



THE ROLE OF GOVERNMENT IN SIMULATING PORTHARCOURT CITY MASS TRANSPORTATION PROBLEM

Otoro-Theodore, Wonimidei
Department of Architecture
Rivers State University NkpoluOroworukwo, Port –Harcourt
E-mail: Ojay4dizzle@yahoo.com

Abstract:

Transportation as a major activity in human existence forms the basis of all socioeconomic interactions as inadequate transport facilities often hinders economic development. Bad roads, inadequate fleets of vehicles, inadequate trains, overcrowded airplanes and congested ports are common features of developing world transportation service like in port Harcourt, and Nigeria at large, the aim of this study is to examine the role government can play to stimulate and solve Port Harcourt city transportation problems using computer based software, Descriptive research design was adopted in this study, questionnaires was used to obtain data from commuters and transporters from some transport routes in the city such as, Zoo to Mile1 park, Oil Mile to Mile1 Park to Borokiri, Rumuokoro (Okoronudo) – Mile1 to Borokiri and Mile1 to Leventis to NPA. Data collected were analyzed and presented graphically, the result of the study shows that there is serious transportation problems in port Harcourt, and can best be solved using a computer software matrix system. Therefore, in this research work computer software was developed to tackle the problem. Some constraints were established and the developed software was tested with life data to ascertain the usefulness of the computer programme. It also was recommended there is an urgent on the part of government to actively develop strategies and system that will facilitate the process of road transportation system in Nigeria.

Key words: Transportation, Movement. Problems, Programme, software

INTRODUCTION

Transportation is an integral part of human activity; it forms the basis of all socioeconomic interaction in many developing countries. Lack of transportation facilities often hinders economic development. A good transport system is essential to support economic growth and development. Transportation is a process whereby goods, services and people are moved from one geographical region to another within a specific time (Akpala A. 1990). Several means of transportation exist for both man and goods. These means have evolved through the length of time of man's existence on the planet. The major types of transportation

systems are roads, water, rail, air, and pipeline. If the transport system is not efficient, it affects all pipeline of the society include manufacturing, government work, construction activities and schooling, in fact immobility of labor and materials leads to inefficiency. In Nigeria road transportation involves the use of bicycles, motorbikes, carts, buses, Lorries, trailers etc. in moving people goods and services from one location to another which is an important component of globalization and economic growth and development. This study is an attempt to also assess the issues and challenges that exist in the transportation industry in Port Harcourt as well as profound some possible solution to the identified problems through a transportation software design.

CONCEPT OF TRANSPORTATION

Transportation is the process whereby goods, labor, and people moved from one point to another to provide services, it is a means by which goods (Raw Materials, Production Equipment, operating inventories, semi-finished goods and finished goods as well as people are able to get to or be made available. (Onya O. & Nwafor V.2019). The transportation of people and the materials is therefore one of the greatest needs that have to be adequately satisfied in any society if any meaningful level of social interaction, cooperation, production activities can be achieved. The major types of transportation are highways, water, rail, air, and pipeline. If the transport system of a society is not efficient, it affects all facets of the society.

Public transportation comprises all transport facilities in which passengers do not use their personal means of transportation to travel. It includes shared taxis, mini- bus (Vanagon) Tata buses; public transportation is of essence to passengers due to the fact that it offers opportunities to move from one location to the other with ease. It performs a lot of functions for passengers; it enhances the quality of life in societies on condition that it provides safe, efficient and inexpensive transportation services. The necessity of road transport in the society can easily be realized when we consider the daily activities of an average person. He/she takes road transport to his place of work or business, the goods she/he bought in any market or Super-stores is brought to him/her by means of road transportation, she/he moves around to interact

with others and goes to church activities with the aid of road transport, even to places of social gathering by road transport.

The security agencies ensure that there is peace and security, depends mostly on road transport for them to carry out their responsibilities effectively. Road transport provides the essential activities of time and place utility of time entails making things available when they are needed.

Transportation can therefore be called a catalyst that helps to improve human existence on earth. It is a known fact that movement which is the daily ebb and flow of people and traffic, knits the social areas and functional zones of the metropolis into an integrated whole. An efficient transport system facilitates easy communication in any society and it also saves time spent at any giving point at bus stations or bus-stop (Handcock 1999) the important of efficient transportation in any society cannot be over emphasize for it does not only convey people from their origin to destination at any given time, it also takes care of equipment used by the people.

Transportation in Port Harcourt City

Studies have shown that different works has been done by many Scientists who tried in their various studies to find ways to an efficient transport system in their societies. However with the passage of time most of the services became customer oriented (Benneth 1990) with the new trends service elements and attribute which are needed for customer attraction were included in service quality measures, Their greatest attention was given to road because of its wide coverage in any country. This is because of its importance as a mode used by majority of the people. Road transportation is the most common type of transportation so far. In many cases, it is the only suitable or available form of transportation, with cars, buses, vans,(trucks) and motorcycles as the main modern road vehicles. In areas well served by roads they can provide a variety of transportation by whatever route they choose and they also provide door-to-door freight service (Ogundara, 1972; Lugard, 1992).

Following the creation of Rives State in May 1967 the then Governor Commander A. Diете-Spiff thought it necessary to diversify the activities of government to embrace as many areas as possible to improve the peoples' welfare. These included the establishment of industries like West African Glass Industry, Rison palm, hospitals, educational institutions and others. Also the discovery of crude oil in commercial quantity in Nigeria (Rivers State Dairy, 1999) has contributed to the traffic congestion in Rivers State particularly Port Harcourt the state capital and also the headquarters of many oil companies. This has led to population drift towards Port Harcourt city, causing the city to be over populated. The consequence is traffic congestion in the city. The city is accessible by land, sea, rail and air but the most important type of transportation is by land, as it is very necessary to move workers and goods within the axis of the state capital. On land several different types of vehicles are used for transportation including different types of private cars, Lorries, trucks, taxis, buses of different types and sizes. Bus transportation tends to move more people at a time than any other source. As stated above that the level of land transportation indicates the level of development of the area, government has to come in for the control and improvement of transportation. This research work is focused on government control and implementation of an efficient mass transit bus transport system. Bus transportation is the cheapest in this country because the union and government control it.

In the developed countries detailed studies carried out gave rise to their present reliable and efficient transport system. This can be done in our country, if the government has the political will.

Present State of Transportation Infrastructure in Port Harcourt

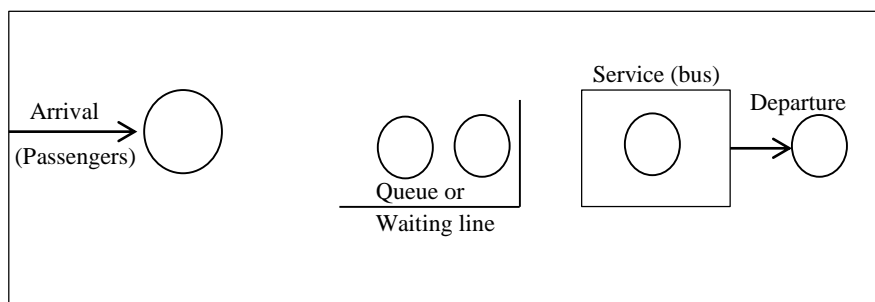
The importance of transport infrastructure to a nation cannot be over emphasized as efficient transport infrastructure facilities act as analysts for development. There is therefore cause for concern while considering the transport infrastructure base in Port Harcourt today which compares unfavorably with those of several African cities both in terms of quality and service coverage. In particular the rural areas where the bulk our population resides is largely deprived of basic pieces of transport infrastructure, so Port Harcourt transportation network is relatively poor because the

transport system is solely managed by the private sector, government is completely out of the transportation system as government don't have any known transport company that operate within the city metropolis there by keeping commuters at the mercy of the private sector, which inflate transfer at will, and always insist on the passengers carrying the required amount of fare (money) before boarding there cads or buses, also they go on strike at the slightest provocation from the police or government policies that don't favor them, and can collapse the transportation system at will.

Solution to Port Harcourt City Mass Transportation Problem

The aim of this work is to come up with an efficient and realistic solution to the transportation problem in Port Harcourt city and its environment. The use of government controlled public bus transportation system is identified to be the necessary solution. The transportation problem is a queuing problem; hence it will obey all the conditions for this type of problem. A queering system is a system where entities (customers, parts, passengers, etc) arrive and require a service. The simplest queuing system contains a single service channel as shown in

Figure 1, these suits the transportation problem being discussed in this paper.



The main aim of this work is to minimize passengers waiting time at bus stops; hence transportation problem is an optimization one. Therefore, certain key elements necessary in seeking an optimal solution have to be identified. Some of these elements are:

- (a) Definition of system boundary – mass transportation in Port Harcourt axis,
- (b) Criterion – minimization of waiting time at bus stops;

- (c) Identification of independent and depend dependent decision variables of the problem
- (d) Setting up condition for the study.

Some of the decision variables that need to be determined are:

- (1) Number of bus stops;
- (2) Number of buses available;
- (3) Arrival rate of passengers;
- (4) Arrival rate of buses;
- (5) Departure rate of buses;
- (6) Number of passengers carried per bus at a time;
- (7) Number of passengers waiting at a bus stop for bus (service); and
- (8) Number of trips/bus top/day. In this study it is very clear that decision variables like (3) to (4) and (7) are uncontrollable hence the need of the simulation solution.

To simplify and make the problem more realistic certain assumptions have to be made. Some of these assumptions are:

- 1) Waiting time by passengers is known and varies within certain limits.
- 2) Time spent by buses between bus stops is known and varies within certain limits.
- 3) Main transport routes, bus stops, transport zones are known.
- 4) Cost of transportation per transport zone is known.
- 5) All buses are of the same capacity.
- 6) At the start of any trip the system is empty that is, there are no people waiting for service, hence the probability of having people in the system ($P_n = P_0$) = 0
- 7) $\lambda = \mu$ And traffic density, $\rho = \lambda / \mu = 1$
- 8) Loading time of each bus is known and it is known and constant.
- 9) Maximum working hours per day and working days per month are known.

To provide realistic and sensible solution some physical and practical readings and records were taken; like main bus routes, bus stops, time spent at bus stops etc.

Theoretical Calculations

Based on the above assumption certain quantities can be calculated that are relevant in this study.

- Let the longest identified transport route have three (3) transport zones and fourteen (14) bus stops.
- Let the loading time at each bus stop = 2 minutes
- Let the time spent between two bus stops = 10 minutes.
- Let the maximum bus working hours per day = 18 hours
- Let minimum working days in a month = 25 days.
- Let maximum waiting time of a passenger = 12 minutes
- Loading time at 14 stops = $14 \times 2 \text{ min.} = 28 \text{ minutes}$
- Running time of route = $(14 - 1) \times 10 \text{ minutes} = 130 \text{ minutes}$
- Total time for one day = $(28 + 130) \text{ minutes} = 158 \text{ minutes}$
- Time for a trip = $(188 \times 2) \text{ minutes} = 316 \text{ minutes}$
- Maximum number of trips bus = $18 \times 60 / 316 = 3 \text{ trips}$
- Number of required stops bus = $18 \times 60 / 12 = 90 \text{ stops}$
- Required number of buses $90 / 3 = 30 \text{ buses}$
- So, if government provides the 30 buses per day within the conditions set there will be no congestion in the city.
- Let the size of a bus = 50 passengers
- Number of passengers carried/day = $50 \times 30 \times 2 = 3,000$
- Let the transport fare per transport zone = N10.00
- Therefore, daily revenue = No. of passengers x No. of transport zones x transport cost zone = $3000 \times 3 \times \text{N}10.00 = \text{N}90,000.00$
- Monthly revenue = $\text{N}90,000.00 \times 25 = \text{N}2,250,000.00$
- Annual revenue $\text{N}2,250,000.00 \times 12 = \text{N}27,000,000.00$
- Knowing the revenue generated the viability of the venture can be improved

Computer Software

Optimization problem requires simulation and as the transportation problem is an opportunity to consider several varying conditions to determine the best solution. Computer offers the best service for solving a problem using simulation, hence the necessity for developing this computer software Miller (1981). The series of calculations required are many and only the computer can very well perform these calculations. The computer software is

The Role of Government in Simulating Portharcourt City Mass Transportation Problem

written in BASIC computer language the program calculates and prints the following variables;

1. The required number of buses to minimize passengers waiting time at bus stops based on variable loading and running times for the buses.
2. The total number or income generated per day/month/year.
3. The most profitable transport route.

All these calculations were based on the assumptions stated in this work. At this stage it becomes necessary to use real life situation to test the developed software to establish its usefulness.

An Illustrating Example – Port Harcourt City

To test the developed software the transport situation of Port Harcourt and it’s environ was studied to be used. For a start the major bus transport routes, zones and bus stops were identified as stated below in Table 1.

Table 1: Main Bus Routes:

| S/No | Route | No. of Bus Stops | No. of Transport Zones |
|------|--------------------------------|------------------|------------------------|
| 1 | Zoo to Park to Borikiri | 12 | 3 |
| 2 | Oil mill to Park to Borikiri | 12 | 4 |
| 3 | Rumuokoro – Mile 1 to Borikiri | 14 | 4 |
| 4 | Mile 1 to Leventis to N.P.A. | 6 | 1 |

The detailed bus routes are shown in Figure 2

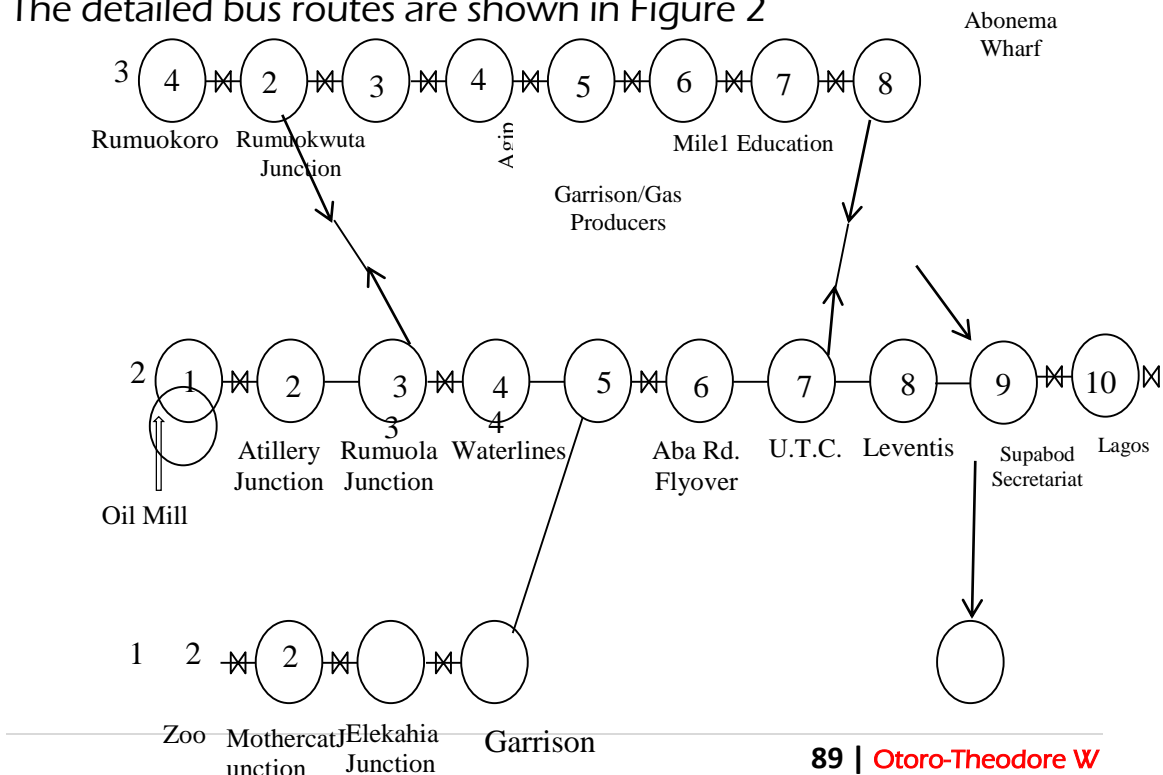


Figure 2: Port Harcourt City Bus Routes

The next stage is to establish waiting time for passengers, loading time for buses and time used by buses in between bus stops. For this work the following conditions were set: (1) the loading time for passengers varies from 2 to 10 minutes; (2) the time between bus stops varies from 4 minutes to 20 minutes in steps of 2 minutes; (3) the maximum waiting time of a passenger is dependent on the Operator.

The computer operator will be required to provide the following information while interacting with the software; (1) the transport fare in Naira per zone; (2) the capacity of a bus, that is the number of passengers the bus can carry; (3) maximum number of routes and their zones; (4) maximum number of bus stops/route; (5) maximum working hours/day for a bus; (6) names of main bus routes; (7) minimum working days in a month; and (8) maximum waiting time for a passenger. In short eight sets of information will be requested from the operator. After this the computer does all the necessary calculations and print what is necessary on the screen and if also instructed it produces a hard copy from the computer printer. Typical computer printout and the computer software are available for usage.

CONCLUSIONS

Transportation which aid the movement of people have become one of the bedrock of nation building element. The mobility (transportation of people and materials) is therefore one of the greatest needs that have to be adequately satisfied in any society if any meaning full level of social interaction, cooperation, production activities, economic and other types of development and the enhancement of human welfare is to be achieved. However in the advent of advanced road network Port Harcourt transportation continued to experience increasing problem which might be born out of the need for greater government intervention to ensure adequate maintenance. The study there concludes that there are significant challenges confronting the transportation system in Port Harcourt.

RECOMMENDATIONS

Given the foregoing discussions, it is acceptable that;

1. Transportation is a major problem in the Port Harcourt City and requires an efficient solution.
2. Government controlled bus transportation system is the ideal efficient solution.
3. Transportation is a queuing problem, so require a simulation solution; hence the use of computer in proffering a solution is necessary and justified.
4. The developed computer software in BASIC language is efficient and useful.
5. From the print-out of revenue to be generated it is clear that the programme can maintain itself.
6. If government judiciously follows the solution of this program the congestion problem in Port Harcourt will be solved.
7. As many buses are involved, it is necessary for this research work to extend to cover the maintenance programme for the buses.
8. The use of computer facility should be extended to cover the maintenance of the buses used in the transportation programme.
9. Also to tackle this problem the time for opening of offices, schools, colleges or Universities in the morning hours may be varied.
10. To reduce the traffic congestion problem in Port Harcourt government should establish more link roads to reduce the pressure on Ikwerre and Aba Roads.

REFERENCES

- Akpala A. 1984 Principles of management (unpublished)
- Akpala A. 1990 Management, an introduction to management and Nigeria perspective, Enugu sunshine lithographic press
- Benneth C. (1990) Orientation and organization analysis, *Journal of management studies* 1(5)
Pp 2-8
- Editorial Comment (1982) Study Guide to the Professional Engineers Examination for Industrial Engineers Norcross Georgia: Industrial Engineering and Management Press.

- Handcock, J. (1939). *The Structure and Growth of Residential Neighborhood in America* Washington D. C.: Federal Housing Administration.
- Howard, A. (1983) *Motivation and values among Japanese and American managers personnel*: New York NY, Longman publication.
- Nwafor M. & Onya O. (2019) Road transportation service in Nigeria: Problems and prospects; *Advance journal of economics and marketing research*. Vol. 4 issue 3 Pp 104-115
- Miller, A. R. (1981). *BASIC Programs for Scientists and Engineers* SYBEX Inc. U.S.A.
- Ogundara, B. (1972). *The Transport Constants on Rural Development in Nigeria*, Ibadan: University of Ibadan Press.
- Olakunle K. O. (2006) *Transportation management*, Enugu: Giovanni publishers
- Smeed, P. (1979). *Urban Transportation Problems* Oxford: Oxford University Press.