



# **Data Analytic Solution for Heterogeneous Transportation Management Network System: A Case Study of Kwara State, Nigeria**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Author AAK designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author AOA managed the analyses of the study. Author TSG managed the literature searches. All authors read and approved the final manuscript.*

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## **ABSTRACT**

When the transportation system of any States in Nigeria is effective, it positively contributes to effective economy growth and infrastructural facilities; saves stress and generate revenue to the authorities. This is the desire of every ministry of Transportation for State in Nigeria although a number of constraints usually make it not attainable. The transportation system presently operated by the Ministry of Transportation, Kwara was studied and found to be suffering, cumbersome, exploitative and fall short in all standards of a good transportation network system. Therefore this paper seeks to present the results of the research carried out to Big Data Analytic Solution (BDAS) for the management of the transport companies' network system within Kwara State. The research adopts a transportation frame work design solution, MySQL for data migration and Php framework 'codeigniter' for productive server for the full development. The phase testing is carried out and presents the improved version for the improvement in routes schedules, company's services and driver's registration and user booking.

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The system will serve as open access to heterogeneous communities in Kwara State, Nigeria and make easy booking for passengers, assist communities in management of transportation systems within kwara state, Nigeria.

*Keywords: Commuters; Heterogeneous transportation; Network system.*

## 1. INTRODUCTION

An ideal road transport system is a type of road network required for a thriving and growing economy. The road transport management system in Kwara State, Nigeria Transportation network system is inadequate and unstructured; the effect is affecting common citizens since transportation is the key access to all human activities and public transportation services [1].

There are three categories of road network in Nigeria, federal roads, State roads and local government roads respectively. The Federal road network is being managed by the Federal Government of Nigeria; this road networked 36 States in Nigeria including Abuja capital territory. The State Road network is managed by the State Government and this creates access to cities, towns, villages within each State in Nigeria. On the other hand, the local road network is a subset road network within Local Government Area and it's been managed by each LGA in the State.

In the history of Kwara State commuter's service, the ministry of transportation supervises and manages the affairs of transportation systems in the State; their function includes commuters establishment acts, road management and many more. There are two categories of commuters in Kwara State, private companies and State transport service. They both offer the same service to the community called public bus/taxi transportation service. In reality, private commuter's service is more visible and accessible to common citizens compared with State transport service. The State transport service is more rigid in terms of effectiveness and management headship, which makes it inaccessible to passengers. This operation of private transportation service is unstructured since the State Government is unable to deregulate commuter service within the State. It's in the tradition that passengers engagement with commuter's service proven manually systemised, shows that the traveller's physical appearance is required before service. This makes transportation service inaccessible anywhere in the cities. Online booking system has reshaped the road transport system in most developed

countries. A case study of Kwara State is attracting serious attention compared with other States in Nigeria. During seasonal festival periods, travellers always stress-out for inaccessibility of road transport facilities as a result of high demands, transporters irregular pricing patterns, and lack management ethics. This really affects travellers on their daily target [2].

The research is looking at modalities to bridge the gap between the travellers and commuter system in Kwara State. This general ideal of an online road transport booking system is to create an enabling environment for both travellers and commuters engaging in online transactions with the intent to demand and provide service without physical appearance. The frameworks that introduce a technology then replace old systems procedures like physical booking and takeoff. In other ways round, to gain access commuters' portal management companies, make bookings and also to get the basic travel information.

In the recent time, there is rapid urbanization taking place in the major developed States "Lagos, Abuja, Kano, Kaduna, Ibadan, Port Harcourt, Imo, Enugu and Delta" in Nigeria, as Nigerians businesses are gradually embracing the use of ICT and IT based services in their daily lives. Looking into the statistical figure shows that Nigeria with estimated populations over 206 millions profiled with over 76.2 million internet users dated 2019 [3] can change from its old traditional style of transportation. Since there are over 76.2 million Internet users as at December 2017 in Nigeria, which constitutes 41.0% of the population, this same fact further narrates that over 17,000,000 active facebook users as of December 2017 according to NCC [4] therefore the internet user experience rising tendency should be estimated over 25,000 considering ongoing user experience during COVID 19 pandemic in 2020.

Based on this fact, over 5million internet users were acknowledged by NCC [4] in Kwara State; this research tends to improve the user experience on the use of BDAF for commuter

services and passenger's. Dealing with cross-platform business models which exploits the power of IT and also factor-in the value created whilst effectively meeting the demands of the major stakeholders. With this reasons, according to [5] the supply chain in taxi and commercial buses transportation while *Hou Sheng* [6], claimed the chain of transportation industry shown that *"asymmetry by changing the push-pull boundary of transportation service for achieving speed-to market purpose"*. The concept of chain network for business objectives is impressive and considered solemnly for this work. Therefore, this sets road-map for the design and implementation of a commercial business model of website prototype which coherently meets the needful of the commuters' service in fulfilment of business objectives. The next chapter will review the literature review while section three of the study to present procedural approach for the design and implementation. The section four contains the research findings were translated into requirements, specifications for the BDAF solution.

## 2. WORK-FLOW FUNCTIONAL REQUIREMENTS

Web applications are gaining trends for the business solution around the globe, the perfective of making design is related to user objective. This objective is in line with functional and non functional requirements for a given website [7], this give top-bottom visual environment for code beginners. The behaviours, features, and general characteristics as it affect the users. The detailed functional and non-functional requirements specification is considered in the research work based on the user experience and system requirement for it to fully address the problem area and the environmental conditions for the business drives on the existing research works. A summary of the functional and non-functional need are outlined as follows:

- i. The needful for transport companies to register on the website.
- ii. The requirement for passengers to search for travel information
- iii. The request response from passengers/ travellers to book/buy tickets online.
- iv. Provision and declaration of facilities requirement by the transport

- v. The needful for transport companies to fulfil travel needs as a service.
- vi. The working environment for collaboration among the commuters (transportation companies) service.
- vii. Creation of access control that allow stakeholders (Federal Government, State Government and Local Government) to communicate and mediate on service modalities to the benefit of the travellers.
- viii. The needful for passengers to access all company facilities for onward booking /buy ticket and cancelation of services
- ix. Opening of transparent medium for travellers and companies to manage transactions with respect to time stamp
- x. Creation of session modules to render detailed information and service reports based on schedule.

This criterion for the development heterogamous transportation management website is critically examined in the table 1 below, this is associated with each functional and non functional requirement so that at the end of the study stakeholders in the transport service will have roles to play and seek to means to associate with system for business growth. This functional and non functional requirement has been prioritised based on significant based needs. The relational operation for each functional requirement is a significant number (S) and an affiliate to require (R) outlined above. The requirements are numbered 1-8 while the affiliation of each (S) is ranging from 1 – 3. Thus, '1' indicates important and very significant, '2' indicates preferred and average and '3' indicate feature is would be fine, low significant.

### 2.1 Description of Functional Requirements

**User Registration (S1, R1):** In order to achieve big Data analytic, the commuters should be able to register individually by completing form requests on the website. Therefore, the system should be able to validate each commuter's form then verify that each commuter's name is unique, and if there is an attempt to duplicate commuter's name or register with existing commuters' name, the system must automatically notify the user with function alert. Furthermore, the system should verify the password provided and ensure there is a follow password format algorithm pattern.

**Table 1. Summary of functional website requirements**

Functional web Requirement	Significant Number & Proven Based Require
User Registration	S1, R1
Fleet management system	S1, R2, R3
Search Travel Facilities and Trip management system	S1, R2
User Online Payment	S1, R3
Message board and Instant Reporting System	S2, R7
Web Contact Page	S2, R8
Banner for Advertisements	S3, R6
Online Ticket booking system	S1, R3
Counter & agent management system	S1, R3
Human resource management	S1, R4
Payment, Price & offer management system	S1, R3
Financial Management System	S1, R3
Vehicle fitness & performance evaluation module	S2, R4

The system must be able alert the user if there is a mismatch. Then finally, the user must concord with service Terms & Conditions after reading through before the registration form is submitted for processing.

- Fleet management system (S1, R2, and R3):** A request form was provided for the both state and private commuters to complete in order to upload time schedule facilities information. The transportation management system is always dependable on the capability to manage it's scheduled fleet therefore, there should be procedural design for every fleet management step. Commuters should be able to record their vehicle details, schedule, time, seat number and set availability to active. Then look for the best way to manage every single ticket booking history related to the individual commuters' fleet. The system should be able to track agents, drivers & counter activities on a daily basis.
- Searching Facilities and Trip management system (S1, R2):** A search travel facility must be rendered and to allow travellers search for the transport companies of their choice, their available facilities and other travel information with activities routine. In addition, travellers are allowed to click on a search result to view details, get estimated travel time, arrival time, then make a selection and start trip booking.
- User On-line payment (S1, R3):** The interface for an online payment system is required for the automated payments. This should be available on the website to

provide access passengers and commuter service providers based on demand and request. The transport companies should be able to receive payment and also make payment with means of a credit card or through bank payment while registering. In a null shell, travellers or passengers should be able to make payment for every action ticket online. The function of the online payment is to establish partnership to commuters with aims of business drives. The partnership with services like third party API gateway like MasterCard and PayPal, which will guarantee the secure all transactions on the website.

- Message Board and Instant Reporting System (S2, R7):** Reporting Section should be made available to make a transport business the ultimate decision maker such that every commuter can get booking & schedule management report, get fleet assigning report to the driver, officer. Therefore, all reports of such are presented in CSV, Excel or PDF format and just in-one click. A feedback media or comment form request is available for passengers to send customised information for their request to administrators or associate commuters. This improves users' trust on their experiences and also guarantees them on their services. The request messages are always sent through the feedback form on the website and a copy of such message should be forwarded to the email addresses of the respective transport companies.

- **Web Contact page (S2, R8):** Another form is provided for contact purposes, this form is for both active travellers and commuters companies for them to be able to contact the business of the day. The messages of this type are sent through the form and are routed to the site system administrator's email address.
- **Website Banner advertisements (S3, R6):** A professional website must have a banner, to be made for displaying advertisements of different types on some of the pages header of the website and this include the search result pages.
- **Counter & agent management system (S1, R3):** These should feature the responsibility of administrative Counter officers. The super admin should be able to track, evaluate the performance, daily activities of every officer & agent and take result oriented decisions from the admin panel. The details of the counter & agent management officer should include name, address, contact details etc therefore, this should be a way to evaluate agent performance, get performance report presented in CSV, Excel or PDF file format and finally, provide needs for company actions to manage each single detail.
- **Human resource management (S1, R4):** The human resources feature should be an added value in other to be able to manage workforce competently for full management and classification of employee according to their resignation and look to way the system to maintain list of employee by number of registered drivers according to their designation. The system should be able to get reports of employee performance in CSV, Excel, or PDF file format then entail monetization modality for the workforce, and rewards just to get best outcome for IGR Internally Generated Revenue.
- **Financial Management System (S1, R3):** The system should be able to render finance management for commuter business; this will serve as a detailed expense of running commuter as a business enterprise and also seek ways to get financial reports at any time and make proper decisions based on reports from the admin end.
- **Vehicle fitness & performance evaluation module (S2, R4):** Transporters need to be up to date with its vehicle & fleet, and track vehicle

fitness regularly. The design should include a fitness module for the keeping record on important data about fitness condition of vehicle, expiration of insurance validity, Route permit, Tax token and many more.

## 2.2 Description of Non-Functional Requirements

Non-functional requirements pose to cover all the remaining requirements which are different from functional requirements in the design [7]. This indicates the specify criteria that judge the operation of entire system, rather than specific behaviours, for instance: "Modified data set in a database should be updated for all users accessing it within 2 to 3 seconds."The required target the qualities and how the system should behave and the constraint upon the entire systems behaviours. A study of corporate websites revealed that 10 characteristics of commercial websites had poor user experience and this tends to affect customers' loyalty and website trust which often leads to failure of such websites [8]. The poor usability of some sites coupled with bad user experience has been attributed to poor implementation of basic non-functional requirements for such web portal [9]. For this case study, the non-functional requirements were weighted just as essential as the functional requirements, and also given the exteriority. Taking the Jakob Nielsen 10 general principles for interaction design into consideration [10,11], the following non-functional requirements were the main factors for the web portal.

**Visibility of system status and user interface design:** The user interface should be visually inviting to the users as it is the part of the website features to be precise to specific objectives and detail enough to interact with the system. The user interface design must be user friendly and should be able to support multiple users and purposes devices like phones, laptop and desktop computer by exploring the readability.

**Website Layout:** There should be consistency in the use of colours, table, fonts, links, menus and icons for the layout of the website. The layout should be simple and avoid complexity. The navigation patterns of the website should be efficient in order to help users find what they want easily.

**Help and documentation:** This always improves the user experience and serves as a professional

way to guide website users and website owners to the best practice and details about the setup requirement for the website.

**Content Presentation:** The contents should be delivered in a concise and organized manner by considering easy readability and visual impairment users. This will ensure that site users are not worsened by the information on the web pages.

**Compatible Browsers:** The Compatibility with Multiple browsers for the website must conform to standards and be compatible with many of the available web browsers like IE11, Firefox, Safari, Opera, Chrome, Edge etc. This requirement will ensure that site users are able to use any web browser to easy access the site.

**Accessibility and High Resolution:**The website should be always active and accessible 24hours a day in order to guarantee access to site users at any time of the day. The use of font lettering, images and colour on the website should be sharp and avoid distorting layout presentation.

**Software Framework:** The type of technology adopted for the full programming to allow smoothing running on the server. *CodeIgniter*as a powerful PHP framework with a very small footprint was built for developers to provide a needful and elegant toolkit to create full-featured web.

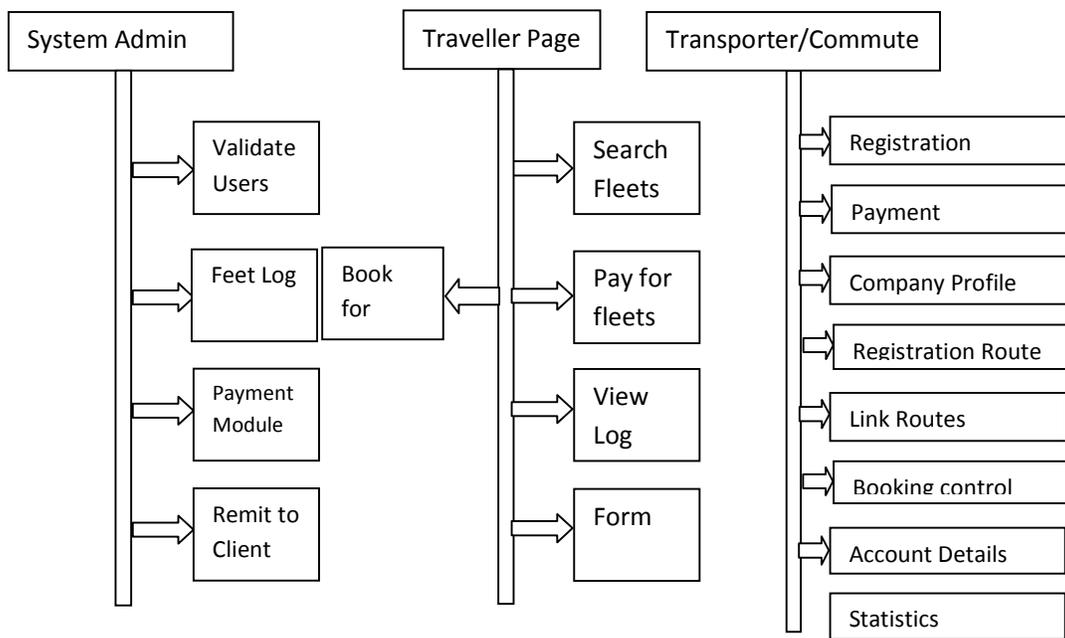
**Usability:** Site users should be able to use websites easily without requiring specialized training or contacting online support to simple tasks. The HTML and CSS codes used in the design and implementation must conform to the W3C (World Wide Web Consortium) standards and be able to present information in a prescribed format.

**2.2.1 Files included**

**Software Version:** The best practice for every web programmer to keep a regular update of both functional and non-functional requirements of the website. This will improve users experience and allow website owners to compete favourably in the business.

**2.3 Requirements Specification the System Model**

The phases for the design were broken down into modules in order to effectively capture the essential functional requirements of the website to be developed. The first design module will ensnare the entire activities of system administrators. The second module ensnaring the functional requirements of applied travellers while the third module ensnaring the functional requirements of the transport companies in the research study. Therefore the functional requirements model is shown in Fig. 1 below.



**Fig. 1. Requirements Specification Model**

### 3. METHODOLOGY

#### 3.1 Software Development Model

This research framework for this production inherits Spiral Software Development (SSD) Model. The spiral model was selected because it is particularly suitable for the development of websites. More so, the work flow combines some key elements of both the waterfall model and the prototyping model, reducing the impairment and stricture of both models. The spiral model is additionally a risk-contraction oriented model that breaks a software package project up into mini-projects, every addressing one or additional major risks [12].

Prototype 1 would be the first aspect of the design based on the pick-out objectives. Prototype 2 would be an improved version of Prototype1; it would include all the required features for both the travellers and the transport companies. The third iteration would capture the development of Prototype 3 which would be administered to real life pilot testing by a few users to verify its correctness. Feedback would be taken and used to improve on Prototype3. Therefore, would lead to the final iteration, which has the Operational Prototype as its deliverable.

#### 3.2 Web Architecture

The *CodeIgniter* is a php Framework chosen for the website development. The fact remain that *CodeIgniter* is regards as a powerful PHP framework with a very small footprint, built for developers who need a simple and elegant toolkit to create full-featured web architecture of a website outlines the structures needed to reason about the operations of the website.

CodeIgniter PHP framework has provided features that greatly speed up the development of the web applications because it has a small performance footprint due to the modular approach to loading its libraries and does an amazing job separating logic from presentation by using a Model-View-Controller (MVC) dynamic. In the intended website which comprises software features, interactive modules, connections between them, and properties of both and this is regarded as a documentation of a system's software architecture according to [13] findings. The three-tier model was constructively adopted for web architecture. This is done in reality to pilot a client-server architecture in which the

presentation, layout, the application processing, and the data management process are logically separate processes. The three-tier model is particularly adoptable for web development usage such as e-commerce websites which are implemented using three tier; the front end, the middle tier and the backend. In this scenario, the website to be developed requires that a user interface, admin interface, a functional process logic (business logic), and a database be developed and maintained independently on separate platforms

#### 3.3 Software Package and Programming Languages

Appserver is basically an open source application server running program that handles all application operations between users and an organization's backend business applications or databases as related [14] solutions. The window 8.1 version was downloaded and typically used to run the complex transaction-based applications of the website. The Appserv Apache + PHP + MySQL was adopted been a Simple package for programming, quickly and easy to install Apache, PHP, MySQL because it consists of independently-created programs that can be installed on computers according to [15], that use the Appserv other tools used for the design and implementation phase areas are detailed below:

- i. Adobe Photoshop CS5: was used for development of webpage layout such as the User Interface design
- ii. Software Framework "CodeIgniter" for writing JavaScript JS, HTML, CSS, PHP, SQL, PHP 7.x, PHP 5.x, PHP 5.4, PHP 5.5, PHP 5.6codes.

#### 3.4 User Interface Design

The user interface of the website was designed using Adobe Photoshop CS6 web technology, the use of Sass variables and mixins, responsive grid system, extensive prebuilt components, and powerful JavaScript plugins are new feature bootstrap 4.0 version according to [16] to improve user layout. The homepage is known to be the index page of the website designed and layout features include a header and footer section. The header section features the company logo, the navigation menus and some a company banner relevant to website objectives. The main body contains a short description of the business solution and relative objectives the

website is rendering for both the transport companies and travellers. The search link was embedded to help travellers to explore solutions. The footer section contains links featuring

contact page, enquire page, Google map, rating and the social media links to Twitter and Facebook pages of the website as shown in Fig. 2 below.

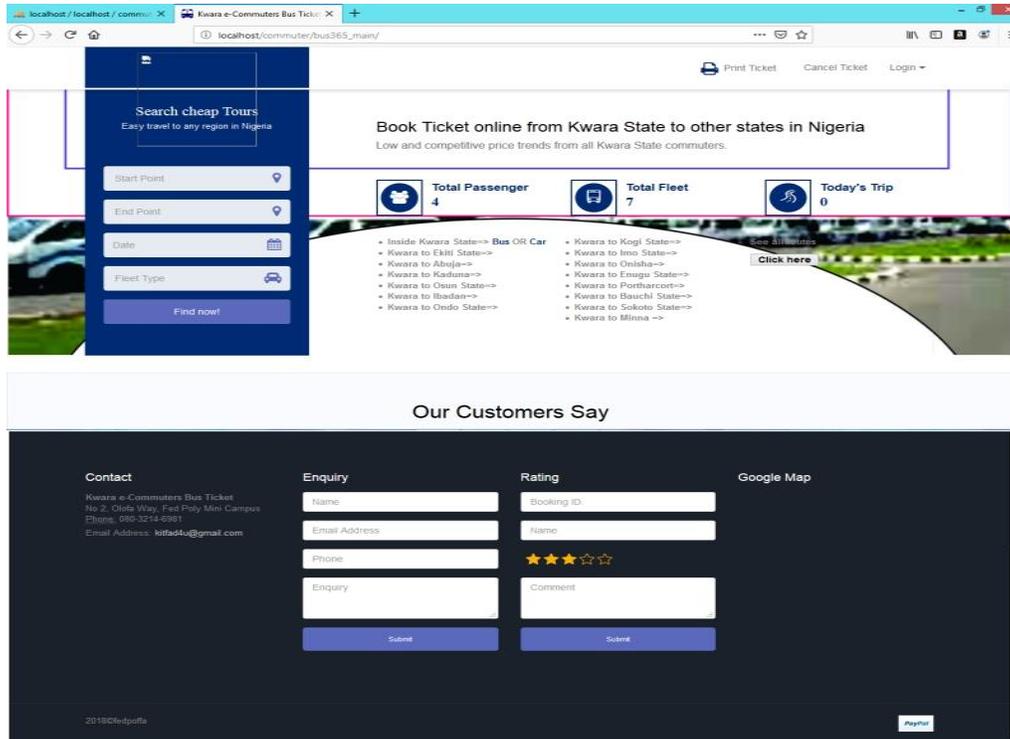


Fig. 2. The Home Page generally known as index page for fleet management

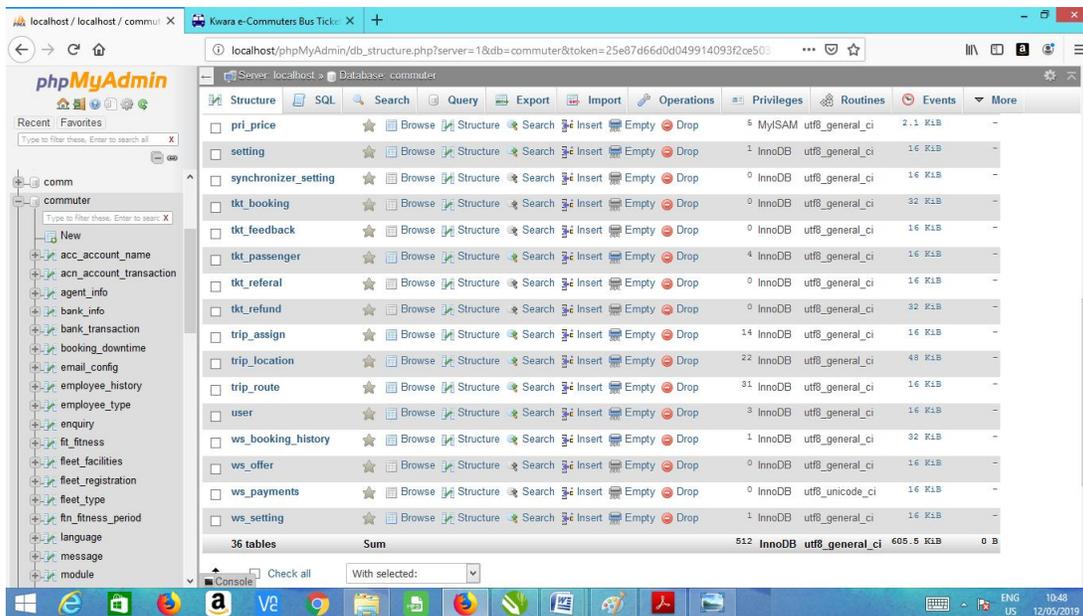


Fig. 3. PhpMyAdmin shown for 36 tables in the database as migrated from Codeigniter

## 4.5 Database Design

The database was designed with a total number of 36 tables as presented in Fig. 3 using appserv server phpMyAdmin after a thorough analysis of the entities and the relationships between them. The fact that the website is a database driving Codeigniter, the schema diagram presented in Fig. 2 below shows a main summary of the entities and the relationships between them.

## 4. RESEARCH ANALYSIS, RESULTS AND DISCUSSION

### 4.1 Workflows and Activity Diagram

Activity diagram describes and illustrates the business and operational procedural steps workflows of components and modules in a system [16]. It displays the entire flow of control revealing the progression of activities from a start point to the finish point brandishing the many preference paths that exist in the progression of events embodied in the activity. They may be used to brass tacks situations where coextending processing may show in the execution of some activities. Therefore the activity diagram for the system is shown in Fig. 3 before a user gain access the system, traveller/admin (user) must provide the system with valid user credentials (username and password), the user is authenticated, authorized and gain access to the appropriate features or resources for the user is privileged; in some scenario where the user credentials are not valid, there the system will definitely thrown user back to the login interface to provide valid login credential according [17] report. The resources given to the user are based on their respective roles, profile status and privilege as specified in Fig. 4.

Therefore, walkthrough for the activities of the admin, the transport companies and travellers on the website is presented in this section and the sitemap for the operational prototype is characterised in Fig. 4.

Bus Reservation System with Website is a very wonderful Bus and fleet Booking System, This Bus reservation system is developed by PHP and Codeigniter. It is mostly useful for any Bus, Fleet and Ticket Selling Company. It has variety of features on Bus ticket Management.

#### 4.1.1 Sign-up or registration form

There is a need for companies to create an account on the website before they can gain

access to website resources. This can be achieved by clicking on the registration /sign up link on the homepage and following the on screen instruction to complete the application online by supplying the primary details. The system is designed such that it can verify primary data to avoid double entries by considering most required fields, required fields and optional fields through validation before final insertion into database. According to [18] design ethics, therefore system is designed to allow consistency and loop through possible mismatch on passwords combinations therefore prompt users for possible correction on the first three consecutive submission errors attempt. This is done to prevent possible spamming, SQL injections and invasion. Therefore the system also prompts users to check the "Terms and Conditions" check box before allowing them to proceed further to make payment.

The user form is designed to allow passengers and other stakeholders to gain access using two level authentication methods. The use of e-mail coupled with password is adopted in the design after registration. The system is designed to allow users to update profile information like address field, update password, and retrieve password respectively as shown in Figure 6 above. A reset button could allow the user to refresh login form on a point of misspelled situation or press reset button for data discard. In the case of password reset, only valid email is required by the user end, the system was designed to automatically send e-mail to user original email after validation in conformity with production cycle development.

### 4.2 Passenger Registration

The form in above (Fig. 7) is a design form from admin end basically to registration users/passengers for pre-booking and this form the basis of big data analysis concept. It involves collaboration of many commuters across Kwara State in Nigeria. Passenger first name, middle name, last name, email address and password were core field requirements while address line, photo image, city, State and Country are optional requirements which constitute passenger bio data.

### 4.3 Admin Control Panel

The admin Control panel is a required module from the design stage since part of the research variants is to present an overview of functional

and non-functional components and make it a structural control. The part of the structures include momentum analysis of all activities from user end, transport companies and services agents in form of info-graphics ( pie chart and histogram) format and this enable the supper administrator to pre-empt performance of the system as shown in Fig. 8.

#### 4.4 Ticket and Booking Page

The ticket and booking page is another essential module required for the achievement of the search aim. In Fig. 9, it is essential for the admin

to provide ticket facilities for commuters to access. Two major payment systems were considered to increase the possibility of system adoption in the research area.

The design captured off-line payment method as a result of low level ICT usage from user end, the PayPal also integrated as alternate method, the fact remains that PayPal API is easy to configure and generally adopted by all commercial banks in Nigeria. The use of PayPal is easy as a means of payment, also very secure for the system as shown in Fig. 9.

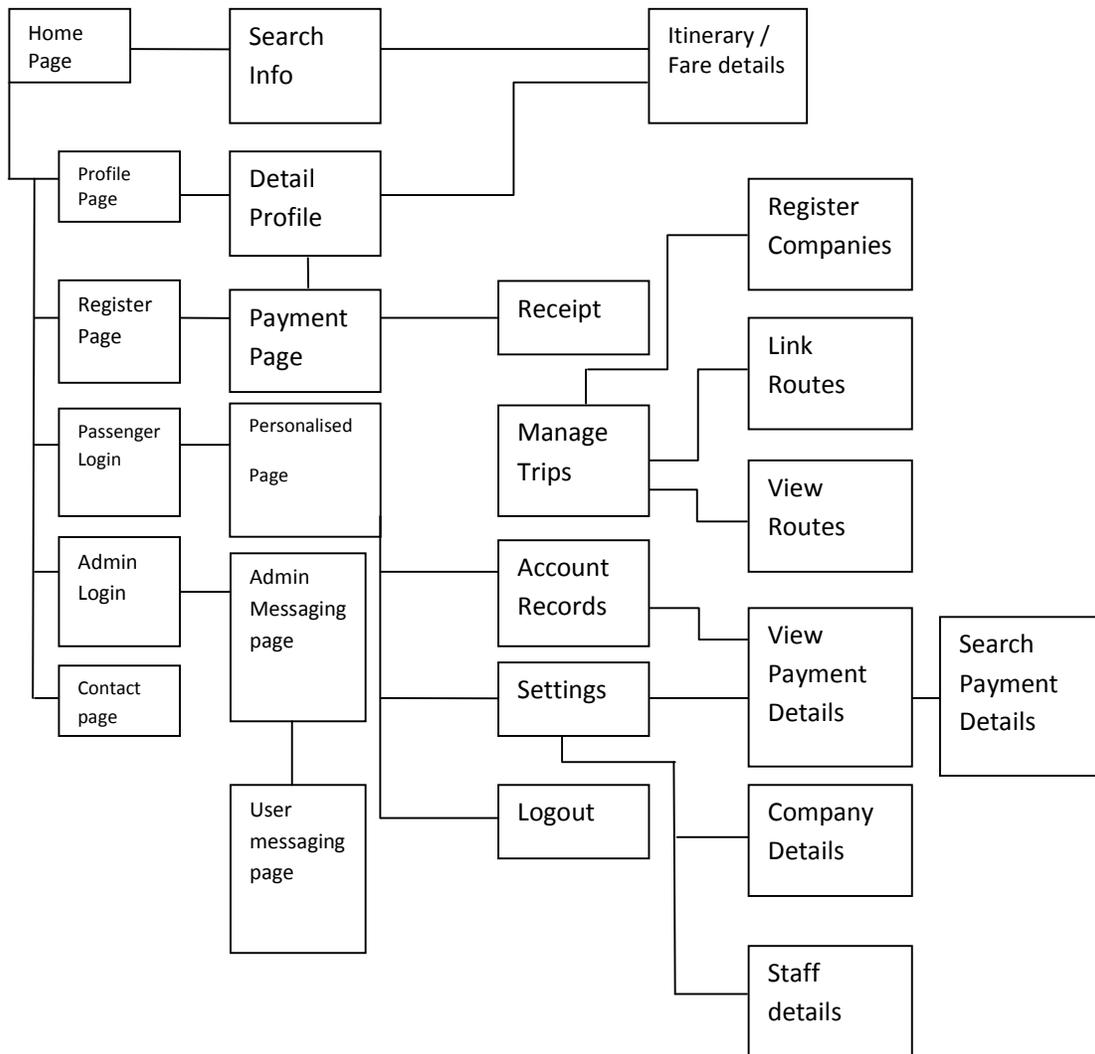
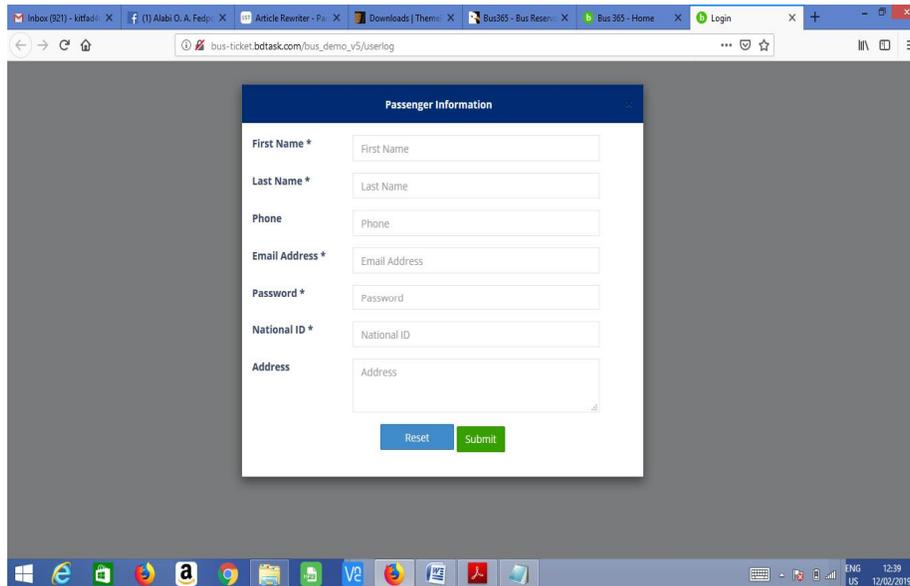
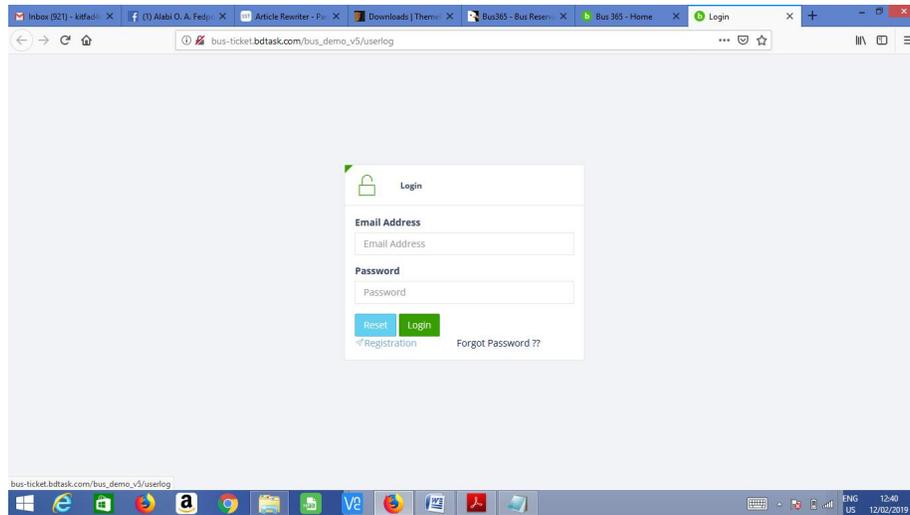


Fig. 4.Relational Sitemap of the Website



**Fig. 5. User registration form control**



**Fig. 6. The user login form control**

Ticket and booking can only be visible from passengers end only after completing registration then follow with booking which enables passengers to reserve seats. Another feature from the admin control panel gives privilege to admin to register users, service agents and assign passenger registration roles. This was done to emerge all companies' administration on cross platform. Each administrator, users, passengers and agent control panel is designed separately by adopting inheritance algorithm as shown in Fig. 4.

#### 4.5 Fleet Type/Bus-Car registration Page

Fleet registrations features enable all categories of administration to register their company vehicles such as local roaming taxi-cars, transit buses and transit vehicle categories as shown in figure 10 and 11 respectively. The fleet type registration is set active and subject to super admin approval. this initialise activities for the registered company services and make public to allow passengers to compare and contrast services before booking. Each fleet type according to commuters varies in terms of

number of required passenger's equally with road safety standards in Nigeria. Private cars used for commercial can only accommodate four passengers while 14 transit buses can accommodate only 14 passengers. The system is designed with standard to avoid bridge of service agreement between the commuters and the Federal Road safety in Nigeria.

#### 4.6 Bus-Car Facilities Registration Page

The super administration is charges with responsibility to validate vehicle information submitted by each company to ensure it in right order with road safety rules and regulation. Parts

the requirements include, plat number, engine number, fleet facilities, air condition, road fitness, road worthy, tyres standard with extra and valid company information. The passenger will have full access to review vehicles enrolled for tours before booking and are done to improve the commuter's service reliability and fit in for passengers' interest as shown in Fig. 11a and 11b.

#### 4.7 Bus-Car Categories Page

The Bus-Car Categories registered page shown in Fig. 12, presents the number of fleets registered with status update. The page feature

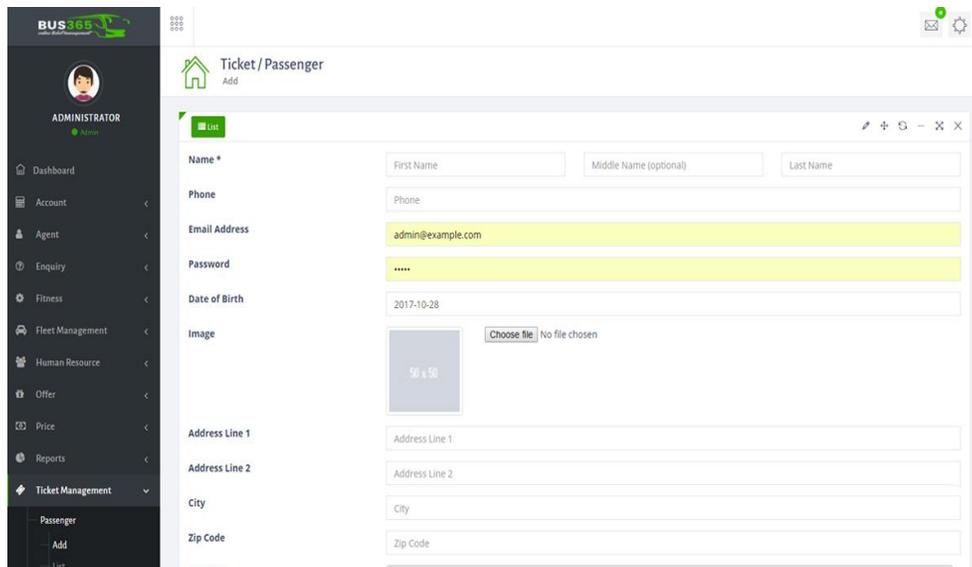


Fig. 7. Commuter control panel showing Passenger booking registration page

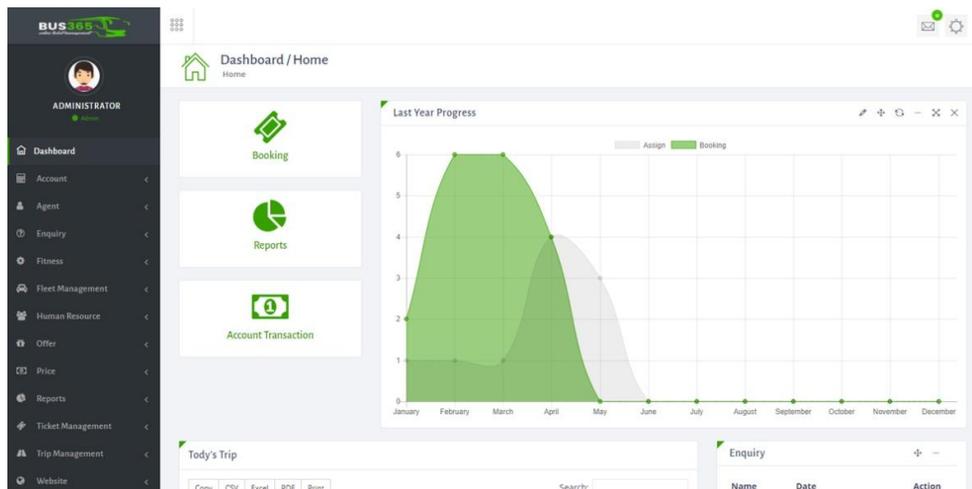
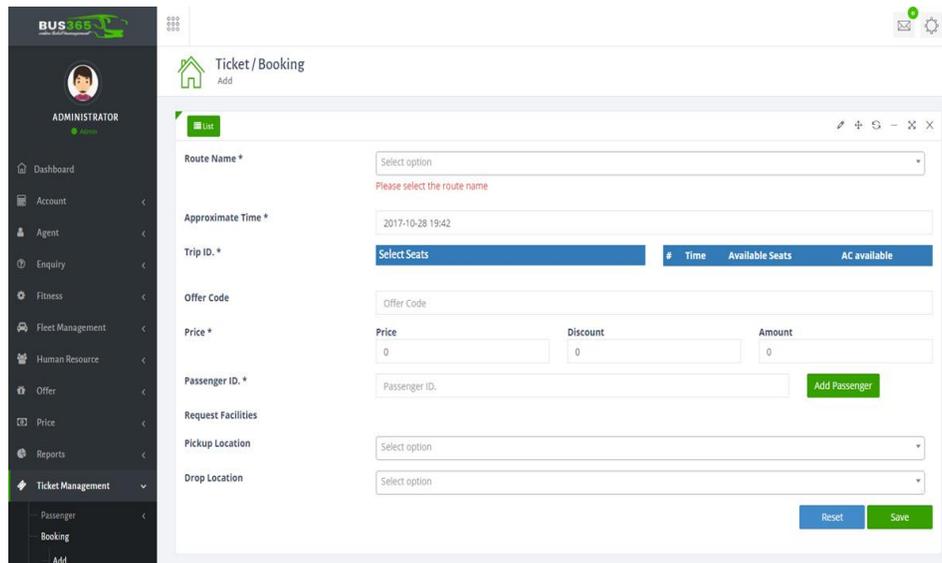
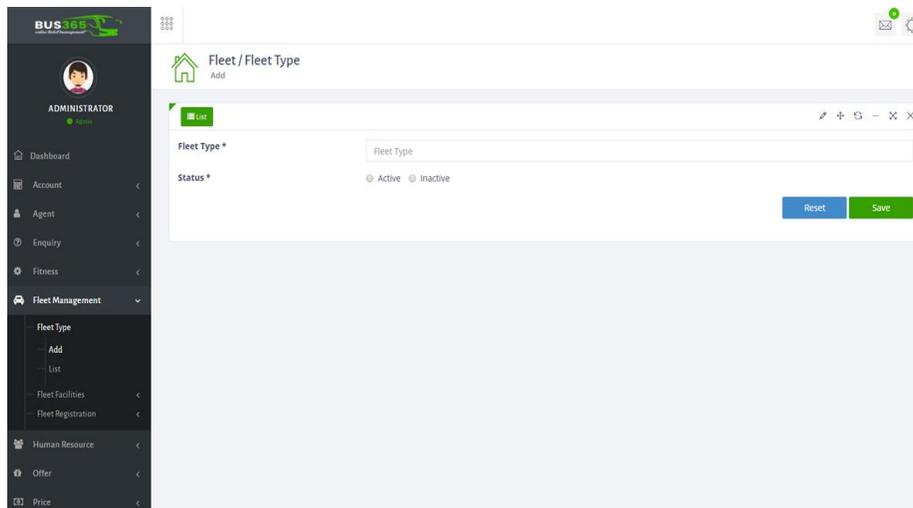


Fig. 8. Admin Control dashboard or control panel



**Fig. 9. Passenger Ticket booking with fleet facilities from commuters control panel**



**Fig. 10. Admin control panel for adding fleet type for commuter resources**

is accessible to system administrators, visible as a control panel to effects changes to register fleet, edit to update and delete fleet where necessary. The cumulative registered fleet can be extracted and export in csv, pdf and excel format. The available option to copy and print is set active allow administrators to copy to keyboard and paste else to a readable output format .

The system to allow each commuter (registered transport companies) to manage staff “Human Resource HR” and only super administrator has privilege to created HR features CP Control

Panel and this is presented in figure 12 in above. The components of HR include executive director, manager, company agents, company drivers, accountant and many more. A complete CRUD functions was written from server side to enables the company administrator to record a list of staff with respect to their position includes duties, using registration procedures. The output can be exported into any form of readable format i.e.pdf, excel and csv respectively for proper accountability. The action bottom to copy, delete, and update records is set to enable CRUD features from the administration control panel.

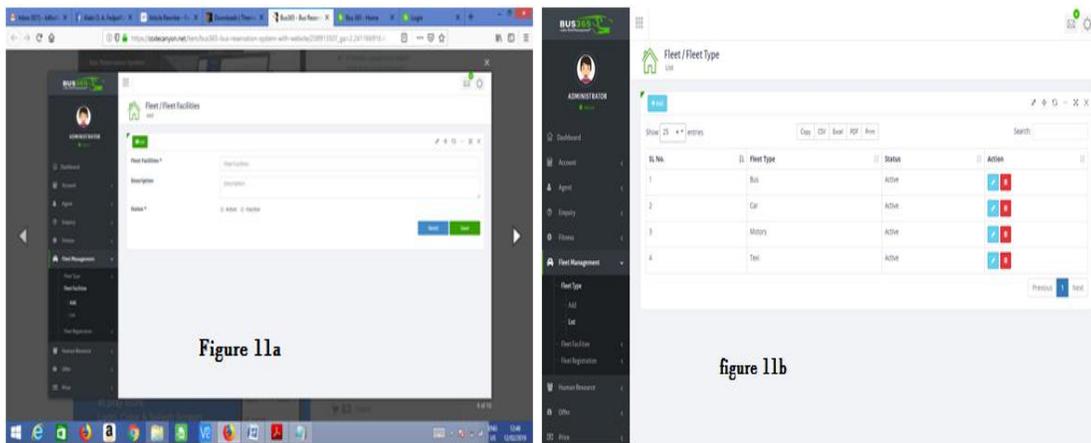


Fig. 11a&b. Admin Area to render Fleet Facilities resource available for commuters

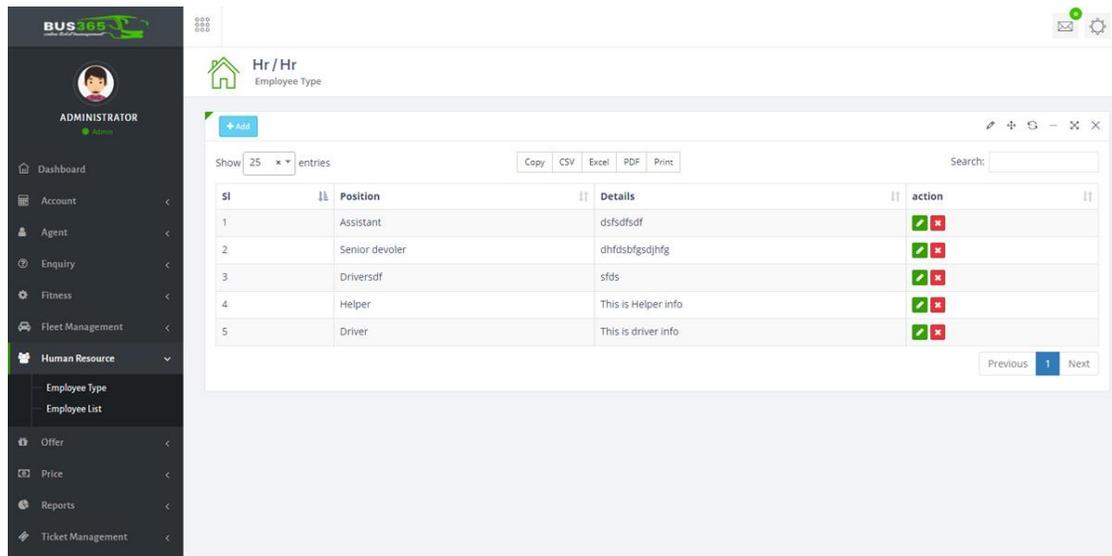


Fig. 12. Human Resource Registration and listing page

The pricing pattern is a dependent factor which has to do with individual commuters from the perspective differences in their service charges in figure 13. The design is flexibly for administration to perform CRUD function i.e read, add, delete, and update pricing records with respect to distance coverage. We adopted dollar currency as default purposely to synchronise PayPal API module. In the nearest future, we intend to add Nigeria currency to the index API. In this case, presentation was derive from current exchange rates and as presented in the user / passenger index page (booking page). In order to complete booking procedure, the process of register as a new user come first

before, follow by booking, and at end, user will be redirect payment gateway when transaction will be exercise. The accredited and paid users/passenger is presented in figure, showing list of validated and paid passengers.

The website is designed to render service to visitors, therefore travellers need to visit the webpage, click to view schedule link, a detailed trip schedule (time-table) of the transport company is displayed in figure 14. This time-table is which had been profiled with fleet information can be access by travellers couple with search navigation on the website.

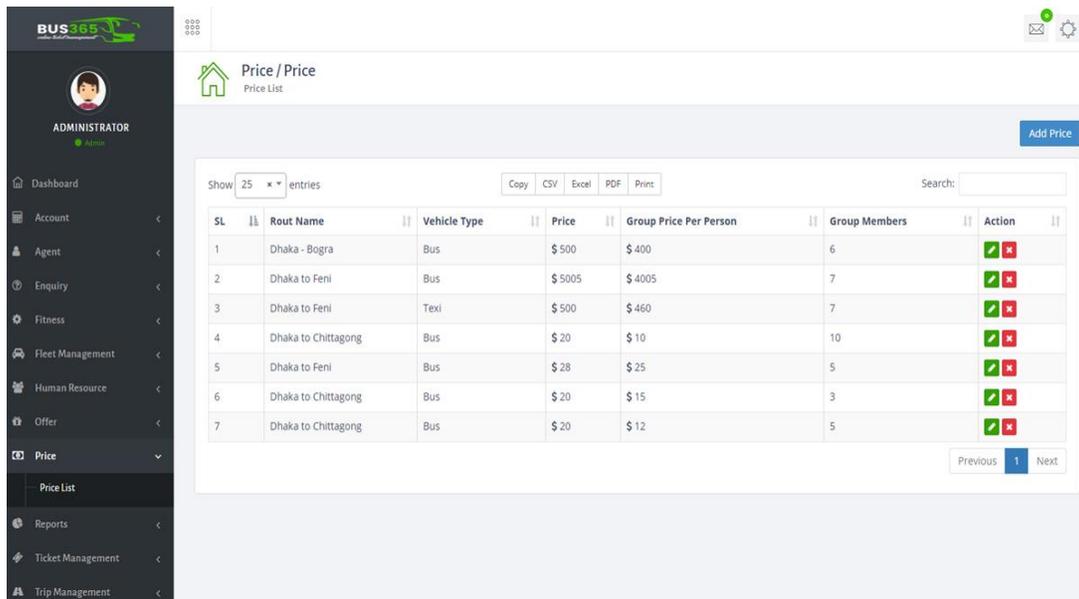


Fig. 13. Pricing page to shortlist page transport fare from admin end

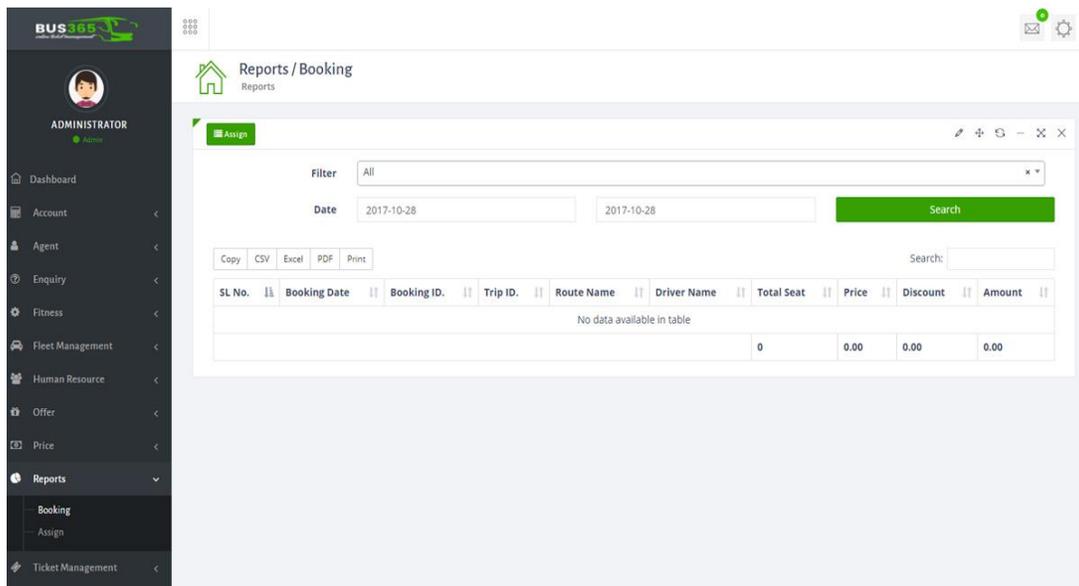
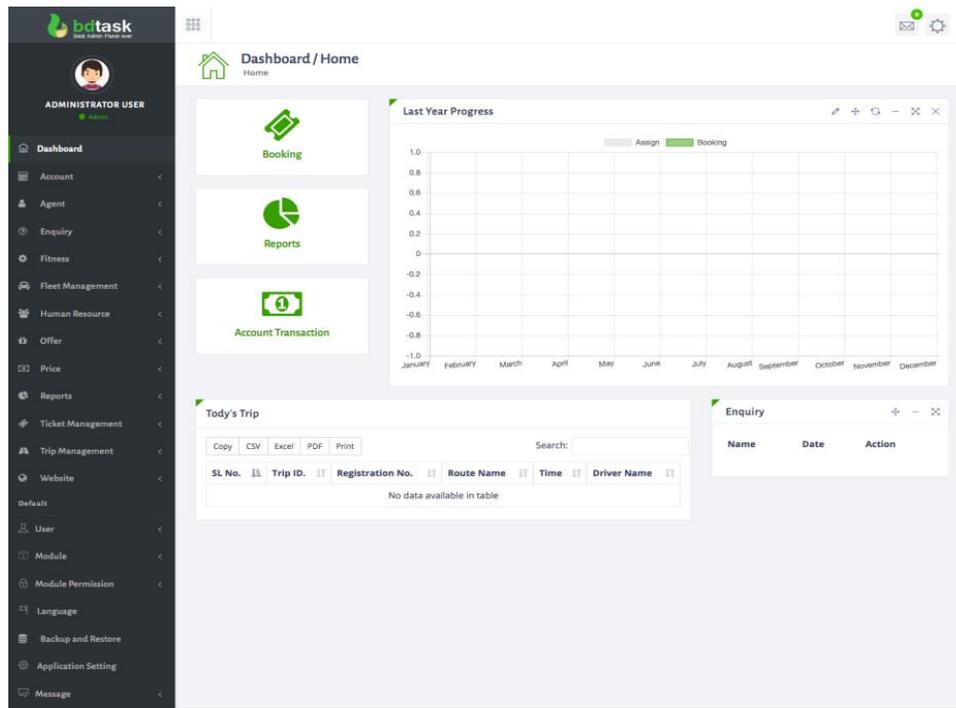


Fig. 14. The website viewing schedules

#### 4.8 The Contact Form

The contact form is added as a link on the navigation bar and set to parent hierarchy to allow web users or visitors to make inquiries about the web services. User can access with simple just a click on the menu “contact us” link

via the navigation bar. This presents a contact form that is required to be completed by the travellers, transport companies and other site users who’s intent to send message to site administrator, hence, the site administrator from the server end will receive incoming mail from server mailbox.



**Fig. 15. The Dashboard showing summarised layout of the fleet ticketing software, report, accounting and evaluation sheets**

## 5. EVALUATION

In order to determine the user's expertise and ascertain whether or not the web site meets the needed specifications for this research, an evaluation was carried out. This would insight the accessibility of the functionalities of the web site and the grey areas within transport system in Kwara State, which demands the web development. Therefore a separate task sheets was developed and accessible only to super administrator to allow feedback from each travellers and transport corporations. Subsequently, an evaluation sheet covering each the usability and practicality of the web site review page was deployed with back-end. The results of the web map performances are summarized in Fig. 15.

## 6. CONCLUSION AND RECOMMENDATION

This paper has presented the design and implementation of a responsive prototype website road transport companies and travellers network in Kwara State. The concept of big data analysis in this study goes along with heterogeneous commuters in the region that

shared the same business objective. The resolution in the research challenges on road transportation could improve the livelihood of the citizen and improve Gross Domestic Product (GDP). In the design and implementation section of a suitable prototype website to improve transportation sector in Kwara State. The core motives are achieved, now subject to deployment and to make publicity to all stakeholders.

The parts implementation had shown that all functional and non functional requirements and was intensively discussed accordingly. The interface designs in conjunction with the database schema is achieved this reference an improvement on user experience. The entities of the website page along with Significant (S) and required (R) level were prioritised during development. If all stakeholders in the study area could adopt solutionBDAS, then migrate their business online, this will serve a great advantage to all travellers from different regions. Taking instances like sources for travel information, free booking, avoids unbearable travel stresses and bonds communication between travellers and commuters just for a face lift and a course to improve the livelihood of all beneficiaries.

Therefore, an ideal practice the functional requirements of the website have been implemented which has captured the needful of the system requirement, and user requirement for a case study also accomplished for a meaningful and sustainable transportation system in Kwara State, Nigeria.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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