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AWARENESS AND USE OF BIG DATA MANAGEMENT SYSTEMS BY LECTURERS IN UNIVERSITIES IN RIVERS STATE, NIGERIA

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Abstract

The study investigated the awareness and use of Big Data management systems by lecturers in universities in Rivers State. The population comprised of lecturers in Three (3) public universities in Rivers State namely; University of Port Harcourt, Rivers State University and Ignatius Ajuru University of education. A structured online questionnaire was used to gather the data. 152 online responses were received, but 144 were useful for the analysis. The data was analysed using frequency of the simple percentages and mean scores. The result shows that lecturers are not aware of big data management system tools; however, they understand the benefits and know what it can be used for. The factors influencing the use of Big Data management systems were shortage of manpower, availability of technology among others. It was therefore, recommended among others that information technology leaders of universities should ideally demonstrate the importance and use of Big Data management system in their information technology strategic plans to address the need for big data management skills among lecturers in Rivers State Universities.

Keywords: *Big data, Big data management system, lecturers, Rivers State Universities and skills*

Introduction

The concept of Big Data is becoming increasingly popular as a result of the influx of data from different works of life. This big data as become is now a tool for business competitiveness, quality education, and social integration amongst others. Big data is the result of information explosion in the world today. Big data could be said to be the buildup of the participation of the public in data creation and dissemination. Also, Companies churn out a high volume of transactional data, capturing trillions of bytes of data about their customers, supplies, and operations. Millions of networked sensors are being embedded into the physical world in devices such as mobile phones, smart energy meters, automobiles, and industrial machines that sense, create and communicate data in the age of the internet of things. Indeed, as companies and organizations go about their business and interact with individuals, they are generating a tremendous amount of digital data that are created as a by-product of activities (Oguntimilehin & Ademola, 2014). Social media sites, smart phones, and other consumer devices including PCs and laptops have allowed billions of individuals around the world to contribute to the amount of Big Data available and the growing volume of multimedia content has played a major role in the exponential growth in the amount of Big Data (James et al, 2011).

Big Data management system covers innovative techniques and technologies for capturing, storing, distributing, managing and analysing large data sets with different formats (Cope and Kalantzis, 2016). They characterized big data by 6Vs; namely, volume, velocity, veracity, variety, verification and value. Volume refers to large amount of information that is challenging to store, process, analyze and present; while velocity relates to increasing rate at which information flows in an organization. Veracity refers to trust, biases, and uncertainty in data; while variety focuses on whether data is structured or unstructured. Verification deals with security of data; while value refers to usefulness of data generated for guiding decision making. These big data are becoming extensively structured and unstructured with complex forms of data. Big data refers to data that is too large, complex and dynamic for any conventional data tools to capture, store, manage and analyze. It describes data that is too big and moves too fast, that conventional methods of data analysis cannot handle. It is a typical data lake which holds all forms of data (White, 2015). In reality, big data sizes are a constantly moving, ranging from a few Terabytes to several Zettabytes of a single data set, depending on the particular context in which the data is used (Jinchuan, et.al, 2013).

The volume of data is increasing in public and private organizations with no exception to universities. University data ranges from the personal data of staff and students to records of university dealings with other bodies. Academic data are the major information that forms the collection of university's data sets. These data is multiplying in increasing value causing the influx of unsystematic sets of information leading to the concept of big data in universities. As a result of this, big data management system becomes a necessity to ensure proper control, evaluation and interpretation of Big data. Big data management system is an emerging technology that is use to manage big data. It is a software that help to collect, process, organize, store and distribute large data characterized by the 6Vs. it is an administrative software as well as instructional applications which include the process of recruitment

and admissions, monitoring of students performance, donor tracking and financial planning (Eguavoen & Okodugha, 2022)

In the educational sector, Big Data management system are broadly divided into two such as, Learning analysis (LA) and academic analysis (AA) software (Daniel, 2014). Learning analysis software is special management software that deals with collection of data about learners and their contexts for improving students learning. Academic analysis software is concerned with improving institutions productivity through the use of students, academic and organizational data. Big Data management system becomes an imperative management tool in effective management of Big Data in universities. Big Data management support lecturer collection and interpretation of data and lecturer to students' assessment of learning activities. The continuous monitoring of lecturers development, appraisal and contribution to knowledge is checkmated through Big Data management system. In today universities appraisal, the area of researches and impact to the body of knowledge is evaluated by Big Data management system. For example, monitoring and evaluation of the numbers of lecturers work cited by researchers is a fast growing appraisal method in universities and this could be said to be managed by Big Data management system.

Opportunities are provided by Big Data management system in various institutions of education for their information technology resources to be effectively used so as to bring about the development and promote lecturer to an advanced rate of achievement and to likewise improve the outcome of students for the attainment of university's objective. Therefore, it becomes a need to investigate the awareness and uses of Big Data management systems by lecturers in universities in Rivers State.

Statement of Problem

Big Data is a concept that is used to describe large amount of data, structured and unstructured that is used to solve problems, make decisions, and make predictions among others. Big Data involves variety of data, of a high volume and very complex data and requires that it be adequately managed to enable it become meaningful to users; hence, the need of Big Data management system. Big Data management system is an electronic device mostly in a software format that aid the collection, processing, organization, control, storage, dissemination and interpretation of Big Data. It means that without Big Data management system, Big Data will be in a form that it cannot be used to solve problems. The introduction and adoption of Big Data in higher educational institution especially in university has necessitated the skill of manipulating Big Data management systems. There have been indications in researches that universities in Nigeria are adopting Big Data management systems to process large data however, there have not been research carried out concerning the awareness and use of Big Data management systems by lecturers in universities in Rivers State. This forms the essence of this research.

Objective of the Study

The objective of this study is to investigate the awareness and use of Big Data management systems by lecturers in Universities in Rivers State. Specifically, the study tends to;

1. Determine the extent of lecturers' awareness of Big Data management systems in Rivers State Universities.

2. Investigate the benefit of Big Data management systems by lecturers in Rivers State Universities.
3. Ascertain the use of Big Data management systems by lecturers in Rivers State Universities.
4. Investigate the factors influencing the use of Big Data management systems by lecturers in Rivers State University.

Research Questions

1. What extent are lecturers aware of Big Data management systems in Rivers State Universities?
2. What is the benefit of Big Data management systems by lecturers in Rivers State Universities?
3. What are the uses of Big Data management systems by lecturers in Rivers State Universities?
4. What are the factors influencing the use of Big Data management systems by lecturers in Rivers State Universities?

Review of Literature

University institutions are regarded as one of the key indices for growth as well as the development of a nation. One of the central objective of university institution is the pursuit to learn and also commit to make sure knowledge is been enhanced and likewise provide a balanced training for the betterment of individual's life and the society at large. Modern university institution is seen as an organized institutional learning and training centre that consist of conventional field of study like humanities, arts, managements and science faculties and more specialized university institutions in engineering, science, technology as well as agriculture (Alemu, 2018). University education play an enabling role to the society by ensuring the provision of manpower, promotion of socio-economic development in a country and also development of intellectual capability of an individual, groups and the society at large. This primary responsibility therefore makes the university system different from any other institution. The value of a university as an institution is evolving and beginning to take a new dimension on daily bases. The adoption of various technologies in today's reality is strengthening the capacity of various higher institutions in other to face the new challenges. To project the outcomes of the value of learning, it is essential that the large amount of data that is being produce by the system of education have to be adequately analysed and interpreted in forms that are better understood in other to appropriately give support to recent challenges.

Big Data has the potential to revolutionize not just research, but also university education. Big Data refers to data sets that are too large and complex that traditional data processing applications cannot handle (Oguntimilehin & Ademola, 2014). Big Data is a term applied to data sets whose size is beyond the capability of commonly used software tools to capture, manage and process. Divyakant et al (2012) conducted a quantitative comparison study of different approaches taken by 35 Charter schools. They found out that one of the top five policies correlated with measurable academic effectiveness was the use of Big Data to guide instruction. This data could be used to design the most effective approaches to education, starting from reading, writing, and math, to advanced, college-level courses. In a relational view, higher institutions are attracted to Big Data management system because it holds a great promise

in providing a qualitative analysis of Big Data for educational institutions to use their information technology resources strategically to improve the quality of education and enhance students' completion rates, improve their resilience as well as performance (Anikweze, 2019).

University institution's data when properly analyzed can play a vital role in deciding how certain contentious issues could be addressed (Marsh, Maurovich-Horvat & Stevenson, 2014). Also Murumba and Micheni (2017) posit that it is absolutely important for universities to use Big Data Analytics in order to deliver the very best of learning environments for the good of society. Daniel (2015) suggests that IT analytics could be employed to cover usage and performance data that help with monitoring required for developing or deploying technology, developing data standards, tools, processes, organizational synergies and policies. The conviction is that IT analytics can integrate data from a variety of systems such as student information, learning management and alumni systems, as well as systems managing learning experiences outside the classroom.

Big Data has come of age, and State policymakers, university leaders, and entrepreneurs should necessarily set new standards and expectations for data in this new era (Burns, 2016). Accountants and auditors should equally begin to clarify some basic compliance standards for data collection, management, security, interoperability, privacy, and more, the humungous costs notwithstanding (Samiddha & Ravi, 2016). However, new data-management techniques are inevitable for handling Big Data. Kellen, Reektenwald and Burr (2013) acknowledge that the thickness of data and the difficulty in bending them into shape has constituted a perennial impediment for organizations, requiring a class of people with specialized knowledge and skill to bring data together from different sources, combine them, analyze them, and find patterns previously hidden. Among the lecturers in Nigerian higher education institutions, new knowledge and new skills are imperative both for analyzing dig data and for working with interdisciplinary teams of colleagues that understand programming languages as well as the cognitive, behavioral, social and emotional perspectives on learning. There is the need for a new horizon of professional knowledge (Gibson, 2012).

On the other hand, it is necessary to explore new means for improving and monitoring student's success and other institutional policies (Tulasi, 2013). Big Data management system allow for very exciting changes in the educational field that will revolutionize and develop innovative educational strategies like the way students learn and teachers teach (Alonso & Arranz, 2016). Student's information like-financial, enrollment, academic, extracurricular and instructional plays an important role in accomplishing a thorough analysis of students and learning to make better and informed decision on future course selection (Kelechi et al, 2020). It cuts across every aspect of university system such as administration, teaching, and learning. Management of data in the correct way, using and analyzing data has become important due to availability of voluminous data in management department of universities (Ahiauzu & Agundu, 2014). Big Data management software has made it possible to analyze such vast volume of data and evidences for decision making very possible. Indeed, industry, government and academia have long produced massive data sets for example, national censuses (Rob, 2014). Big Data management system presents to institutions of higher learning a good framework for efficiently utilizing the vast array of data in shaping the future of university education (Alonso & Arranz, 2016).

Big Data management system in the context of e-Learning systems (also called Big Learning Data system), consists in the information sources (courses, modules, experiments etc.) created by the teachers, but especially in data coming from the learners (students) throughout the education process, collected by the Learning Management Systems, social networks, multimedia, as they were defined by the organization or the professionals (Banica & Radulescu, 2015). Sources of Big Data in universities have been identified in literature. They include demographics, such as age, sex, location and professional background. Ozioma, etal (2021), in their work listed the benefits of Big Data management system, such as; Improved Instruction, Matching Students to Programs, Matching Students to Employment, Transparent Education Financing and Efficient System Administration.

The training needs of lecturers for ICT skills enhancement revealed that lecturers were not skilled in slides preparation and presentation, spreadsheets preparation, and data analysis using computer software (Akinnagbe & Baiyeri, 2011). Therefore, the management of complex data emanating from students' enrolment, tests and examination records, and even financial matters had always been done either haphazardly or with great strains and stresses, what with endemic paucity of ICT infrastructure and associated relevant software. Furthermore, Big Data should be processed in a platform that can handle the variety, velocity, and volume of data by using a family of components that require integration and data governance (Mules, 2016). Few personnel of the Nigerian tertiary education institutions are really familiar with these processes. Hence the challenges confronting the application of Big Data in Nigerian Higher Education could be expected to be monumental and intimidating. However, it is possible that the scare could be only in one's imagination since there was no empirical evidence known to the researchers concerning the involvement of lecturers in handling Big Data.

An investigation shows how Big Data are generated, processed, and identifies the problems of generating and processing assessment Big Data in Nigeria (Esemonu et al, 2020). Through purposive sampling technique forty-five experts in education assessment and research were selected. The instruments for data collection were interview and documents. The data collected were analysed using descriptive statistics to answer the five research questions that guided the research. The results of the investigation showed that the internal and external examinations and assessments from secondary schools, and course work results in universities were identified by more than 95.5% of the experts interviewed as the major sources of assessment data in Nigeria. The major problem in generating and processing assessment Big Data from the experts' opinions is low awareness on the need/advantages of assessment Big Data with the highest mean rating (4.29±0.76). Many data are not analysed and a lot of information are lost. Recommendation was made amongst others on the need for the stakeholders to create awareness on the importance of Big Data in the modern education system to improve learner's performance.

Big Data management system is noticed to be relatively new. Looking at the sector of the tertiary institution, the important of keeping staff and students' data in various departments and faculties cannot be overemphasized. The use of Big Data analysis techniques for addressing contemporary challenges facing higher education is a current trend that requires attention of the academia. As concluded by Dnuggets (2018), following a recent survey, the key benefits of assessing the value of Big Data to

organizations include improved and timely access to decision-making information, greater transparency, scalability and better change management. The need to explore the potentials of Big Data management system for addressing contemporary challenges facing university education in Rivers State motivated this study.

Methodology

A descriptive research design was used. The populations of the study were lecturers in the three government owned universities in Rivers State namely; university of Port-Harcourt, Rivers State University and Ignatius Ajuru University of education, Port-Harcourt. A Self-structured online questionnaire was used to gather the data. The questionnaire was a 4 point likert scale (ranging from 4-1). 152 online questionnaires were received while, 144 were properly filled and useful for analysis. The data was analysed using frequency distribution of simple percentages and mean scores.

Decision Rule: Based on the mean of 2.50, the decision was that any item with a mean of 2.50 and above was accepted while any item with a mean below 2.50 was not accepted

Results and Discussion

Demographic characteristics of the respondents

The respondents consist of 144 lecturers from the three public universities in Rivers State. The results show that there were 67(47%) males and 77(55%) females. The result of the qualification were; 42(29%) PhD, 63(44%) master's degree, and 39(27%) bachelor's degree. Rank results show 17(12%) graduate assistant, 34(24%) assistant lecturer, 24(16%) lecturer 11, 26(18%) lecturer 1, 19(13%) senior lecturer, 14(10%) associate professor, 10(7%) professor. The result of the respondents universities were; 51(35%) University of Port-Harcourt, 61(42%) Rivers State University, 32(22%) Ignatius Ajuru University of education.

Table 1: Extent of lecturers' awareness of Big Data management systems in Rivers State Universities

To what extent is lecturers' awareness of Big Data management systems in Rivers State Universities?	HA	A	SA	NA	Mean	Decision
Apache hadoop	20	31	40	53	2.1	NA
Atlas.ti	15	27	40	62	2.0	NA
Storm	17	29	45	53	2.1	NA
Cassandra	22	25	43	54	2.1	NA
Stats IQ	13	30	48	53	2.0	NA
Couch DB	20	13	49	62	1.9	NA
Pentaho	18	27	50	49	2.1	NA
Cloudera	23	26	59	36	2.3	NA
Flink	14	22	56	52	2.0	NA

Table 1 shows the awareness of Big Data management systems by lecturers' in Rivers State universities based on a 4 point likert scale (4-1) of Highly Aware (HA), Aware (A),Somehow Aware (SA)and Not Aware (NA). It shows that respondents were not aware of Big Data management systems such as; Cloudera (2.3), apache hadoop (2.1), storm (2.1), Cassandra (2.1), Pentaho(2.1), atlas.ti (2.0), Stats IQ (2.0) and flink (2.0).

This result was hitherto supported by Esomonu et al (2020), they agreed that university staff are not well aware of current ICT tools for managing Big Data however, there are indications of ICT advocacy to educate them on the available tools. Eguavoen and Okodugha (2022), exposed the importance of awareness of the prospective advantages of Big Data tools to tertiary institutions. Anikweze et al (2019), in their study revealed that there is a wide gap in the access and involvement of Big Data among lecturers in higher institutions in North central Nigeria which could be as a result of inadequate advocacy and training. Findings from this study suggest that the possibility of using Big Data management tools can be hinged on the awareness of the relevant Big Data management systems in universities.

Table 2: Benefits of Big Data management systems to lecturers in Rivers State University

Items	**SA**	**A**	**D**	**SD**	**Mean**	**Decision**
It stores students information	62	51	15	16	3.1	Agree
It guide lecturers teaching activities	49	62	20	13	3.0	Agree
It promote learning activities	51	59	14	20	3.0	Agree
It ensure quick collection of information	53	60	14	16	3.0	Agree
It promotes accurate evaluation of data	48	63	21	2.2	3.0	Agree
It facilitate the dissemination of data	60	44	25	15	3.0	Agree

Table 2 above shows the benefits of Big Data management systems to lecturers in Rivers State University based on a 4 point likert scale of ranging from Strongly Agree (SA), Agree (A), Disagree(D) Strongly Disagree (SD), it revealed that Big Data management systems stores students information (3.1), it guide lecturers teaching activities (3.0), it promote learning activities (3.0), it ensure quick collection of information (3.0), it promote accurate evaluation of data (3.0) and it facilitate the dissemination of data (3.0).

This result is in agreement with Ozioma, et al (2021), whose work listed the benefits of Big Data management system, such as; Improved Instruction, Matching Students to Programs, Matching Students to Employment, Transparent Education Financing and Efficient System Administration. Dnuggets (2018), stated key benefits of assessing the value of Big Data tools to organizations, these includes; improved and timely access to decision-making information, greater transparency, scalability and better management.

Table 3: Uses of Big Data management systems by lecturers in Universities in Rivers State

Items	SA	A	D	SD	Mean	Decision
It is use for analyzing and interpreting students data	62	49	14	19	3.1	Agree
It is used to store large data	54	59	16	14	3.1	Agree
It is use to increase lecturers job performance	53	47	27	17	2.9	Agree
It facilitate lecturer collaboration with other lecturers	31	27	46	40	2.3	Disagree
It is use to gather information for academic research	51	47	22	24	2.9	Agree
It is use as a basis to examine lecturers ICT skills	10	25	59	50	2.0	Disagree
It is use to plan curriculum	31	15	42	56	2.0	Disagree
It is use for marking and grading	51	67	18	8	3.1	Agree

Table 4 above shows the uses of Big Data management systems by lecturers in Universities in Rivers State based on a 4 point Likert Scale of ranging from Strongly Agree (SA), Agree (A), Disagree(D) Strongly Disagree (SD). It therefore reveal that Big Data management system isuse for analysing and interpreting data (3.1), it is used to store large data (3.1), it is use for marking and grading (3.1), it is use to increase lecturers job performance (2.9) and it is use to gather information for academic research (2.9). While the respondents disagreed that it facilitates lecturer collaboration with other lecturers (2.3), it is use as a basis to examine lecturers ICT skills (2.0) and it is use to plan curriculum (2.0).

The result is in line with Divyakant et al (2012) in their quantitative comparison study of different approaches taken by 35 Charter schools. They found out that one of the top five policies correlated with measurable academic effectiveness was the use of Big Data tool to guide teaching and learning activities. This data derived could be used to design the most effective approaches to education, starting from reading, writing, and math, to advanced, college-level courses. In a relational view, higher institutions are attracted to Big Data management system because it holds a great promise in providing a qualitative analysis of Big Data for educational institutions to use their information technology resources strategically to improve the quality of education and enhance students' completion rates, improve their resilience as well as performance (Anikweze, 2019).

Table 4: Factors influencing the use of Big Data management systems by lecturers in Rivers State University

Items	SA	A	D	SD	Mean	Decision
Shortage of manpower	47	53	27	17	2.9	Agree
Availability of technology	54	59	16	14	3.1	Agree
Invasion of privacy when manually handling records	51	47	24	22	2.9	Agree
Availability of variety of Big Data sources	49	62	19	14	3.0	Agree
Complexity of data	41	60	21	22	2.8	Agree
Human errors in evaluation and interpretation of data	52	53	18	11	3.1	Agree
ICT skills	54	59	16	14	3.1	Agree

Table 4 above shows the Factors influencing the use of Big Data management systems by lecturers in Rivers State University based on a 4 point Likert Scale of ranging from Strongly Agree (SA), Agree (A), Disagree (D) Strongly Disagree (SD). It revealed that respondents agree that availability of technology (3.1), human errors in evaluation, interpretation of data (3.1), ICT skills (3.1), availability of variety of Big Data sources (3.0), shortage of manpower (2.9), invasion of privacy when handling records manually (2.9), and complexity of data (2.8) are factors influencing the use of Big Data management systems by lecturers in Rivers State.

This study is consistent with Murumba and Micheni (2017), they identified pressing factors that necessitated the use of Big Data management systems in higher institutions of such are; increase in students and lecturer data, proliferation of ICT tools, the need to get accurate analysis and interpretation of multifaceted data related to the development of university education among others. Also, Kelechi et al (2020) pointed out that university need to be able to predict students' performance, optimize research for development and ultimately promote service delivery becomes a motivation for the adoption of Big Data management tool.

Conclusion

The Big Data concept in universities emanates from the influx of data gathered from various sources used for academic development and other associated purposes. The advent of Big Data in the academia has necessitated the need for a system that will be used to manage Big Data. The essence of Big Data management system in universities is to ensure that the influx of data are properly evaluated and interpreted to promote development in universities. The findings of this study have given empirical evidence to the awareness and uses of Big Data management system by lecturers in Rivers State Universities. The result shows that lecturers are not aware of the various management tools needed to manage Big Data. However, the study revealed that Big Data management systems are beneficial. The study showed that Big Data management can used to analyse and interpret Big Data. Also, the result revealed the factors influencing the use of Big Data management system such as; availability of technology, ICT skills among others. It is therefore recommended that technology leaders of universities should demonstrate the importance of Big Data management system in their information technology strategic plans to address the of Big Data management skills among lecturers. Further studies should examine some details of what data that comprise the Big Data.

Recommendations

The study recommends that:

1. University managements through ICT department should create awareness on the various Big Data management tools.
2. University managements should make it a priority to train lecturers on how to use Big Data management systems to boost job performance.
3. Information technology leaders of universities should ideally demonstrate the importance of Big Data management system in their information technology strategic plans to address the need of Big Data management skills among lecturers.

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