

Full Length Research Paper

Factors influencing the quality of rail transport services in metropolitan Lagos

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This paper presents user's opinion on the factors influencing the quality of rail transport service passengers' operation and also evaluates the relationships between the adopted factors (variables of the quality of rail passengers' services in metropolitan Lagos). Data collection was through the administration of structured questionnaires on the quality of rail service in Lagos. Passengers were purposively selected from a total number of 1,100 passengers on board in order to attain a sample size of 19.1% which represents the total number of questionnaires (210) administered for the study. The study revealed that most of the passengers make many trips per week and are likely to depend more on train than other modes of transport. Only a minority 38 (18.1%) of the train patrons in Lagos metropolis observed the arrival time of train as a good one. The study revealed that 80% of train patrons in Lagos metropolis observed that the service was ineffective and inadequate. It implied that, majority of the respondents 170 (81%) rated the cleanliness of the coaches as poor. The study also revealed with inferential evidence that, only the arrival time of trains at stations has a significant relationship with the patrons' trip frequency ($r = 0.124$, $p > 0.05$) out of the various determinants. The paper concluded by recommending measures that could enhance the quality of rail service operation which includes the review of the time schedules, departure time and the cleaning of the coaches from time to time.

Key words: Public transport, rail transport's quality, Lagos metropolis.

INTRODUCTION

Transportation implies the movement of people, goods, services and information by specific modes, some of which are roads, railways, airlines, and shipping lines (Fadare and Omole, 1991a). These modes have been studied widely all over the world by researchers in varying disciplines. While all modes of transport are important in national development, the main focus of this paper is the rail transportation in Lagos metropolis. The importance of well organized public transport is acknowledged in both developed and developing countries because, public transport systems are more efficient means of transporting large numbers of people between and within settlements than the flexible private cars (Adeniji, 1983, 1987; TSU, 2002; Daramola, 2004). The significant contribution of public transport to travel in urban areas cannot be overemphasized and incidentally there has been a diffusion of urban centers over the years in several parts of Nigeria, while the rate

of urbanisation and the rate of urban growth have also been persistently high. Average annual growth rate in urban areas is about 4.7% as against the national growth rate of 2.8% (World Bank, 2006a, b).

In Nigeria, the road transport sub sector plays a dominant role in the internal movement of passengers and goods accounting for over 95% of overland movement of passengers and freight (NISER, 2003). As many as 47% of Nigerians now live in urban areas (World Bank, 2006b) while up to 70% of urban residents make their trips using public transport (Oyesiku, 2002). The issues of public transport provision, which have been compounded by phenomenon of urban sprawl, have not been appreciably addressed at the level of policy while some of the issues addressed in the policy document have not been implemented.

The Nigerian Railway Corporation was to manage and operate the railway undertakings and provide all necessary facilities for carriage of passengers and goods. The social duties of the corporation seem to out weight the economic (Iwayemi, 1987). This is due to many unprofitable services especially passengers' services it renders to the society. In any case, the passengers'

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services have been very important as a social service in the operations of the Nigerian Railway Corporation.

From the fore-going, this paper investigates the factors that influence the quality of rail transport services in Lagos metropolis with emphasis of the following major variables: train arrival time, ride's smoothness, level of cleanliness and frequency of passengers' patronage (influencing factors) in order to investigate the users' opinion on the quality of rail passengers operation in metropolitan Lagos. It also investigates the relationship between the adopted variables (influencing factors) of the quality of rail passengers' services.

Literature review

A railway can be broken down into two major components. Basically these are the items which "move", the rolling stock, that is the locomotives, passenger carrying vehicles (coaches), freight carrying vehicles (goods wagons/freight cars) and those which are "fixed", usually referred to as its infrastructure. This category includes the permanent way (tracks) and buildings (stations, freight facilities, viaducts and tunnels) (Wikipedia Foundation, 2009). The operation of the railway is through a system of control, originally by mechanical means, but nowadays more usually electronic and computerized. Signalling systems used to control the movement of traffic may be either of fixed block or moving block variety. Most blocks are 'fixed' blocks, that is, they delineate a section of track between two defined points. On timetable, train order, and token-based systems, blocks usually start and end at selected stations. On signalling-based systems, blocks usually start and end at signals. Alternatively, cab signalling may be in use. The lengths of blocks are designed to allow trains to operate as frequently as necessary. A lightly-used branch line might have blocks many kilometres long, whilst a busy commuter railway might have blocks a few hundred metres long.

Disadvantage of fixed blocks is that the faster trains are permitted to run, the longer the stopping distance, and therefore the longer the blocks need to be. This decreases a line's capacity. With moving block, computers are used to calculate a 'safe zone', behind each moving train, which no other train may enter. The system depends on precise knowledge of where each train is and how fast it is moving. With moving block, lineside signals are not provided, and instructions are passed direct to the trains. It has the advantage of increasing track capacity by allowing trains to run much closer together. Most rail systems serve a number of functions on the same track, carrying local, long distance and commuter passenger trains, and freight trains. The emphasis on each varies by country. Some urban rail transit, rapid transit and light rail systems are isolated from the national system in the cities they serve. Some

freight lines serving mines are also isolated, and these are usually owned by the mine company. An industrial railway is a specialized rail system used inside factories or mines. Mountain railways are usually isolated, with special safety systems (Wikipedia Foundation, 2009).

Most public transport passenger operations happen in the train station and in the passenger car. The passenger buys a ticket, either in the station, or on the train (sometimes at a higher fare). There are two ways of validating a ticket. In one case the passenger validates the ticket himself (by perforating it, for instance) and this is randomly checked by a ticket controller. A conductor checks all persons on the train, validates the ticket and devaluates it, so it cannot be used again. Some passenger cars, especially in long distance high speed trains have a restaurant or bar. In recent times, train catering has been diminished somewhat by vending machines in the train station or on the train. When not in use, passenger cars are stored, maintained and repaired in coach yards.

Freight or cargo trains are loaded and unloaded in intermodal terminals (also called container freight stations or freight terminals), and at customer locations (e.g. mines, grain elevators, factories). Intermodal freight transport utilizes standardized containers which are handled by cranes. Along their routes, freight trains are routed through rail yards to sort cars and assemble trains for their final destinations, as well as for equipment maintenance, refueling, and crew changes (Wikipedia Foundation, 2009). Within a freight yard, trains are composed in a classification yard. A unit train (also called a block train), which carries a block of cars all of the same origin and destination, does not get sorted in a classification yard, but may stop in a freight yard for inspection, engine servicing and/or crew changes.

In Nigeria, studies based on rail transportation are many, for example Buchanan and Pugh (1955) and Omiunu (1981) studied the development of the rail system in Nigeria with emphasis on its role in the development of the nation. Olanrewaju (1986) studied the rail traffic administration in Nigeria, Jakpa (1977) and Igben (1977) studied its problems and its prospects. Others who have x-rayed the rail transport in Nigeria are Iwayemi (1987), Babalola (1989) who studied the engineering and rail traffic, Olanrewaju (1986) and Oyekunle (1988) studied freight traffic. Agunloye, (2008) studied the rail transport service in Lagos metropolis with emphasis on its terminal facilities, operations, patron's perceptions and challenges. The rail track network and track system is another major component influencing the viability efficiency and the strategic relevance of rail system in national development.

For example, the rail's narrow gauge tracks in Nigeria covers two major rail lines: one connects Lagos on the Bight of Benin and Nguru in the northern state of Yobe; the other connects Port Harcourt in the Niger Delta and Maiduguri in the north eastern state of Borno. Years of

Table 1. Passengers' weekly trip frequencies.

No of trips	Frequency	Percent
1-2 times	18	8.6
3-4 times	21	10.0
5-6 times	19	9.0
7-8 times	12	5.7
9-10 times	113	53.8
11-12 times	27	12.9
Total	210	100.0

neglect and lack of investments have severely hampered the capacity of the rail network to act as a mass transit vehicle. As part of its plans to revitalise the nation's railways, the government is seeking to privatise the Nigerian Railway Corporation (NRC). Under the privatization plan, the government will grant concession to private sector companies, who would be expected to provide train service and maintain the infrastructure. Three separate concessions of 25–30 years are expected to be given out for the western, central, and eastern regions (Obi, 2009). This was eventually contracted at the initial stage and consequently paused as a result of some political intricacies in 2009.

Also as stated by Cullingworth (1974) "the train service variables are safety of service, cost of service, accessibility of service, reliability of service, efficiency of service and the comfortability of service". Fadare and Omole (1991a) observed that, the variables that determine the quality of rail passengers services are smoothness of the ride, cleanliness of the train, and train's time of arrival at stations.

The study area

The Lagos railway started under the management of the Nigeria Railway Corporation in 1896, with its terminus at Iddo. The railways in Nigeria are regulated and operated by the Nigerian Railway Corporation, which was established by the government in 1955. It inherited a rail network, from British Colonial masters, which was designed in a north to south fashion to facilitate the flow of goods, such as groundnuts, cocoa and cotton, from the inlands to the coast, where they were shipped to Britain (Obi, 2009). Road network development started in the second half of the 19th century with the initial opening up of the Marina. The administration of Governor Glover opened up the Broad Street in Lagos. He also linked up the then Victoria Street (now Nnamdi Azikwe Street) with the Mainland in 1866. By 1900 the city had about 15 kilometers of road over which horse drawn carriages were pulled. By 1956 two main arterial roads of greater Lagos had become prominent links with the hinterlands.

They are the Ikorodu road and Agege motor road

both of which run in north-south direction with the Agege motor road running parallel with the railway line.

During this period, Nigeria's single-narrow-gauge railway line was constructed and for many years was the only mode of freight movement between the northern and southern parts of the country. The current rail network consists of 3,505 km of narrow gauge tracks and 276 km of standard gauge tracks which connect Ajaokuta, when the country's steel mill is located to Warri, a major oil city and transit point for goods through its port (Delta Ports).

METHODOLOGY

The data for this study were obtained through questionnaire administration. Questionnaires were administered with the total number of passengers on board between the origin (Iddo) and destination (Agbado) of the particular trip covered by the study. Each train wagon has an average of ten coaches, each having a seating capacity for 90 passengers thus; the total number of passengers is about nine hundred (900) excluding the standing passengers. The standing passengers per coach were about 20 passengers. Consequently, about 200 standing passengers were on the train. This put the sample frame (the train passengers) as one thousand, one hundred passengers. A sample size of 20% was used for this study. This translates to two hundred and twenty passengers and this represents the total number of questionnaires that were administered, using twenty field officers.

However, two hundred and ten questionnaires were duly completed and retrieved from the passengers. This eventually puts the sample size at 19.1%. Since there is no pre-determined working population for the study area, the purposive sampling technique was used for the questionnaire administration. Thus, 210 were purposively selected from the passengers on board in all the ten coaches of the train. Descriptive and inferential statistics were used for data analysis in this study. The descriptive analysis includes simple statistical analytical tools like frequency tables. The inferential statistics used entails the use of correlation analysis. The correlation analysis was used to explain the relationship between train service variables (influencing factors) and passengers' patronage using the SPSS data analyses software programme.

DATA ANALYSIS

The issues analysed evolves through the descriptive and inferential analysis. The descriptive variables are weekly trip frequencies, observed arrival time of trains at stations, observed smoothness of ride and observed level of cleanliness in the trains. The inferential results encompass correlations of determinants with the patrons' trip frequency and matrices of the correlations of determinants.

Weekly trip frequencies

As shown in Table 1, passengers who make between 9 and 10 trips per week are the majority 113 (53.8%) and those who make 11 to 12 trips per week follows with 27 (12.9%). The train patrons who make less than 9 trips per week jointly accounts for about 70 (33%) of the week jointly accounts for about 70 (33%) of the passengers.

Table 2. The train arrival time, smoothness of ride and cleanliness in the train.

Rating	Train arrival time		Smoothness of ride		Cleanliness in the train	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Very good	18	8.6	20	9.5	19	9.0
Good	20	9.5	22	10.5	21	10.0
Fair	64	30.5	75	35.7	64	30.5
Poor	77	36.7	66	31.4	73	34.8
Very poor	31	14.8	27	12.9	33	15.7
Total	210	100.0	210	100.0	210	100.0

This suggests that, most of the passengers made more trips per week and are likely to depend more on train other than other modes of transport in the study area.

Observed arrival time of trains at stations

Based on Table 2, the patrons who observed the nature of the time of arrival as very good was 18 (8.6%), 20 (9.5%) perceived it good, 64 (30.5%) observed the train time of arrival as fair, 77 (36.7%) of the respondents (train patrons) stated it as a poor state while 14.8% of the patrons observed the state of the arrival time of trains at stations as very poor. This study indicates that, 51.5% of the train patrons in metropolitan Lagos observed that, the nature of the arrival time of train is not predictable. This study suggests that, only a minority (18.1%) of the train patrons in Lagos metropolis observed the nature of the arrival time as good.

Observed smoothness of ride

The study as shown in Table 2, considered the smoothness of train ride on board. The patrons who consider the smoothness of ride as very good was 9.5%, those who considered the ride as a good amounts to 22 (10.5%), 75 (35.7%) of the patrons observed the smoothness of service as fair, 66 (31.4%) of the train patrons observed the service as poor while 27 (12.9%) of the respondents observed smoothness of ride as very poor. This shows that 168 (80%) of train patrons in Lagos metropolis observed the smoothness of train ride as ineffective and inadequate.

Observed level of cleanliness in the trains

The study revealed as shown in Table 2 that, 19 (9.0%) of the respondents opined the level of cleanliness as very good. 21 (10.0%) opined that the level of cleanliness as good, 64 (30.5%) of the respondents observed the level of cleanliness to be fair, 73 (34.8%) of the patrons observed the nature of cleanliness in the train as poor

while 15.7% observed the cleanliness in the train as very poor. Based on the study, the level of cleanliness in the trains leave much to be desired as only 40 (19.0%) of the respondents commended the cleanliness of the coaches particularly the toilets. This study indicates that, majority of the respondents 170 (81%) rated the cleanliness of the coaches as poor and inadequate.

Correlations of factors influencing the patrons' trip frequency

Based on the Pearson's Product Moments Coefficient, the result of the correlation through the SPSS, as shown in Table 3, indicates that, only the arrival time of trains at stations has a significant relationship with the patrons' trip frequency out of the various factors of influence. This analysis suggests that, the better the arrival time of trains at stations, the higher the trip frequency of train patrons in Lagos metropolis. The strength of this relationship is a positive low relationship ($r = .124, p > 0.05$).

Matrices of the correlations of factors influencing the quality of rail transport services

This study from Table 4 identifies the significant determinants based on matrices of correlation as weekly trip frequency of train patrons, arrival time of trains at stations, smoothness of ride and the cleanliness in the train. This study indicates that, there is a weak positive relationship between the arrival time of trains at stations and trip frequency. This explains that, the more efficient the train arrival time the more the trips that would be made by train patrons.

There is a strong positive relationship between smoothness of ride and the arrival time of trains ($r = 0.877, p > 0.01$). This suggests that the better the arrival time of trains at stations, the more convenient the ride would become. However, both the smoothness of ride and the arrival time of trains are on the same direction. This explains that the patrons' time will not be wasted, value for their money will appreciate and more passengers are likely to join the mode and at a point in

Table 3. Correlations of train services' determining factors with the patrons' trip frequency.

		Passengers' patronage
Weekly trip frequency	Pearson correlation	1
	Sig. (1-tailed)	
	N	210
Arrival time of trains at stations	Pearson correlation	0.124(*)
	Sig. (1-tailed)	0.037
	N	210
Smoothness of ride	Pearson correlation	0.076
	Sig. (1-tailed)	0.137
	N	210
Cleanliness of the train	Pearson correlation	0.056
	Sig. (1-tailed)	0.208
	N	210

* Correlation is significant at the 0.05 level (1-tailed). ** Correlation is significant at the 0.01 level (1-tailed).

Table 4. Matrices of the Correlations of influencing factors

		Weekly trip frequency	Arrival time of trains	Smoothness of ride	Cleanliness of the train
Weekly trip frequency	Pearson correlation	1	0.124(*)	0.076	0.056
	Sig. (1-tailed)		0.037	0.137	0.208
	N	210	210	210	210
Arrival time of trains at stations	Pearson correlation	0.124(*)	1	0.877(**)	0.731(**)
	Sig. (1-tailed)	0.037		0.000	0.000
	N	210	210	210	210
Smoothness of ride	Pearson correlation	0.076	0.877(**)	1	0.828(**)
	Sig. (1-tailed)	0.137	0.000		0.000
	N	210	210	210	210
Cleanliness of the train	Pearson correlation	0.056	0.731(**)	0.828(**)	1
	Sig. (1-tailed)	0.208	0.000	0.000	
	N	210	210	210	210

* Correlation is significant at the 0.05 level (1-tailed). ** Correlation is significant at the 0.01 level (1-tailed).

the smoothness will be more appreciated.

There is a positive strong relationship between arrival time of trains and cleanliness within the train ($r = 0.731$, $p > 0.01$). This indicates that both the arrival time of trains and cleanliness in the train as determining factors are on the same direction. This suggests that, the better the arrival time of trains, the cleaner it becomes simply because there will be a reasonable time for the train workers (cleaners) to tidy up the trains in case of any left over in the previous trip and this will be done before the

departure time. As a result, the cleanliness improves to a reasonable state.

There is a strong positive relationship between the smoothness of ride and cleanliness within the train ($r = 0.828$, $p > 0.01$). This indicates that both smoothness of ride and cleanliness within the train as determining factors are on the same direction. This study however suggests that, the more efficient the cleanliness within the train, the more the smoothness of ride will improve because of the possible convenience that would have

evolved as a result of the clean environment.

Conclusion

This paper has examined the user's opinion on the factors influencing the quality of rail service passengers operation in metropolitan Lagos. It also evaluates the relationships that subsist between the variables of the factors influencing the quality of rail passengers' services. The paper concludes that, most of the passengers make higher trips per week and are likely to depend more on train than other modes. Only a minority (18.1%) of the train patrons in Lagos metropolis observed the nature of the arrival time as good. The study also confirmed that 80% of the train patrons in Lagos metropolis observed the smoothness of train ride as ineffective and inadequate. The study also implies that, majority of the respondents (81%) rated the cleanliness of the coaches as poor and inadequate.

Recommendations

Based on these research findings, it was observed that, train passengers in Lagos experienced inconvenience during their patronage, especially between the origin and destination of individual trips. These inconveniences entail the uneasy status of getting to the precise train stations and the comfort within. In order to ameliorate this problem in the intra city rail transport services, there should be a provision of conveniences' gadgets such as television, radio, video player and video C.D. player in order to improve smoothness of ride so as to relieve the stress experienced by the passengers, thereby enhancing the quality of rail service and attracting more train patrons.

The Nigeria Railway Corporation should encourage its marketing and research departments in order to carry out frequent researches on the passengers' services from time to time to be able to keep abreast of the patrons' desire and the market forces affecting their demands (Fadare and Omole, 1991). The research department being a data bank, will be able to design policy guidelines regarding traffic flow, quality of service, fare structure which are capable of improving rail services and ridership.

A research based transport study should be conducted on passengers' trip characteristics at reasonable intervals in order to know and analyse the train's travel time table. This time table should be reviewed at regular interval so as to improve the rail quality in order to attain more efficient daily movement and arrival of train. Departure time must be fixed to a time which is about 15 min before the schedule, in order to facilitate the train getting to most destinations during the day as much as possible.

Since it has been established that, the level of

cleanliness as rated by the patrons was observed in the train as a poor state and the fact that the cleanliness in the trains leave much to be desired as only a few of the respondents commended the cleanliness of the coaches particularly the toilets, this paper however recommends that, the coaches particularly the toilets must be kept clean from time to time so as to attract more patrons and improve the quality of the rail transport service in metropolitan Lagos.

REFERENCES

- Adeniji K (1983). Nigerian Municipal Bus Operations' Transportation. Quarterly. 37(1): 135-143.
- Adeniji K (1987). Para transit modes in Nigeria: problems and prospects. The Int. Quarterly on Urban Policy. 37(1): 135-143.
- Agunloye OO (2008). Assessment of Rail Transport Services in Lagos metropolis. An unpublished MSc. Thesis. Univ. Lagos. Akoka-Yaba, Lagos.
- Ayeni B (1999). Concepts and Techniques in Urban Analysis. Croom Helm Ltd. London.
- Babalola A (1989). Estimating the expected additional cost borne by each patron of an unreliable rail transport; a paper presented at a conference of NIIT, Lagos.
- Buchanan H, Pugh JC (1955). Land and People in Nigeria, the human geography of Nigeria and its environmental background, university of London press ltd, London.
- Cullingworth JB (1974). Problems of an Urban Society. The Social Framework of Planning. Vol. 1, George Allen and Unwin Ltd: London.
- Daramola B (2004). 'public transport and the survival of Nigerian cities: A call for value reorientation' NISEREEL Magazine of the Nigerian institutes of social and economic research) 6: 36-39.
- Fadare SO, Omole T (1991). Assessing the quality of rail passengers services.the case of Nigerian Railway Corporation. Ilorin J. Bus. Soc. Sci. 36-42.
- Igben M (1977). The Nigerian Railway Corporation. A liability or an assets Onakomaiya and Ekanem (eds). Transport. Niger. Natl. Dev., p. 90-98.
- Iwayemi A (1987). "Rail Transport in Nigeria Issues and Public Policy in Nigeria". J. Econ. Soc. Stud., 29(1): 77-93.
- Jakpa P (1977). Nigerian railway in the 1980's in Onakomaiya SO, Ekanem NP (eds). Transportation in Nigeria National Development, NISER Publication, Nigeria.
- NISER (2003). Understanding Poverty In Nigeria. NISER review of Nigerian development 2001/2002. NISER and SISERA.
- Obi I (2009). The New Nigeria '12 Steps, economy, Nigeria, railways, transportation'
- Olanrewaju SA (1986). Transport Systems in Nigeria, p. 31-50.
- Omiunu FO (1981). 'The role of transportation in nation building: the case of Nigeria railways' Nigerian magazine, 137: 3-16.
- Oyekunle EO (1988). The role of the Nigerian Railways in Integrated National Transport Development with reference to freight and passenger movements. The conference on transport technology. Nigerian institute of transport technology, Zaria.
- Oyesiku OK (2002). From Womb to Tomb. 24th Inaugural Lecture, Olabisi Onabanjo University. Ago Iwoye. August 27, 2002.
- Transport Studies Unit (TSU) (2002). Traffic management in the federal capital city (Abuja) and its Environs. Final report prepared for the federal ministry of transport. Abuja.
- Wikipedia Foundation (2009). A United States Registered 501, (c) (3) tax
- World Bank (2006a). 'Equity and Development' world development report 2006. World Bank, Washington D.C. USA and Oxford Univ. Press.
- World Bank (2006b). Report on Nigeria: Urban Transport in Crisis, Washington, D.C.