

SYMBOLS DESIGN FOR EFFECTIVE IDENTIFICATION AND UTILIZATION OF ROAD TRANSPORTATION FACILITIES: A CASE STUDY OF OWO, ONDO STATE NIGERIA

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Abstract: This study examines symbol design for effective identification and utilization of road transportation facilities in Owo town. The study utilized questionnaire attached-with derived symbols for respondents to attached meaning. The questionnaires were later analyzed using tables and percentages. To also apply the symbols obtained from the respondents on a digital street guide of Owo. It was revealed that road transporters preferred derived symbols for road facilities on maps to other symbols as it scored above 50%. Based on the findings recommendations were made.

Keywords: Symbol design, symbol, transportation, colour, derived symbol.

1. INTRODUCTION

Transportation is one of important aspects of our life. If there is no transportation, how do we go somewhere or how would goods be transported? The relationships and connections between areas are usually reflected in the character of transportation facilities and in the flow of traffic, involving such basic geographic concepts as “spatial interaction” and “area association”. The character of transportation in an area is determined by its interrelationship with physical and social forces and condition. Transportation form an integral part in economic development [1], the economic history of Nigeria is largely the story of the opening up of its vast area by various forms of transportation resulting in economic growth which in turn stimulate further demand for transportation [2]. It does not only lead to increased specialization in production but also act as a control on factor mobility. Transportation has been identified as the critical investment sector, and thus the stimulus for economic growth. However, geographers have emphasized the approach which stipulates that transportation lead to economic development through increased accessibility provided by transport facilities due to the spatial dimension of this approach [3].

The primary facilities for transport movement involving vehicles and motor bikes are: roads with bridges where necessary, petrol stations, mechanic workshops, hospitals, vulcanizing workshops, police stations, licensing office, road safety office, bus stops, and motor parks. All these when properly mapped, will increase accessibility to such points as well as enhance proper and uttermost utilization of the facilities. Such map will enable the users to locate the nearest facilities in time of need.

1.1 Symbol Design:

Is the practice of representing things, by means of symbols or of attributing symbolic meanings or significance to objects, events, or relationships. An understanding of symbolism is a critical part of graphic design.

Symbol: According to Davis [4], a symbol is a “diagram, design, letter, abbreviation which by convention or reference to a legend is understood to represent specific character or object” [5].

Symbols are not usually drawn to scale and the details represented on the map symbols used on the map is expected to satisfy four main requirements [5] which are:

- i. each symbol must be uniform throughout the map,
- ii. it must be comprehensive and not lead to guess work,
- iii. it must be legible, and;
- iv. it must be sufficiently precise.

1.2 Research Problem:

The roles played by map in the development of transportation in Nigeria cannot be over emphasized and many studies on land vehicular transport has, increasingly, been on road facility, its network design, quality, accessibility, maintenance, and the like [6], [8] but the mapping and design of symbols for other servicing facilities has received little or no attention by either the government or private organization which is vital for development of the town. These facilities are found in Owo which require identification and utilization by road transport users. Therefore, the research is to design symbols for other road transport facilities within Owo town.

1.3 Objectives of the study

The objectives of the work are:

- i. to design symbols for road transport facilities in Owo town,
- ii. to find out to what extent transport users will be able to identify the symbols derived and interpret them with reference to the particular utilities, and;
- iii. to apply these symbols to Owo street guide.

1.4 The Study Area:

Owo town is the headquarters of Owo Local Government Area of Ondo State Nigeria. It is bounded within Latitudes (Φ) $07^{\circ} 09'$ and $07^{\circ} 15'$ North and Longitudes (λ) $05^{\circ} 30'$ and $05^{\circ} 40'$ East. Owo is about 50km east of Akure, the State Capital and 320km South West of Abuja the Federal Capital.

It has an area of about 25km^2 . The settlement dates back to the middle of the 12th century. The average elevation is about 309m above the sea level. Its particular location on top of the hill suggested defence strategy. The people are Yoruba speaking people who have traveled North East from Ile-Ife, the home of their ancestors.

The town is both the administrative and commercial centre of Owo Local Government Area with an excellent layout and good roads linking it with the State Capital, Akure in the West and Benin in the South. It is situated in the Humid Tropical region of Nigeria and enjoys abundant rainfall of over 1,500mm annually and the South – Westerly winds blow most of the year. From the months of December to February, the cooler continental winds from the interior of the continent of Africa prevail [3].

There are few industries and most commercial activities take the form of trading. In the markets, traders display their wares which include foodstuffs, clothing and cosmetics. In the commercial centre of the town, automobiles, electronics and other businesses thrive.

There are many attraction spots in the town either owned by private or government agencies. These include town hall, hotels, guest houses, restaurants, supermarkets, banks, primary & secondary schools, university, Polytechnic and School of Nursing. The town has a Federal Medical Centre with over 1,000 beds, a State General Hospital and a number of private clinics and local government health/maternity centres.

Owo is by-passed by a major road that runs from Akure to Benin and Ikare through the northern to eastern part of the town which is mainly meant for travelers travelling without the intention of passing through the town.

The good internal road network has brought about spatial and transport development within the town, though many of the interior roads are untarred and of lateritic surfaces. The major means of transportation within Owo is taxi and motor-bikes (Okada). The taxi and Okada plies the main roads (distributor) which runs from North-West down to the South-East of the town known as Otapete, Ademulegun, Oke-Ogun, Fajuyi, Oja-Oba, Idimisasa, Irugbe, Iyere-road, Oke-Bola, Mission, Ukiti and JOKS motor at different part of the town and from North-East to the centre of the town also called Mobil, Ogbonmo, Isolo, Ishokun-Odo and Ikare junction at different points of the town. They usually stop to pick or drop passengers at different spots, although few sheltered bus stops exist in some routes. There exist many streets (collectors) within the town majorly plied by private cars and motorbikes; among them are: Aruwajoye, Idaniken, Uka, Ekusi, Uselu, Igboroko, Iloro. Oludasa, Isama, Idimepen, Owatowose, Police Station, Rainbow, Oke-dogbon, Ogbontun, Otutu, Irowolisawo, and others.

Also in existence are many access roads that link streets to main road which serves as alternate route normally plied by motorbikes; among them are: Ajanaku, Owaluwa, Afusi, Ikare, Aruliwo, Samco, ogunmolawa, Asewa, Ora, Aralepo, Imola, Egon, Bishop's Court, Irowolisawo, Oluka, Agbowo and many others.

Major terminal exist in four areas – Emure junction, Poly gate, Iyere and Ikare junction. There are two police Divisional Headquarters at Ijebu-Owo and Otapete road ('A' & 'B' respectively) with three police stations including Vehicle Inspection Unit at Otapete road. Others are twelve petrol stations, five (private and government) hospitals, nine parks for cars and buses, and several parks for bikes, one licensing office, one federal road safety office, 25 vulcanizing workshops and 32 mechanic workshops [3].

2. RESEARCH METHODS

The relevant data for this study were collected from primary and secondary sources. The primary comprised derived symbols for transport facilities that were attached to questionnaire. Secondary data obtained from textbooks, project dissertation, journal and research materials and the internet.

For the primary source, two hundred and fifty questionnaires was distributed among the bike riders, drivers, mechanics, vulcanizers, FRSC staff, police station, licensing office, hospitals, schools, banks, markets and the like.







The questionnaire was attached with sixteen derived symbols (computer design) of transport facilities that respondents need to assign meaning in terms of: name and colour that best fit each of the facility Table 1.

Out of two hundred and fifty (250) questionnaires, two hundred and twenty (220) were filled and returned which were later analyzed. The sixteen derived symbols given to the respondents to fill the meaning of different symbols and it was emphasized that the symbols relate only to road transportation (No alternative interpretations of each symbol was provided). This is to give respondents chance to give answer to their best knowledge, since pictorial forms and abbreviations of symbols were used in the research.

The secondary data involves digital street map of part of Owo, where the result of the symbols obtained from respondents will be applied; textbooks, project dissertation, journal and research materials and the internet all will be use for the work.

TABLE 1: Attached Symbols Design to show Transportation Facilities

S/N	Symbol	Name of Symbol	Colour Preferred
1	₤		
2	E		
3	W		
4	U		
5	π		

6	k		
7			
8	χ		
9			
10			
11			
12			
13	■ FRSC		
14	■ LO		
15			
16	■ VIO		

(Source: Field

work, 2017)

3. ANALYSIS OF RESULTS

Data analysis for this work involved the use of tables and simple percentages through which inferences were drawn. The presentation, interpretation and analysis of data include the calculation of responses variables into percentages. Tables were used to show the final summaries of the result.

Deductions from the questionnaires:

Age: Table 2 shows that majority of those involved in transportation are young and adult (19-36years and above), when put together it gives 95.4%.

TABLE 2: Age of the Respondents

Age (years)	No of Respondents	%
Below 18	10	4.5
19 – 25	30	13.6
26 -35	85	38.6
36 and above	95	43.2
Total	220	100

Education: Education level of respondent’s shows that 29.5 % have primary education, 43.2% with secondary, 25% higher education and above while 2.3% have no formal education. This is to say that about 97.7% of the total respondents can read and write, which is good for the objective of the research (Table 3).

TABLE 3: Education Level of the Respondents

Education	No of Respondents	%
No formal	5	2.3
Primary	65	29.5
Secondary	95	43.2
Higher and above	55	25.0
Total	220	100

Map Seen: From Table 4, 88.6% of the respondents claimed that they have seen a map before; therefore, map is not new to them. Though 11.4% said they have not seen a map, this set of people may belong to the group of those without formal education.

TABLE 4: Have you seen a Map before?

Sight of Map	No of Respondents	%
Yes	195	88.6
Not at all	25	11.4
Total	220	100

Identification of the Map Symbols: It could be deduced from Table 5 that, 73.2% knows the meaning of symbol, 26.8% identify it without the full understanding. This is to say that majority of the respondents are not new to map symbols; therefore, they will be able do justice to the attached symbols.

TABLE 5: Do you understand Map Symbol

Type of map seen	No of Respondents	%
Yes	161	73.2
No	59	26.8
Total	220	100

Symbols: Symbols are used to represent geographic phenomena [<https://en.wikipedia.org/wiki/Symbol>]. Most phenomena can be represented by using point, line, or area symbols. Table 6 shows the result analysis from the respondents. Out of the sixteen symbols designed, petrol station, bank, mechanic workshop, hospital, park, bus stop, school, dual, major, minor roads, FRSC and VIO scored above 50% which can be interpreted as correct.

The symbol representative for vulcanizing workshop (tyre) recorded low score (29.5%) as majority of the respondents miss-concept it for tyre sales outlet, because the tyre did not look like puncture tyre that need the service of a vulcaniser (Table 6).

Another symbol that scores low mark was Licensing Office (Table 6), though licensing office is not new to road users but the abbreviation "LO" that was used for the symbol seems unfamiliar to majority of the respondents unlike FRSC that has become a household name to the respondents, this resulted to its low score.

Colour: Mapping colouring is the act of assigning different colours to different features on a map. The decision on colours to be used for portraying various symbols is very vital since it can affect the ability of map users to identify and interpret symbols [9].

The analysis showed that Black colour is preferred by respondents for most of road facilities as seen from Table 6; features like bank, hotel, petrol station, motor park, bus stop, vulcanizing workshop, FRSC, and VIO each scored above 50% this is in line with federal surveys conventional signs for mapping, which uses black for cultural features (man-made). But in terms of roads and road infill, the respondent's response differs as they opted for Black colour for all categories of road found within Owo (dual, major, secondary and minor) against the red adopted by the federal surveys.





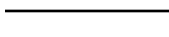





Hospital was another colour that respondents called for its change from black to red as 56.8% of 59.1% responses assign red to the representative symbol (cross), this may not be unconnected to the fact that red is easily recognize among other colours which is good for location of hospital on the map in case of road accident or emergency.

School also receive respondents comment as 45.5% of 52.3% of those that accorded the symbol as school pen down green colour for the representative symbol (flag) which from oral interview, it saw gathered that national flag carries green as major colour which is normally use in schools and other government establishment.

Police station is also in colour, though few people could not attached correct meaning but 112 respondents (50.9%) got it correct and maintain that blue, yellow and red colours of the representative symbol (Siren) be maintained since this light is know with emergency and police.

















Finally Table 7 is the adopted derived symbols which will be applied on the digital street guide of Owo for the use of road transporter within the town.

TABLE 6: Analysis of Derived Symbols obtained from the respondents

S/N	Symbols		Name attached to Feature	Responses (%)	(%)	Color	Responses (%)	(%)
	Derived	Conventional						
1			Bank	150	68.2	Black	137	62.3
2	E		Hospital	130	59.1	Red	125	56.8
3	W		Hotel	110	50.0	Black	101	45.9
4	U		Petrol Station	190	86.0	Black	190	86.0
5	π		Motor Park	125	56.8	Black	121	55.0
6	k		Mechanic Workshop	140	63.6	Black	138	62.7
7			Bus Stop	129	58.6	Black	128	58.6
8	χ		School	115	52.3	Green	100	45.5
9			Dual road	189	85.9	Black	171	77.7
10			Major road	189	85.9	Black	171	77.7
11			Other Road	175	79.5	Black	175	79.5
12			Vulcanizing workshop	65	29.5	Black	65	29.5
13		 FRSC	Federal Road Safety Office	185	84.0	Black	185	84.0
14		 LO	Licensing Office	82	37.3	Black	167	76.8
15			Police Station	112	50.9	Blue, Yellow Red	112	50.9
16		 VIO	Vehicle Inspection Office	180	81.8	Black	180	81.8

(Source: Field work, 2017)

TABLE 7: Adopted Derived Symbols for road transportation facilities

S/N	Symbols	Interpretation
1		Bank
2		Hospital
3		Hotel
4		Petrol Station
5		Motor Park
6		Mechanic Workshop
7		Bus Stop
8		School
9		Dual road
10		Major road
11		Other Road
12		Vulcanizing workshop
13	 FRSC	Federal Road Safety Office
14	 Licensing Office	Licensing Office
15		Police Station
16	 VIO	Vehicle Inspection Office

(Source: Field work, 2017)

4. SUMMARY OF THE RESULT

The outcome of this work is the design of symbols for road transportation facilities as shown in Table 7 and its application on digital Street Guide of Owo (Figure1)

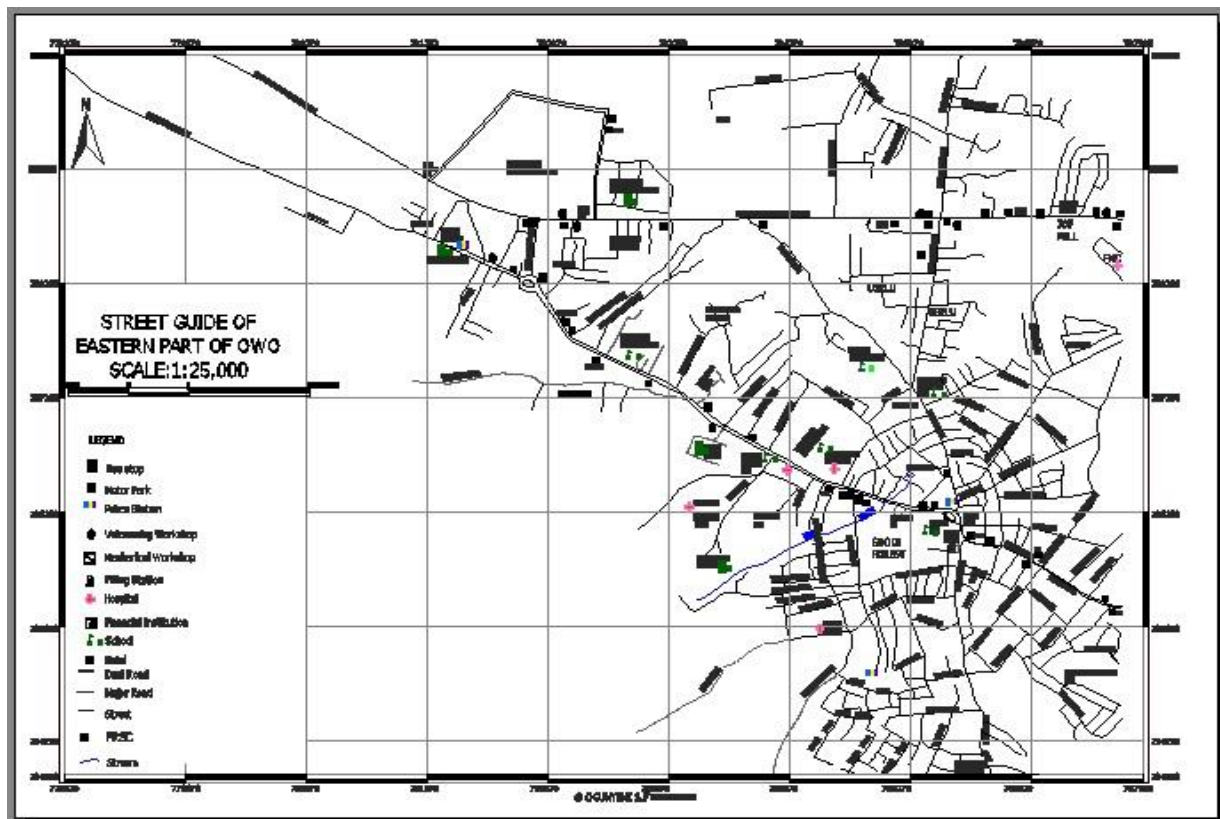


Figure 1: Owo Street Guide

The study reveals that pictorial symbols are suitable for road transport facilities mapping, because it is easily recognized and interpreted by map users, nine out of ten pictorial symbols (derived) scored above 50% and were interpreted to be correct (Table 6). The interpreter does not require high level of education before interpreting the symbols.

Also, it was found that the respondents appreciate colours on map but prefer black colour to red for roads infill on the map. Those respondents that assign black colour did so because of the black surface of most roads.

Furthermore, symbol designs become easier with the use of computer in maintain uniformity and legibility as seen in (Table 1).

Finally, abbreviation of symbol for name that is difficult to abbreviate, for the purpose of clarity and effective communication should be avoided, instead it should be written in full as seen with symbol “LO” for licensing office (Table 7).

5. RECOMMENDATIONS

The work recommends:

- i. the use of pictorial (derived) symbols on all maps meant for road transportation like street guide and road map,
- ii. the use of computer in symbol design in mapping,
- iii. abbreviation symbol(s) that are not common should be written in full to avoid confusion from the users and;
- iv. the use of black colour for road infill on street guide.

6. CONCLUSION

The result of this work is symbol design for effective identification and utilization of road transportation facilities in Owo town. These symbols were designed and applied on digital Street guide of Owo already prepared by the researcher. It is believed that the findings and recommendations in this work will open a new research in the area of mapping transportation facilities.

REFERENCES

- [1] Filani M.O and Onyemelukukwe, J.O.C.1982: Transportation 2: Road in Barbour, K.M. Oguntoyinbo, J.S, Onyemelukukwe, J.O.C. and Nwafor, J.C. (eds), Nigeria in Maps, Hodder and Stoughton, London.
- [2] Robinson, A.H; Morrison, J.L; Muchreke, P.C; Kimerling, A.J. and Gunptill, S.C. (1995): Elements of Cartography, New York, John Wiley and Sons, 6th edn.
- [3] Ajitrotutu, J. O. and Ufuah, M.E. 2013: "Application of Geographic Information System in Street Mapping for Sustainable Development in Owo, Owo LGA, Ondo State." Olomo, R.O. and Udoh,, J.C. (eds) in Journal of Cartography and GIS, Vol. 8 No 1 September, 2013.
- [4] Davis, R.E. Foote, F.S., Anderson, J.M. Mikhail M.E. 1968 Surveying Theory and Practice, McGraw-hill Book Company, New York. 6th edition.
- [5] Symbols. <https://en.wikipedia.org/wiki/Symbol>
- [6] Ajaegbu, H.I. and Faniran, A. 1977: A New Approach to Practical Work in Geography. "The Language of Maps". Heinemann Educational Books, London 2nd edition.
- [7] Adefolalu, A.A. 1977: Towards a Realization of Better Transport Services in Nigeria; in Onakomaiya, S.O. and Ekanem, N.F. (eds) Transportation in Nigeria Development. NISER, Ibadan.
- [8] Onokala, P.C. 1988: The role of transportation in Economic Development in Nigeria: a case study of the development of rural roads and agricultural projects in Imo State. A paper presented at the 31st Annual Conference of the Nigerian Geographic Association, Port-Harcourt.
- [9] Mastra, I. D. R. and Brown, M.H. 1981: Proposed Specifications for the 1:50,000 Topographic Map Series of Indonesia. Cartographic Volume 18.