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DESIGN AND DEVELOPMENT OF A WEB BASED VEHICLE MANAGEMENT SYSTEM (VMS)

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ABSTRACT

This project was aimed at designing and developing a web-based Vehicle Management system (VMS) for Africonnect. The system is to be used internally as an ERP system for the organization to manage vehicles in terms of distribution of fleet for operations to reach their customers. The VMS is designed to enable users from departments to request for a vehicle through the system. In addition to allocation of vehicles, the system also optimizes the use of company or corporate transport resources such as misuse of fuel and also reduction of unplanned use. Tremendous works has been done in form of vehicle management as well as installing of tracking systems to vehicles, but internal distribution has been left out to help out the organization in planning schedules.

Through the use of the system, vehicles are only allocated when need arise and requested. The requests have to be approved by the administrator for the vehicle to be given out. The vehicle is only given out if it is not on maintenance, break down and is readily available.

*The system administrator is able to perform the Create, Read, Update, Delete and Edit (CRUDE) Operation on Users, Departments, and Vehicles and approve/decline requests from user depending on the status of the vehicle or nature of the task. In addition to CRUDE Operations, the administrator is also responsible for routine maintenance checks of vehicles such as **Fitness**, **Road** and **Insurance Taxes** through the system. system is able to generate a report on the use of the vehicle for a certain user.*

Once define, the user is able to login with the specified credentials and request the vehicle from the system. The only entry by the user is the vehicle registration number, destination and the task. The user has to wait for the request to be approved, else the status remains pending approval.

*The system has been designed on the client-server paradigm having the **MySQL** on the backend and **PHP**, **HTML**, **CSS** and **JavaScript** on the front end.*

The system has the capability of reminding the administrator on the mentioned taxes via the reminders tab when any of them is due for payment to avoid unnecessary charges. The system is able to calculate the next maintenance schedule for a vehicle using the current mileage plus the default service mileage. By default, the vehicle is supposed to move about 5000 Kilometers before taken for engine service. The administrator then is able to update vehicle record once it is returned by the user. After the maintenance, the administrator is responsible to update the next service mileage threshold value. For audit purposes on use of the vehicle, the

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I. INTRODUCTION AND BACKGROUND

Worldwide, there has been a wave of change towards the use of information and Communication Technology in many sectors of the economy. Some of these sectors include Agriculture, Banking, Mining, Transport, Communication and Commerce. The ever-growing technologies in the internet have brought a lot of pressure on a lot of organizations and humans as they always want to keep abreast with new technology.

The development of a Vehicle Management System came to light due to the fact that the Organizations has been experiencing problems in taking audit of usage and Utilization of the organization's Vehicles. The other reason is simply to see to it that the company does not spend too much money on maintenance of the vehicles due to the misuse by some individuals taking advantage of lack of Vehicle Management System in place. This System is an Interactive system from the top management to the operation level, hence easy for decision making.

Once the System is implemented, Distribution and Utilization will address the pressure that the transport department has been facing in recent past. For efficiency and effective manner, organizations entirely demand the need for vehicles Management System. In undertaking huge projects, the implementation cost has been weighed against the project's benefit and it has been found that the benefits overweigh the cost by far, hence the great move to develop and implement the said project. Overall, the new system automates the process of vehicle management thereby increasing productivity.

Motivation and Significance of the study

Despite this evaluation that Zambia has started going through, there is nothings much that have been developed in the area of Transportation, Communication and e-commerce as bringing the service closer to the user is concerned.

Today, new paradigm of technological development is fast emerging in both developing and developed countries. Old ways of delivering important services to the employees are being challenged and traditionally societies are being transformed into knowledge societies all over the world. Throughout literature, there is a clear assumption that technology and development are closely tied. It has become a common business practice that allows small and medium-sized businesses to gain services and skills they would usually find hard to develop, because of either financial or manpower restrictions, or possibly a combination of both (Chris C. Ducker, 2009). Most of the companies are non-profit making organization, they focus on the service delivery to the people of the Republic of Zambia. Keeping the vehicles in a running condition will mean great production for the organizations and Zambia at large. The system will be a distributed system that will employee a three – tier Architecture. Access will be through a web service, the fronted technology that will be used is HTML and MYSQL server 5.1 will be used in the back-end technology for the database. The system will have different uses and users will have different access rights. The department users will have to login into the system and request the vehicle through the coordinator approval. Vehicles will be assigned by the transport Coordinator; the drivers will also be required to login to check if has been assigned any task by the supervisor.

Scope of the study

The web-based vehicle management system (VMS) will need to demonstrate ability to perform the following scope of services:

- Understanding of current fleet management process
- Size and scope of fleet for the organization

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- To review the requisition process of the vehicle
- Review of maintenance activities completed in-house and those activities contracted.
- Review of current fleet management costs

Problem Statement

Since the privatization of Zambia economy, there was a decline of the state-owned parastatals. For instance, the Zambia Airways and United Buses of Zambia (UBZ) collapsed. Consequently, the citizens started to come onboard to start their own businesses in different areas of the economy like Transport, Manufacturing and Banking among others. In the telecommunication sector, companies came up with services that support mobility such as Global System for Mobile Communication (GSM), General Packet Radio (GPRS) and other data services. As technology keeps on evolving, private companies are now able to track the vehicles in the world as long as it is attached to with the GPRS gadget. Most of the previous research (Mohamed, 2006; Kinyua, 2000 and Serem, 2003) related to transportation in humanitarian logistics has taken a central planner perspective without examining transportation implementation. There is little literature on the current Field Vehicle Fleet Management (Field VFM) in humanitarian operations and how existing managerial structures, strategic interactions and incentives shape fleet management in in-country programs. It is therefore difficult to conclude whether optimization methods could be used to improve in country program delivery performance. In addition, if the unpredictable operating conditions, complex organizational structures, loose objectives, or donor constraints would make the use of decision tools too complex or prohibitively expensive (Balcik, Beamon and Smilowitz, 2008). Well managed and maintained equipment can result in 20-30 % or more cost savings on running costs alone. Improved efficiency of the users can result in even more savings. Better acquisition, management and disposal of vehicles could save 12-17 percent (between US$120 million and $170 million a year) of an estimated $1 billion annual spend (Fleet Forum, 2012). In past years some steps have been taken to create a more logistically structured approach to vehicle management (Auditors report, 2017), but these measures have been periodically undercut or eroded by the pressure of budget cuts. This project is an online system which will take care of all the vehicle operations and maintenance by giving reminders to important routine maintenance of the vehicles such as Road Tax, Fitness and Insurance expiries and also provider security that only the authorized users will be able to access the data. The system is aimed at improving or rather eliminating all these problems that are encountered during the operations and vehicles management.

Aim of the study

The main aim of this project is to develop an internal web-based vehicle management system for companies to ensure customer support effectiveness and reliability retention

Objectives of the study

1. General Objective

The main objective of this study was to design and develop a web-based vehicle management system (VMS) practices on service delivery for a better Zambia.

2. *Specific Objectives*

The study was based on the following research objectives;

1. To determine how vehicles service and maintenance influences service delivery to internet service providers (ISP) in Zambia.

2. To assess how departmental vehicle allocation can influence service delivery as customer care improvement in Zambia.
3. To establish the use of vehicle's mileage, save on fuel expense impacts on service delivery to service provider in Zambia
4. To determine the influence of driver management and training on service delivery in Zambia.

Research Questions

RQ1. What limitations face when the vehicle is not regularly taken for service?
RQ2. How does vehicle allocation to departments done, do you have a system in place?
RQ3. What impact do you expect working with a drive who is not trained on customer service?

Organization of the thesis

In this introduction the author has given a detailed background to the problems that have necessitated this research proposal. Out rayed the various challenges the companies face as regards to transport i.e. permanent assignment of vehicles to Departments and Drivers, and high maintenance cost, no proper record keeping of insurance and fitness, and has given the background to the motivation of undertaking such a very important and key application development in Vehicle Management System

Summary

In this introduction the author has given a detailed background to the problems that have necessitated this research proposal. Out rayed the various challenges the companies face as regards to transport i.e. permanent assignment of vehicles to Departments and Drivers, and high maintenance cost, no proper record keeping of insurance and fitness, and has given the background to the motivation of undertaking such a very important and key application development in Vehicle Management System

II. LITERATURE REVIEW TO THE RESEARCH

2.0 Introduction

This chapter, literature review serves to show projects and ideas of similar systems that have been developed before and also how these systems would help building on their drawbacks as the Web based Vehicle Management System (VMS) is developed. The section discusses the web-based vehicle management system that can help the transport department to plan for their fleet and well as allow other departments to request for vehicle which is suitable for the task intended to carry out.

2.1 Review of the Literature

Murdy (1999) did a study to evaluate the effectiveness of the Fleet Support community's management practices in meeting the dynamic changes in the complex fleet support arena, while increasing its value to the Navy in the future. The Fleet Support community's mission statement was used as a benchmark in the evaluation process. Data on billet base management, accession policies, education and the detailing process were evaluated against the mission statement to determine the extent to which these practices support it. The results of the study indicated that current practices provide limited support in meeting the Fleet Support community's mission statement.

Russell (2000) did a study on the humanitarian relief supply chain an analysis of the 2004 South East Asia earthquake and tsunami. The study created a survey concerned with supply chains used in the Tsunami relief effort. The surveys were distributed while the organizations were still actively involved in the relief effort. The surveys collected data on the whole relief chain and sought to determine issues that hampered relief efforts. The survey interviewed organizations alone about their supply chain, while the

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beneficiaries, other actors in the field, or government officials were not consulted. The study found out that each disaster response should be better than the last. In order to improve humanitarian relief for the next disaster, work needs to be done to change the way that people view philanthropy. Giving money, earmarked solely for an immediate crisis makes little difference in an organization's efforts to respond to the next crisis. Funds need to be designated to develop insights and technology that apply across organizations. New process and technology infrastructure could support communication and coordination, assessment systems for early warning and response, knowledge systems to capture and apply lessons learned from previous efforts, and humanitarian logistics systems. Mayak (2004) conducted an in-depth study to uncover the causes of accidents and fully detail their consequences. Mayak produced a report that provided a baseline understanding of the nature of Merck driver accidents from several angles, including the relationship between accident frequency and severity. The study also identified trends corresponding to driver demographics and recommended avenues to reduce the company's accident rate, improve its understanding of the accident experience, and focus its safety training efforts.

Herrmann (2006) did an evaluation of the utilization and management of UNHCR's light vehicle fleet. In the development and preparation for the evaluation it was expected that an experienced logistician would collaborate with EPAU in a critical analysis of UNHCR's transportation response, relying on both field-based observations and a quantitative analysis of available data. Soltun (2007) carried out a study on Fleet Management Optimization which was built around the concept of fleet management, focusing on designing and implementing a solution for such a purpose. The study was approached as a combination between a literature study (theory and business model creation) and a software design process (design and implementation). The study proposed that implementing the GIS functions was to be done after the proposed system was complete and implementing the remaining functionality in co-operation with a possible customer was a good approach to discover necessary functionality that had not been detected in the work process. The process of monitoring and increasing efficiency of transportation problems is called fleet management. The services included in a fleet management too vary depending on the organization in context. According to Ratcliffe (2007), there are five main fleet management activities, these are pointed out as being; Routing and Scheduling, Fuel Management, Vehicle Acquisition, Vehicle Maintenance, Driver briefing and debriefing. These activities are supervised by the fleet managers and primarily, a policy is formulated to serve as a guide for these activities. Ratcliffe (2007) emphasizes that the most important thing in fleet management is cost management. The fleet manager must ensure that his/her activities are cost effective. Fleet managers oversee delegation of duties to large groups of personnel responsible for operating the vehicles within the fleet. This may include coordinating the employee schedule, managing communication between the drivers and headquarters, planning driving routes or alternate routes, as well as referring or solving problems that may crop up during the day such as accidents, absenteeism and automobile malfunctions. Martinez, Wassenhove and Stapleton (2009) did a study on Field Vehicle Fleet Management in Humanitarian Operations: A Case-Based Approach. Transportation is the second largest overhead cost to humanitarian organizations after personnel. The international 4x4 Field Vehicle Fleet size is estimated between 70,000 and 80,000 units with a cost above $1 billion per year. Nevertheless, academic knowledge about fleet

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management in humanitarian operations is scarce. By using a multiple case research design study field vehicle fleet management in 4 local public and private institutions in the service delivery sector: the Africonnect Zambia (ISP), Lusaka Water and sewerage Company (LWSC), the ZESCO and MACO. The field research included more than 40 interviews at headquarters, regional and national level in Africa, the Middle East and Europe. The study's aim was to answer three questions: How do Africonnect Zambia (ISP) manage their field vehicle fleets? What are the critical factors affecting Africonnect Zambia field vehicle fleet management? How does field vehicle fleet management affect service delivery? As a consequence, it can be the case that more than 50% of the total cost of the fleet is not optimized. Finally, the study suggested further research areas in transportation and fleet management in humanitarian operations.

Zeimpekis (2009) conducted a study on design and evaluation of a real-time fleet management system for dynamic incident handling in urban freight distributions. The aim of the study was to enhance urban delivery execution by modelling the process of dynamic incident handling through the design and implementation of a real-time fleet management system. The research methodology that was followed combined three basic steps: literature review and interviews for requirements elicitation and system design, theoretical system testing and evaluation via simulation and confirmatory study of the theoretical results through field experiments in two freight operators. During the design process of the system the study focused on two main performance aspects of the system. Firstly, such systems should have the ability to detect time deviations from the initial plan when they occur. The study proposed thus, a method for travel time estimation which is based on historical data from previous delivery deliveries. The study demonstrated that this method provides very accurate results when traffic conditions are not exceptionally different from the historical ones. However, in urban settings there are cases in which travel times vary significantly during the day. For these cases the study proposed a second travel prediction method that uses real-time data to compute travel times in a dynamic manner. To enhance performance the system incorporated an intelligent mechanism that selects the method that gives the most accurate prediction based on traffic patterns and vehicle's state. A second critical issue for such systems is the decision process on whether a detected deviation between the scheduled delivery program and the current time prediction is significant or not.

Marshal Fisango and victor Patson Mutambo in 2017, did a study on Optimization of the fleet per shovel productivity in Surface Mining: (Case study of Chilanga Cement, Lusaka Zambia). An organized fleet management in surface mining is required in order to maximize truck per shovel Match Factors. The most common materials handling in surface mining is by truck and shovel combination. The operation was one of the key factors to reduce the cost of mineral production. The paper presented a complete methodology that can be used to determine the number of trucks required per shovel during striping and the extraction of minerals for Surface mining. The results are aimed at measuring the number of loads per truck in the mining area

2.2 Related Works

Fleet management has become integral to the success of vehicle movement in institutions and must be a priority for organizations. Transport staff must as always be aware of the basic rubrics that accompany vehicle management. With reference from the other researcher's objectives and results, show more of concern on the movements of vehicles from point A to point B leaving behind how the request and task involved (interdepartmental engagement) also the routine

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maintenance of the vehicles to be monitored by the system, efforts must be made to make staff aware of these policies. Having looked at the existing projects in relation to the objectives, development of a new Web based system is done. The developed system is called "**Web based Vehicle Management System**". The application is to be used on all the devices with a browser and internet connection. The system will be distributed in an IT environment and should be able to achieve the below tasks; an administrator to create users of the system different access levels, remind users of the system when important tasks are due, for example when the motor vehicle insurance, Road tax and certificate of fitness expires or is due. Vehicle assignment to be carried out in a manner that is correct and unbiased allowing vehicles to be used only for the intended purpose and not abused, hence reduction in cost of maintenance to vehicles. Drivers will be able to work freely to any department were vehicles are assigned to them and make checks if the car is in good condition before a drive, maintaining running sheets for all vehicles. Department to keep track and follow which vehicles are rightfully due for service, also to identify deficiencies. Will be able to keep and maintain sufficient performance information which will be complete and accurate to support decision making. In short it will deliver comprehensive report and easy to carry out regular audit of VUS practices. The system will allow user to login to the with their collect user login details as supplied by the administrator. The administrator will have the exclusive right to create and even delete a user of the system and do other tasks that users are not able to do.

2.3 Summary

As mentioned and reviewed works by other researchers the Web based Vehicle Management System. The above Systems specifications are not according to user's needs and mostly focus on Vehicle tracking. Administrator's rights are restricted to specification. The other thing is that most of the issue addressed in the previous research focuses on Monitoring and management of vehicles and leaving behind the allocation of the vehicles

III. METHODOLOGY

A. 3.0 Introduction

This chapter outline the web-based vehicle management system model. It covers the following areas; implementation of the system, system analysis, project design DFDs, ER diagrams case diagram, case scenarios and UML diagram.

Rajasakr. (2013) defines research as being a logical and systematic search for new and useful information on a particular topic. Research is done with the help of study, experiment, observation, analysis, companion and reasoning. Rajasakr then describes a methodology as being a systematic way to solve a problem, and a science of studying how research is to be carried out.

Having made a few definitions of some terms above, in this chapter of the report, I describe the research methodology or methods that was used to implement the Vehicle Management System.

B. 3.1 Baseline Study

Current situation is that most of the companies are still using manual in the running of transport department, this makes it difficult to take stoke of usage and utilization of vehicles. Drivers are assigned with permanent vehicles of which they tend to use the vehicle for personal gain if there's no task to do. When on duty below logbook is used to record movements and mileage for you to know when the vehicle is due for maintenance, somehow its very cumbersome it being done

manually. Mostly it's not every distance which is recorded.

On the other hand, managing of routine maintenance like **Fitness, insurance cover and tax**, also is done manually and so vehicles are always impounded by the traffic officers for none payment.

C. 3.1.0 Data Collection

Data-collection techniques allow us to systematically collect information about the subject of study (people, objects, phenomena) and about the settings in which they occur. There are various data collection techniques that can be used, for example, Observing, Interviewing, administering written questioners. (Chaleunvong, 2009).

The data collection techniques used in the project are Interviews, and Questionnaires. Observation means selecting, watching and recording behavior of a living being or people, while Interviewing means oral questioning of respondents either individually or as a group. The reasons for choosing the techniques are:

1. **Interviews** were appropriate for data collection because I was able to get real time answers from users regarding the system.
2. **Observations** were also an appropriate data collection technique because it helped me observe how the users are using the current systems and had given me an idea of how I improved the System.

D. 3.1.1 Research Approach

The software development methodology which was used to implement the Vehicle Management System was the agile software development methodology.

Why Agile

The Agile methodology was the most appropriate in situations that we need to respond to changing in requirements of a project. This ensures that the efforts of the development team are not wasted, which is the case with other development. (McCormick, 2012).

1. Agile works well with highly volatile requirements of Systems: meaning agile is ideal for projects with high levels of uncertainty and are appropriate for developing the Vehicle Management System. (Harlen K.Fora, 2014)
2. Agile increases reliability: Agile development with its iterative testing and quality assurance practices assists developers to build more quality and reliability through repeated cycles of testing. (Harlen K.Fora, 2014).

Waterfall Model

The waterfall model is the first published model of software development process that was derived from more general system engineering process. It is an example of a plan driven process in principle, the waterfall model requires that you plan and schedule all process activities before you start working on them. The figure below shows the diagrammatic illustration if the model. (Sommerville, 2011).

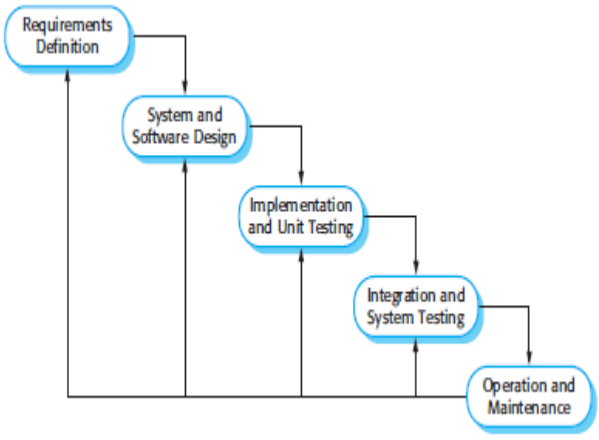

Figure 1: Source: (Sommerville, 2011)

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The waterfall model basically has five activities as shown in the figure above.

1. Requirements analysis and Definition: System services, constraints and goals are established by consulting system users. (Sommerville, 2011)
2. System and Software Design: Allocates requirements either to hardware or software, software design involves identifying and describing the fundamental software system abstractions and their relationships. (Sommerville, 2011)
3. Implementation and Unit Testing: Software design is realized as a set of programs or program units, unit testing involves verifying that each unit meets its specification. (Sommerville, 2011)
4. Integration and System testing: Individual program units or programs are integrated and tested as a complete system. After testing, the software is taken to the customer. (Sommerville, 2011)
5. Operation and Maintenance: This is the longest life cycle phase, where the system is installed and put into practical use. Maintenance involves correcting errors which were not discovered in the life cycle. (Sommerville, 2011)

3.1.2 Development of the application

Development of a web-based vehicle management system will find a solution to the problems associated in vehicle management. The system will be developed using PHP, HTML as graphical interface tool, CSS and java script at the front and MYSQL at the backend. Platform used was Net beans IDE

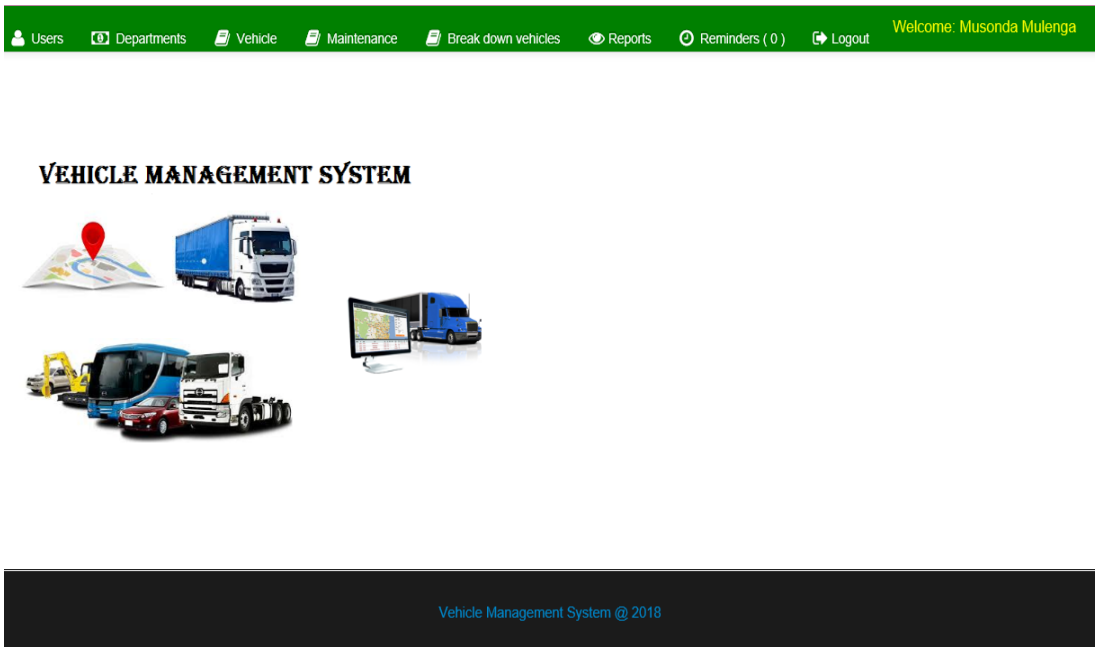

Figure 2: **vehicle management system admin interface, source: Author 2019**

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E. 3.2 System Design

Based on the user requirements and the detailed analysis of the existing system, the new system must be designed. This is the phase of system designing. It is the most crucial phase in the developments of a system. The logical system design arrived at as a result of systems analysis is converted into physical system design. Normally, the design proceeds in two stages:

- **Preliminary or General Design**
- **Structured or Detailed Design**

Preliminary or General Design:
In the preliminary or general de-sign, the features of the new system are specified. The costs of implementing these features and the benefits to be derived are estimated. If the project is still considered to be feasible, we move to the detailed design stage.

1) **Structured or Detailed Design***:*

In the detailed design stage, computer-oriented work begins in earnest. At this stage, the design of the system becomes more structured. Structure design is a blueprint of a computer system solution to a given problem having the same components and inter-relationships among the same components as the original problem

3.2.1 Context diagram

System design focused on the system Architecture, Entity relationship and the logic design and the conceptual design of web-based vehicle management system. The components of the system are described as follows. The system components are:

System Architecture:
The composition of the system, which describes the modules and flow of data through the system that is how the modules would be interacting.
Data design
Entity relationship in the system and data tables
Application design
Consists of the system modules

Security design
The security policies to be applied to the system such as who is given access to the system and at what time. Account details are also created depends on individual access level, user or admin rights.

3.2.2 System Software Level architectural design

The relationship among the entities that make up the OEM system is modeled using the entity-relationship diagram presented in figure 10 below.

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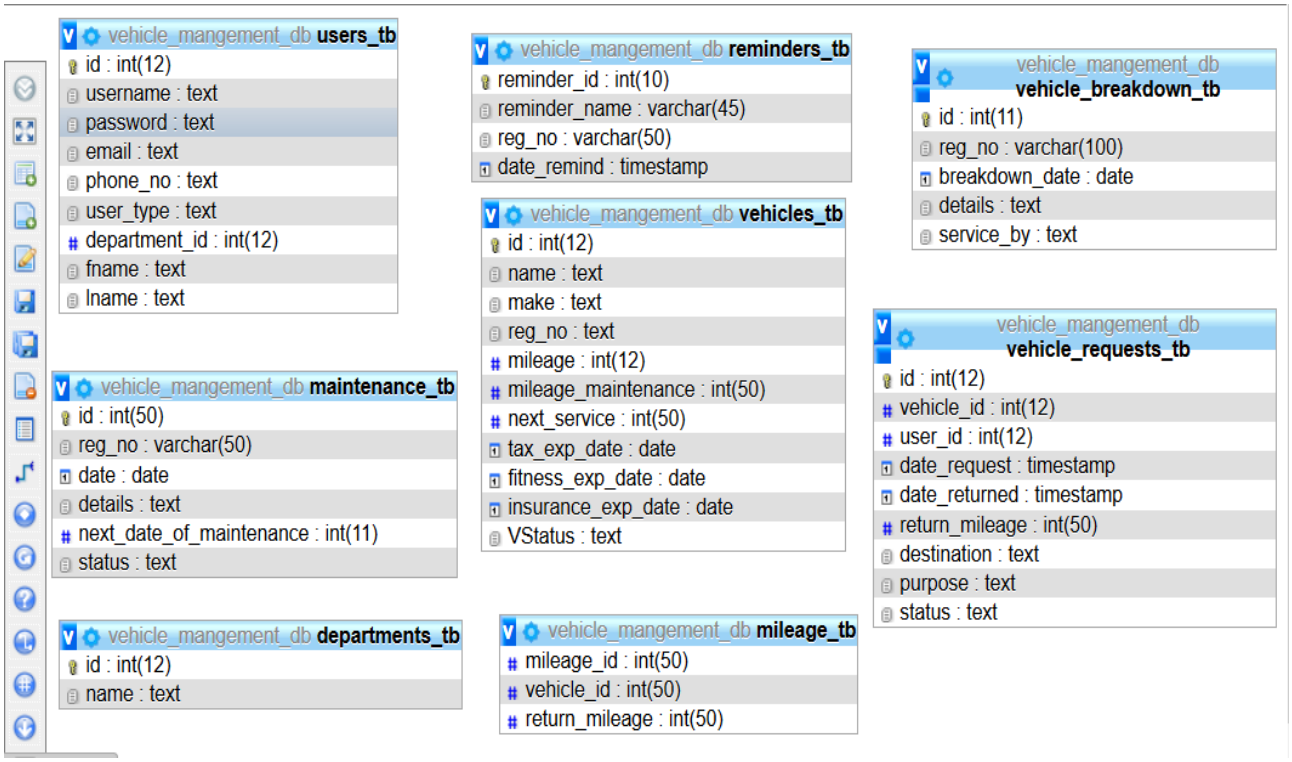

Figure 5: Database model design, source: Author 2019

1) *3.2.3 Modular design of the system function*

Below is the interface for the admin. The administrator can Create User, Read, Update, Delete and Edit (CRUDE).

All the requests are to be sent to the Admin and actioned to request based on the status of the vehicle. The other tasks perfumed by the admin is to ensure that reminders are always checked for him to take track of the vehicle which is next for routine maintenance

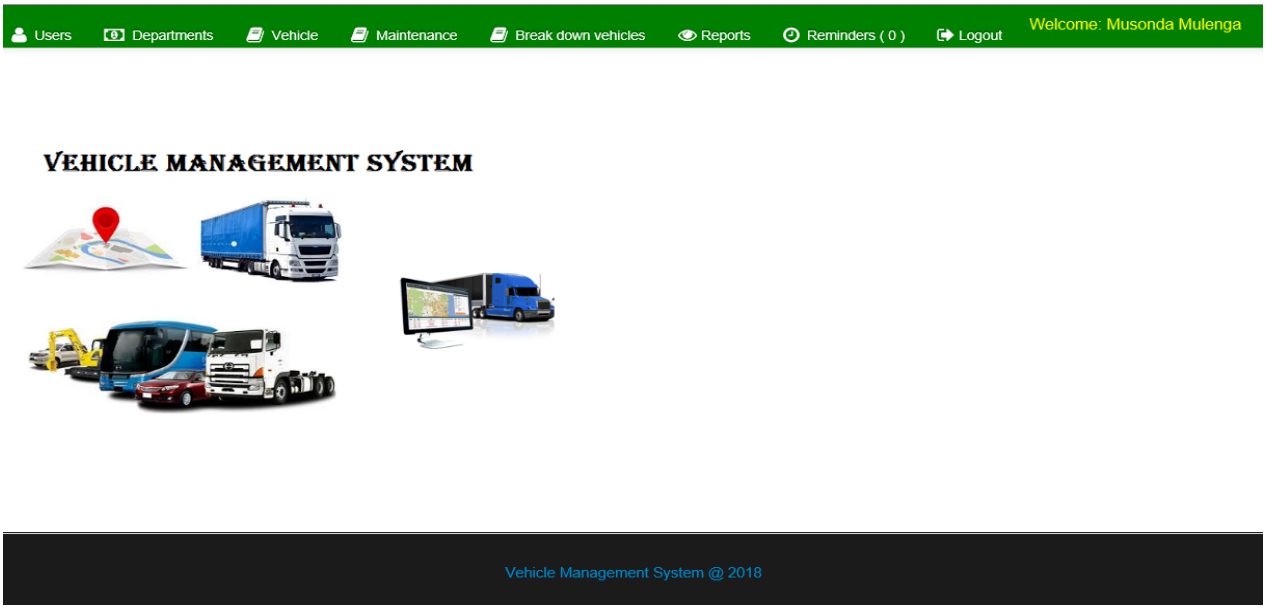

Figure 6: System admin dashboard, source: Author, 2019

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1) *3.2.5 System Data Model Design*

The Vehicle management system database has been designed using the MYSQL database, the diagram below shows the database architecture and tables used.

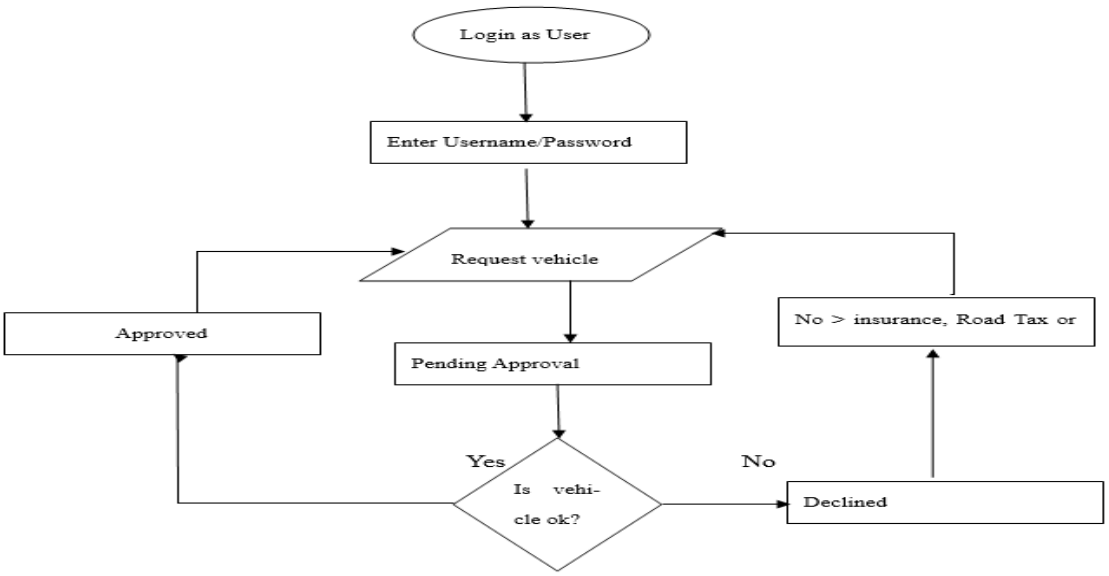

Figure- 7: User System case diagram, source: Author, 2019

The user interface (UI) is everything designed into an information device with which a person may interact. With web-based vehicle management system the administrator creates the user account, with username and password. The user then will access the system with unique credentials. Only the allowed members should have access to the system as a security measure.

Once the user login, he/she will only be able to request the available vehicle by putting all necessary details and send the request wait for an approval from the coordinator. By doing so we are making the drivers to interact with any of the members of staffs.

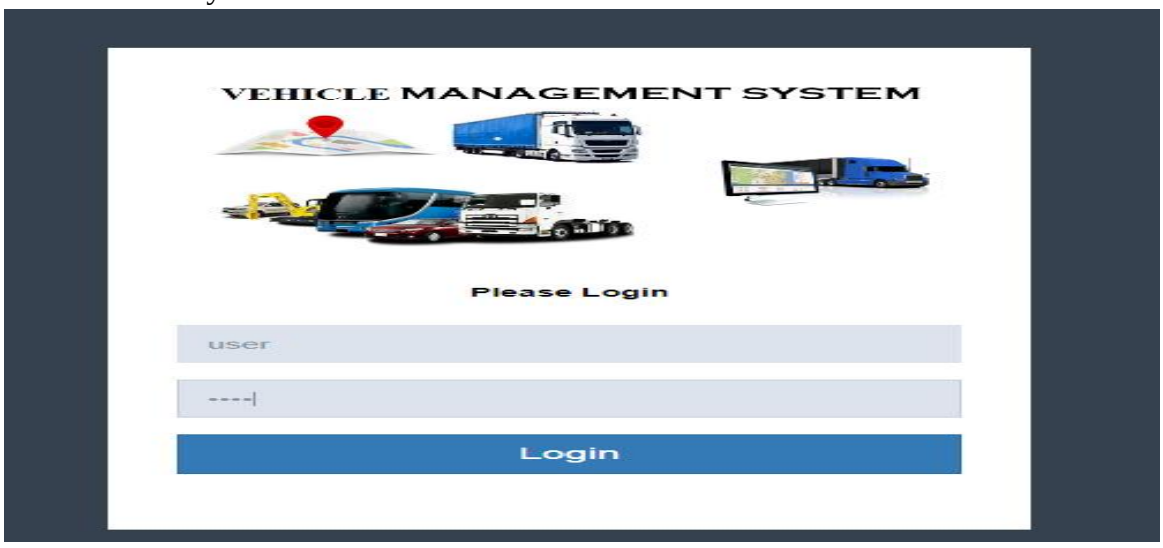

Figure 8: System login page, Source: Author, 2019

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The user login the system request for the vehicle and start waiting for approval from the coordinator, see the status "**Pending Approval**". The status will remain like this until the action is done by the coordinator.

1) 3.2.7 Summary

In this chapter have explain the components of the web-based vehicle management system and the features that makes it different from the existing system. Have also state the main reasons why we need a computerized system in place.

IV. RESULTS

A. *4.0 Introduction*

The study was conducted through a descriptive survey research design. The study targeted an accessible population of 35 registered public schools in Lusaka district. The study administered highly structured questionnaires to all the 35 respondents who are the head teachers in all the 35 schools in the district. This means that the study was census in nature since it involved gathering information from the head teachers of all the schools in the district. A personally administered semi-structured questionnaire was the main tool for collecting data. The data was tabulated, and then analyzed by use of descriptive statistics.

B. *4.1 Baseline Study Results*

Out of the 35 questionnaires administered to the respondents, 32 questionnaires were successfully filled and returned. This represented 91.43% response rate and this was considered sufficient enough to analyze and draw conclusions upon.

C. *4.2 Survey Results and Discussion*

The respondents were asked to indicate whether or not they knew how to use a computer.

The results showed that 93.75% of the respondents had some knowledge on how to use a computer while only 6.25% of the respondents were still green on how to use a computer. This high number of computer literate respondents could be due to the increasing need for use of computer in our daily life that has necessitated people to be computer literate. This shows that majority of the head teachers are computer literate.

Respondents were asked to indicate when they acquired their computer skills. The results showed that 50% of the respondents acquired their computer skills before the year 2010. This could be due to the increase in use of computers in the respondents' daily lives, for example in e-mail correspondences and doing research for those respondents studying, which made the respondents see the need to have computer knowledge early. It was also noted that 21.88% of the respondents acquired their computer skills in the year 2010. The research further showed that 28.12% of the respondents acquired computer knowledge after 2010.

Respondents were asked to indicate whether they had easy accessibility to internet for online examinations purposes. The study established that 62.5% of the respondents had easy accessibility to internet while 37.5% of the respondents had difficulty in accessing internet. This could be attributed to the fact that most of the schools are located in remote areas where the network is low. This shows that there is well distributed network

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coverage within the country. However, there is need to improve it in regions of low reception.

Respondents were asked to state whether access to internet was a hindrance to online examinations. The results realized that 37% of the respondents acceded to the claim that internet was a hindrance to online examinations while 63% of the respondents were against the opinion that access of internet is a hindrance to online examinations.

The respondents were asked to indicate their preferred method of conducting examinations between the initial manual method and the online method. As figure 2 indicates, 88% of the respondents preferred online examinations. However, 9% of the respondents showed preference for manual examination. This could be representing the group who are not computer literate and therefore have not experienced the ease and benefits of online examination. A small proportion of 3% seemed undecided. This shows that online examination is gaining preference by the head teachers, perhaps because of the advantages it has offered to them compared to the traditional manual examination.

The respondents were asked to state the extent to which online examination can reduce exam malpractice. The findings showed that 31.25% of the admitted that online examination can reduce malpractice by a "very high extent" while 53.13% were of the opinion that online examination can reduce malpractice by "high extent", 18.75% of the respondents felt that online examination can reduce malpractice by a "moderate extent". This implies that generally, online examinations can reduce malpractice in the examinations.

D. 4.3 System Implementation Results

The findings from the study shows that online examination can reduce exam malpractice cases. The results of the study show that online examination is quicker than manual system, it enables a pupil know if s/he has been registered for the examination, it reduces paperwork, it is more reliable than manual, it allows us do corrections after entries are made. The fact that majority of respondents show preference for online examinations shows that online examinations is gaining preference by the head teachers, perhaps because of the advantages it has offered to them compared to the traditional manual examinations.

V. CONCLUSION

A. 5.0 Introduction

When fully implemented, the proposed system will definitely reduce drastically the problems mentioned above. These problems include human interference, impersonation, bribe-taking by lecturers, invigilators and supervisors, too much paper work, examination leakages and also reduce the number of invigilators needed for invigilators.

B. 5.1 Discussion

These online examination solutions have different strengths and weaknesses. As with any procedural process, any particular solution is only as good as its weakest attribute. If any element of the examination preparation, delivery, and answer script collection process breaks down, there is the chance of candidates not receiving the mark to which they are entitled. Inevitably comparisons are made with conventional paper examinations where failures are limited to one or two in a thousand. Any technical failure in an e-examination system becomes a threat to the integrity of the assessment.

C. 5.1.0 The baseline study

The project has been accomplished and an application was developed to solve the aforementioned problems in the transportation sector.

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The road traffic and safety Agency (RATSA) in Zambia has provided guidelines through its National Road Safety Strategy (2010-2020) to improve road and fleet safety in the country. According to the strategy, the Road Development Agency (RDA) has developed strategic framework aimed at halting the increasing trends of fatalities and injuries by 2015 and reducing same by 50% by the year 2020. As mentioned, and reviewed the research done by researchers compared to the Web based Vehicle Management System. The Systems specifications are not according to user's needs and mostly focus on Vehicle tracking. Administrator's rights are restricted to specification. The only difference with web-based vehicle management system is that the transport coordinator is given full control of the system and vehicle operations. Maintenance schedules to be conducted based on the system output. In terms of making, web-based vehicle management system interacts between the top management who are decision makers and the drivers who are the users. All the reports concerning the vehicles are taken serious with urgency.

D. 5.1.1 Use of technology

Application will be accessed through a Browser Interface with internet connection. The interface would be viewed. The software would be fully compatible with all browsers. No user would be able to access any part of the application without logging on to the system. The system should be accessed over LAN or WAN. For users to access the application server the network should be running TCP/IP protocol.

E. 5.1.3 Comparison with other similar works

Ayo ***et al*** (2007) proposed a model for electronic examination in Nigeria which enforces all applicants to be subjected to online entrance examination as a way of curbing the irregularities as in the Joint Admissions Matriculation Board (JAMB) examinations. This model was designed and tested in Covenant University, one of the private universities in Nigeria. Findings revealed that the system has the potential to eliminate some of the problems that are associated with the traditional methods of examination such as impersonation and other forms of examination malpractices. Akinsanmi ***et al*** (2010) developed a web application where tests in multiple choice formats could be taken online and graded immediately. The web application relies solely on Microsoft developed technologies. It runs on the Microsoft.net framework, uses the ASP.NET web server, C# as the intermediate language, ADO.NET to interact with the relational database and Microsoft SQL server as the relational database.

The limitations of the above systems are enormous: these systems are domain / application area-specific, so cannot fit into all deployment area needs; not well secured in terms of data security and integrity; do not present a generalized model for adoption by any user willing to migrate to the ***e***-examination platform; most of the systems are stand-alone applications that only run on distributed networks and thus access is limited to the networked geographical domain. However, in this paper, these limitations are well addressed.

F. 5.1.4 Possible application

The Web based Vehicle Management System is addressing issues which resolves the management and Operations, all the works were designed with different objectives. The results yield out of a web-based vehicle management system the author was trying to engage the users to be strongly involved and able to track down if the duty was done. The web-based management system is meant for the users who are in this case those who are authorized to access the system with account details created by the transport coordinator.

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The Systems specifications are not according to user's needs and mostly focus on Vehicle tracking. Administrator's rights are restricted to specification.

5.2 Summary

This chapter gives a general overview of the Web based vehicle management system and recommendations that may be taken into consideration to enhance the system future. Have benefited the experiences whilst doing the project, challenges encountered and how they were resolved.

5.3 Conclusion

The web-based vehicle management system is designed to help users to the use of computerized system for the audit purposes as well as record management. The users are able to request for the vehicle in the system which improves efficiency in doing things and reduce on moving back and forth for manual approvals. The system is designed to use the client server paradigm having the MYSQL database as the backend and HTML, PHP as the frontend programming language. The database administration is done using the php madman console in the web browser. The system user is required to have a created the user account by the administrator to use the service. The system has the maintenance and breakdown modules to store the vehicles which needs attention and they are not supposed to be requested for any tasks.

The users of the system achieve the intended results, it is hoped that the system users will adhere to instructions given and not to breach the security measures by sharing of personal password.

5.4 Future works

This section chapter discusses the recommended future work in the future version. Having the ever-evolving technology at hand.

- In future will add the tracking module so that the vehicle is monitored from wherever it is and the time spent on certain location using GPRS and other monitoring tools.
- Fuel will be monitored also using the gauge.
- Sending of SMS when a violation is done on the vehicle for example over speeding and overloading.

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