

Assessment Of The Effectiveness Of Telecommunication Delivery Among Operators Of GSM In Ekiti State.

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Abstract: Data survey on the service delivery of the three principal Global System for Mobile Communications (GSM) Operators in Ekiti State, Nigeria was conducted with a questionnaire administered among its citizens. Three locations: Ado Ekiti ($7^{\circ}38'15''N$, $13^{\circ}15'00''E$), Ikere Ekiti ($7^{\circ}30'15''N$, $14^{\circ}15'00''E$) and Aramoko Ekiti ($7^{\circ}43'15''N$, $13^{\circ}15'00''E$) were selected. Based on the responses from various subscribers using the networks, the performance analyses of the operators were assessed using the descriptive statistical method. The assessment was based on the coverage area; interconnectivity, call quality, number of subscribers; growth and other supplementary services to assist the various GSM operators know the area of weakness and improve on the quality of the service delivery. It was discovered that the users have more complaints to offer with the performance generally rated below average, and a need for fast and better network optimization for needed improvements for an effective telecommunication delivery.

Keywords: Call quality, Coverage area, interconnectivity and subscribers.

I. Introduction

The Global System for Mobile communication (GSM) was introduced in 1992 with the aim of producing quality telephone services and maintaining a standard building block not tied to specific operators, but the growth of telecommunication industry in Nigeria has gone beyond specification. The first generation GSM mobile telephone network operators provide subscribers with Quality of voice communication and low bandwidth of 9.6kb/second (but later reviewed to 14.4 kb/second, though not all operators adopted this) for data communication, for Short Messaging Service (SMS) and dialling calls. Wireless Application Protocol (WAP) was later introduced. As the first generation was done with, second and third generation technologies were introduced (2G and 3G). The Second generation introduces the General Packet Radio Service (GPRS) and the third introduces the Universal Mobile Telecommunication System (UMTS). This increased the use of mobile telephone and devices for data communication which drives the need from the market for a fast, reliable and available infrastructure. Again there has been tremendous transformation from old analogue system to more efficient digital coding technique with new method of transmission and this has led to advancement in the technology change of GSM and number of subscribers. In Nigeria, August 2001 was important in the history of telecommunication with the introduction of GSM which brought in operators namely MTN, CELTEL (later ZAIN) and now AIRTEL, GLOBACOM and MTEL. Before independence, the country had only 18,724 functional telephone lines for an estimated population of 45million which has a teledensity ratio of 0.04 telephones per 100 people.

According to International Telecommunication Union (ITU) by 1996 Nigeria's teledensity was 0.30, slightly 0.4 by 1996 which is a far cry from the Africa's average of 1.67. However, with the introduction of GSM, telecommunication market has been growing at a geometric rate from 2.3million line at the end of 2002, the number connected telephone lines to about 4.04 million at the end of 2003, and according to *Hassan et al*, (2009), the total number of connected (mobile and fixed) telephone lines was about 22.9 million in the first quarter of 2006 [1]. This has since increased to about 91% by the end of 2007 [2]. As at August 2015, the phone subscription was 148 million with MTN taking the lead [3]. It must be mentioned that in the past, telephone was a luxury for only the privileged in Nigeria. Equally, the usage and penetration of internet services witnessed commensurate growth. Due to the geometric growth in GSM services, the Quality of Services (QoS) has dropped. A few works had been reported on the introduction and performance of GSM in Nigeria by various authors. *Popoola et al* (2009) provided some measures to be taken at improving the QoS in Nigeria [4]. *Salawu* (2013) measured the signal strength in three locations in Kwara state, Nigeria and concluded that the QoS was unsatisfactory [5]. *Ekejiuba et al* (2015) while describing the performance of GSM in Nigeria also identified the components of quality of service and located the bottlenecks associated with the GSM networks [6]. The Quality of Service is a measure of the network performance that reflects the network transmission quality and service availability [2]. It also describes the performance evaluation of the system from the perspective using specific parameters. In telephony, the parameters used include call failure rate, call drop and call voice quality [7]. The Nigeria Communication Commission (NCC) is putting a lot of pressure on operators to step-up the Quality of Service. It will be recalled that NCC mandated the operators to pay subscribers some amount of money in 2008. For example the benchmark for call drops is 2% but in September 2008 MTN had 2.77%, GLOBACOM had 2.61% and AIRTEL had 1.52%. There were also worse Dropped Call Rate (DCR) in NCC's standard between May and October 2008 by MTN while GLOBACOM fluctuated between April and September 2008.

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II. Basic Concepts of GSM Structure

The basic concept around which cellular telecommunication operates is that the coverage area is split up into small units called a cell. Each cell is covered by a relatively low power base station. The cell system enables local area coverage using low power handset so that at a certain distance away, the frequency can be reused. Interference is kept at minimum level due to fact that adjacent cells used different frequency or channel. Different arrangement of cells may be used dependent upon the requirements. This may vary according to the terrain and the level of usage. In, general, the cells are arranged in a group called 'Clusters'. As there are only few number of channels available, the balance between the number of channels by each base station and the number of cells in a cluster has to be made if few cells are used in each cluster; then the channel have to be frequently reused i.e. fewer cells in the cluster means that; the distance between the two base stations that use the same channels are smaller; and interference may be a problem. However it has advantage that greater numbers of channels are available in each cell and hence there is capacity to a greater number of calls. However if the number of cells in a cluster is increased to reduce the level of interference, the larger number of cells has to share the same number of channels and each base station has fewer channel and thereby reduces its capacity. Cell is a term used to describe a site where antenna and other electronic communication equipment are placed on a radio mast or tower to create a cell in a cellular network. In this work, we examined the effectiveness of the telecommunication delivery among operators in GSM sectors in Ekiti State, Nigeria based on some parameters such as coverage, interconnectivity; call quality, number of subscribers,

growth, and other services. A descriptive survey research design was adopted and data were collected using questionnaires administered to some respondents randomly selected from different towns in Ekiti State, Nigeria. This findings will enable us to know the significant different in the performance of the operators in the GSM sector. Despite the fact that GSM as emerging communication system in Africa and with Nigeria rated the fastest growing market in the field of communication, the performance of the operators in the GSM sector is still marginally poor especially in Ekiti State. Hence, higher quality performance of GSM services is achievable through fast and accurate network optimization.

III. Materials and Method

The focus areas include three notable locations in Ekiti state South west Nigeria. These locations are Ado Ekiti (the state capital), Ikere Ekiti and Aramoko Ekiti. Research questions were distributed for answers to GSM subscribers to 3 leading GSM operators in Ekiti State. The questions asked were based on the performance of the three leading GSM operators in Ekiti State using the coverage areas, interconnectivity, choice of network provider, call quality, growth and other services as the parameters. Data collected from the questionnaire were presented and analyzed with one statistical method- the Bar chart (descriptive statistic). Table 1 shows the number of respondents as a percentage of total questionnaires distributed. About 50% of the questionnaires was administered to Ado Ekiti because of the population density of the mobile phone users and about 30% was administered to Ikere Ekiti while 20% of the questionnaire was administered to Aramoko Ekiti.

Table 1: Questionnaires administered

TOWN	RESPONDENT FREQUENCY	PERCENTAGE (%)
ADO EKITI	145	48.3
IKERE EKITI	90	30.0
ARAMOKO EKITI	65	21.7
TOTAL	300	100

Table 2: Analysis of data based on coverage area

NETWORK PROVIDERS	RESPONDENT FREQUENCY	PERCENTAGE (%)
MTN	150	50
GLOBACOM	78	26
AIRTEL	72	24
TOTAL	300	100

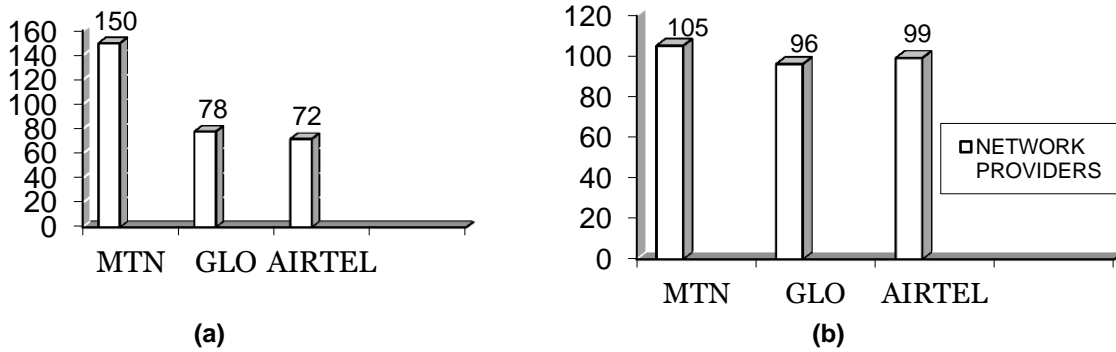


Figure 1: Relationship between the operators based on (a) coverage area (b) interconnectivity.

Table 3: Analysis of data based on the Interconnectivity

NETWORK PROVIDERS	RESPONDENT FREQUENCY	PERCENTAGE (%)
MTN	105	35
GLOBACOM	96	32
AIRTEL	99	33
TOTAL	300	100

In the analysis, 50% of the respondent confirmed that the MTN has a wider coverage area, 26% ascertained that the GLOBACOM to be next to MTN while 24% of the respondents confirmed AIRTEL as the least with coverage area as shown in Table 2 and Figures 1(a&b) showing the bar chart statistics response. Similarly, as in Table 3, it was observed that 35% of the population sampled ascertained

that the MTN network has good connectivity to other networks and 32% confirmed that the GLOBACOM has good connectivity to other networks and 33% confirmed that the AIRTEL has good connectivity to other network, with Figure 1(b) showing the interconnectivity relationships.

Table 4: Analysis of data based on Call Quality

NETWORK PROVIDERS	RESPONDENT FREQUENCY	PERCENTAGE (%)
MTN	114	38
GLOBACOM	105	35
AIRTEL	81	27
TOTAL	300	100

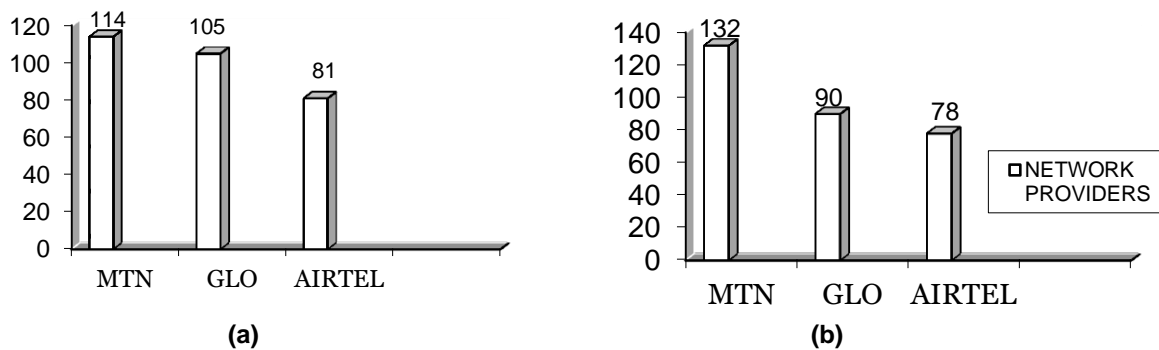


Figure 2: Relationship between the operators based on (a) call quality (b) Network Subscription.

From Table 4, about 38% of the population sampled affirmed that the MTN network has good call quality as 35% confirmed the GLOBACOM network has good call quality, and 27% was of the opinion that the AIRTEL has good call

quality. About 44% of the respondent subscribed to MTN network, 30% of the respondent subscribed to GLOBACOM network and 26% subscribed to AIRTEL network as indicated in Table 5.

Table 5: Analysis of data based on number of Subscribers

NETWORK PROVIDERS	RESPONDENT FREQUENCY	PERCENTAGE (%)
MTN	132	44
GLOBACOM	90	30
AIRTEL	78	26
TOTAL	300	100

Table 6: Analysis of data based on growth

NETWORK PROVIDERS	RESPONDENT FREQUENCY	PERCENTAGE (%)
MTN	135	45
GLOBACOM	90	30
AIRTEL	75	25
TOTAL	300	100

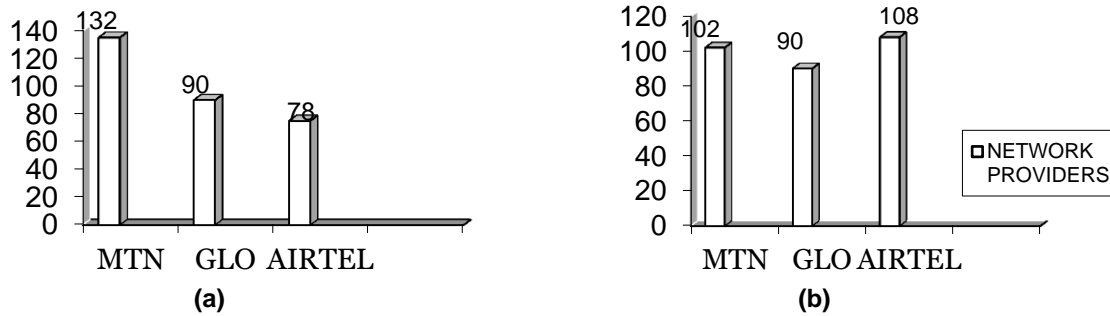


Figure 3: Performance of the GSM operators based on (a) growth (b) Networks.

It was observed that about 45% of the sampled population showed that MTN has expanded largely in Ekiti while 30% and 25% subscribed to GLOBACOM and AIRTEL respectively as shown Table 6. Figure 2(a) shows the call quality relationship between the network providers, while

Figure 2(b) shows the network subscription pattern by subscribers. The performance pattern of the three GSM operators based on growth is depicted in Figure 3 (a) while Figure 4 (b) shows the network performance analysis.

Table 7: Analysis of data based on other services

NETWORK PROVIDERS	RESPONDENT FREQUENCY	PERCENTAGE (%)
MTN	102	34
GLOBACOM	90	35
AIRTEL	108	36
TOTAL	300	100

The chart in Figure 6 shows that 34% of the respondents confirmed that the MTN network has better services with 30% GLOBACOM and 36% AIRTEL based on the quality of services rendered.

The various parameters analyzed above are represented in Figure 4 using multiple bar charts representation.

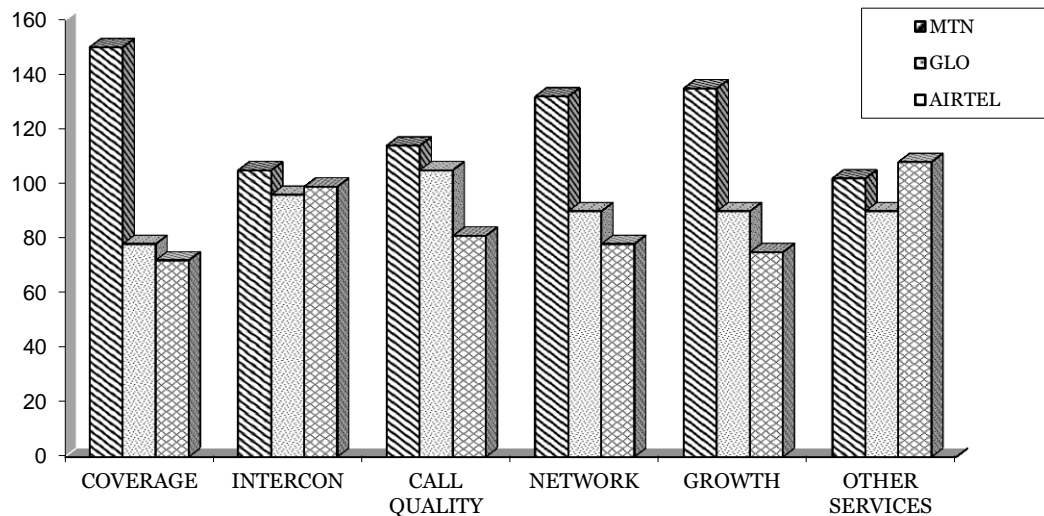


Figure 4: Representation of the analyzed data using multiple bar charts

IV. Results and Discussions

The major focus of this paper was on the assessment of the effectiveness of telecommunication delivery among operators in the GSM sector in Ekiti State, Nigeria. Attempt was made to examine the performance of operators in the GSM sector based on the coverage area, interconnectivity, call quality, growth, total number of subscribers and other services. The first major observation that should be made is that the introduction of GSM has actually improved information and communication delivery. With the arrival of GSM, a larger percentage of Nigerians include those in the rural communities now have access to communication. The significance observation in the performance of operators in the GSM sector in Ekiti State is perhaps the major findings in the study. A further analysis of the network strength/coverage area, service delivery, text and multimedia message delivery, internet access and problem

resolution was also carried out as shown in Table 8 using one location, Ajilosun in Ado Ekiti as a case study. From Table 8, it can be seen that Airtel network operator provides the best network strength (37.5%) and service availability of 18.75% when compared to other operators in this location. This however is not the best that can be delivered if adequate measure such as good infrastructure is put in place. In terms of the text message delivery, Airtel operator offers a more excellent performance of about 43.75%. However, the MTN operator shows a significant performance in both MMS delivery and problem resolution as given by the respondents in this location. Responses gathered from subscribers in this location indicated that there is no excellent performance of internet access with any of the operators but Airtel and GLO operators with 78.5% and 64.28% respectively are good at this location.

Table 8: Analysis of Network's Coverage in Ajilosun

PARAMETER	NETWORK	VERY POOR		POOR		FAIR		GOOD		EXCELLENT	
		No	%	No	%	No	%	No	%	No	%
NETWORK STRENGTH	MTN	2	2.8	-	-	18	25.35	40	56.3	11	15.49
	GLO	1	6.25	-	-	3	18.75	10	62.5	2	12.5
	AIRTEL	-	-	1	6.25	3	18.75	6	35.5	6	37.5
SERVICE AVAILABILITY	MTN	1	1.4	2	2.8	18	25.7	41	58.6	8	11.4
	GLO	1	6.25	1	6.25	5	31.25	8	50	1	6.25
	AIRTEL	-	-	1	6.25	3	18.75	9	56.25	3	18.75
TEXT MSG DELIVERY	MTN	1	1.4	1	1.4	2	2.8	49	69	18	25.4
	GLO	1	6.25	-	-	-	-	14	87.5	1	6.25
	AIRTEL	-	-	-	-	-	-	9	56.25	7	43.75
MMS DELIVERY	MTN	4	6.45	8	12.9	12	19.35	27	43.5	11	17.7
	GLO	2	16.67	3	25	1	8.3	6	50	-	-
	AIRTEL	-	-	1	7.69	4	30.78	7	53.5	1	7.69

INTERNET ACCESS	MTN	3	4.6	6	9.2	27	41.54	21	27.27	8	2.3
	GLO	2	14.28	1	7.1	2	14.28	9	64.28	-	-
	AIRTEL	-	-	1	7.1	2	14.28	11	78.5	-	-
PROBLEM RESOLUTION	MTN	5	7.5	8	12.1	27	40.9	18	27.27	8	12.12
	GLO	2	13.33	-	-	8	53.3	4	13.33	1	6.67
	AIRTEL	-	-	-	-	9	60	5	33.33	1	6.67

V. Conclusion

The Quality of GSM service providers in Ekiti state, Nigeria has been analysed in this work. Questionnaires were administered to three hundred respondents within specific areas in Ekiti state. The questionnaires were subjected to data analysis using the descriptive statistical method. The criteria used for analysis include service availability, network strength, text Message delivery, multimedia message delivery, and internet access and problem resolution. The result shows that performance of the operators services fluctuate between fair and good. This generally means that the networks under review are not reliable and not stable; thereby causing low Quality of Service (QoS), and in some exceptional cases it leaps to excellent. The result also shows that there is no environmental factor such as mountain, hill or high raising building that may constitute blockage to both voice and data transmission. In the same vein the result shows that climatic changes such as rain always disrupts service provider's network. One can infer from results that the Quality of Service (QoS) can be very good if there is commitment from the service providers and dedication from the Nigeria Communication Commission (NCC) towards ensuring adequate service delivery to subscribers. In future however, there may be need to also analyse the recently introduced ETISALAT operator in the state to investigate these parameters.

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