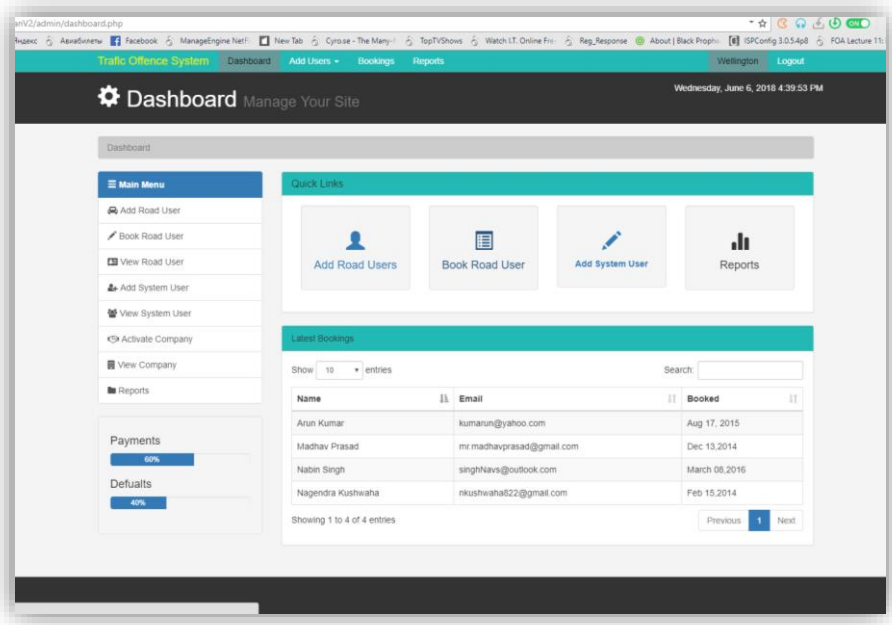


Fig. 18 – Admin Dashboard

4. On the admin dashboard the user can perform the following actions:

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

i) Add a road user

This means the user can add a driver that is not already existing in the system.

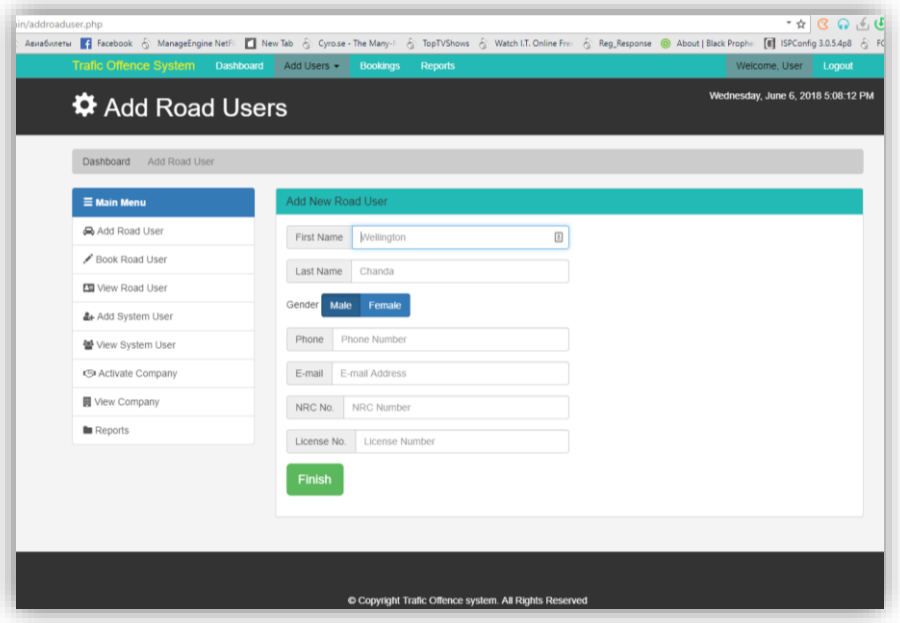


Fig. 19 – add road user

ii) Book a road user

This function is used to record what kind of offence the user has committed. It has an additional text field, should the officer want to add more information.

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

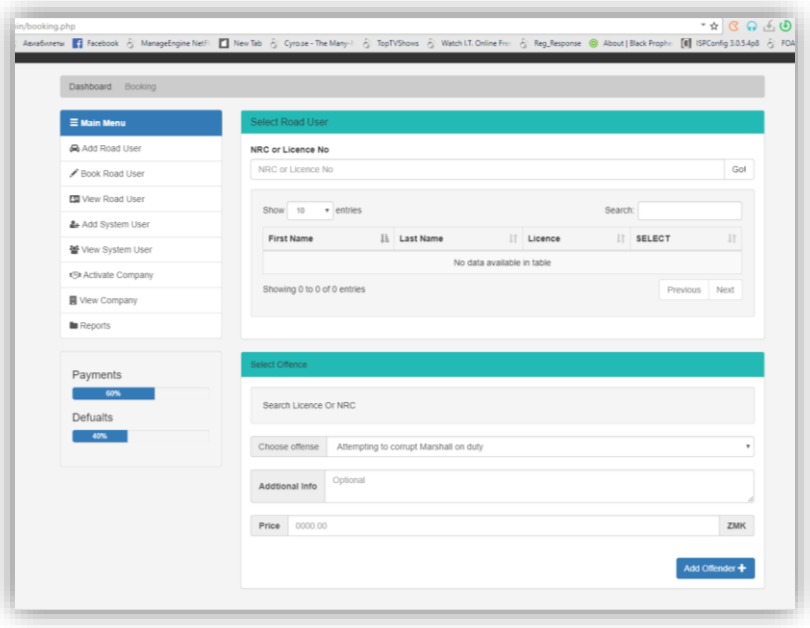


Fig. 20 – book road user

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

iii) View road user

Here a user can view a driver's offence history record.

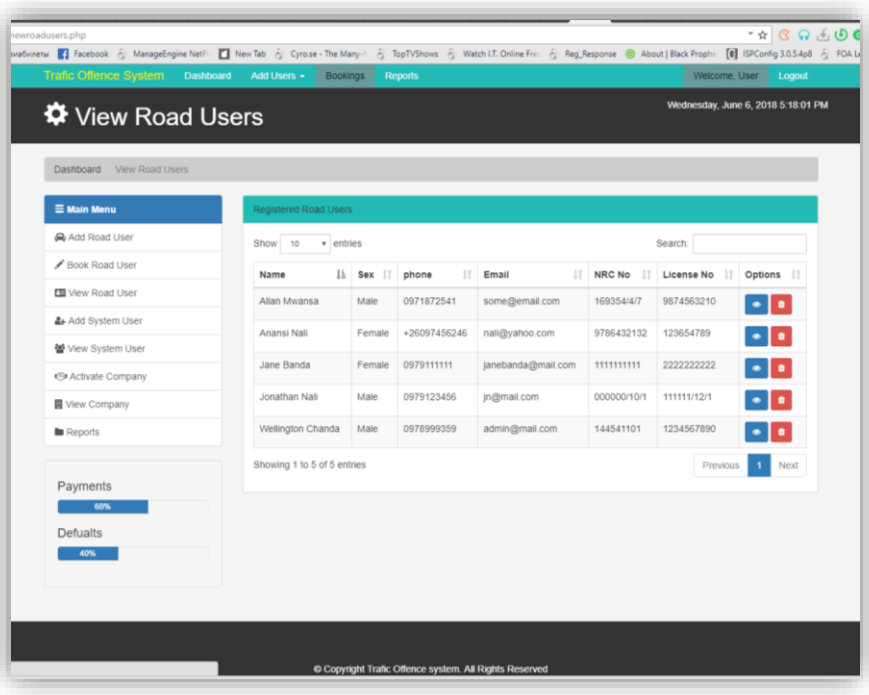
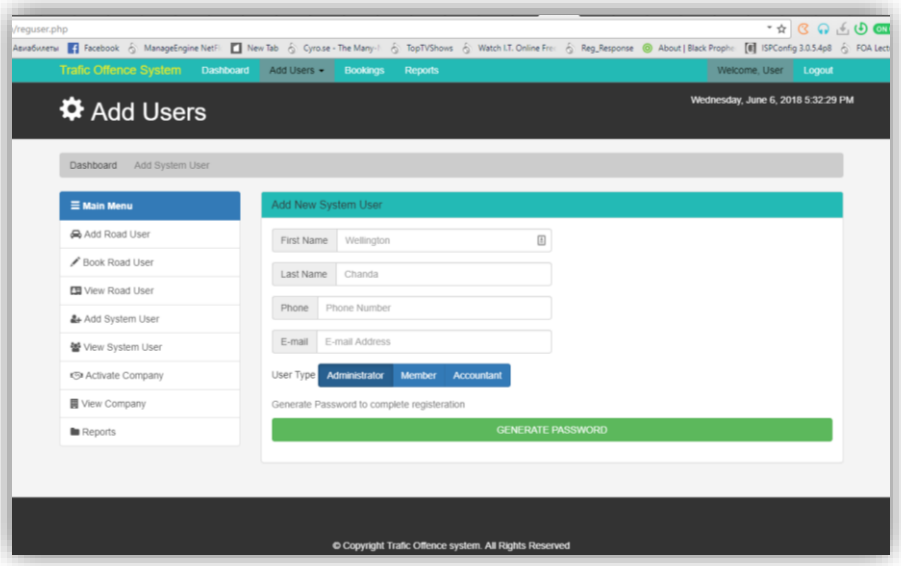


Fig. 21 – view road user

iv) Add system user

An administrator is a super user and can add a system user and assign roles. The available roles are Admin, Traffic officer and accountant.



ISSN: 3471-7102, ISBN: 978-9982-70-318-5

Fig. 22 – add system user

v) View system user

An administrator can view the previous activities on of system users. i.e how many drivers booked.

vi) Activate company

If a company wants to check for a driver's driving history they are required to register with the system. When they do register, the administrator can either approve or not for whatever reason the choose.

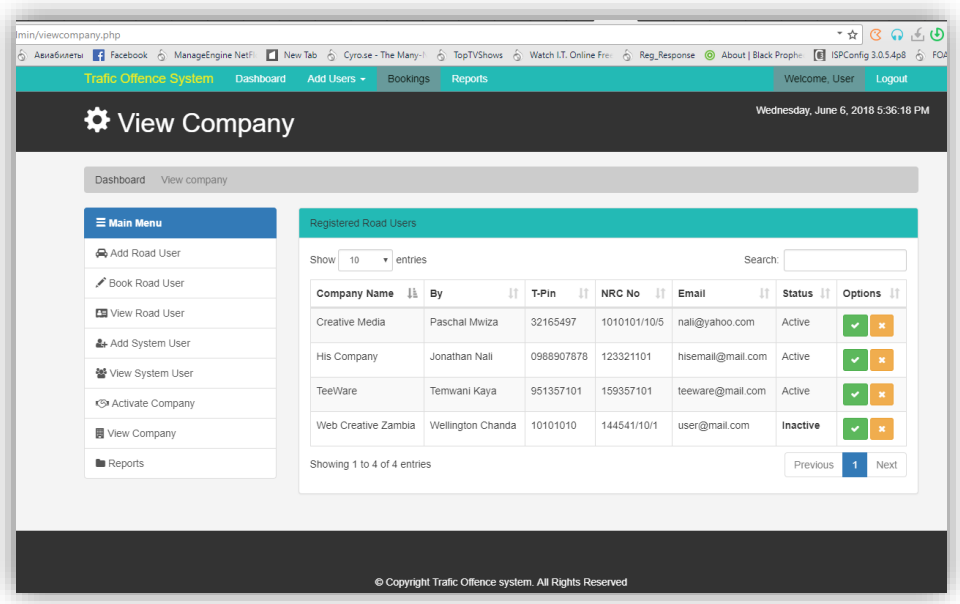


Fig 23 – View Companies

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

B) Company registration

An individual can register their company if they want to be able to check a driver's record.

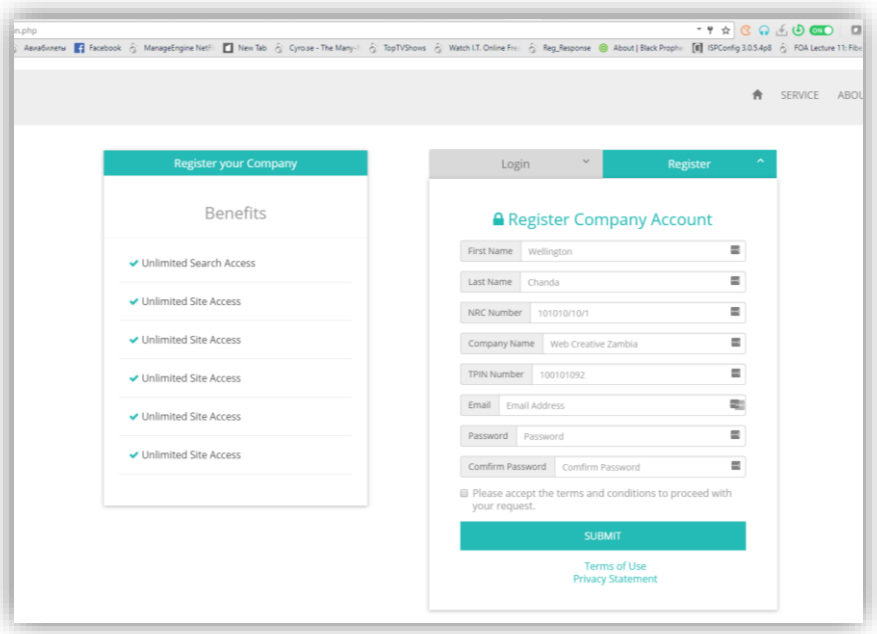


Fig. 24 – Company Registration

Once the company is registered they can now login and check for driver history as shown in Fig. 23

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

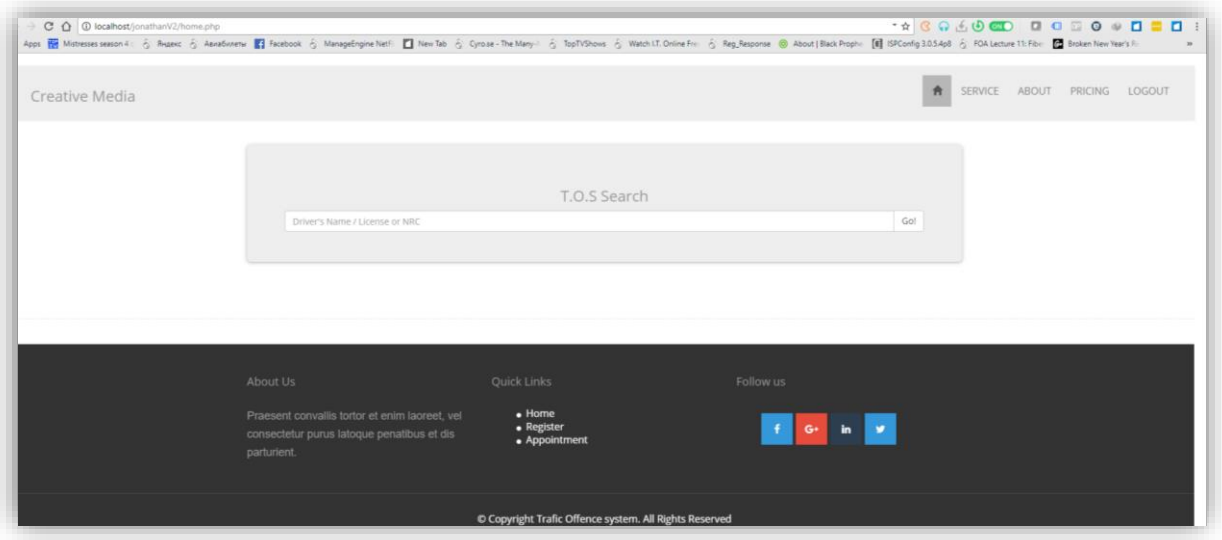


Fig. 25 – Registered company welcome page

The individual can now search of a specific driver.

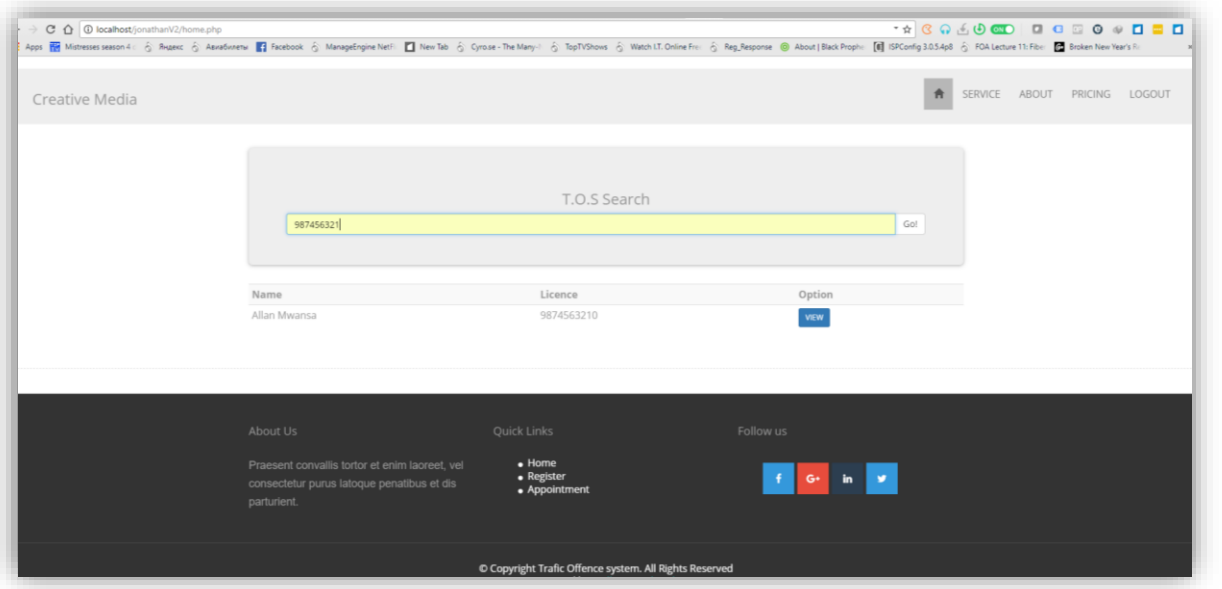


Fig. 26 – searching for a specific driver

Clicking the '*View*' button will reveal the driver's history, if any. In the figure below, ***Allan Mwansa*** only has two records and hasn't paid for them.

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

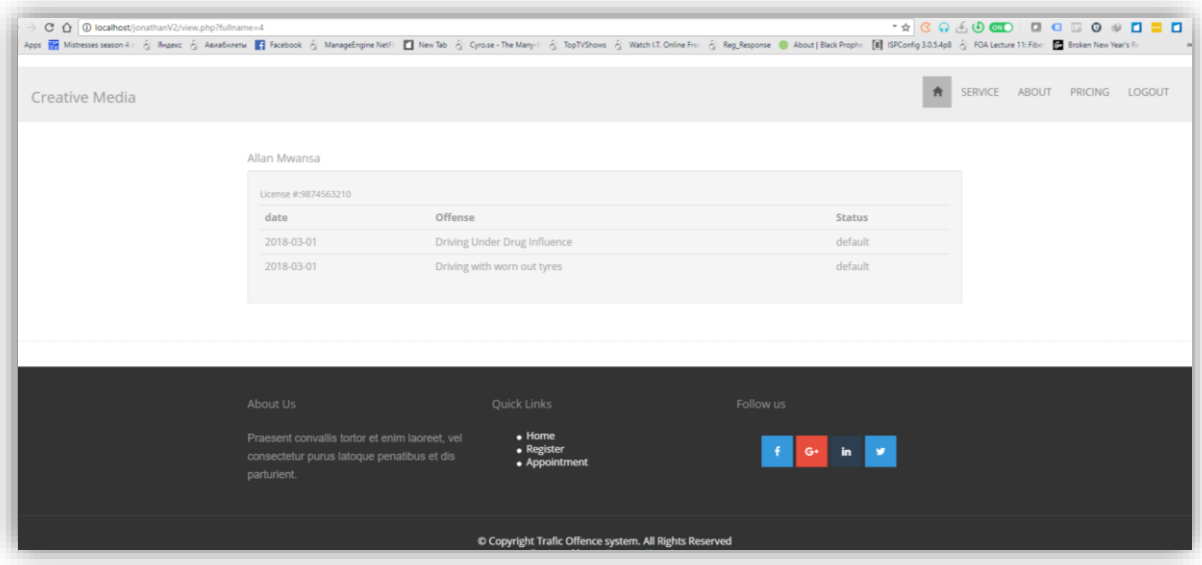


Fig. 27 – Driver history displayed.

C) How can an individual pay for his fines?

If a driver has a fine he wants to pay for, he would have to go to the Central Police where he will meet with the accountant.

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

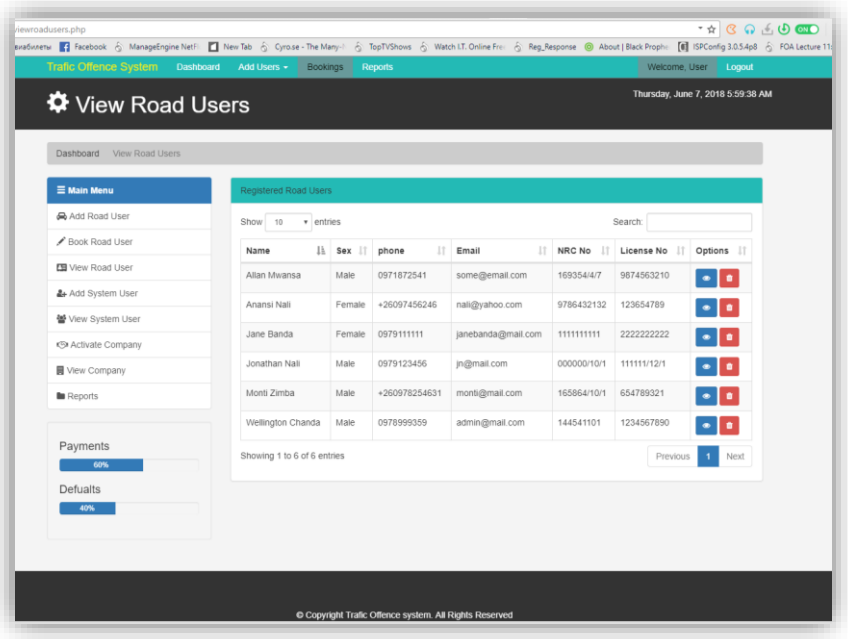


Fig. 28 – View drivers

Search for specific user.

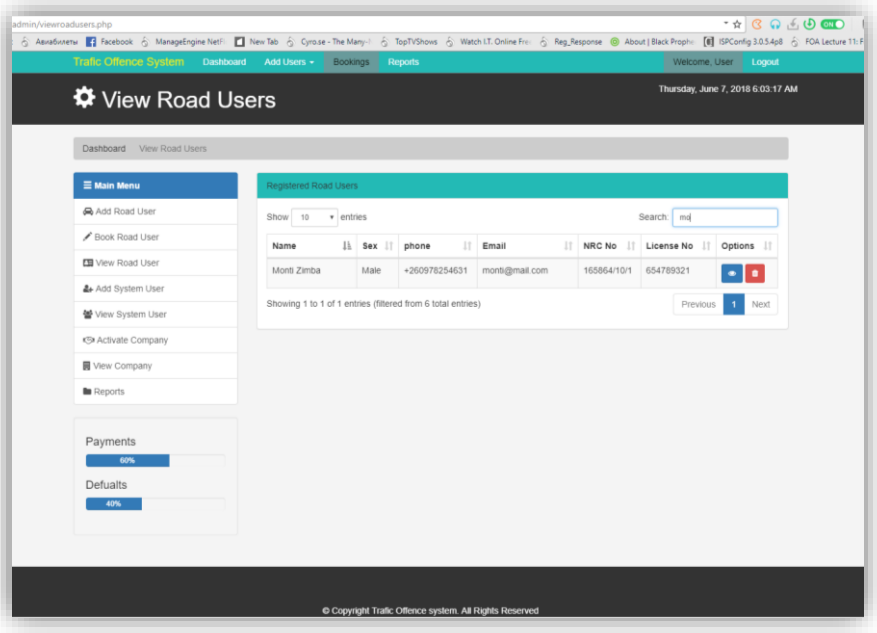


Fig. 29 – search for driver

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

By clicking the eye button, the officer can view all fines by the driver which are paid or unpaid. It also shows the type of zone the driver is in (Green, orange, Red).

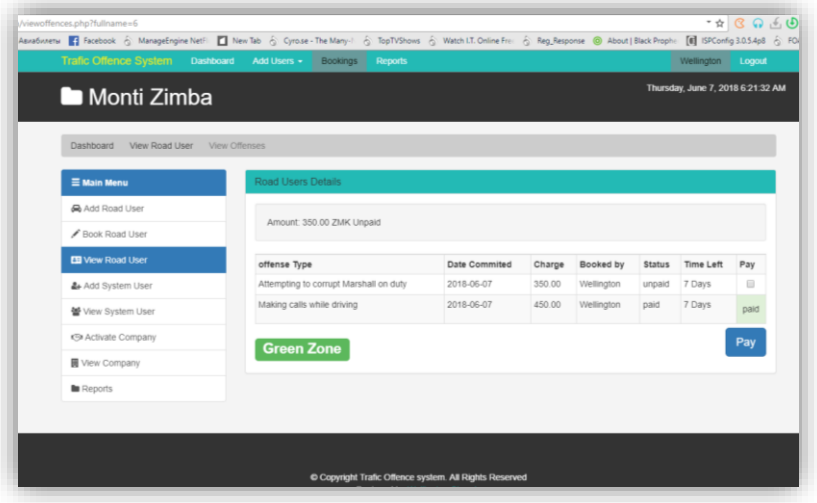
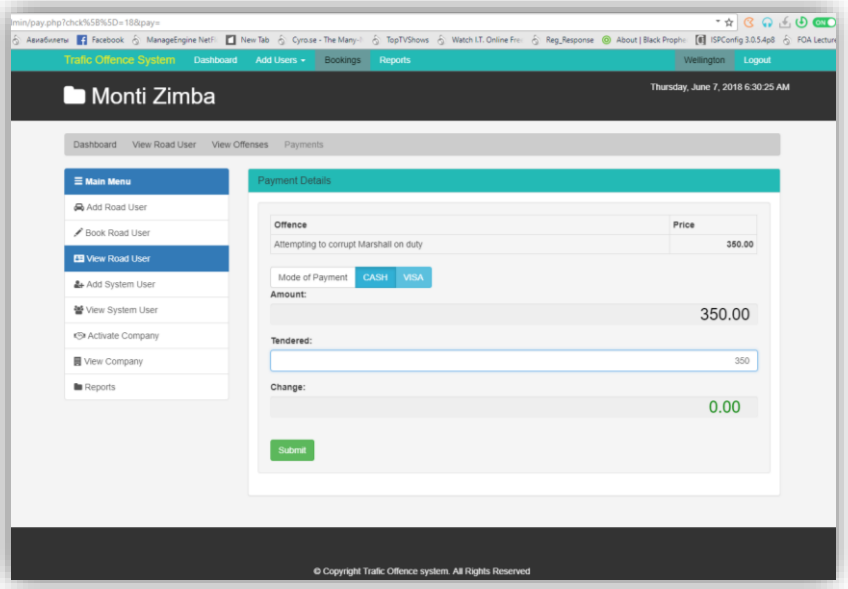


Fig. 30 – Viewing the status of the fines.

Registered Company checking for driver details.

Once the desired fines are checked and the user clicks ‘Next’, the user is taken to the screen shown in Fig. 28 where they can enter the amount they want to pay.



ISSN: 3471-7102, ISBN: 978-9982-70-318-5

Fig. 31 – Paying for a fine

After clicking 'Submit' the officer is taken to the next screen where he is able to issue a receipt.

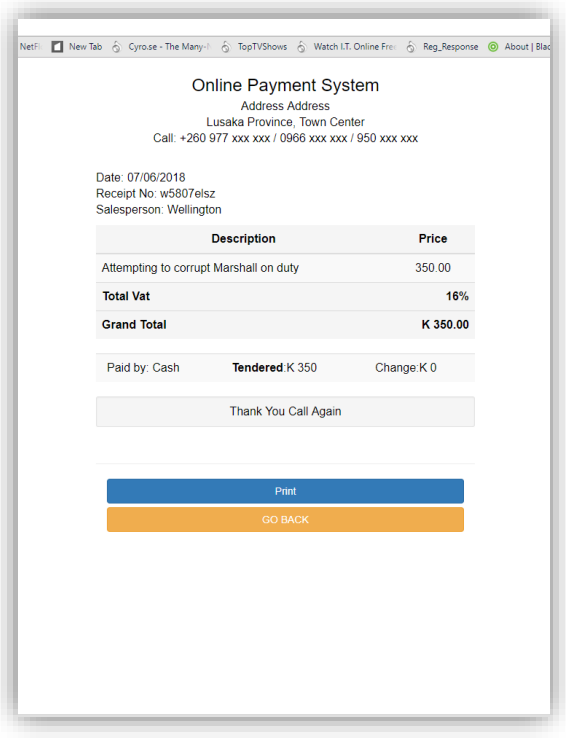


Fig. 32 – Receipt

When a company registers with the TFMS they can check the driver, history should they choose.

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

APPENDIX C

System Diagrams

Website data flow diagram

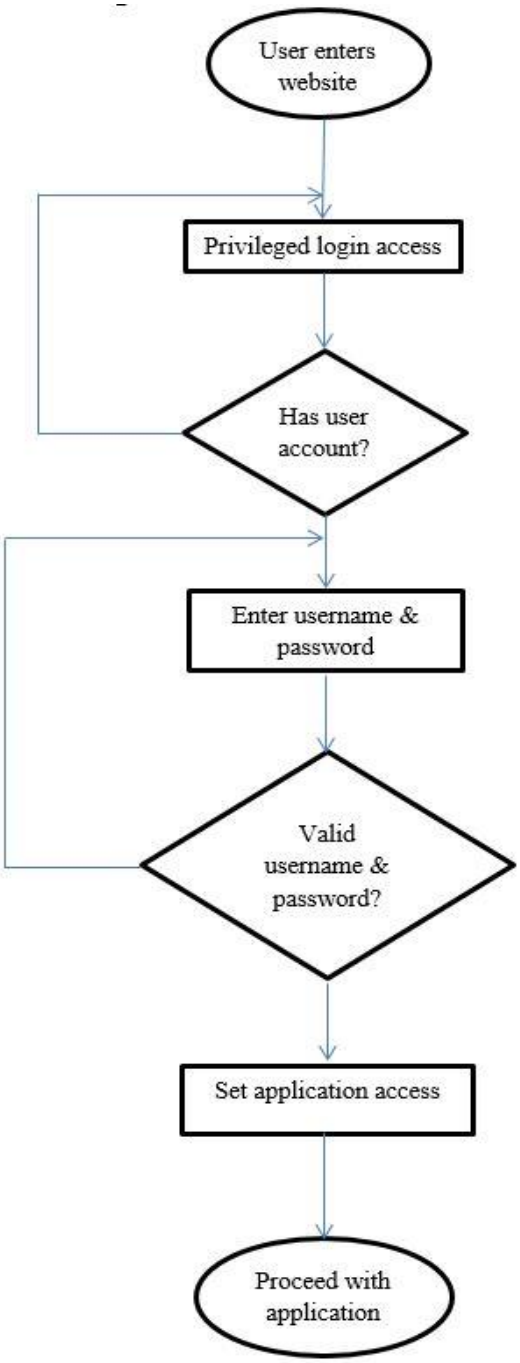


Fig. 33 - Website data flow diagram

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

System process flow diagram

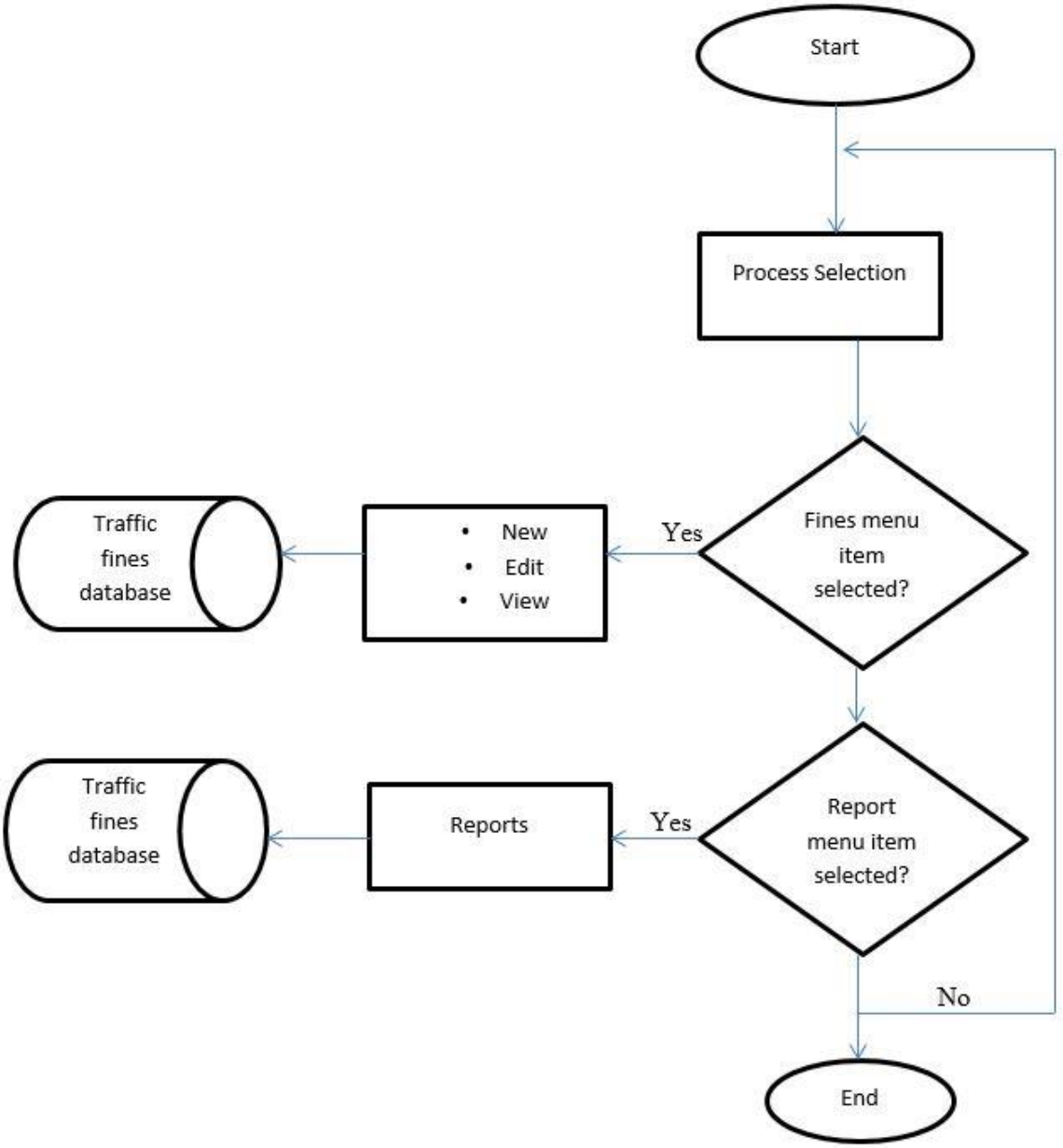


Fig. 34 - System process flow diagram

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

Bibliography

[1] Speed-fines-management-system (2017) Available at: http://www.speedautosystems.com/ [Accessed 20 Apr. 2017].

[2] Intoweb Intranet & Extranet Software. (2017), Available at: http://www.intoweb.com/articles/traffic_fine_management.php [Accessed 21 Apr. 2017].

[3] Some Assembly Required: Building a Digital Government for the 21st Century, Center for Technology in Government, University at Albany/SUNY, 1999. http://www.ctg.albany.edu/publications/reports/some_assembly

[4] Eight Imperatives for Leaders in a Networked World, Harvard Policy Group, JFK School of Government, Harvard University, 2000. http://www.ksg.harvard.edu/exec_ed/3e/eight_imperatives.htm

[5] E-Government: The Next American Revolution, Council for Excellence in Government, 2001. http://www.excelgov.org/techcon/egovpoll/index.htm.

[6] "Welcome to e-government" Archived 2013-06-06 at the Wayback Machine., Kenya e-Government website, Directorate of e-Government Kenya, Retrieved 14 October 2017.

[7] "Transparency". Centre for Democracy & Technology. Archived from the original on 2009-03-15. Retrieved 15 October 2017.

[8] "The pros and cons of e-government". Economist. 2008-02-14. Retrieved 28 October2017.

[9] Pratt, Philip J.; Last, Mary Z. (2014-09-08). Concepts of Database Management (8 ed.). Course Technology. p. 29.

[10] Eqstra Fleet Management, (2017), [online] Available at: http://blog.efm.co.za/how-to-manage-your-fleets-traffic-fines [Access on 20 Apr 2017];

[11] AVIS Fleet, (2017), [online] Available at: http://www.avisfleet.co.za/about-us/blog/traffic-fine-management-and-the-aarto-system-part-1/ [Accessed on 23 May 2017].

[12] Otto, Mark (January 17, 2012). "Bootstrap in A List Apart No. 342". Mark Otto's blog. Archived from the original on October 28, 2016. Retrieved February 23, 2017.

[13] Embedding PHP in HTML". O'Reilly. 2001-05-03. Viewed 20 October 2016.