APPLICATION OF BIG DATA ANALYTICS IN NIGERIA MOBILE TELECOMMUNICATION INDUSTRY

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ABSTRACT

One industry that can reap substantial benefits from big data and analytics is the mobile phone industry. Nigeria in the West Africa is one country where mobile phone market is considerably big. Over 90 per cent of individuals and corporate businesses completely rely on the mobile industry for their day-to-day transactions. The study focused on the Application of big data analytics in Nigeria Mobile Telecommunication Industry with particular reference to MTN, Globalcom, Airtel and 9mobile. The study is based on the data obtained from literature survey, archival sources and the four Telecom providers in Africa's most populous country (Nigeria). Mobile Telecommunication industry in Nigeria has embraced the application of Big Data Analytics in its operation in order to maximize the benefits it offers including Churn reduction, cost-effective mechanism to structure the unstructured data part, Customer centricity and e.t.c. The integration of data sources as a primary operational challenge is the top concern for the operators. A big data advanced analytics solution that effectively utilizes structured and unstructured data to improve decision-making will be the "silver bullet" that communication service providers need to alleviate. This study examines the application of big data analytics among the mobile telecommunication operators in Nigeria.

Key Words: *Application, Big data, Analytics, Mobile Communication, Telecommunication Industry, Churn reduction, Customer centricity, Service Providers.*

1. INTRODUCTION

Big data as an aggregate of data sets which are large and complex, thus it overshadows the traditional data mining tools. Big data analytics is a term involving the new methods, tools and technologies for collecting, managing and analyzing, in real-time, the vast increase in both structured and unstructured data for insightful and effective decision-making.

Big data analytics is also the process of examining large and varied data sets e.g. big data -- to uncover hidden patterns, unknown correlations, market trends, customer preferences and other useful information that can help organizations make more-informed business decisions.

Big Data as an important concept applied to data that doesn't conform to the normal structure of the traditional database. It consists of different types of key technologies like Hadoop, HDFS, NoSQL, MapReduce, MongoDB, Cassandra, PIG, HIVE, and HBASE that work together to achieve the end goal like extracting value from data that would be previously considered dead.

Big data and analytics are intertwined, but analytics is not new. Many analytic techniques, such as regression analysis, simulation, and machine learning, have been available for many years. Even the value in analyzing unstructured data such as e-mail and documents has been well understood. What is new is the coming together of advances in computer technology and software, new sources of data (e.g., social media), and business opportunity. This confluence has created the current interest and opportunities in big data analytics. It is even spawning a new area of practice and study called "data science" that encompasses the techniques, tools, technologies, and processes for making sense out of big data [25].

According to a recent market report published by Transparency Market Research, the total value of big data was estimated at $6.3 billion as of 2012, but by 2018, it's expected to reach the staggering level of $48.3 billion that's almost a 700 percent increase.[1]

Big Data Analytics describes the data challenges too vast, unstructured, and too fast moving to be managed by traditional methods. From businesses and research institutions to governments, organizations now regularly generate data of unprecedented scope and complexity. Meaningful information and competitive structures from massive amounts of data has become increasingly important to organizations globally. In view of efficiently extracting meaningful insight from such data sources which can be challenging, analytics has become vital to realize the full value of big data to improve business performance and increase market shares.

The tools available to handle the volume, velocity, and variety of big data have improved in recent years and technologies are not prohibitively expensive with several software as an open source. Hadoop, the most commonly used framework, combines commodity hardware with open-source software. It takes incoming streams of data and distributes them onto cheap disks; it also provides tools for analyzing the data. However, these technologies do require a skill set that is new to most IT departments, which will need to work hard to integrate all the relevant internal and external sources of data. Although attention to technology isn't sufficient, it is always a necessary component of a big data strategy.

The telecommunications industry generates and stores a tremendous amount of data [25]. These data include call detail data, which describes the calls that traverse the telecommunication networks, network data, which describes the state of the hardware and software components in the network, and customer data, which describes the telecommunication customers. The amount of data generated in telecommunication companies is so great that manual analysis of the data is difficult and sometimes practically impossible. The need to handle such large volumes of data led to the development of knowledge-based expert systems. These automated systems carried out several important functions such as identifying fraudulent phone calls and identifying network faults. The problem with this approach is that it is time consuming to obtain the knowledge from human experts (the "knowledge acquisition bottleneck") and, in many cases; the experts do not have the requisite knowledge.

2. OBJECTIVES OF THE STUDY

The main objective of this study is to examine the application of big data analytics in the mobile telecommunications industry in Nigeria. To realize this objective, the focus of the study shall be through the following specific objectives:

1. Investigate the availability of big data analytics in the telecommunication industry.
2. To evaluate the various Analytics techniques of telecommunication company in Nigeria.
3. To determine a new analytical techniques.
4. To identify challenges existing in the application of big data analytics in Nigeria mobile telecommunications industry.

3. RESEARCH QUESTIONS

1. Are big data analytics readily available in telecommunication companies in Nigeria?
2. What are the readily available analytic techniques in Telecommunication Company in Nigeria?
3. To what extent does Telecommunication Company use big data analytics and how has it benefited the company?
4. What are the challenges faced in the use of big data analytics in telecommunication industry?

4. LITERATURE REVIEW

4.1. Concepts of big data and big data analytics

The magnitude of data generated and shared by businesses, public administrations numerous industrial and not-to-profit sectors, and scientific research, has increased immeasurably [1]. These data include textual content (i.e. structured, semi-structured as well as unstructured), to multimedia content (e.g. videos, images, audio) on a multiplicity of platforms (e.g. machine-to-machine communications, social media sites, sensors networks, cyber-physical systems, and Internet of Thing. [9] Report that every day the world produces around 2.5 quintillion bytes of data (i.e. 1 exabyte equals 1 quintillion bytes or 1 exabyte equals 1 billion gigabytes), with 90% of these data generated in the world being unstructured. [10] Assert that by 2020, over 40 Zettabytes (or 40 trillion gigabytes) of data will have been generated, imitated, and consumed. With this overwhelming amount of complex and heterogeneous data pouring from any-where, any-time, and any-device, there is undeniably an era of Big Data – a phenomenon also referred to as the Data Deluge. The potential of BD is evident as it has been included in Gartner's Top 10 Strategic Technology Trends for 2013 [21] and Top 10 Critical Tech Trends for the Next Five Years [22]. It is as vital as nanotechnology and quantum computing in the present era. In essence, BD is the artifact of human individual as well as collective intelligence generated and shared mainly through the technological environment, where virtually anything and everything can be documented, measured, and captured digitally, and in so doing transformed into data – a process that [18] also referred to as datafication.

In same view with the datafication concept and ever increasing technological advancements, advocates assert that in the future a majority of data will be generated and shared through machines, as machines communicate with each other over data networks

[24]. Regardless of where BD is generated from and shared to, with the reality of BD comes the challenge of analyzing it in a way that brings Big Value. With so much value residing inside, BD has been regarded as today's Digital Oil [27] including the New Raw Material of the 21st century [3]. Appropriate data processing and management could expose new knowledge, and facilitate in responding to emerging opportunities and challenges in a timely manner [6]. Nevertheless, the growth of data in volumes in the digital world seems to out-speed the advance of the many extant computing infrastructures. Established data processing technologies, for example database and data warehouse, are becoming inadequate given the amount of data the world is current generating. The massive amount of data needs to be analyzed in an iterative, as well as in a time sensitive manner [15]. With the availability of advanced BD analyzing technologies (e.g. NoSQL Databases, BigQuery, MapReduce, Hadoop, WibiData and Skytree), insights can be better attained to enable in improving business strategies and the decision-making process in critical sectors such as healthcare, economic productivity, energy futures, and predicting natural catastrophe, to name but a few [27].

4.2. Big Data Analytical Methods

To facilitate evidence-based decision-making, organizations need efficient methods to process large volumes of assorted data into meaningful comprehensions [12]. The potentials of using BD are endless but restricted by the availability of technologies, tools and skills available for BDA (Big Data Analytics). According to [16], BDA refers to methods used to examine and attain intellect from the large datasets. Thus, BDA can be regarded as a sub-process in the whole process of insight extraction from BD. It is certain that for BD to realize its objectives and progress services in business environment, it requires the correct tools and approaches to be analyzed and classified effectively and proficiently [2]. The potential value of BD is solved simply when leveraged to the drive decision-making process. Extant research studies have demonstrated that substantial value and competitive advantage can be attained by businesses from taking effective decisions based on data [7]. But, BDA is more perplexing than merely tracing, classifying, comprehending, and quoting data. [8] Emphasize that large organizations regularly gather BD and exploit analytics for support in decision-making as part of their usual procedures, and SMEs are the ones presently struggling to enhance top management decisions while adding more data for the analysis process. Aligning the people, technology, and organizational resources to become a data-driven company is problematic [26]. Given BD can enhance the decision-making and increase organizational output; this is possible when a selection of analytical methods is used to extract sense from the data, such as:

- *descriptive analytics* scrutinizes data and information to define the current state of a business situation in a way that developments, patterns and exceptions become evident, in the form of producing standard reports, ad hoc reports, and alerts [16];
- *inquisitive analytics* is about probing data to certify/reject business propositions, for example, analytical drill downs into data, statistical analysis, factor analysis [4];
- *predictive analytics* is concerned with forecasting and statistical modeling to determine the future possibilities [25];
- *prescriptive analytics* is about optimization and randomized testing to assess how businesses enhance their service levels while decreasing the expenses [14]; and
- *pre-emptive analytics* is about having the capacity to take precautionary actions on events that may undesirably influence the organizational performance, for example, identifying the possible perils and recommending mitigating strategies far ahead in time [23].

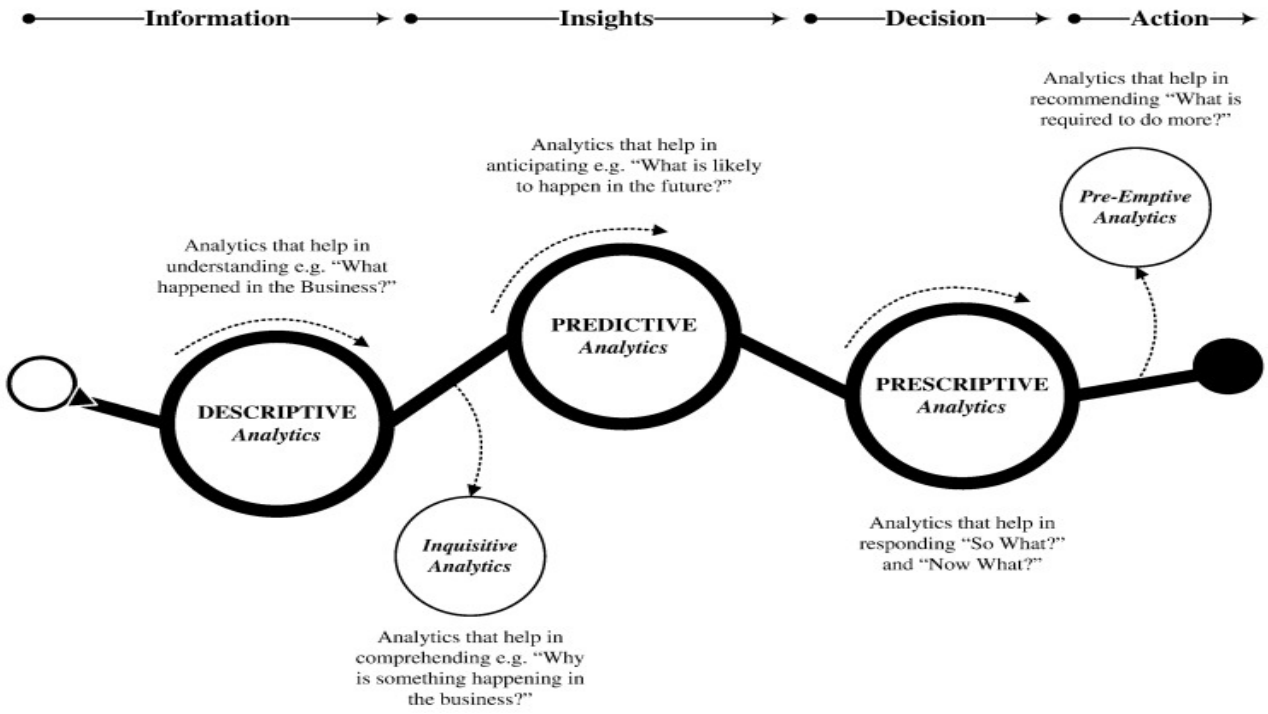

Fig. 1: Classification of types of big data analytical methods

4.3. Telecom analytics framework in Nigeria

Globally, the telecommunication industry has witnessed rapid growth and innovation over the past three decades. The significance of telecommunication to globalization, internationalization and effective coordination of economic activities over very far distances and across national borders is unarguable. The importance of telecommunication today goes well beyond facilitating business activities and interaction to making substantial contribution to the national incomes, as well as engendering many diverse and novel job opportunities [5].

The revolution in the telecommunication industry that has resulted in today's highly dynamic information age began in the mid-1980s when, due to changing ideology of how best to organize markets, the state monopoly in the telecoms industry was ended in the US, UK and Japan. By the late-1990s, with the agreement of the European Union to fully liberalize its telecoms markets and the similar agreement of the WTO, there was a widespread consensus that the liberalization of telecoms is essential to industry efficiency. Further innovative developments in the 1990s brought about fundamental changes that further transformed the Telecoms Industry into the Info-communications Industry. These influences which came from the Internet include the development of packet-switching, Internet Protocol (IP), and the World Wide Web [11],13].

According to [11], the old telecommunication industry can be categorized into three layers.

- The first is the equipment layer where the network elements –switches and transmission systems and customer premises equipment are produced.
- The second layer involves the circuit switched network, while
- The third layer is where telecom services voice; fax and enhanced services such as toll free services are rendered.

He further notes that due to the perception of telecommunication as a natural monopoly in these early days, the network layer of the telecommunication industry was dominated by a monopoly network operator. In some nations, there was also vertical integration of network operation and equipment production.

Despite the existence of national monopolies in the telecommunication industry in this era, innovation still grew substantially, though with significant limitations. There are two major non-market incentives that powered innovation in this telecommunication industry structure: the first is the competition that existed between national systems to be the first to introduce the next generation of technologies and services; the second is political incentives and pressures to improve telecoms services for both residential and

business users who together constituted the bulk of the population. However, closed innovation system, high entry barriers, few innovators, fragmented knowledge base, medium-powered incentives, and slow and sequential innovation process are part of the major constraints to innovation in this era [11].

[11] However notes that perhaps because the market environment in which the new entrants played were characterized by partial competition, these firms were largely conservative in their competition with the incumbent, merely imitating them while only slightly under pricing them. This did not stand the test of time, as the original new entrants soon became overshadowed by a new breed of entrants whose emergence signaled the birth of the New Telecoms Industry.

The Nigerian telecommunication industry has somewhat toed the path of development of the global telecommunication industry from state monopoly to liberalization to weak competition to growing competition and to growing service innovation. The history of the nation's telecommunication industry dates back to 1886 when the first telegraphic submarine cable was laid by the British firm, Cable & Wireless Ltd. From this time up till independence in 1960, Nigeria had 18,724 fixed telephone lines [20]. Then, the telecommunication industry was dominated by the Nigerian Telecommunications Limited (NITEL), a government owned monopoly operator [17]. NITEL"s services include the provision of Fixed Telephone,

Telegraph (gentex) and Payphone etc. Its main objective was to harmonize the coordination of the external and internal telecommunications services, rationalize investments in telecommunications development and provide easy access, efficient and affordable services.

Ndukwe (2003) notes that between 1987 and 1992, no remarkable improvement was recorded in the performance of NITEL, and consumer demands were largely unmet. This prompted the Federal Government to embark on market oriented reforms by partially liberalizing telecommunication industry. This Liberalization actually began in 1993, with the establishment of the Nigerian Communications Commission (NCC) as prescribed by Decree 75 of 1992. However, some segments of the market were still restricted to the monopoly of NITEL [20]. This ceased to be the case in 2001 when NITEL came under the regulatory oversight of NCC, and was formally licensed as an operator. Nigeria's return to democracy in 1999 brought full liberalization of the telecommunication industry, and necessitated the strengthening of the power and independence of the industry regulator, NCC. Consequently, a new telecommunication law was enacted in 2003. This law specifically empowers the NCC to make regulations and guidelines for the industry [17].

The period from 2000 till date, could be described as the period of Nigeria's telecommunication revolution, given the enormous growth and innovation registered in the industry. The major auctioning of digital mobile licenses in 2001 spurred many activities in the sector: active subscription grew from 400, 000 lines in 2001 to 89.8 million in 2011, resulting in a teledensity of 0.4 and 64.16 per cent in both years respectively [20].

4.4. Big data analytics and telecommunication industry in Nigeria

The telecommunication industry land mass in Nigeria is characterized with major operators such as MTN Nigeria, Globacom Nigeria, 9Mobile (Former Etisalat) and Airtel Nigeria engulfed with stiff competition for survival. Customer capacity and profitability hinges on three key pillars; efficiency, insight, and performance. Profitability, customer churn reduction and increase in wallet share hinges upon obtaining a coherent, current and actionable view of a service provider's entire business [20]. In 2012, digital world of data was expanded to 2.72 zettabytes (10^{21} bytes). It is predicted to double every two years, reaching about 8 zettabytes of data by 2015 [19].

The proper harnessing of such magnitude of data is a source of revenue for Communication services providers. In a world where more and more customers interact online via Facebook, Twitter, blogs, etc., and talk about their experiences and issues online, communication service providers must have a proactive social strategy through collecting data and analyzing the data to take action on customer retention and offer attractive services. However, dealing with social media means dealing with unstructured data, which is complex as it does not always fit into neat tables of columns and rows. The advent of these new data types that can be both structured and unstructured means they must be pre-processed to yield insight into a business or condition. Data from Twitter feeds, blogs, call detail reports, network data, video cameras and equipment sensors is not stored directly in a data warehouse until it is pre-processed to correlate and normalize the data to detect basic trends and associations.

It is a cost-effective mechanism to structure the unstructured data part, load that data into data warehouses for comparison and then use that data with other collected data to run advanced analytics processes on it. There is a need for solutions that can combine usage and subscription data with insight into the network, cost, customer mood and customer preference data to trigger specific actions, which helps enhance customer experience. Communication service providers have no dearth of data at their disposal, but they are missing actionable insights from that data. The fact that data passes through the network does not mean that actionable, correlated information is available to the company. Communication service providers must find efficient ways to bring

together normalize and correlate all data sources, which poses a serious challenge. The integration of data sources as a primary operational challenge is the top concern for the operators. A big data advanced analytics solution that effectively utilizes structured and unstructured data to improve decision-making will be the "silver bullet" that communication service providers need to alleviate.

5. RESEARCH METHODOLOGY

The research methodology involves the use of research procedures used in the study of this work. Articles, journals and several written documents formed a detailed literature review of published and unpublished evaluations on the Big Data Analytics in the Mobile Telecommunications Industry in Nigeria in chapter two but this chapter states the research into the case study on big data analytics in Abuja metropolis and how it has helped in telecommunication industries through a series of in-depth, structured design conducted to get results.

5.1 Research Design

The term research design is the use to describe a number of decisions, which need to be taken regarding the collection of data before ever the data is collected. The research design process aims at building and evaluating innovative artifacts. For the purpose of this study, the use of survey design was used for the research questions. The survey research is one in which a group of people or items is studied by collection and analysis of data from large people or it is considered to be representative of the entire group. The use of structures questionnaires and interviews touched upon evaluating the Big Data Analytics in telecommunication industry in Nigeria, its impact and challenges associated with the developing system in the industries.

5.2 Population of the study

The population of this study will be based on the four mobile telecommunications firms in Nigeria. The research topic targets about 200 staffs of the four telecommunication industry which includes MTN, Globalcom, Airtel and 9Mobile (Etisalat).

5.3 Sample Size and Sampling Technique

Sample is the representative of a population with which the researcher carries out on a population and draws inference. Within each firm, judgmental sampling will be used, which involved the choice of respondents who are most advantageously placed or in the best position to provide the information required. This research will prefer this type of respondent selection in order to get first-hand information. From each firm target respondents are used from either of the following categories: technical, sales and marketing, fraud detection and network management in the telecommunication industry.

The details are summarized in Table 5.1 below:

Table 5.1: Sample size

Population Category	Target Population	Sample Size
MTN	50	50
Globacom	50	50
Etisalat	50	50
Airtel	50	50
TOTAL	**200**	**200**

5.4 Instrumentation

The instrument used in the research is structured questionnaires, and it allows the researcher to collect data by designing a question like form and it is to be completed by the technical, sales and marketing, fraud detection and network management of the selected telecommunication industry. This instrument is usually used when the data to be collected is extremely very small.

6. DATA PRESENTATION, ANALYSIS AND DISCUSSION

This chapter will elaborate more on the findings gathered of this project. This chapter will perform all the mechanism involved with the questions from the research questionnaire on the Application of Big Data Analytics in Nigeria Mobile Telecommunication Industry.

MS excel is a wonderful tool for sorting, filtering, extraction and searching which made the work easy. I was able to use this tool effectively with tables, and arranging at percentages for each questions answered by the respondent. Multiple elements can be searched easily from large amounts of data to help solve a lot of problems and questions.

Background of the respondents

Table 6.1: Age distribution of respondents

AGE(years)	NUMBER	PERCENTAGE (%)
≤ 30	35	41.67%
31- 35	130	43.33%
36-41	25	11.67%
≥ 42	10	3.33%
Total	**200**	**100**

Source: Field Survey 2018

From table 6.1 above, it shows that staffs of Nigeria Mobile Telecommunication industry are more at the age of 31-35years (43.33%) and below 31years (41.67%). This shows the activeness and maturity of staff in the industry as to other industries.

Table 6.2: Gender of Respondents

Gender	No	Percentage (%)
Male	125	65.0%
Female	75	35.0%
Total	**200**	**100**

Source: Field Study 2018

Table 6.2 above shows that staffs are more of the male gender with a percentage of 65% than female gender (35%) explaining that there are less female as telecommunication industry staff than male.

Table 6.3: Department

Qualifications	Number	Percentage (%)
FRAUD DETECTION	10	3.33%
SALES AND MARETING	120	40.0%
NETWORK MANAGEMENT	24	31.33%
ICT	30	20.0%
Others	16	5.33%
Total	**200**	**100**

Source: Field Survey 2018

Table 6.3 shows that telecommunication industry staff are more in the department of Sales and marketing (40.0%), Network management (31.33%). Others are ICT (20.0%) and fraud detection (3.33%) that is very low in percentages.

Table 6.4: Years of working experience with the organization

Years of experience	Number	Percentage (%)
0< 1	40	20.0%
1 – 2	10	13.34%
2 – 5	10	13.34%
= 5	140	53.33%
Total	200	100

Source: Field Survey 2018

Table 6.4 shows that the experience of staff in telecommunication industry are more of > 5year (53.33%) followed by 0-1year (26.67%) and then those of 2-5years are few (20.0%).

Answering Research Questions

Table 6.5: Research Question 1: Are big data analytics readily available in telecommunication companies in Nigeria?

S/N	ITEMS	Yes	%	No	%
1	Awareness of the concept of Big Data Analytics	180	90.0	20	10.0
2	Organization been storing transactional data in the long-term	51	25.5	149	74.5
3	Are data sources very large?	45	22.5	155	77.5
4	Has your organization ever carried out a Big Data Analytics exercise	120	60.0	80	40.0
5	Efficiency in skills of analytics	98	49.0	102	51.0
6	Is the level of adoption of big data analytic exercise high in the organization	155	77.5	45	22.5

Source: Field survey 2018

Table 6.5 shows that about 180 staff is aware of big data analytics in the industry but only about 98 staff has the required skills used in analytics. This shows that in the industries, awareness of big data analytics is high but the skill needed for efficiency in it is a little lower than the awareness.

Table 6.6: Research Question 2: What are the readily available analytic techniques in Telecommunication Company in Nigeria?

S/N	ITEMS	AGREE	%	DISAGREE	%
1	Descriptive Analytics	160	80.0	40	20.0
2	Inquisitive Analytics	154	77.0	46	23.0
3	Predictive Analytics	143	71.5	57	28.5
4	Prescriptive Analytics	175	87.5	35	17.5
5	Pre-emptive Analytics	135	67.5	65	32.5

Source: Field Survey 2018

Table 6.6 showed the analytic techniques used in telecommunication industry. These include descriptive analytics (80.0%), prescriptive analytics (87.5%) and inquisitive analytics (77.0%). Others are predictive analytics (87.5%) and pre-emptive analytics (67.5%).

Table 6.7: Research Question 3: To what extent does Telecommunication Company use big data analytics and how has it benefited the company?

S/N	ITEMS	AGREE	%	DISAGREE	%
1	Application of Big Data Analytics creates strategic advantage.	154	77.0	46	23.0
2	Application of Big Data Analytics leads to costs-saving.	175	87.5	35	17.5
3	Application of Big Data Analytics leads to reduction of customer attrition/churn	134	67.0	66	33.0
4	Application of Big Data Analytics enables efficient management of the network infrastructure.	135	67.5	65	32.5
5	Application of Big Data Analytics aids in fraud detection.	143	71.5	57	28.5
6	It makes decision making easy and faster.	106	53.0	94	47.0

Source: Field Survey 2018

Table 6.7 shows the benefits of big data analytics in the telecommunication industry. These include efficient management of network infrastructure (77.0%), cost-saving (87.5%), reduction of customer attrition/churn (67.0%). Others are fraud detection (71.5%) and make decision making easy and faster (53.0%).

Table 6.8: Research Question 4: What are the challenges faced in the use of big data analytics in telecommunication industry?

S/N	ITEMS	AGREE	%	DISAGREE	%
1	Cost of purchase	186	93.0	14	7.0
2	Staff have no access to big data analytics	139	69.5	61	30.5
3	Most staff lack literacy in the use of big data analytic	152	76.0	48	24.0
4	Reluctance of staff to acquire more knowledge about ICT	125	62.5	75	37.5
6	Lack of fund to establish fully functioning big data analytics	183	91.5	17	8.5
7	Demands that too much time be spent on technical problems	197	98.5	3	1.5

Source: Field Survey 2018

Table 6.8 shows the major challenges facing the use of big data analytics in telecommunication industry and it includes cost of purchase (93.0%), lack of literacy on big data analytics among staff (76.0.0%), lack of funds to establish fully functioning big data analytics (91.5%) and reluctance of staff to acquire more knowledge (62.5%).

Discussion

Most of the data collected by telecommunication industry in Nigeria are structured in nature and very suitable for current ideal technological world. The collected data is used only for statistical purpose and not solving any mission critical challenge that can improve the quality of the telecommunication service to its customers.

This huge amount of data should be recognized as an asset to the industry and is expected to grow as new technologies are adopted and an increasing amount of both structured and unstructured data become available.

The application of Big Data analytics to this growing resource can increase the value of this telecommunication to the people and nation at large. There is the need to have telecommunication ICT strategy that will identify the need to have framework for Big Data analytics so as to further develop communication capability in Big Data.

The rapid rise in the use of Smartphone and other connected mobile devices has triggered a spurt in the volume of data flowing through the networks of telecom operators. It is necessary that the operators process, store, and extract insights from the available data. Big Data analytics can help them increase profitability by helping optimize network usage and services, enhance customer experience, and improve security. Research has shown that the potential for telecom companies to benefit from Big Data analytics is substantial.

The potential of Big Data, however, poses a challenge: how can a company utilize data to increase revenues and profits across the value chain, spanning network operations, product development, marketing, sales, and customer service.

Big Data analytics, for instance, enables companies to predict peak network usage so that they can take measures to relieve congestion. It can also help identify customers who are most likely to have problems paying bills as well as those about to change operators, thus exacerbating churn.

Operators are usually advised against taking the usual top-down approach when it comes to Big Data analytics, which marks out the problem to be solved and then seeks out the data that may help resolve it. Instead, the operators should focus on the data itself, using it to make correlations and connections. If done correctly, the data could reveal insights that could form the basis of more streamlined operations.

Table 6.5 showed that there is a huge awareness of the use of big data analytics but the skills of staff are few in numbers compared to the awareness. Specially trained personnel to expose staff to big data analytics skills do not even exist in most cases. Technology makes the world into global village and also bulldozes previous communication super highway but non availability of the facilities is a major setback.

Table 6.6 showed the major data analytics used in telecommunication industries in Nigeria are descriptive analytics, prescriptive analytic and inquisitive analytics.

On table 6.7, the benefits of using big data analytics techniques enhances efficient management of network infrastructure, cost-saving in data sources management, reduction of customer attrition/churn, fraud detection and make decision making easy and faster.

On table 6.8, the study revealed that the major challenges faced in the use of big data analytics include cost of purchase, lack of literacy on big data analytics among staff, lack of funds to establish fully functioning big data analytics and reluctance of staff to acquire more knowledge on big data analytics.

Big Data is used in Nigeria telecommunication sector. Prior to SIM registration exercise, customers were usually segmented based on amount of money they spent on the network. To a greater extent, major use of these data generated by the telecommunication companies are in customer classification mainly for network expansion, planning for promotion or even marketing. But as soon as government directives was passed on mandating all the telecommunication service providers to carry out SIM registration of their customers, most (if not all) Telecommunication companies migrated their Customer Relationship Management (CRM) systems to one with Big Data analysis integrated. Why?… The answer is to give them better understanding of their customers and plan for efficient service delivery.

7. RECOMMENDATION, CONCLUSION AND SUMMARY

7.1. Conclusion

The convergence of big data in telecommunication industry is shaping the future of telecommunication how to drive business value from data analytics capabilities. Digital era has moved data accessibility from batch into real-time. The capability to access large volume inside big data platform helps the data scientist to produce meaningful analytics results. Big data analytics platform has enabled the data scientist to work with the massive amount of data set without restriction. This is why many telecommunications have moved from hypothesis based towards data driven approach.

Big data platform enables the environment which encourages data discovery. As a result, telecommunication now can move faster, do more experiments and learn quickly. Now, they can load all the data and let the data tell the story.

7.2. Summary

Forecasting through researches showed that in year 2050, 95% of world population will be connected via internet and most of it will be using wireless mode to connect especially GSM or future telecom architecture. It will generate huge amount of data for telecommunication industry for which the industry is not ready to deal with. Most of this data will be redundant therefore proper data mining tools and techniques are required to dig out for the required data and dump the redundant data.

7.3. Recommendation

Based on the findings of the study, the following recommendations are made:

- Telecommunication industry/organizations should strive to equip organization with adequate data analytic techniques facilities.
- Industry should reward any staffs who try his/her hands on innovative ideas on analyzing big data.
- Needs analysis should be employed whenever staff are being sent for training so that maximum benefits can be derived from such training programmes.

All management of telecommunication industries should make provision for types of hardware, operating system and software that will be conducive for use in big data analytics. This may include any equipment or interconnected system or subsystem of equipment that is used in the automatic acquisition, storage, manipulation, management, control, displaying switching, interchanging, transmission or reception of data or information.

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