



Design and Implementation of Train Transport Management System for Railway Corporations in Nigeria

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Abstract - This paper deals with design and implementation of Train Transport Management System for Railway Corporations in Nigeria (A case study of Osun State Railway Corporation). The system was designed and developed using WAMP stack, HTML, JAVA SCRIPT, PHP, CSS, and FTP. The system consists of the introductory page, home page, space reservation page, train scheduling page, etc. Agile and user-centered design methodologies were adopted. The implementation of this system shows that customers' enquiries, booking, and management of other related activities can be enhanced greatly by software applications. In view of this, it is advisable for the Railway Corporations to adopt this automated option considering the high capital outlay involved in train business and the need for profitable operation.

Keywords: *Train transport, management system, customer's enquiries, booking, user-centered, software applications.*

1.0 Introduction

Transportation can be defined as the movement of goods and people from one place to another. No nation or society will desire growth and development as its prime objective will neglect the factor of viable transportation systems. As a matter of fact, the more mobile the people are, the faster the advancement of the community and the richer the people and the economy of the nation becomes. Many activities are related to transportation, however the management aspect is very important considering the high capital outlay involved and the need for profitable operations (Henning, 2011). Thus the need to harness the potentials of computer to ensure proper accounting, transparency and profitability by any concerned organization either owned by government or private. The use of computers in transportation has exploded over the past decade. The transportation industry is one of the largest growth areas for electronics and embedded computers (Yilin and Alexander, 2009).

2.0 Motivation for the study

The issue of rail transportation in our contemporary days is such that should be of interest to all. Rail transport is very important to industrial development in terms of human and goods conveyance. Most railway corporations in Nigeria today use manual management systems. This paper-based system is not only limited in its capabilities, but also introduces both redundancy and inefficiency. The operation at Nigeria Railway Corporation, Osun state chapter is strictly manual. This manual system is combated with low response to customers' enquiries, and inability to meet high proportion of booking.

3.0 Aim and objectives

The purpose of this study is to design and implement Train Transport Management System for Railway Corporations in Nigeria. Objectives of the study include:

- (a) To develop a flexible and interactive Train Transport Management System that enables good management of Train Transport in Nigeria.

- (b) To develop a simple easy-to-use Train Transport Management Application which an individual with little or no idea of software application can interact with a great deal of comprehension.

4.0 Literature Review

4.1 Transportation infrastructure

Transportation is rapidly being changed by new technology, such as intelligent transportation system (including smart cards, on-board diagnostics and information systems, smarter highways, logistic systems, and other information systems). The range of options and their impact will continue to expand as new technologies are introduced over the next two decades, and may alter transportation system in many ways (OECD, 2013). For example, electric vehicles, hydrogen vehicles, or hybrid electric-petroleum vehicles may be introduced that would substantially alter emissions and fuel characteristic of the fleet, and potentially pose challenges in terms of system operations and finance. Smart card technology could greatly improve the feasibility and convenience of a variety of pricing options for road use, parking, and transit fares. Monitoring information systems could enable travellers to time trips and select route to avoid congestion. Advanced traffic management systems could increase road capacity significantly while improving safety and respecting other objectives such as pedestrian comfort. In the long run, automation could cause serious improvement on safety, capacity, and conveyance of goods and passengers. Moving goods and people from one place to another is critical to maintaining strong economic and political ties between regions. Nigeria with a land area of 910,768 sq. km, population estimate of 150 million people and GDP - growth rate of 6% per annum (2006 estimate), the centrality of effective public transportation in Nigeria is readily seen. Nigeria's transportation infrastructure is in a dismal state and falls short of the world standards. The transformation agenda of any government should see transportation as a tool for achieving rapid economic growth and development (Vasile, 2013). Globally, Nigeria ranks low in the quality of its infrastructure which impacted negatively on the ease of doing business in Nigeria. Inadequate investment and poor management of transport infrastructure have created a huge infrastructural deficit (Agunloye and Oduwaye, 2011). An estimated \$15b is required annually to adequately fund Nigeria's infrastructural deficits.

What goals should Nigeria set for its transportation infrastructure? The future state of transport system is expected to be efficient, affordable, adequate, safe, well integrated and environmentally sound. In line with the realization of these expectations and visions, potential investment opportunities for roads, rails, aviation, seaports and waterways must be effectively harnessed.

4.2 Rail transport

Rail transport is a means of conveying passengers and goods by wheeled vehicles running on rail track and known as a railway or railroad. The rails are anchored perpendicular to railroad. A train consists of one or more connected vehicles that run on the rails. Propulsion is commonly provided by a locomotive that hauls a series of unpowered cars that can carry passengers or freight. The locomotive can be powered by steam, diesel or by electricity supplied by trackside systems. Alternatively, some or all the cars can be powered, known as a multiple unit. Also, a train can be powered by horses, cables, gravity, pneumatics and gas turbines. Railed vehicles move with much less friction than rubber tires on paved roads, making trains more energy efficient, though not as efficient as ships (Abril et al., 2013).

4.3 Rail transport in Nigeria

The Nigerian Railway system officially came into existence in October, 1912 when Frederick Lugard merged the pre-existing Lagos government railway and the Baro-Kano railway to become the 'Nigerian Railway'. The merger further enhanced the desirability of merging the Northern and Southern Nigeria protectorates. The railway line ran on two principal North and South trunks: one from Lagos to Nguru and Port Harcourt to Maiduguri, both tracts having branch extensions. In the 1950s, partly for economic reasons, the railway system in the country came under the coordination of the Nigerian Railway

Corporation. The rail transport system employed Nigerian workers from the various ethnic groups in the country and was known as having a diversified workforce which also included West Indians. Prior to the creation of the Nigerian Railway Corporation, the government railway department had four core sections, the engineering department, running department, traffic and commercial department, and accounts and stores department. Since the 1980s, the Nigerian Railway Corporation had been bounded by technical and financial shortcomings (Oshin, 1990). The corporation rarely placed commercial objectives as a priority and government changes in administration and policy resulted in structural and managerial problems. The use of tracks of narrow gauge strewn with curves and gradients coupled with low maintenance over the years resulted in slow speeds for trains. As at today, the rail network in the country stands at 3,557 kilometers with 3,505 kilometers still on the narrow gauge. Passenger traffic grew from 7 million in 1978 to 15.5 million in 1984, but then declined again to 3.0 million in 2003. The same dismal performance is reflected in the freight traffic fluctuation from 3 million tons to a terribly dismal level of less than 10,000 tons in recent (Tolofari and Gubbins, 2007).

5.0 Methodology

The design methodology used is the integration of user-centered design (UCD) philosophy with agile development practices for software development (Joseph, 2012). Agile provides designers with tangible software sooner, and it also provides the transparency and constant feedback against which designers can validate and steer decisions. This employs Feature Driven Development (FDD) approach to software development. The processes (that make up FDD) are structured around defining every element of a project as a feature, then designing and building each feature in an iterative manner (Gerard, 2015). It means design, coding, and testing in an iterative manner until the whole system emerges.

5.1 Data collection technique

A significant percentage of data and background information needed to successfully design this system were collected from the Nigeria Railway corporation, Osun state, Osogbo through various methods which include the following:

- (a) Interview: In order to obtain relevant information with regards to the policies, procedures, and situations that might not be apparent from documents the interview method was adopted.
- (b) Direct observation: The activities of the staff carrying out their various tasks were discreetly observed.
- (c) Document analysis: The relevant materials and literature were read to get valuable information.
- (d) Information is also gathered from various web-sites e.g. www.wikipedia.org.
- (e) Various textbooks on rail transport were read. Qualitative data collection methods provide information useful to understand the processes behind observed results

6.0 Results and Discussion

The major components of this design are Input Design, Database Design, Table and File Design, Data Design, Output Design, process Design and Program Design. The tools used for this research work are WAMP stack, HTML, JAVA SCRIPT, PHP, CSS, and FTP.

6.1 The system model

The system flowchart in Figure 1 shows the system model for the train transport management system. Developing the model helped to move thinking step by step from generalities to specifics. This includes programs, procedures, files, reports, and screens.

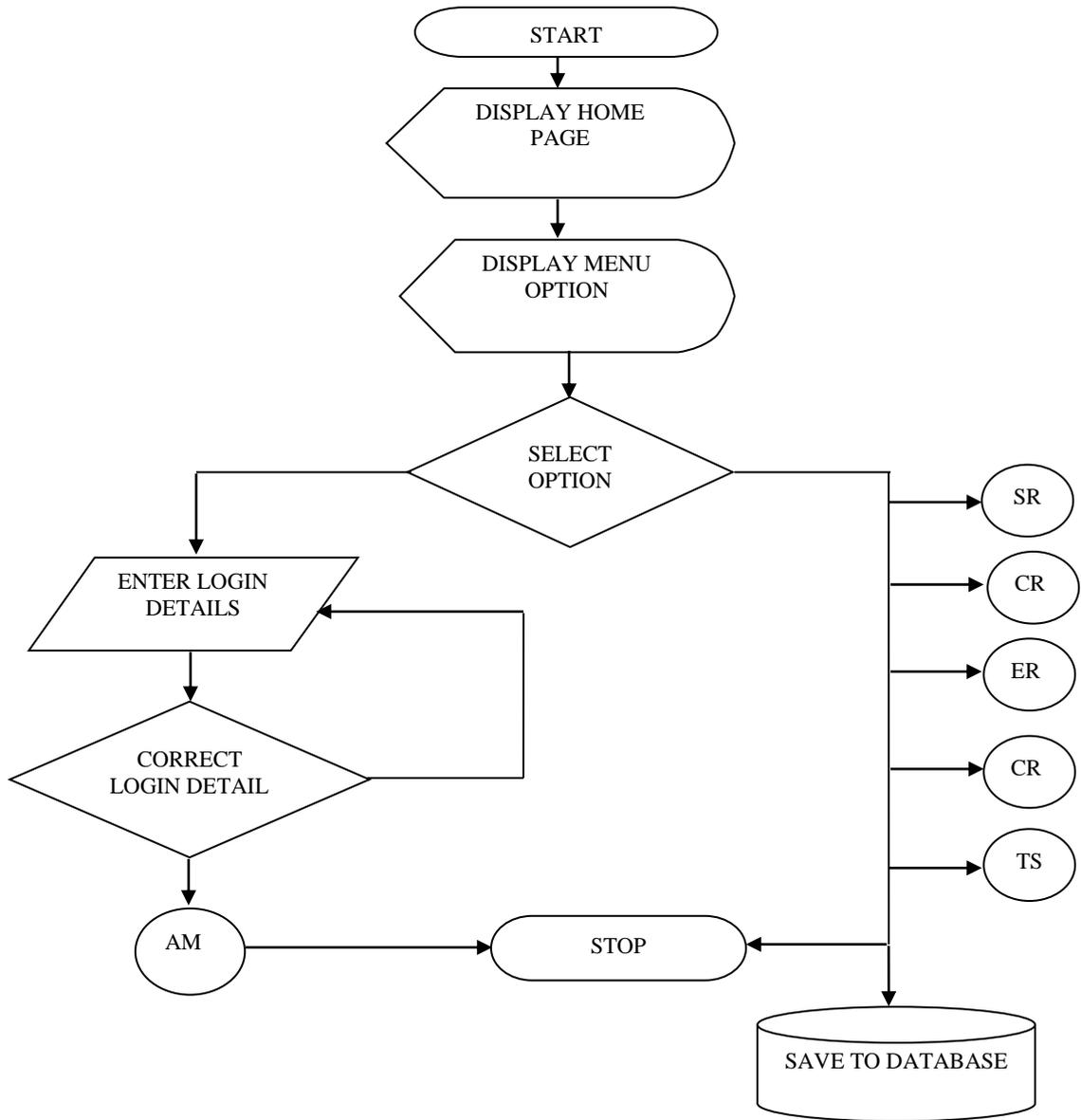


Fig. 1: The system model.

The first screen or homepage is the “welcome screen” followed by the other screens such as About us page, Contact us page, Space reservation page, Complaints and Request page, Train Schedule page, Train registration page, etc. Figure 2 shows the homepage for Train Transport Management System. Figure 3 shows Space Reservation page, and figure 4 shows Train Scheduling page.



Fig.2: The Screen Shot of Home Page



Fig. 3: The Screen Shot of Space Reservation page



Fig. 4: The Screen Shot of Train scheduling page

A number of final activities that put the system into operation include installation of hardware and software, system testing, changeover procedures, user education and training, and system appraisal and maintenance plan.

7.0 Conclusion and recommendations

The study has examined the design and implementation of train transport management system for railway corporations in Nigeria. In a challenging economy, industrialization is a vehicle for economic development and it requires good transport methods such as rail transportation to achieve its objectives.

For the managements of Railway Corporations in Nigeria to achieve rapid response to customers' enquiries and meeting a high proportion of booking placed by the customers, the following recommendations are made:

- (i) The federal government should assist in the funding and maintenance of the Railway corporations in Nigeria.
- (iii) The management of Osun State Railway Corporation should create Transport Management Unit (TMU) to manage and maintain the software.

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