

THE INVESTIGATION OF THE NEED FOR DEVELOPMENT OF BUS RAPID TRANSIT FOR ABUJA, NIGERIA

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ABSTRACT

Due to delays and congestion during peak hours caused by inefficient and improper planning of the transportation system, which contributed to losses of man hours and subsequent negative effects on the economy, this research seeks to investigate the possibility of the use of modern Bus Rapid Transit for Abuja, Nigeria. Convenience sampling was adopted as a sampling technique, using questionnaires as an instrument. Questionnaires were distributed to four different groups, including a pilot study. Both IBM SPSS and Microsoft Excel performed statistical analyses on the data. The results of the investigation have shown that there is a need for the government to introduce congestion and parking charges to private car users with single occupancy to reduce traffic congestion through the government adoption of the Bus Rapid Transit transportation system through systematic planning. Additionally, the government should make public transport safe, secure, effective, accessible, and comfortable to all strata of social life. The study recommends that bus rapid transit should be introduced with dedicated lanes and transit priority signals, and also the government should boost the generation of electricity to fully gain the impacts of bus rapid transit systems; finally, the public should be encouraged to use non-automobiles such as walking and cycling.

Keywords: Bus rapid transit, modal shift, dedicated lanes and transit signal priority

1 INTRODUCTION

The Institute of Transportation and Development Policy (ITDP) defines BRT as “a high-quality bus-based transit system that delivers fast, comfortable, and cost-effective urban mobility through the provision of segregated right-of-way infrastructure, rapid and frequent operations, and excellence in marketing and customer service” [1]. But the Federal Transit Administration defines it as “a rapid mode of transportation that can combine the quality of rail transit and the flexibility of buses [2]. Nigeria is bewildered with transportation problems. The mainly transport system is the road, the rail transport has been in despair and measures has just been taken to rectify it. A research [3] concluded that greater than 90 per cent of the transportation of passengers and goods in Nigeria is through the road transport. The Federal Government planned for a new capital city as a result of congestion and delays in Lagos and created a new

capital on 3rd February, 1976 and finally moved to Abuja, the new Federal Capital Territory in 1991. This created long delays and congestion during the peak hours of 7.00 a.m. and 4.00 p.m. Nigeria lies between 4° 16' and 13° 53' north of the equator and 2° 40' and 14° 41' east of the longitude with an area of 923,768 square kilometers. By 2006 census, Nigeria has a population of 140,431,790 [4] and a population growth rate of 6.48 percent [5]. It is the largest black-coloured country in the world and the largest country in Africa. In term of land mass, Nigeria is ranked fourteenth in Africa. Nigeria is Africa's second largest economy after South Africa [6]. Petroleum contributes more to the gross domestic product (GDP) at 38.8 percent and followed by agriculture at 32.5 % [7]. Nigeria has thirty-six states and a Federal Capital Territory sited in Abuja with 774 constitutionally accepted local government areas.

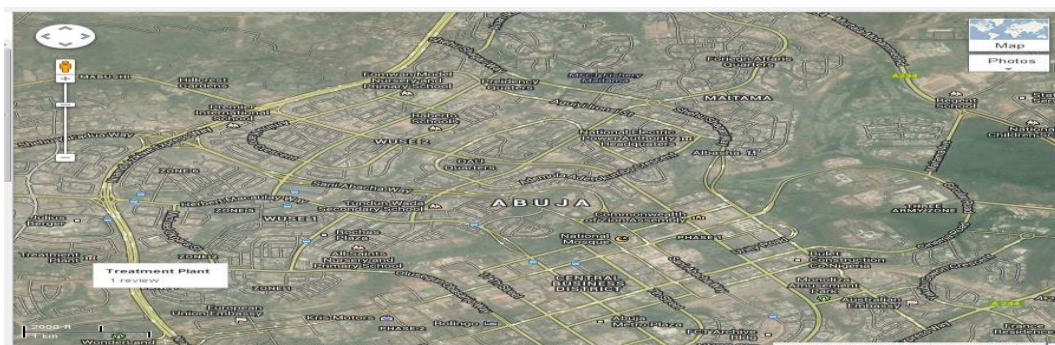


Figure 1. Map of Abuja showing routes (Source: Google map)

As early as 1937, some bus priority measures such as designated bus-ways and bus lane were implemented all over the world [8]. But the term ‘bus rapid transit’ or in short form ‘BRT’ was originally used in the study conducted for the American Automobiles Association by Wilbur Smith and Associates in 1966 [9]. The bus rapid transit system started in Curitiba, Brazil in 1963 [10]. Some of the advanced bus rapid transits are found in the developing countries like Curitiba and Sao Paulo, Brazil; Bogota and Cali, Columbia; Santiago, Chile; and Lima, Peru [8, 11, 12]. The Federal Capital City, Abuja, has been expressing the movement of people from other parts of the country and around the world since its creation in 1976 and final movement of the Federal Government in 1991. It has grown as Administrative, Commercial and Educational Centres. It is about 8,000 square kilometers and the neighbouring boundaries are Niger, Kaduna, Plateau, Kwara and Kogi States. Traffic congestion, delays, and CO₂ emissions has been on the increase which are dangers to human and environmental health and economic growth. The only mode of transportation within the city is by road, except for those travelling outside could use the International and Local Airports. The more road infrastructure built the more the vehicles plying the road. Therefore, the researcher is advocating the development of bus rapid transit as a way forward. The bus terminal in Abuja is not well planned for a new and busy capital city for a growing and vibrant nation like Nigeria [13]. To reduce the problems of congestion and delays, a thorough research will be carried out on people perception on public transport. This research will make a sound argument for the development of bus rapid transit system for Abuja. The general aim of the research is to investigate the need for the development of a bus rapid transit for the city of Abuja with a view to reducing the congestion, delays and man-hour lost during the journey and the objectives are to conduct a critical review of public transport in Abuja and other parts of Nigeria and to develop a conceptual framework based on the theory and collect data of all the factors responsible for congestion and delay and use available techniques for measuring them.

2 METHODOLOGY

The methodology that was adopted for this research was the quantitative approach [14, 15]. Questionnaires which was the instrument used were distributed to four groups of participants and their perception sought over public transport in Abuja. Convenience sampling technique was adopted based on the willingness of the participants to participate in the study and their privacy protected.

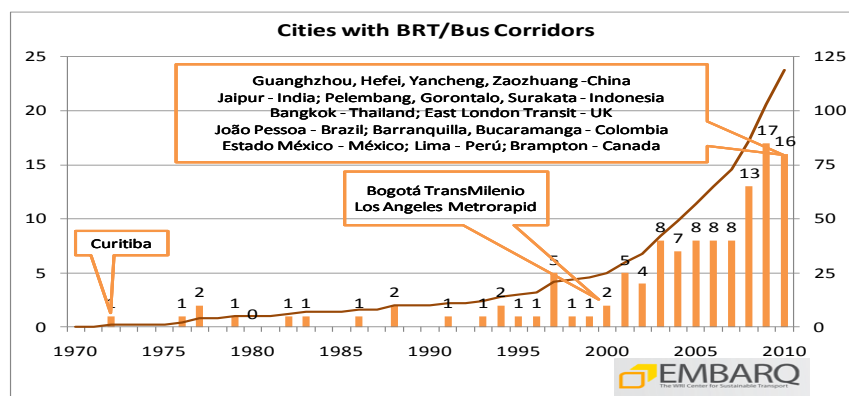


Figure 2. Cities with BRT and bus corridors [8]

The World BRT Data [16] reported that there are 27,136,154 passengers per day in 158 cities with a distance of 4.077 kilometres of road length. The table below shows the indicators by continents:

Table 1. Difference between BRT lite and BRT exclusive [1]

BRT LITE	BRT EXCLUSIVE
Mixed traffic	Dedicated right of way
Queue jumps	Signal priority
Skip stops	Larger fixed stations

2.1 Road Infrastructure In

[17] researching on the effect of government expenditures on economic growth observed that “government expenditures on health services, transport and communication impacted negatively on growth while expenditures on agriculture and security were not significant in the economy”.

2.2 Congestion and Decongestion of Road Transport

OECD [18] defines congestion as “the impedance vehicles impose on each other, due to the speed-flow relationship, in conditions where the use of a transport system approaches capacity”. Dhaka, Bangladesh, this city’s traffic is “one of the most chaotic ones in the world” [19]. So, to reduce the traffic jam the researcher suggested that the government need “construction of roads through east-west connection of Dhaka’s city, grade separated road network systems, bus rapid transit (BRT) systems and Metro-rail system” [19].

2.3 Required Data

There are many methods in producing data [20]. And Creswell [15] stated that research design is usually known through the research topic, its aims and objectives, the nature of essential evidence and also the accessibility to such data or evidence. Therefore, data had to be verified to justify and achieve the objective of the study.

2.4 Research Strategy

There are three methods in carrying out research namely: Quantitative approach, Qualitative approach, and Mixed methods. The quantitative approach is objective in nature whereas qualitative method is subjective. Mixed method combines the characteristics of both the quantitative and qualitative methods. For quantitative approach, statistical analysis had to be carried out. Amaratunga [21] and Naoum [14] agreed that qualitative approach is comprehended to be wise in making research in the real world. Mixed

method uses both the quantitative approach and qualitative approach [15]. Quantitative method of research will be used in this study has data will be analysed using both Microsoft Excel and IBM SPSS (International Business Machine's Statistical Package for Social Science).

2.5 Use of Questionnaire

Four sets of close-ended questionnaires were administered to get and gain public opinion. The questionnaires were designed to have background information of the respondents, the types of modes of transportation, the purpose of using it, whether they will shift to public transport, and ranking of the public transport system in Abuja.

3 RESULTS AND DISCUSSION

Q1 represents the pilot study group; Q2 represents the private car drivers' group; Q3 represents the public transport commuters' group; and Q4 represents the public transport drivers' group.

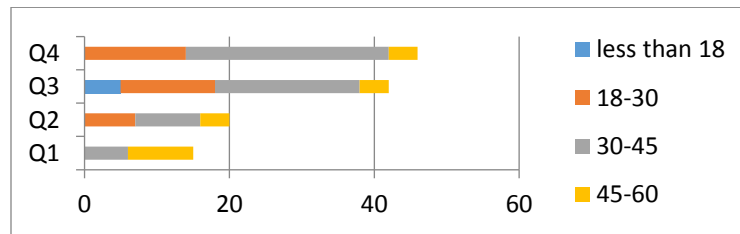


Figure 3. Ages in years

In Figure 3, less than 18 years were 11.9 % in Q3 but none in the rest, this is because people of that age are not permitted to drive vehicles by law. The 18-30 age groups had 40 in Q1, 35 in Q2 31 in Q3 and 29.8 in Q4. While the age group 30-45 were 45 % in Q2, 47.6 % in Q3 and 59.6 % in Q4; majority of the public drivers are always in this group. 45-30 age group had 20 % in Q2, 9.5 % in Q3 and 8.5 % in Q4. Finally, above 60 years only available in Q4 with 2.1 60 %. But the Q1 featured 30-60 age groups with 60 %.

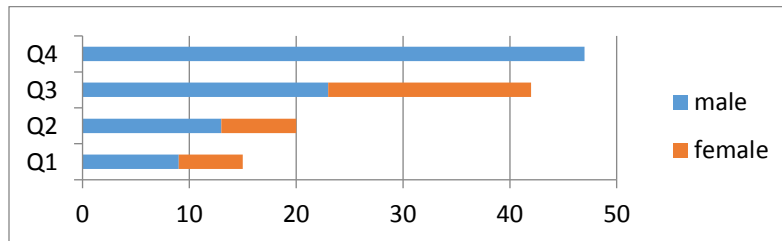


Figure 4. Gender

Figure 4 showed the gender questionnaire, the male to female ratio were 40 to 60 in Q1, 65 to 35 in Q2, 54.8 to 45.2 in Q3, and 100 to 0 in Q4. This is single male in Q4, that is, public transport drivers' group, the main reason is that public driving is seen culturally as male job in Nigeria.

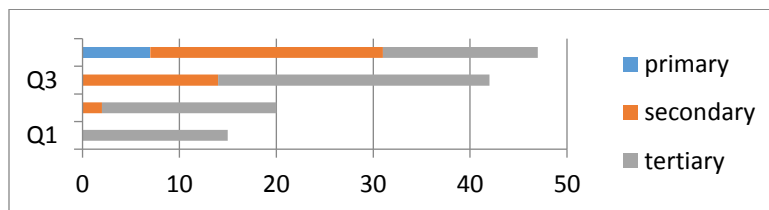


Figure 5. Education level

In Figure 5, all the people interviewed for the pilot group (Q1) all had tertiary education, with 90% in Q2, 66.7% in Q3 and 34% in Q4; also, 14.9% had primary education only in Q4. Those that had secondary school education were 10% in Q2, 33.7% in Q3 and 51.1% in Q4.

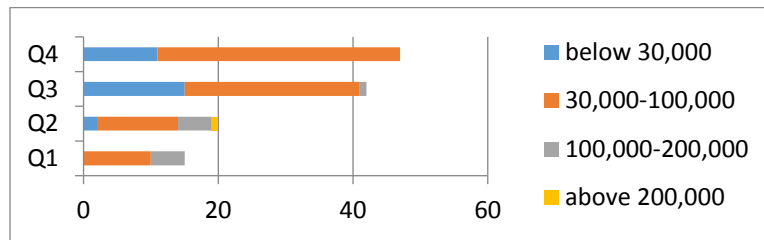


Figure 6. Personal income in Naira

In Figure 6, respondents with personal income below Naira 30,000 were 10 % in Q2. , 35.7 % in Q3 and 23.4% in Q4. But that between Naira 30,000 to 100,000 were 66.7% in Q1, 60 % in Q2, 61.9 % in Q3 and 76.6 % in Q4. While that between Naira 100,000 to Naira 200,000 were 33.3% in Q1, 25% in Q2, 2.4% in Q3, and 76.6% in Q4. Finally, personal income above Naira 200,000 only 5% in Q2.

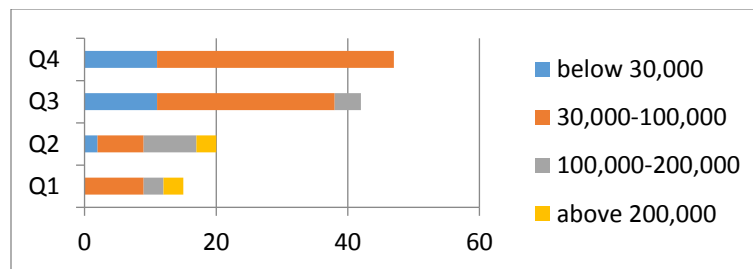


Figure 7. Family income in Naira

In Figure 7, respondents with family income below Naira 30,000 were 10 % in Q2. , 64.3% in Q3 and 23.4% in Q4. But that between Naira 30,000 to 100,000 were 60% in Q1, 35% in Q2, 64.3% in Q3 and 76.6% in Q4. While that between Naira 100,000 to Naira 200,000 were 20% in Q1, 40% in Q2, 9.5% in Q3, and 76.6 % in Q4. Finally, personal income above Naira 200,000 20 % in Q1, and 15 % in Q2.

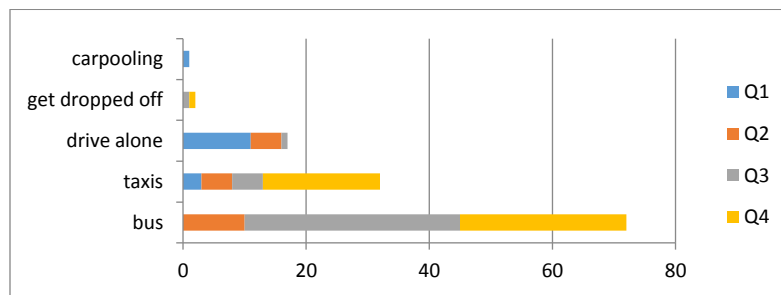


Figure 8. Transport modes

Figure 8 represents the modes of transportation taken by the respondents, and bus were 50 % in Q2, 83.3% in Q3, 57.4 % in Q4. Those that went with taxis were 20 % in Q1, 25 % in Q2, 11.9 % in Q3 and 40.4 % in Q4. That of carpooling was 6.7 % in Q1 only. While for drive alone were 73.3 % in Q1, 25 % in Q2, and 2.4 % in Q3. Get dropped off were 2.4 % in Q3 and 2.1% in Q4. Majority of the public commuters used bus as mode than any other means, and the private car drivers were majorly single-occupancy driving.

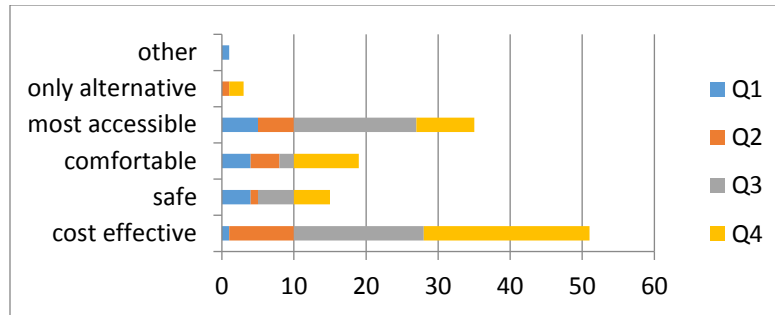


Figure 9. Reason for transport mode

Reason for using the choice transport modes is in Figure 9; cost effective was 6.7 % in Q1, 45 % in Q2, 42.9 % in Q3 and 48.9 % in Q4. Safe option was 26.7 % in Q1, 5 % in Q2, and 10.6 % in Q4. Comfortable was 26.7 % in Q1, 20 % in Q2, 11.9 % in Q3 and 19.1% in Q4. Most accessible was 33.3 % in Q1, 25 % in Q2, 4.8 % in Q3 and 17 % in Q4. Only alternative option was in 40.5 % in Q3 and 4.3 % in Q4. Other reason not stated in questionnaire was 6.7 % in Q1.

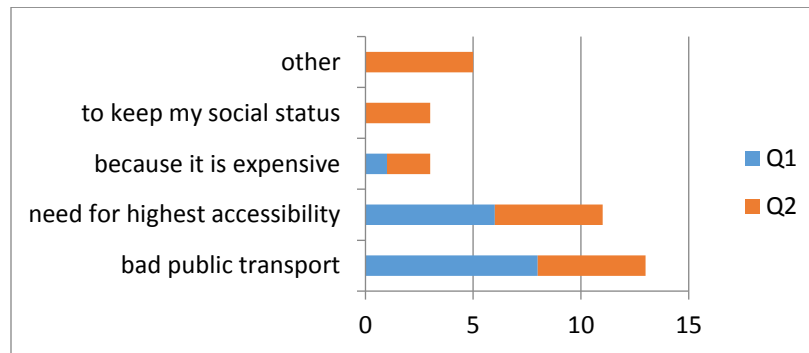


Figure 10. Reason for driving car

Figure 10 shows the reason why private car drivers used their cars. Because of bad public transport was 53.3 % in Q1 and 25 % in Q2. Need for highest accessibility was 40 % in Q1 and 25 % in Q2. Because it is inexpensive were 6.7 % in Q1 and 10 % in Q2. To keep my social status and other reason not stated were 15 % and 25 % in Q2 respectively. This is show that the private car users used their cars because of bad public transport.

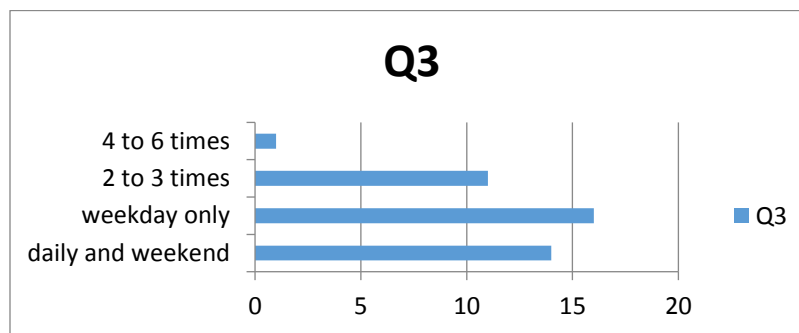


Figure 11. Bus usage by public transport commuters

The numbers of time in a week of using public transport is represented by Figure 11. All weekdays including weekend is 33.3 %, weekdays only 38.1 %, 2 to 3 times a week 26.2 % and 4 to 6 times a week 2.4 %.

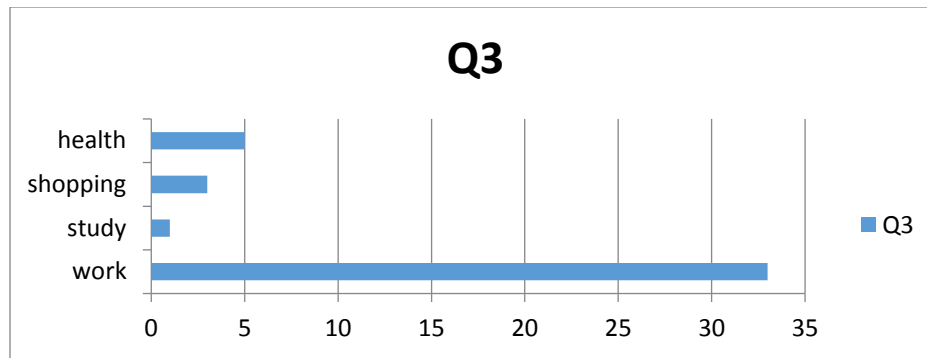


Figure 12. Bus purpose by public transport commuters

The purpose for using the public transport is shown in Figure 12. Work took 78.6 %, study 2.4, shopping 7.1 % and to attend health centres 11.9 %.

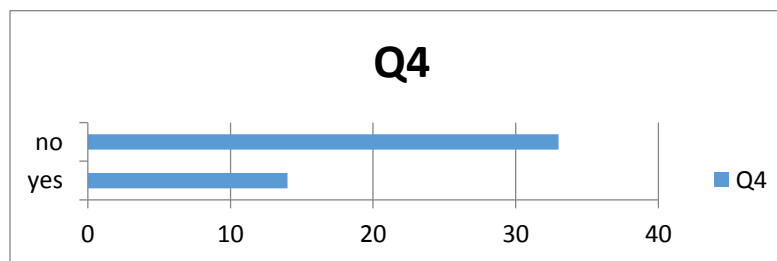


Figure 13. Ownership of bus/ taxis

Figure 13 represents ownership of bus or taxis being driven by public transport drivers. Only 29.8 % owned the vehicle.

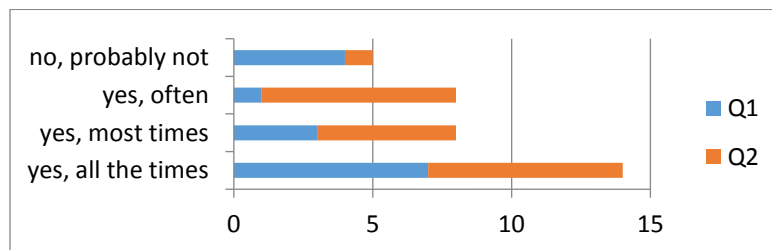


Figure 14. Modal shift of private car drivers to transit

In asking the private car drivers whether they will shift from using the cars if the public transport is comfortable, safe and efficient is shown in Figure 14. Yes at all times was 46.7% in Q1 and 35% in Q2; yes at most times was 20% in Q1 and 25% in Q2; yes but often 6.7% in Q1 and 35% in Q2; and probably not was 23.7% in Q1 and 5% in Q2.

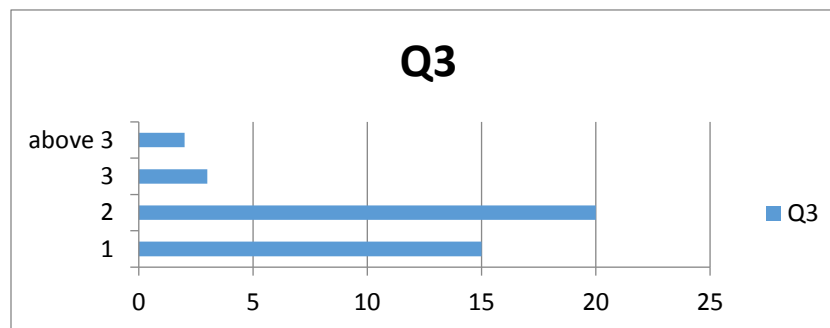


Figure 15. Per trip of transit made by commuters

Figure 15 represents the numbers per trip made by public transport commuters. The options were 1, 2, 3 and above 3 times per trip and 35.7%, 47.6%, 7.1%, and 4.8% respectively.

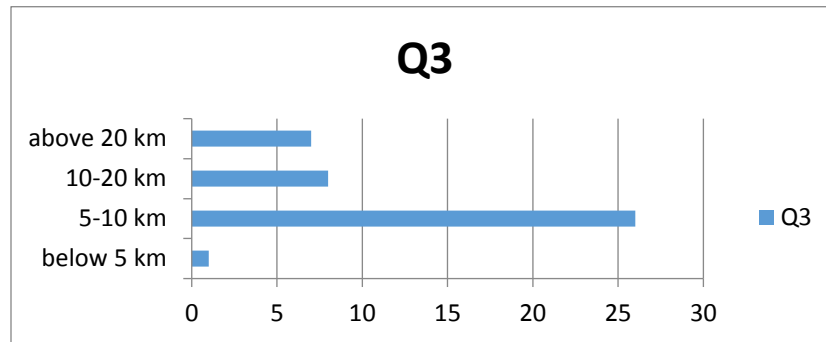


Figure 16. Journey distance covered by commuters

Figure 16 shows the distance of the journey made by commuters. The options were below 5 km, 5 to 10 km, 10 to 20 km and above 20 km and the percentage respectively were 2.4%, 61.9%, 19%, and 16.7%.

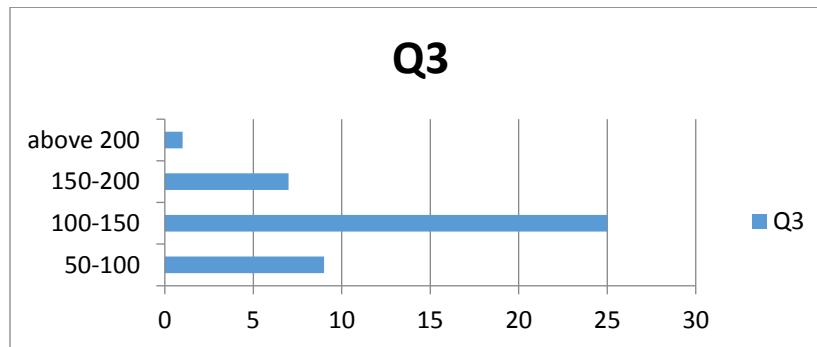


Figure 17. Payment per trip paid by commuters in Naira

Payment paid per trip on public transport is shown in Figure 17. Majority (59.5%) paid fare Naira 100 to 200 but will like to pay below Naira 50 as 61.9%.

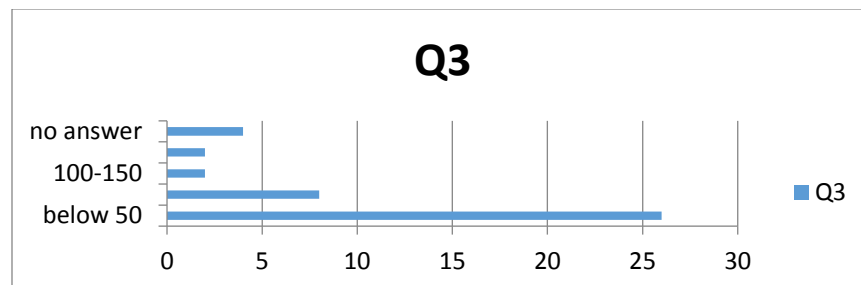


Figure 18. Payment that could be afford to pay per trip by commuters in Naira

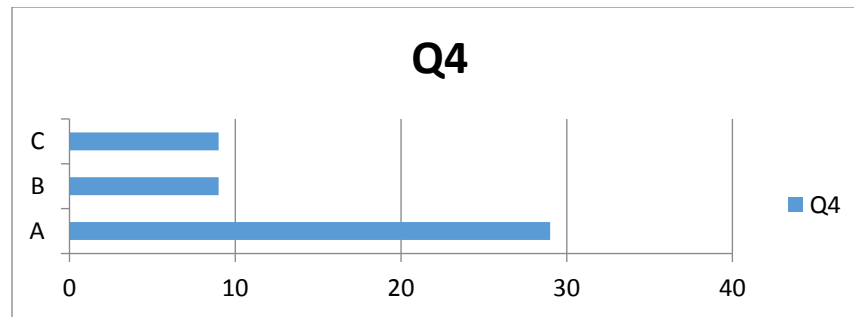


Figure 19. If *araba* bus not allowed to operate

Note: A: I will leave the city; B: I will sell my bus; and C: I will look for another job. If other type of public transport popularly called *araba* is not allowed majority of the drivers will leave the city (61.7%). This is shown in Figure 18. But as Figure 19 show that they are ready to accept employment opportunities from government agencies (76.6%).

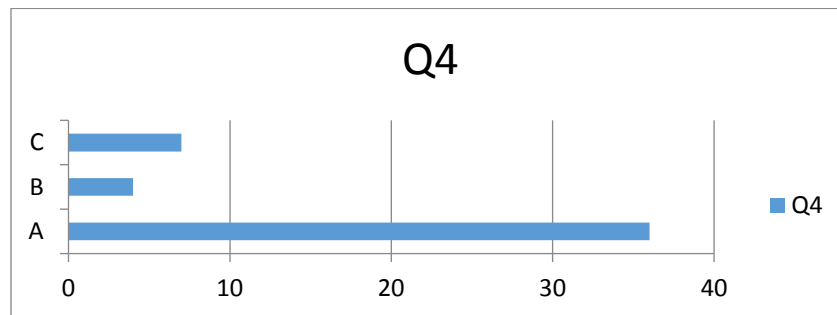


Figure 20. FCDA employment opportunity

Note: A: I will accept; B: I will not accept; and C: I will only accept if *araba* bus not allowed.

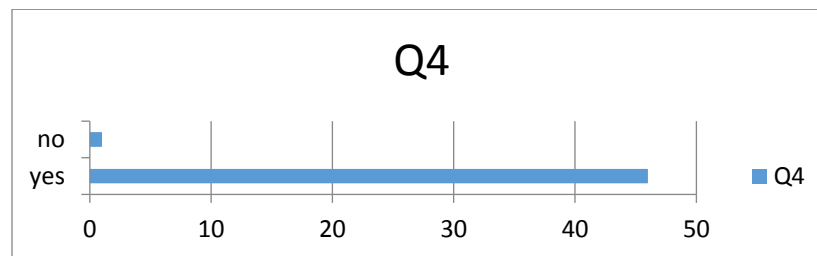


Figure 21. Whether more privately owned bus needed

97.9% wants the government to allow more privately owned buses to operate within Abuja as represented in Figure 21.

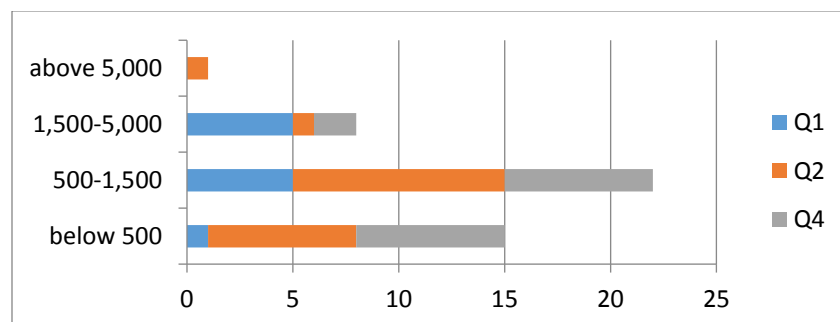


Figure 22. Fuel consumption per day in Naira

Figure 22 shows the fuel consumption per day for vehicles by both private and public drivers.

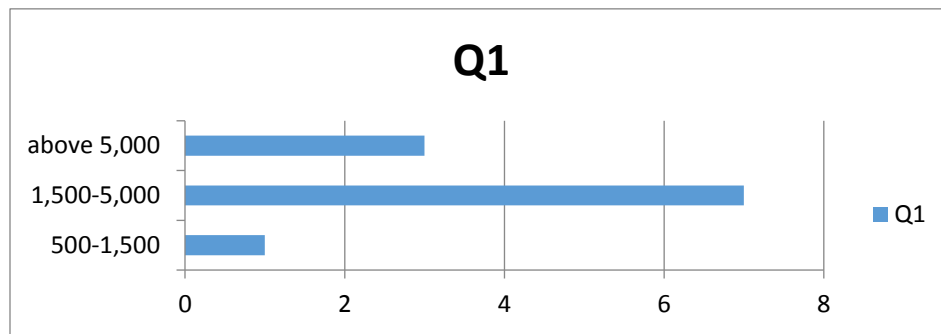


Figure 23. Maintenance of vehicle per month in Naira

Figure 23 shows the maintenance per month for vehicles by the pilot study.

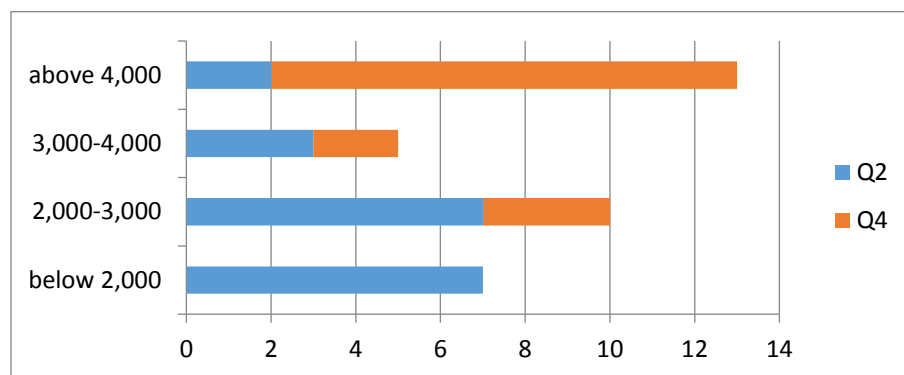


Figure 24. Maintenance of vehicle per month in Naira for Q2 and Q4

Figure 24 shows the maintenance per month for vehicles by both private and public drivers.

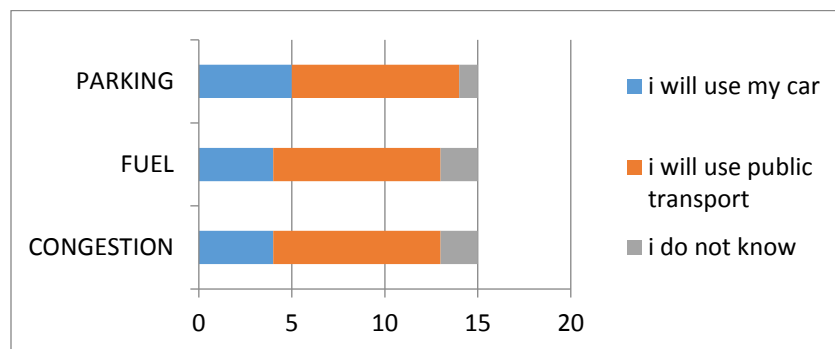


Figure 25. Congestion charges, fuel tax and parking charges for pilot study

Figure 25 represents introduction of charges for the pilot study. Options were 'I will use my car', 'I will use public transport' and 'I do not know'. For congestion charges and fuel tax the percentage respectively were 26.7%, 60% and 13.3%; while for parking charges were 33.3%, 60% and 6.7%.

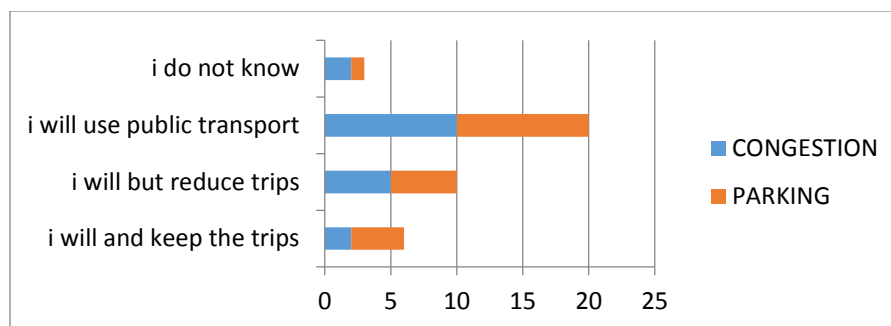


Figure 26. Congestion charges and parking charges for private car drivers

Figure 26 represents introduction of congestion and parking charges for the private car drivers. The options were 'I will and keep the numbers of trip', 'I will reduce the numbers of trip', 'I will use public transport' and 'I do not know'. The percentage respectively was 15%, 25%, 50 % and 10% for congestion charges; and 20%, 25%, 50%, and 5% for parking charges.

4 CONCLUSIONS

For Nigeria in general and Abuja in particular, to be able to experience modal shift from private cars to public transport, there is need for the government to make public transport efficient, comfortable, secure, safe, accessible and comfortable to all strata of social life. The foremost importance is the planning for a comprehensive transport policy that composed all transportation modes, such as air, land and water transportation. Since there are more than 90 % private cars in Lagos alone, there is the need for parking spaces for private car users to leave their cars and joined public transit and enough bus stops for modal integration and modal shift. Abuja, since its creation in 1976 and movement of the seat of government in 1991, has constantly experience urbanisation but has not had a well-planned bus terminal. And urbanisation will continue to increase as World Bank stated that from 33.9 % in 1960 to 52.6 % in 2012 for less developed countries like Nigeria. Non availability of other transport modes and land use resulted to greater number of trip generation that cumulate in traffic congestion. From hypothesis 2 of this study, the government should introduce congestion and parking charges to private car users with single-occupancy as to reduce traffic congestion in Abuja.

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