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Adequacy of Off-Parking Facilities in Federal University of Technology, Akure, Ondo State, Nigeria

Adeniran, Adetayo Olaniyi
Department of Transport Management Technology, Federal University of Technology, Akure, Ondo State, Nigeria

Abstract
Vehicular traffic and availability of parking space becomes more paramount when critically viewed from the level of huge investment that has been pumped to the road and infrastructural development by successive governing council of FUTA.Car parking can be defined as a situation when a vehicle is temporarily/permanently put out of use and kept in a designated place without impairing the movement of other vehicles.There is an increased shift in the number of vehicles or automobile privately and commercially owned. The consequence of this trend has led to congestion on road and excessive use of the existing car parks. FUTA community is a good example for this study. The buildings covered in the study are Entrepreneurship Building, CERAD Annex office, School of Agriculture Building, School of Engineering Building, Senate Building, Old Student Affairs, School of Postgraduate, School of Management Technology, School of Earth and Mineral Science and School of Science.From the findings, majority of the car parks are not adequate. Also, there is a statistical significant relationship between the demographic characteristics of car owners and private car ownership. As at the time of survey, it was revealed that the %, parking index for School of Management Technology is 100%; this shows that all the parking bays were occupied as at the time of survey.The recommendation in this paper for the institution revolves around three categories, which are, education, engineering and enforcement.
Keywords: Car parking, Off-Street Parking, Parking accumulation, Parking index, FUTA.

1. Introduction

Vehicular traffic and availability of parking space becomes more paramount when critically viewed from the level of huge investment that has been pumped to the road and infrastructural development by successive governing council of FUTA. In order to enhance suitable free flow of traffic, there is an increase in road capacity and provision of parks in virtually all buildings constructed in FUTA.

Car parking can be defined as a situation when a vehicle is temporarily/permanently put out of use and kept in a designated place without impairing the movement of other vehicles (Olatunji, 2016). Movement from one location to another is a fundamental need for human existence, since all his needs are not evenly distributed. This quest to solve geographic distance and interlink two ends has stimulated man over the years to create and develop mode and means of transportation; this includes road transportation (bicycle, tricycle, motorcycle, vehicle etc.) air transportation (airplane, jet etc.) water transportation (ship) (Olatunji, 2016).

Ideally, the provision of car parking facilities would regulate the supply of off street parking; hence the facility should be optimal and not under-utilized, also, on the other hand, to make sure the facility is not too little, which would result in an under-supply. When the facility is inefficient, there will be traffic congestion which might pose in-orderliness in an academic environment.

1.1 Research questions

This paper intends to find appropriate solution to the following fundamental question such as;

1. What are the causes of parking problem(s) in FUTA?
2. How adequate are the existing Off-Street parking facilities in meeting the increasing vehicle ownership in FUTA?
3. What are the measures proffered to correct the inadequacies?

1.2 Aim and objectives

The aim of this paper is to assess the adequacy of car parks in the areas listed above at FUTA. The objectives of the paper are to:

1. To assess the adequacy of car parks;
2. To determine the demographic factors of teaching staff, non teaching staff and postgraduate students in car ownership;
3. To assess the parking accumulation and parking index of car parks in various buildings.

1.3 Research hypotheses

For the purpose of achieving the aim and objectives, the following hypotheses are formulated;
H0: Off-Street Car Parks are adequate

H0: There is no significant relationship between demographic characteristics of car owners and private car ownership.

2. Theoretical framework

2.1 Urban Car Parking Model

Urban car parking model is of significance important both at the local and at the strategic level of planning. As FUTA is likened to an urban area, parking policy and supply play a major role in traffic management systems in dense urban areas. The amount and the location of parking affect, in particular, the level of service and congestion on access roads. Parking behavior is characterized by complex dynamic relationship between multi-dimensional demands, performance and supply quantities.

The most commonly used parking models related parking demand to the scale of a single land use (ITE, 1985; TANSW, 1985). The distinguishing features of the model that should be used to investigate parking policy.

3.0 Methodology

3.1 Study area

The study was conducted within the university campus of the Federal University of Technology, Akure, Ondo State, considering the following area (Entrepreneurship Building, CERAD Annex office, School of Agriculture Building, School of Engineering Building and Senate Building. The institution lies between longitudes 70E and 70451E, and latitudes 60N and 70N of the equator in Nigeria. The Federal University of Technology, Akure has a population of over 10,000 students and staff (Ewulo, 2015).

3.2 Data collection

The primary data were obtained from well-structured questionnaires and personal interview, as well as physical observation of the areas covered by parking facilities under focus. The questionnaires were administered to teaching staff, non-teaching staff and postgraduate student within the study focus.

Information collected includes their demographic variables such as the category they belong (teaching staff, non-teaching staff, postgraduate student), and strength in meeting the demand for parking space in the study areas. The respondents were randomly selected in the area such that there will be fair representative from the study areas.

The numbers of potential locations for off-street car parks were identified in the study as shown in table 1. The data used in this study includes: Car park names of the following building; Entrepreneurship Building, CERAD Annex office, School of Agriculture Building, School of Engineering Building, Senate Building, Old Student Affairs, School of Postgraduate Building, School of Management Technology Building, School of Earth and Mineral Science Building, and School of Science Building. Data on the car parks capacity was taken from the survey count. The data was shown in the table below;

Table 1: The car park names and numbers of potential locations for Off-street car parks in the selected areas.

CAR PARK NAME	**CAPACITY**
Entrepreneurship Building	28
CERAD Annex office	54
School of Agriculture Building	63
School of Engineering Building	125
Senate Building	80
Old Student Affairs	38
School of Postgraduate	19
School of Management Technology	63
School of Earth and Mineral Science	113
School of Science	73
TOTAL	**656**

Source: Author's Survey

3.3 Data analysis

The data was analyzed with the use of descriptive statistics and Chi Square test in-line with the proposed objectives and hypotheses.

4. Discussions

4.1 Availability of parking facilities

Table 2 shows that larger percentage of the respondents in the study wants to park in Off-Street Parking facility most especially for security reason. In assessing the adequacy of the Off-Street Parking facilities, in

Entrepreneurship building, the Off-Street Parking facility is adequate, in CERAD Annex office, Off-Street Parking facility is also adequate, in the School of Agriculture Building, Off-Street Parking facility is not adequate, in School of Engineering Building, Off-Street Parking facility is not adequate, in the Senate Building, Off-Street Parking facility is not adequate, Off-Street Parking facility is not adequate in the Old Student Affairs, it is adequate in the School of Postgraduate Building, it is adequate in the School of Management Technology Building, it is not adequate in the School of Earth and Mineral Science Building, and it is adequate in the School of Science Building. Based on the information gathered from respondent through direct interview concerning the adequacy of Off-Street Parking facilities in FUTA, the H0: Off-Street Car Parks are adequate will be rejected. This gives a basis for the alternate hypothesis which states that the Off-Street Parks are not adequate. The respondents stated that On-Street Parking is being practiced in those building where the Off-Street Parking facility is inadequate.

Table 2: The car park names and numbers of respondents sampled in the selected areas.

CAR PARK NAME	**NUMBER OF RESPONDENTS**
Entrepreneurship Building	8
CERAD Annex office	15
School of Agriculture Building	20
School of Engineering Building	30
Senate Building	25
Old Student Affairs	10
School of Postgraduate	5
School of Management Technology	12
School of Earth and Mineral Science	20
School of Science	15
TOTAL	**160**

Source: Author's Survey

4.2 Demographic variables of parking demand

The data sources was undertaken to identify the demographic variables of car owners with respect to the degree of private car ownership, this will have an increasing impact of parking demand.

To test the hypothesis H0: There is no significant relationship between demographic characteristics of car owners and private car ownership, Chi Square technique will be used.

Table 3: Demographic characteristics (category of individual) of car owners and private car ownership at various building.

Car ownership	Teaching Staff	Non-Teaching Staff	Postgraduate Student	**TOTAL**
Entrepreneurship Building	5	2	1	**8**
CERAD Annex office	2	10	3	**15**
School of Agriculture Building	10	5	5	**20**
School of Engineering Building	15	8	7	**30**
Senate Building	2	20	3	**25**
Old Student Affairs	3	5	2	**10**
School of Postgraduate	1	2	2	**5**
School of Management Technology	5	3	4	**12**
School of Earth and Mineral Science	10	4	6	**20**
School of Science	5	5	5	**15**
TOTAL	**58**	**64**	**38**	**160**

Source: Author's Survey

The degree of freedom at critical value or significance level 0.05 = (R-1) (C-1)

R= 10 and C = 3, therefore (10-1) (3-1) = (9) (2) = 18

Table value at degree of freedom 8 and significance level 0.05 = 28.87

Table 4: Determination of the computed or calculate value

Observed (O)	Expected (E)	O – E	$[O-E]^2$	$[O-E]^2 \div E$
5	2.9	2.1	4.41	1.52
2	5.4	-3.4	11.56	2.14
10	7.3	2.7	7.29	1
15	10.9	4.1	16.81	1.54
2	9.1	-7.1	50.41	5.54
3	3.6	-0.6	0.36	0.1
1	1.8	-0.8	0.64	0.36
5	4.4	0.6	0.36	0.08
10	7.3	2.7	7.29	1
5	5.4	-0.4	0.16	0.03
2	3.2	-1.2	1.44	0.45
10	6	4	16	2.67
5	8	-3	9	1.13
8	12	-4	16	1.33
20	10	10	100	10
5	4	1	1	0.25
2	2	0	0	0
3	4.8	-1.8	3.24	0.68
4	8	-4	16	2
5	6	-1	1	0.17
1	1.9	-0.9	0.81	0.43
3	3.6	-0.6	0.36	0.1
5	4.8	0.2	0.04	0.01
7	7.1	-0.1	0.01	0.00
3	5.9	-2.9	8.41	1.43
2	2.4	-0.4	0.16	0.07
2	1.2	0.8	0.64	0.53
4	2.9	1.1	1.21	0.42
6	4.8	1.2	1.44	0.3
5	3.6	1.4	1.96	0.54

Source: Author's Survey

Chi Square calculated value: $\Sigma[O-E]^2 \div E = 80.37$

The computed value is 80.27 and the table value is 28.87, therefore the computed value is more than the table value. We reject the Null Hypothesis. This give a basis that there is a statistical significant relationship between the demographic characteristics of car owners and private car ownership.

Findings from related research works revealed that parking problems leads to time delays and traffic congestion. They are as a result of inadequate parking space, traffic signs/signals, human factor indiscipline act and development of illegal stall at car park (Samson, 2012).

4.3 Parking accummulation, and parking index

Parking accumulation is the total number of vehicles parked in an area at a particular time. Parking index is the percentage number of bays occupied divided by the total number of bays available.

Table 5: The parking accumulation and parking index in the study area by 2.00 PM on Monday 4th July, 2016.

CAR PARK NAME	**CAPACITY OF PARKING BAYS**	**PARKING ACCUMULATION**	**PARKING INDEX**
Entrepreneurship Building	28	15	53.57%
CERAD Annex office	54	48	88.89%
School of Agriculture Building	63	50	79.37%
School of Engineering Building	125	75	60%
Senate Building	80	64	80%
Old Student Affairs	38	27	71.05%
School of Postgraduate	19	15	78.95%
School of Management Technology	63	63	100%
School of Earth and Mineral Science	113	99	87.61%
School of Science	73	70	95.89%
TOTAL	**656**	**526**	

Source: Author's Survey

From table 5 above, the parking index for Entrepreneurship Building is 53.57%; this shows that more

than half of the bays were occupied as at the time of survey. The parking index for CERAD Annex office is 88.89%, the parking index for School of Agriculture Building is 79.37%, the parking index for School of Engineering Building is 60%, the parking index for Senate Building is 80%, the parking index for Old Student Affairs is 71.05%, the parking index for School of Postgraduate is 78.95%, the parking index for School of Management Technology is 100%; this shows that all the parking bays were occupied as at the time of survey. The parking index for School of Earth and Mineral Science is 87.61%, and the parking index for School of Science is 95.89%.

5. Conclusion and recommendations

This section summarizes the findings of the previous chapter in-line with the research objectives;

From the assessed Off-Street Parking facilities, in Entrepreneurship building, the Off-Street Parking facility is adequate, in CERAD Annex office, Off-Street Parking facility is also adequate, in the School of Agriculture Building, Off-Street Parking facility is not adequate, in School of Engineering Building, Off-Street Parking facility is not adequate, in the Senate Building, Off-Street Parking facility is not adequate, Off-Street Parking facility is not adequate in the Old Student Affairs, it is adequate in the School of Postgraduate Building, it is adequate in the School of Management Technology Building, it is not adequate in the School of Earth and Mineral Science Building, and it is adequate in the School of Science Building.

Also, there is a statistical significant relationship between the demographic characteristics of car owners and private car ownership.

As at the time of survey, it was revealed that the %, parking index for School of Management Technology is 100%; this shows that all the parking bays were occupied as at the time of survey. These happen to be the only parking facility that was fully occupied. Hence, there is need for proper measure of Off-Street Parking facility in this building.

The recommendation in this paper for the institution revolves around three categories;

1. Education: Informing and orientating staff and students in the university about the usage of parking facilities.
2. Engineering: Construction of enough well labeled Off-Street parking facilities to all buildings purposely for the teaching and non-teaching staff and construction of general Off-Parking facilities for the student and visitors. Car parking should be designed in a way that within the University premises. Teaching staff, non-teaching staff, students, meters and greeters, and even retirees have their various parking lots and each should be registered to their various parks. In the same vein, the University should make provision for Special Events parking and fines are designed to people/ cars that park in wrong parking spaces.
3. Enforcement: Developing measures, policies, rules and standard such that all vehicle owners must comply with, without which there will be monetary sanctions in which the school will use in maintaining existing parking facilities and construction of modern off-parking facilities.

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