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The Consequences of Mobile Spam in Nigeria Emerging and Evovling Mobile Communication Sector of the Economy

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Abstract- Over decades, man has sought to improve the quality of his life and everything around him. GSM which is an acronym for Global system for Mobile Communication which is cellular network where mobile phones connect to by searching for cells in the immediate vicinity is one of those technology that was designed to improve quality of human life [1]. In Nigeria, the GSM technology has changed lives since its introduction in early 2001. The deployment of the GSM technology into the Nigeria market was universally embraced by stakeholders in the industry and found to be relatively efficient at inception. Over the years in Nigeria, operators in the industry had experienced an unprecedented growth in customer base which also had necessitated for increase facilities to accommodate the growth. With the ability of the GSM technology to give a flexible Nigeria mobile phone user access to network facilities anytime (anywhere) with unlimited access to data, it is becoming a platform for mobile users to access people oriented services. This is because, today's world economy requires flexibility in every sector of the society. Corporate and individual time management has significantly improved and the general impact of the technology on Nigeria's overall economic development has been simply awesome [2]. Though this technology had brought new innovations, it had also introduced so many challenges to telecommunication industries and Nigeria mobile users. The same criminal activities done by Nigerian fraudsters using PC for many years (fraud, theft, viruses, malware and spam) have also begun to threaten the integrity of mobile industries in Nigeria. Therefore in this paper, we critically x-rayed the consequences of mobile spam in Nigeria emerging and evolving mobile communication sector of the economy.

Keywords: GSM, Telecommunication, Mobile Users, GSM Technology, Mobile Phone, GSM Subscribers, GSM Operators, Mobile Spam.

I.   INTRODUCTION

The world has become a global village with telecommunication an indispensable tool in the entire process of globalization [3]. However, in today's highly competitive global economy, the pressure on organizations to find new ways to creating and delivering services is growing stronger. Interestingly, Mobile Communication is a major driver in service delivery. With the introduction of GSM mobile communication into the Nigerian economy in 2001, it has created thousands of jobs while making life easier with enhanced business operations [2]. It has been established that Nigeria is the fastest growing telecoms nation in Africa and third in the world [4]. According to [9], today's world economy requires flexibility in all activities of human endeavours. Introducing mobility and flexibility in the activities of people can be greatly enhanced with the use GSM mobile phones. Hence, providing services to mobile users from any place and at any time is becoming the central requirement in the current information and communication technology market. This is also the trend in Nigeria mobile communication market. The concept is driven with the aim of providing a seamless pervasive computing environment to a mobile user anywhere globally with limitless access to data. The country had experienced a phenomenal growth from a tele-density of 0.49 in 2000 to 80.85 in year 2012. Tele-density is defined as the number of telephone connections for every hundreds of individuals living within an area, could also vary across nations, urban and rural areas within a country. This trend had brought about a monumental development in the major sector of the economy such as banking, telecoms and commerce in general [5]. GSM is one of the most explosive developments ever to have taken place in the telecommunication industry in Nigeria [6].

Recent deregulation of the mobile phone market in Nigeria has led to the introduction of network of network providers operating on the 900/1800 MHz spectrum which includes MTN Nigeria, Airtel, Globacom, Visafone, Etisalat, Multilinks among others [7]. Available statistics from the Nigerian Communication Commission (NCC) as at June 2013 stated that they are One Hundred and Nineteen Million, Nine Hundred and Seventeen Nine Thousand, Five Hundred and Forty (119, 979, 540) active mobile subscribers in Nigeria. The breakdown is seen in the table below which shows that the MTN Nigeria is still leading in the number of active subscribers with a number of Fifty Five Million, Two Hundred and Thirty Eight Thousand, Four Hundred and Thirty while Glomobile coming second.

Table 1: Mobile Operators Active Subscribers in Nigeria

S/N	Mobile Operator	Network Type	Active Subscribers	Website Address
1.	MTN Nigeria	GSM/UMTS/HSDPA	56,238,430	www.mtnonline.com
2.	GloMobile	GSM/UMTS/HSDPA	25,019,862	www.gloworld.com
3.	Airtel	GSM/UMTS/HSDPA	21,591,904	www.ng.airtel.com
4.	Etisalat	GSM	15,303,647	www.etisalat.com.ng
5.	Visafone	CDMA/EVDO	2,094,785	www.visafone.com.ng
6.	Multilinks	CDMA/EVDO	151,688	www.multilinks.com
7.	Starcomms	CDMA/EVDO	209,627	www.starcomms.com
8.	ZoomMobile	CDMA/EVDO	111,077	www.zoomnigeria.com
	Total		119,979,540	

Source: NCC, 2013

From the table1 above, GSM operators in Nigeria have a combined active lines of about 117 million, while the remaining operators had a combined active lines of 2.56 millions including 382,678 fixed wired and wireless operators. A recent survey by the Nigerian Communication Commission indicates that as at April 2014 the number of active subscribers had increased rapidly as shown in table 2 below. This result shows with a total increment in the active subscriber base to 129,391,392, that GSM technology is going through revolution and is becoming available everywhere in Nigeria. As a result it is widely deployed by flexible Nigerian mobile phone users in accessing various services for their day to day activities.

Table 2: Mobile Operators Active Subscribers in Nigeria

S/N	Mobile Operator	Network Type	Active Subscribers	Website Address
1.	MTN Nigeria	GSM/UMTS/HSDPA	58,355,855	www.mtnonline.com
2.	GloMobile	GSM/UMTS/HSDPA	24,015,713	www.gloworld.com
3.	Airtel	GSM/UMTS/HSDPA	25,475,672	www.ng.airtel.com
4.	Etisalat	GSM	19,111,664	www.etisalat.com.ng
5.	Visafone	CDMA/EVDO	2,004,010	www.visafone.com.ng
6.	Multilinks	CDMA/EVDO	35,381	www.multilinks.com
7.	Starcomms	CDMA/EVDO	108,235	www.starcomms.com
8.	ZoomMobile	CDMA/EVDO	111,077	www.zoomnigeria.com
	Total		129,391,392	

Source: NCC, 2014

In table 2 above, GSM operators in Nigeria have a combined active lines of about 126 million, while the remaining operators had a combined active lines of 2.25 millions including 382,678 fixed wired and wireless operators. According to [10], the sporadic growth in the acceptability of GSM services has however led to the need to address the ever-growing complexity in the management of GSM telecommunication networks, which is sequel to expansion in size cum complexity in the delivery of services to the flexible user. With strong growth of both internet and mobile telecommunication, there is a migration to market end-user applications. It is entirely a new class of wireless infrastructure where everyone and everything is always connected and interoperating. Interestingly, as this trend develops the range of services available to a mobile user grow which includes Short Message Service (SMS). However Tiago et. al, [13] in his work opined that the growth of mobile phone users has led to a dramatic increasing of mobile spam messages. In this regards, Nigeria has therefore emerged as a source of fraudulent Spam messages characterized by bogus business proposals and fraudulent joint ventures [14]. Recently, most Nigerians are deploying mobile smart phones in carrying out both legitimate and illegitimate business transactions. Its usage positively in Nigeria has had a positive and tremendous impact to the economy while its usage negatively obviously has ruined the image of the country. One of those abusive usage of GSM technology is the mobile spam which is at the current threatening the integrity of mobile communication industry in Nigeria. A disturbing situation during our investigation revealed that Telecommunication operators in Nigeria do not offer subscribers with means of mitigating unsolicited SMS messages on their networks. Therefore, in this paper we exhaustively examined the consequences of mobile spam in the Nigeria emerging and evolving telecommunication Industry.

II. CONSEQUENCES OF MOBILE SPAM

Mobile spam could be described as the sending of unsolicited messages to mobile phone subscribers most often for mass advertising. It is the sending of unsolicited bulk mails and SMS indiscriminately using mobile phones which includes PDAs Intelligent Smartphone. This is as a result of, [18]SMS messages becoming the popular service of wireless network especially in developing countries. The most alarming situation as Bergstt'en [17] in his work opined that from

an investigation carried out that the majority of spam SMS is sent directly by the mobile operators about their latest packages. The purpose of spam is to deliver data to the user contrary to his or her need [16]. Carl, [15] in his work stated that with most email systems as Windows live mail and Google Gmail are able to filter most spam thereby making spammers to be aggressively targeting wireless mobile cell phones. While Spam can be annoying to the average consumer, this could be very damaging to business users, or most especially to small business users who rely on their mobile phone as a key tool in running their business. This goes far beyond the realm of annoying SMS or unwanted Spam and can do extensive damage to a business's reputation and clientele. According to Yoon et al, [19] spam messages are an increasing threat to mobile communication. Today, we talk of several forms spam messages especially in the form of scam activities by fraudulent Nigerians on Mobile devices. The motivation of these spammers is illegal profit. In Nigeria, as messaging abuse threats targeting mobile carriers increase, mobile carriers require additional resources to accurately detect and address new types of abuse. Increasingly sophisticated spam attacks and spammer use of real user accounts make spam detection increasingly difficult to detect and monitor. Traditional and known mobile threats are evolving in complexity, often capable of eluding traditional solutions and wreaking havoc within networks. This consequences of mobile spam that are threatening the integrity of mobile communication industry in Nigeria are exhaustively discussed below:

a) Target Subscribers for financial fraud

According to Tiago et. el, [13] the explosive growth in text messaging along with unlimited texting plans barely cost anything for the attackers to send malicious messages. This combined with the trust users inherently have in their mobile devices makes it an environment rife for attack. In the Nigeria mobile communication industry, mobile phones are becoming the latest target of unsolicited electronic junk messages where attackers send malicious messages which target mobile subscribers. As a result of this, Nigerians are migrating to the usage of GSM telecommunication services in perpetration of criminal activities, especially scam and spam messages which could led to 'Advanced Fee Fraud (AFF)' popularly known as '419'. The same criminal activities done by Nigerian fraudsters using PC for many years (fraud, theft, viruses and spam) have also begun to threaten the integrity of mobile industries in Nigeria. This situation is not healthy for the Nigerian economy. Tiago et. al, [23] in his work, according to Cloudmark report reveals that financial fraud and spam via text messages is now growing at a rate of over 300 percent year over year.

b) Message Abuse

The growth of SMS/MMS usage together with the convergence of e-mail and mobile communications open the door for a wide range of messaging abuse on mobile networks. In Nigeria today, as messaging abuse threats targeting mobile carriers increase, mobile carriers require additional resources to accurately detect and address new types of abuse. Increasingly sophisticated spam attacks and spammer use of real user accounts make spam detection increasingly difficult to detect and monitor. Traditional and known mobile threats are evolving in complexity, often capable of eluding traditional solutions and wreaking havoc within networks. Unfortunately, in Nigeria new threats continue to break through as techniques required to combat these spam messages are too slow to catch today's sophisticated and rapidly evolving threats.

c) Identity Theft

Masiello, [20] in his work said that spam today is best known as a way to steal a person's identity and sensitive data or to gain access to corporate intellectual property. Identity theft is the term used to describe the theft of personal data to impersonate an individual, usually for financial gain or fraud. It is not a new technique, but has been intensified with the usage of mobile phones with the internet, thereby giving criminals new routes to gathering personal data on a much larger scale. Criminals will use a range of methods to gather personal data – ranging from harvesting data already published online (such as on online profiles and social networking sites), to using a combination of spam, phishing and pharming techniques. Identity theft can be devastating for the victim: aside from the obvious possible consequences of financial loss, it can take lots of time and energy to resolve such issues, and can result in long-term damage to your reputation and the mobile communication operators.

d) Loss of Productivity

There is a great deal of time and expense which are usually associated with lost productivity. Spending just 15 minutes in a day dealing with spam will cost you almost a full week of lost productivity every year in any given task. Multiply that by the number of employees in your business organization and soon it's the equivalent of shutting shop for a month or two each year. Tarek and Ahmed, [21]in their work opined that SMS spam has a bigger effect on users than email spam because users look at every SMS they recive, so SMS spam influences the users directly. This is healthy for the economy of a developing nation as Nigeria. Mobile users engage their time in opening and reading of these unsolicited messages.

e) Rising cost of mobile Infrastructure in Nigeria

The mobile phone when heavily used for spamming activities attracts extra cost for mobile operators to adequately maintain and service their mobile communication infrastructures for effective service delivery. This extra cost can always be avoided as it increases the cost of setting up and managing a mobile communication business in Nigeria. This rising cost of managing a mobile telecommunication business in Nigeria is not helpful for a developing country as Nigeria.

f) Wasted IT Resources

As a frequent source of malwares, worms, viruses and trojans, spam is tremendously wasteful of your IT resources, using up all your mobile phone inboxes, backup space and bandwidth as the case may be. Even if users delete spam emails or mobile spams, unless they are deleted from all inboxes, they may end up remaining stored in archive folders and on server back-up drives.

g) Denial of Service

SMS flooding which is also known as denial of service (DDos) attacks which is a consequence of mobile spam is a situation in which large volumes of SMS spam is sent during short time intervals over a mobile communication network.

h) Carrier for Virus, Trojan horse, Malware.

In Nigeria today, daily intake of unwanted and indecipherable SMS messages has doubled or trebled. It is constituting nuisance to the flexible Nigeria mobile phone user. The most threatening is that this mobile spam serves as carrier for virus, Trojan horse, worms and malware thereby threatening the integrity of the mobile communication industry.

i) Degrading of Mobile Networks

High volume of mobile spam degrades the performance and quality of mobile communication network resulting to significant foregone revenue. These SMS spam tends to congest and flood mobile communication infrastructure thereby degrading the quality of mobile network. According to Jiang et. al [22] the huge amount of spam messages also concerns the cellular carriers as the messages traverse through the network, causing congestion and hence degraded network performance.

To established the consequences of mobile spam in the emerging and evolving mobile communication industry in Nigeria, we embarked on the following experiment below which help us substantiates our claims.

III.   RESEARCH OBJECTIVES

The following research objectives are stated for the study:
- Examine the opinion of Nigerian mobile phone users on what the use their GSM mobile phone device for.
- To find out respondents views on the consequences of Mobile Spam on an average Nigerian mobile phone user.

IV.   MATERIALS AND METHODS

The study adopted descriptive survey research design to describe the consequences of mobile spam in the emerging and evolving Nigerian telecommunication sector of the economy. The study is drawn from GSM mobile phone users in the city of Abakaliki in Nigeria. The researcher administered a total of 200 copies of questionnaires and 110 of the copies were completed and returned. The collected data is as shown in the tables below in line with the questions in the research instrument.

Table 3: Sex of the Respondents

Opinion	Frequency	Percentages
Male	68	61.8
Female	42	38.2
Total	110	100

From the above table, 68 respondents representing 61.8 percent are males; while 42 respondents representing 38.2 percent are females.

Table 4: Age range of Respondents

Opinion	Frequency	Percentage
(a)Under 20 years	6	5.5
(b) 21-30 years	38	34.5
© 31 -40 years	52	47.3
(d) 41-50 years	12	10.9
(e) 51 and above years	2	1.8
Total	110	100

From the above table, the greatest number of respondents was within the age bracket of 31-40 years, representing 47.3 percent of the total number of respondents. It is closely followed by the respondents within the age brackets of 21-30 years (34.5 percent); 41-50 years (10.9 per cent) just like that of 51 years and above (1.8 percent), and under 20 years which represents 5.5 percent of the population. This is an indication that more of the mobile device users used for the research work is within the 31-40 years age bracket.

V. RESULTS

Table 5: Distribution of Respondent on 'What Nigerian GSM Mobile phone Users use GSM for'

Questions	SA	A	U	D	SD	Total
News	46	44	4	6	10	110
	(41.80)	(40.00)	(3.64)	(5.45)	(9.09)	(100)
Calls	105	5	0	0	0	110
	(95.50)	(4.50)	(0.00)	(0.00)	(0.00)	(100)
Sports	16	63	6	20	5	110
	(14.54)	(57.27)	(5.46)	(18.18)	(4.55)	(100)
Pornography	25	45	10	5	25	110
	(22.73)	(40.91)	(9.09)	(4.55)	(22.72)	(100)
Entertainment	27	46	7	20	10	110
	(24.55)	(41.82)	(6.36)	(18.18)	(9.09)	(100)
Academic Research	50	36	2	18	4	110
	(45.46)	(32.73)	(1.82)	(16.36)	(3.64)	(100)
Spamming	26	46	8	9	21	110
	(23.64)	(41.82)	(7.27)	(18.18)	(19.09)	(100)
Retrieving Information	28	36	6	25	15	110
	(25.46)	(32.73)	(5.46)	(22.73)	(13.64)	(100)
SMS/MMS	78	26	6	0	0	110
	(70.90)	(23.64)	(5.48)	(0.00)	(0.00)	(100)
Literacy	28	38	6	16	22	110
	(25.46)	(34.56)	(5.46)	(14.55)	(20.00)	(100)
Electronic Mailing	46	37	7	11	9	110
	(41.82)	(33.64)	(6.36)	(10.00)	(18.18)	(100)
Internet	38	50	4	9	9	110
	(34.55)	(45.46)	(3.64)	(8.18)	(8.18)	(100)
Internet Business	15	44	17	14	20	110
	(13.64)	(40.00)	(15.45)	(12.73)	(18.18)	(100)
Ebanking	14	46	10	14	26	110
	(12.73)	(41.82)	(9.09)	(22.73)	(23.64)	(100)

Result from table 5 shows that 41.8% of the respondents strongly agreed that Nigerian GSM users use GSM phones read news, 44% agreed to it; 4% of the respondents were indifferent to it; while 6% percent of the respondents disagreed to the question; and lastly only 10% of the respondents strongly disagreed. The table also indicated that Nigerian users use GSM mobile phone for calls: 95.46% of the respondent indicated that they strongly agreed to it; 5% agreed to it; 0% were indifferent to it; while 0% of the respondents disagreed to the question; and lastly 0% of the respondents strongly disagreed to the question. Table 5 revealed that Nigerian GSM mobile phone users use GSM for sports events. 14.56% of the respondents strongly agreed with it; 57.27% of the respondents agreed to it; 5.46% were indifferent to it; 18.18% of the respondents strongly disagreed to the question; while lastly 4.55% of the respondent strongly disagreed to the question. Result on investigation on whether Nigerian GSM mobile phone users use it for pornography were presented in table 5 that up to 22.73% of the respondent strongly agreed to it; 40.91% of the respondents agreed; 9.09% were indifferent about it; 4.55% of the respondents disagreed with the question; while lastly 22.73% of the respondent strongly disagreed to the question. Table 5 also revealed that Nigerian GSM users use GSM phones for entertainment. Indications came from opinion that the respondents were 24.55% strongly agreed to it; 41.82% of the respondents agreed to it; 6.36% of the respondents were indifferent to it; 18.18% of the respondents disagreed with the question; while lastly 9.09% of the respondents strongly disagreed with the question. Likewise, the table revealed the result of investigation into the usage of GSM phone in academic research which showed that 45.46% of the respondents strongly agreed that GSM phone is used by Nigerians for academic research; 32.73% of the respondents agreed to it; 1.82% were indifferent to it; 16.36% of the respondents disagreed to the question; while 3.64% of the respondents strongly disagreed to the question. More so, the result from the table also revealed that Nigerian mobile phone users deploy GSM phones in sending spam messages. Investigations from the opinion of the respondents showed that 23.64% of the respondents strongly agreed; 41.82% of the respondents agreed that GSM phones are used for spams; 7.27% were indifferent to it; 8.18% of the respondents disagreed to the question; while 19.09% of the respondents strongly disagreed to the question. Also from the

table, result showed that 25.46% strongly agreed that Nigerian mobile phone users use GSM phones for retrieving of information; 32.73% of the respondents agreed to it; 5.46% of the respondents were indifferent to the question; 22.73% of the respondents disagreed to the question; while 13.64% of the respondents strongly disagreed to the question. Also, the result of the investigation of the opinion of the respondents revealed that 70.09% of the respondents strongly agreed that Nigerian mobile phone users use GSM phones for sending of SMS/MMS; 23.64% of the respondents agreed to it; 5.48% were indifferent to it; 0% of the respondents disagreed and strongly disagreed to the questions respectively. Investigations of respondents opinion as indicated in table 5 also showed that 25.46% of the respondents strongly agreed that Nigerian mobile phone user deploy GSM phones for literacy; 34.56% of the respondents agreed with it; 5.46 of the respondents were indifferent to it; 14.55% of the respondents disagreed to the question; while 20% of the respondents strongly disagreed to the question.

The table also revealed the investigations of GSM mobile users in Nigeria concerning the usage of GSM mobile phones for electronic mails. The investigation revealed that 41.82% of respondents strongly agreed that GSM phones are used for electronic mails; 33.64% of the respondents agreed to it; 6.36% were indifferent to it; 10% of the respondents disagreed to the question; while 18.18% of the respondents strongly disagreed to the question. Investigations from the opinion of the respondents as shown in the table revealed that 34.55% of respondents strongly agreed that Nigerian mobile users deploy GSM phones in accessing the Internet; 45.46% of the respondents agreed to it; 3.64% of the respondents were indifferent; 8.18% of the respondents disagreed and strongly disagreed respectively. Also, results from the table indicated that 13.64% of the respondents use GSM phones for Internet business; 40% agreed to it; 15.45% were indifferent; 12.73% and 18.18% disagreed and strongly disagreed respectively. Lastly, investigation into if GSM users deploy GSM phones for e-banking revealed that 12.73% of the respondents strongly agreed; 41.82% of the respondents agreed to it; 9.09% were indifferent; 12.73% and 23.64% disagreed and strongly disagreed respectively. This implies that the majority of Nigerian GSM mobile users as indicated by the respondents believe that GSM mobile phones are used for service delivery in this areas of human endeavor.

Table 6: Respondents views on the consequences of Mobile Spam on an average Nigerian mobile phone user.

Questions	SA	A	U	D	SD	Total
Message Abuse	46	40	6	14	4	110
	(41.82)	(36.36)	(5.46)	(12.73)	(3.64)	(100)
Loss of Productivity	46	54	2	6	2	110
	(41.82)	(49.09)	(1.82)	(5.46)	(1.82)	(100)
Degrading Mobile Networks	36	48	6	12	8	110
	(32.72)	(43.65)	(5.46)	(10.91)	(7.27)	(100)
Wasted IT Resources	26	46	4	20	14	110
	(23.64)	(41.82)	(3.64)	(18.18)	(12.73)	(100)
Congestion in traffic	48	48	4	6	4	110
	(43.64)	(43.64)	(3.64)	(5.46)	(3.64)	(100)
Identity Fraud	47	45	6	4	8	110
	(42.73)	(40.91)	(5.46)	(3.64)	(7.27)	(100)
Nuisance	60	39	0	4	7	110
	(54.54)	(35.46)	(0.00)	(3.64)	(6.36)	(100)
Downtime on Crashed Computers	26	44	0	8	32	110
	(23.64)	(40.00)	(0.00)	(7.27)	(29.09)	(100)
Crime	45	46	9	4	6	110
	(40.91)	(41.82)	(8.18)	(3.64)	(5.46)	(100)
Message threats	44	48	6	2	10	110
	(40.00)	(43.64)	(5.46)	(1.82)	(9.09)	(100)
Country Image Assassination	66	36	0	6	2	110
	(60.00)	(32.73)	(0.00)	(5.46)	(1.82)	(100)
Fraudulent Activities	59	37	0	8	6	110
	(53.64)	(33.64)	(0.00)	(7.27)	(5.46)	(100)
Denial of Service	48	44	2	8	8	110
	(43.64)	(40.00)	(1.82)	(7.27)	(7.27)	(100)

Result from table 6 shows that 41.82% of the respondents strongly agreed that message abuse is one of the consequences of mobile spam, 36.36% agreed to it; 5.46% of the respondents were indifferent to it; while 12.73% percent of the respondents disagreed to the question; and lastly only 3.34% of the respondents strongly disagreed. The table also indicated that loss of productivity is one of the consequences of mobile spam: 41.82% of the respondent indicated that they strongly agreed to it; 49.09% agreed to it; 1.82% were indifferent to it; while 5.46% of the respondents disagreed to the question; and lastly 1.82% of the respondents strongly disagreed to the question. Table 6 revealed that degrading

mobile network is one of the consequences of mobile spam. 32.72% of the respondents strongly agreed with it; 43.64% of the respondents agreed to it; 5.46% were indifferent to it; 10.91% of the respondents strongly disagreed to the question; while lastly 7.27% of the respondent strongly disagreed to the question. Result on investigation on whether wasted IT resources was one of the consequences of mobile spam were presented in table 6 which showed that up to 23.64% of the respondent strongly agreed to it; 41.82% of the respondents agreed; 3.64% were indifferent about it; 18.18% of the respondents disagreed with the question; while lastly 12.73% of the respondent strongly disagreed to the question. Table 6 also revealed that congestion in traffic is one of the consequences of mobile spam. Indications came from opinion that the respondents were 43.64% strongly agreed to it; 43.64% of the respondents agreed to it; 3.64% of the respondents were indifferent to it; 5.46% of the respondents disagreed with the question; while lastly 3.64% of the respondents strongly disagreed with the question. Likewise, the table revealed the result of investigation into identity fraud as a consequence of mobile spam which showed that 42.73% of the respondents strongly agreed; 40.91% of the respondents agreed to it; 5.46% were indifferent to it; 3.64% of the respondents disagreed to the question; while 7.27% of the respondents strongly disagreed to the question.

More so, the result from the table also revealed that one of the consequences of mobile spam is that it is constituting nuisance. Investigations from the opinion of the respondents showed that 54.54% of the respondents strongly agreed; 35.46% of the respondents agreed that GSM phones are used for spams; 0.00% were indifferent to it; 3.64% of the respondents disagreed to the question; while 6.36% of the respondents strongly disagreed to the question. Also from the table, result showed that 23.64% strongly agreed that one of the consequences of mobile spam is downtime in crashed computer; 40.00% of the respondents agreed to it; 0.00% of the respondents were indifferent to the question; 7.27% of the respondents disagreed to the question; while 29.09% of the respondents strongly disagreed to the question. Also, the result of the investigation of the opinion of the respondents revealed that 40.91% of the respondents strongly agreed that crime is one of the consequences of mobile spam; 41.82% of the respondents agreed to it; 8.18% were indifferent to it; 3.64% and 5.46% of the respondents disagreed and strongly disagreed to the questions respectively. Investigations of respondents opinion as indicated in table 6 also showed that 40.00% of the respondents strongly agreed that messages threat is one of the consequences of mobile spam; 43.64% of the respondents agreed with it; 5.46 of the respondents were indifferent to it; 1.82% of the respondents disagreed to the question; while 9.09% of the respondents strongly disagreed to the question.

The table also revealed the investigations of country image assassination as a consequence of mobile spam. The investigation revealed that 60.00% of respondents strongly agreed that country image assassination; 32.73% of the respondents agreed to it; 0.00% were indifferent to it; 5.46% of the respondents disagreed to the question; while 1.82% of the respondents strongly disagreed to the question. Investigations from the opinion of the respondents as shown in the table revealed that 53.64% of respondents strongly agreed that one of the consequences of mobile spam is fraud; 33.64% of the respondents agreed to it; 0.00% of the respondents were indifferent; 7.27 and 5.46% of the respondents disagreed and strongly disagreed respectively. Lastly, investigation into the consequences of mobile spam revealed that 43.64% of the respondents strongly agreed that denial of service is a consequence of mobile spam; 40.00 % of the respondents agreed to it; 1.82% were indifferent; 7.27% both disagreed and strongly disagreed respectively. This implies that the majority of Nigerian GSM mobile users as indicated by the respondents believe that all the questions as indicated in the questionnaire above constitute consequences of mobile spam.

VI.   DISCUSSIONS AND FINDINGS

From the Tables above, it is evident that there is massive deployment of the usage of GSM mobile phone technology in day to day activities of a Nigerian flexible mobile phone user. Findings from the data collected also showed that the evolving nature of GSM technology brings uncertainties and challenges to users as well as opportunities to provide new services and supplementary information to users in the locations where they find themselves. However, in as much as GSM mobile communication can be used in the following areas of human endeavor which includes: news, calls, sports, pornography, entertainment, academic research, spamming, retrieving information, SMS/MMS, literacy, electronic mailing, internet business, e-banking, it is also necessary to observe from the findings that it's usage cut across both the negative and positive aspect of its' usages in the activities of a Nigerian mobile device user. Findings also revealed that as mobile devices increase in sophistication, the value of data that they carry is making them more valuable than many computers. That providing services to mobile users from any place and at any-time is becoming the central requirement in the current information and communication technology market. As a result, with strong growth of both the internet and mobile telecommunication, there is migration to market end users applications on mobile devices. One disturbing trend from the findings is the migration of Nigerian spammers and scammers to the usage of GSM mobile device platform to perpetrate all forms of fraud activities. This is shown in the findings from the experiment where many Nigerians are now using GSM mobile devices negatively for evil intent which includes sending dubious spam email and SMS messages with the intention of duping innocent Nigerian mobile users. Results from table 6 shows that as a result of escalating mobile spam on telecommunication infrastructures in Nigeria that the consequences includes fraud, significant loss of revenue, degrading of mobile network, congestion in traffic, denial of service, message abuse and threat, country image assassination, loss of productivity, crime and a carrier for virus, malware and worm. With all this findings, results still shows that irrespective of the positive usage of GSM mobile device by Nigerian mobile users, the escalating mobile spam is threatening the integrity of the mobile industry in Nigeria. As a result mobile subscribers in Nigeria are exposed to a lot of dangers with this malicious message while at the same time SMS spam is threatening mobile communication infrastructures. This is not healthy for the economy of a developing country such as Nigeria.

VII. CONCLUSION

The mobile telecommunication industry has and is still undergoing extraordinary changes globally. The coverage of the world's mobile networks is constantly on the increase as many more base stations are being deployed. It had been estimated in [12] that mobile phones and personal computer systems (PCs) subscriptions would reach above 8 billion by 2006. Interesting as the mobile industry expands, also the Nigerian mobile market with opportunities for ethical usage of it for service delivery in Nigeria. This ethical usage of GSM for service delivery will continue to increase while unethical usage which is at present escalating could be curbed through government policies, technology and enabling laws to protect an innocent Nigerian mobile user. This study dealt with the consequence of mobile spam in the emerging and evolving mobile communication industry in Nigeria. Based on the result, we can deduce that there is a lot of consequences of mobile spam in Nigeria emerging and evolving mobile communication sector of the economy. Escalating messages abuse affects the entire mobile ecosystem, resulting in significant loss of revenue, operational problems and customer churn. Spam, scams, phishing and malware transmitted via mobile messaging infrastructure erode subscriber trust, increasing operating costs and devaluing brand loyalty where effort should be made to curb the unethical usage through technology and government policies.

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