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Digital Nervous System: A Strategy for Enhanced Management and Service Delivery in Federal University Libraries in South-East Nigeria

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Abstract

The paper discusses digital nervous system as a strategy for enhanced information service delivery in federal university libraries in South-East Nigeria. The study was guided by four research questions in line with the objectives of the study. The design adopted for this study is a descriptive survey research design and the population consists of Librarians from academic libraries in Nigeria. The instrument used for data collection was a questionnaire and the data generated was analyzed using frequency table, percentage and mean. The findings revealed that there are digital facilities available in these libraries such as multimedia/digital projector, printers, internet enabled laptop, library management software etc. The major services identified were online document delivery, e-mail reference services, online circulation control etc. and the major challenges that hinder effective information service delivery were erratic power supply, high cost of implementation of digital library system, poor maintenance and update culture. It was recommended that enhancement and upgrading of current technological infrastructure/facilities, consistent power supply, consistent staff training, provision of strong internet bandwidth, international exchange of library professionals etc will go a long way to enhancing information service delivery in University Libraries.

Keywords: Digital Nervous system, Enhanced Management, Service Delivery, University Libraries

Introduction

The university library is an essential component of the modern university and survival requires demonstrating its value in new ways, embedding itself deeper into the university's core functions of teaching, learning and research. The indispensability of a university library makes it the Central Nervous System of its parent institution. Thus, they are primarily established to support the teaching, learning and research of its parent body. Today on the campus of virtually every higher institution, the library occupies a central position. In its placement and prominence, the university library conveys its integral role in supporting university education's core missions of

research and learning. University library according to Saint, Hartnett, and Strassner (2003) is fundamental to the establishment of a knowledge economy and society in all nations. Hence, it empowers the citizens and the society at large through knowledge dissemination. However, these potentials of a university library in developing countries are frequently thwarted by long-standing problems of under-funding, inefficiency, in-equity and poor governance leading to lapses in information services delivery in libraries.

Apparently, libraries are established to provide information services and resources in support of teaching, learning and research. It is an established fact that no university can function adequately without prioritizing the positioning and use of its library. Tella, Awolabi and Attama (2009) stated that libraries amongst other things serve the purposes of collecting and preserving the most up-to-date materials for teaching, research and consultation services, collecting and preserving information resources in book and non-book formats, providing materials on history, language, culture, and socio-economic and technological development, maintaining inter-library co-operation with other libraries around the world, facilitating access to Information and Communication Technologies, to mention a few.

However, students, teachers, researchers, etc are user categories of university libraries. Their needs vary, their information seeking behaviours also vary and those needs have to be adequately catered for. Apparently, university libraries are meant to serve their parent institutions as the Digital Nervous System (DNS) being indispensable in every academic and research institution just as the Central Nervous System (CNS) of the human body that controls the flow of information in the body. As the DNS of its parent institution, university libraries need to implement Digital Library System (DLS) for enhanced information service delivery. In other words, without the digital system, a university library cannot even assume its role as the Digital Nervous System of its parent organization.

Interestingly, Digital Nervous System is a phrase popularly associated with Bill Gates of Microsoft, used to describe a vision for how the IT infrastructure of an enterprise could be analogous to the autonomic nervous system of a biological organism (Available at <http://en.wikipedia.org/wiki/Business @ the speed of thought>). In the words of Ballmer (1998), “if you think of the human body, what does our nervous system let us do? It lets us hear, see, take input. It lets us think and analyze plan. It lets us make decisions and communicate and take action. Every organization essentially has a nervous system: they take inputs, they think, they plan, they communicate, they take action. The question is how does the nervous system in your organization operate? Is the IT infrastructure really adding value?”

Moreso, according to Gates (1999), the term digital nervous system is likened to the biological nervous system where one always have the information he needs, one is always alert to the most important things, and he blocks out the information that is not important. This is the implication for Digital Nervous System (DNS) which is all about providing information constantly as well as creating a source of feedback to evaluate performance.

The following objectives were formulated to guide the study:

- To identify the different types of digital system facilities available in libraries.
- To identify the extent of digital services and activities provided in university libraries.
- Ascertain the extent of digital system skills and knowledge possessed by Librarians.
- To identify the problems associated with enhancing information service delivery in libraries.

Research Questions

- The study was guided by four research questions and they are as follows:
- What types of digital library system facilities are available in university libraries in Nigeria?
- What is the extent of digital activities and services rendered in university libraries?
- What is the extent of digital system skills and knowledge possessed by library staff in these libraries?
- What are the problems associated with enhancing information service delivery in university libraries?

Literature Review

Efficiency in service delivery to library users is the aim of all libraries as this era of globalization vis-à-vis information explosion has necessitated the increase of library patron's desire for information. According to Ugonneya et al (2012), information services are library processes and activities which aim at disseminating information to library and information users. Similarly, Yusufu (2011) submits that information delivery means providing effective information service to support productivity. In the same vein, Oni-Orisan (1987) observes that no system of education is complete without well established library with services operational either directly through contact with students (reader services) or indirectly through services carried out behind the scene (technical services). Hundreds of thousands of monographic materials; journals, learning, resources, database etc are presently available in digital formats. This has increased the need and use of digital system vis-à-vis the efficiency of information services in libraries. These trends above have necessitated that university libraries inculcate novel technique in information service delivery.

In the same vein, Anderson (2006) opined that the digital age has re-defined the way Librarians provide their service; hence he identified the services of Librarians in a digital age to include:

- Selecting electronic information resources and evaluating their quality
- Developing expeditions and effective locator tools to make complex web of resources more readily accessible to both sophisticated and naïve users
- Teaching novices how to find information resources

- Teaching critical available skills, etc.

As opined by the Association of Research Libraries (2000) a digital library service is an assemblage of digital computing, storage, and communications machinery together with the software needed to reproduce, emulate, and extend the services provided by conventional libraries based on paper and other material means of collecting, storing, cataloguing, finding, and disseminating information. From a traditional Librarian's point of view, digital system in libraries presents a transformative model of a large-scale, user-centric technology that is moving towards an integrated form with various components. These components come together and function as the Digital Library System making it easier for the library to serve and support its parent institution just as the Central Nervous System (CNS) of the body supports the activities of the body. Obviously, the main function of the Central Nervous System is that it receives incoming information (impulses), analyzes and organizes it, and initiates appropriate action. The CNS is made up of the brain and the spinal cord as well as other components such as the peripheral nervous system etc.

At a more integrative level, the primary function of the Central Nervous System is to control the body. It does this by extracting information from the environment using sensory receptor, sending signals that encode this information into the brain, processing the information to determine an appropriate response and sending output signals to muscles or glands to activate the response. (Available at http://en.wikipedia.org/wiki/Nervous_system#function)(n.d.). The brain as a central computer controls all bodily functions, and the nervous system is a network that relays messages back and forth from the brain to different parts of the body (American Medical Association, 2006).

The Central Nervous System is the major controlling, regulatory and communicating system in the body. It is the centre of all mental activity including thought, learning and memory. (Available at http://trainting.seer.cancer.gov/module_9/2009).

The common infrastructure between the Nervous System of the body and Digital Nervous System lies on how information is managed, controlled and regulated to the relevant part of its environment and beyond. Interestingly, in the library system digital tools must be applied to the critical areas of information processing and provision. Information activities such as these must digitally provide support for teaching, learning and research and this could be best done through the implementation of Digital Library System. According to Omekwu (2010), the most critical aspect of the Digital Nervous System among other functions is how quickly it can respond to the university management's demand for the supply of vital information to enable management ability to resolve issues in a problem-resolution model. In essence, the library system empowers management decision-making process. Digital Nervous System should constantly meet user's needs and exceed regulatory institutions requirement with respect to the diversity of library resources needed for accreditation of various programmes. However, the central need for librarians is to be at the frontage of knowledge availability and accessibility as well as

knowledge usability for effective information services delivery. This is because of the imperative role of the library as the Nervous System, which enables institutions to:

- Act faster and process management decision more rapidly
- React more successfully to opportunities and threats
- Make more informed and result-oriented decisions
- Get closer to patrons and
- Focus on quality information service delivery

In addition to this, Omekwu (2010), further states that a Digital Nervous System is constructed on six fundamental principles which are:

- A PC competing architecture
- Information in digital form
- Universal e-mail
- Ubiquitous network connection
- Common end-user productivity tools
- Integrated business-specific applications

Digital Nervous System whether deliberately developed or informally or unconsciously evolved is central to effective information service delivery in this digital age, owing to recent information globalization. However, librarians need to rethink their methodologies in terms of their relevance and responsiveness to their institutions owing to the evolutionary trends of increasingly digitalized environment. As opined by Eke (2009) in Eke, Orji and Okorie (2010), a web services librarian is that librarian that possesses the skills of web designing, development, maintenance, staffing, and web content management. The web services librarian becomes the web master and takes up the responsibility of developing and maintaining the library website Since the world is becoming a global village, there is a call for information scientists, web masters, ICT gurus, system analysts, programmers, hardware and software engineers.

The above points simply show that in this digital era digital expertise is needed for effective information service delivery. To buttress this fact, Gates' (1999) idea of a Nervous System is about moving information to relevant components of an organization. He strongly contends that the way in which organization gathers, manages, and uses information will determine whether they will win or lose in the new digital era, now and in the future regarding how effective information service delivery can help every organization boost its visibility and relevance. He further opines that like a living organism, an organization functions best if it can rely on a nervous system that will instantaneously deliver information to the parts that need it.

In the same vein, Digital Nervous System will unite university libraries to the students and faculty members of their institutions under one common infrastructure, releasing a wealth of information and allowing the students and faculty members to make quantum leaps in efficiency,

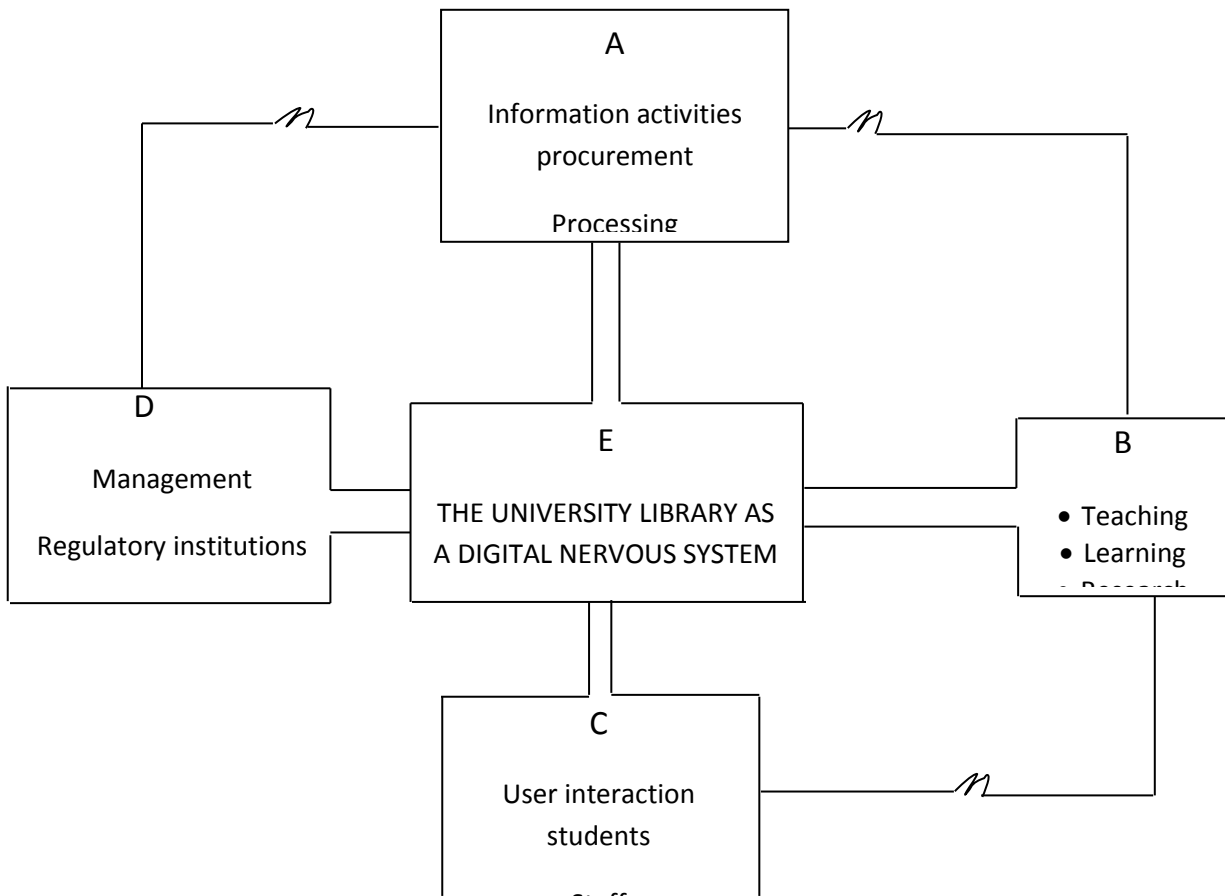
growth and productivity, as needful information is made available to and usable by them at any point in time. In the words of Ballmer (1998):

“How does new business open up to me as a result of the internet connectivity. The degree to which you have an electronic relationship with customers will actually give you more sophisticated understanding of your customers than if you don’t have a digital relationship. And depending on a Digital Nervous System to run a business, it’s got to run all the time, seven days a week, twenty-four hours a day.” This is where IT value comes in (Available [http://www.theregister.co.uk/Digital Nervous System Seminar](http://www.theregister.co.uk/Digital_Nervous_System_Seminar)) p.7

To put these words in the library context, it could read “how does a new opportunity open up to Librarians as a result of the Internet connectivity?” Having a digital relationship involves establishing a more intimate partnership between faculties and libraries, a sort of penetration of the faculties, necessitating dialogue to get the data needful and giving back useful feedback electronically and otherwise.

Owing to the above point, digital tools are required and need to run round the clock in university libraries. This is a critical factor which university libraries need to adopt and adapt to the change, for them to add value to the work of university researchers, faculty and students. Arising from the above points therefore is the imperative involvement of Librarians in developing an effective Digital Nervous System in universities for enhanced information service delivery.

Fig. 1 below is an adaptation of Omekwu’s conceptual framework of the University Library as a Digital Nervous System. (i.e. Developing a Digital Nervous System in Universities)



A implies that digital tools are required for information procurement, processing and provision. While **B** implies that **A** must digitally provide support for teaching, learning and research. The relevance of that support will be evident to the extent that the library's most critical publics are able to access the library (i.e. the university's digital nervous system) to adapt and respond to their teaching, learning and research requirements.

Digital facilities are necessary for information service delivery in this 21st century Libraries. In addition to their traditional library skills and knowledge, today's professional librarians are expected to possess additional knowledge skills required for work within the digital information world. As a consequence, educating digital Librarians who are competent to work in the dynamic and complex digital environment has become a high priority. A significant challenge posed by developing a digital nervous system is the need to provide adequate fund for infrastructural facilities with constant power supply and internet bandwidth as well as maintain an update culture and skills for enhanced service delivery.

Methodology

The research design adopted for this study is the descriptive survey. It is suitable for this study because it is based on the views, opinions of the respondents which would help to elicit the facts needed for this research. The population size of the study was (119) Librarians in the four selected university libraries in South-East Nigeria. The sample size was all the academic Librarians (professionals and para-professionals including the system analysts) in the four institutions. The instrument used for collecting data was questionnaire titled "Digital Library System for Service Delivery Questionnaire" (DLSSDQ). It was face validated through expert opinion. The data generated for the study was analyzed using frequency tables, percentages and mean.

Results and Discussions

Table 1: Distribution of Questionnaire Administered and Returned by Schools.

S/N	UNIVERSITIES	Copies Administered	Copies Returned	Percentage Rate of Return Per University.
1	Federal Uni. Of Technology Owerri (FUTO).	37	30	81.1
2	Michael Okpara Uni. of Agriculture Umudike (MOUA).	7	7	100.0
3	Nnamdi Azikwe Uni. Awka (NAU).	15	14	93.3
4	Uni. Of Nigeria, Nsukka (UNN).	60	47	78.3
	OVERALL Return Rate	119	98	82.4%

Table 1 shows that hundred and nineteen copies of questionnaire were administered and ninety-eight (98) copies representing 82.4% were correctly filled and returned.

Table 2: Observation checklist of the digital facilities available in these libraries

s/n	Facilities Available in libraries	UNN		MOUA		NAU		FUTO		OVERALL	
		AV	NA	AV	NA	AV	NA	AV	NA	AV	NA
1	Workstations (personal computers) laptops internet enabled	√		√		√		√			√
2	Photocopiers	√		√		√		√			√
3	Online data bases	√		√		√		√			√
4	Printers	√		√		√		√			√
5	CD-ROM	√		√		√		√			√
6	Computer server	√		√		√		√			√
7	E-books	√			√	√			√		√
8	E-journals	√			√	√			√		√
9	Scanners	√			√	√		√			√
10	Library website	√			√	√		√			√
11	Web browsers	√		√		√		√			√
12	Flash drives	√		√		√		√			√
13	Projector screen	√		√		√		√			√
14	Library e-mail	√		√		√		√			√
15	Library management software	√		√		√		√			√
16	Telephones	√		√		√		√			√
17	Adobe acrobat readers	√		√		√		√			√

18	Floppy diskettes	√	√	√	√	√		
19	Multimedia/Digital projector	√	√	√	√	√		
20	PDF document viewers	√	√	√	√	√		
21	TV/Video player	√	√	√	√	√		
22	Audiotape player	√	√	√	√	√		
23	Web Cams	√		√	√	√		√
24	Magnetic tapes	√		√		√	√	√
25	Ipads	√		√		√		√
26	Smart phones	√		√		√		√
27	Digital camera	√		√	√	√		√
28	Starboard	√		√		√		√

Key: AV = Available NA= Not Available

Data collected on availability of facilities reported that all except web cams, magnetic tapes, Ipads and smart phones are available in federal university libraries in south-east Nigeria. Observation checklist also revealed that digital cameras and starboard are also available in these libraries.

Table 3: The extent of digital activities and services rendered in the library (N = 98)

SN	ITEMS	VHR	HR	LR	NA	\bar{X}	RANK	DECISION
1	Interlibrary loan services	21	26	36	15	2.54	8 th	Accept
2	Tele conferencing	4	21	29	44	1.85	17 th	Reject
3	Printing and photocopying	55	25	8	10	3.28	1 st	Accept
4	Online publishing	21	28	26	23	2.48	9 th	Reject
5	Online networking	34	33	17	14	2.89	4 th	Accept
6	Online bibliography search services	39	29	19	11	2.98	3 rd	Accept
7	Online chat services	27	24	26	21	2.58	7 th	Accept
8	E-mail reference services	32	20	22	24	2.61	6 th	Accept
9	Web enabled OPAC (Web OPAC) services	35	27	20	16	2.83	5 th	Accept
10	Internet services	46	24	13	14	3.05	2 nd	Accept
11	Collaborative network for reference	13	20	37	28	2.18	14 th	Reject
12	Online circulation control	5	18	31	44	1.84	18 th	Reject

13	Online renewal in circulation services	4	17	29	48	1.77	19 th	Reject
14	Online document delivery	15	19	31	33	2.16	15 th	Reject
15	User identification	20	28	28	22	2.47	10 th	Reject
16	Online selective dissemination of information services	15	19	34	30	2.19	13 th	Reject
17	Online indexing and abstracting of journal article services	13	25	24	36	2.15	16 th	Reject
18	Online consultancy services	18	26	28	26	2.37	11 th	Reject
19	Online library cooperation/consortia	16	19	33	30	2.21	12 th	Reject

Key: Very Highly Rendered: (VHR): Highly Rendered: (HR): Less Rendered (LR): Not At All (NA)

Table 3 above shows the extent of digital activities and services rendered in the library. Using a criterion mean of 2.5, the table reveals that 11 out of the 19 digital system services in the table had mean values that ranged between 1.77 to 2.48 which are all less than the cut-off point value of 2.50. This finding shows that the identified 11 digital system services are minimally rendered in the South-East federal university libraries. While 8 digital system services are significantly rendered in these libraries. Here, printing and photocopying ranked highest with mean score of (3.28).

Table 4: The extent of digital system skills possessed by library staff in South-east federal Universities. (N = 98)

SN	ITEMS	VGE	GE	LE	NA	X	RANK	DECISION
1	Downloading of electronic library resources	58	32	3	5	3.46	1 st	Accept
2	Uploading of institutional repository	37	35	15	11	3.00	4 th	Accept
3	Use of search engines	49	35	8	6	3.30	2 nd	Accept
4	Communication via e-mail	45	34	10	9	3.17	3 rd	Accept
5	E-archiving	16	26	32	24	2.35	17 th	Reject
6	Use of social media	25	43	15	15	2.80	8 th	Accept
7	Digitization of library resources	31	44	15	8	3.00	5 th	Accept
8	Metadata creation	18	29	34	17	2.49	15 th	Reject
9	Online reservation	20	26	22	30	2.37	16 th	Reject
10	Scanning of documents	34	34	19	11	2.93	6 th	Accept
11	Instant messaging	26	28	22	22	2.59	12 th	Accept
12	Ability to read web-related languages	22	30	25	21	2.54	13 th	Accept
13	Ability to handle web-related tasks	18	43	23	14	2.66	11 th	Accept
14	Multimedia presentation	18	46	25	9	2.74	9 th	Accept
15	Project management skills	21	41	21	15	2.69	10 th	Accept

16	Communication and interpersonal skills	30	39	20	9	2.92	7 th	Accept
17	Blogging	16	36	28	18	2.51	14 th	Accept

Key: (VGE): Very Great Extent: (GE): Great Extent: (LE): Low Extent (NA): No At All

The result in table 4 shows that (14) out of the (17) digital system skills had mean values that ranged between (2.51) to (3.46) which are all greater than the cut-off point value of 2.5 which is the criterion mean. This shows that the library staff possess the identified (14) digital system skills in South-East University libraries. On the other hand, the mean ratings of the remaining three items in the table are 2.35, 2.49 and 2.37 which are all less than the criterion mean of 2.5. This table shows that the library staff lack skills on E-archiving, metadata creation and online reservation.

Table 5: The problems affecting the implementation of digital nervous system (DNS) in South-East federal Universities. (N = 98)

SN	ITEMS	SA	A	D	SD	X	RANK	DECISION
1	High cost of implementation	50	35	5	8	3.30	2 nd	Accept
2	Poor maintenance and update culture	39	41	11	7	3.14	3 rd	Accept
3	Obsolete digital facilities	39	31	19	9	3.02	6 th	Accept
4	Insufficient equipment/facilities	38	39	17	6	3.09	4 th	Accept
5	Low ICT skills of staff	24	46	20	8	2.88	8 th	Accept
6	Lack of ICT policies and strategies	25	40	21	12	2.79	11 th	Accept
7	Staff resistance to change	22	29	31	16	2.58	14 th	Accept
8	Frequent power blackout	51	33	7	7	3.31	1 st	Accept
9	Bureaucratic procedures	37	41	12	8	3.09	5 th	Accept
10	Poor technical assistance	28	49	12	9	2.98	7 th	Accept
11	Apprehension, anxiety & technophobia.	19	45	22	12	2.72	12 th	Accept
12	Inadequate planning	26	41	21	10	2.85	10 th	Accept
13	Educational barriers	16	48	21	13	2.68	13 th	Accept
14	Non involvement of software experts	26	44	18	10	2.87	9 th	Accept

Key: (SA) Strongly Agree (A): Agree (D): Disagree (SD): Strongly Disagree

Table 5 above illustrates the responses on the problems affecting the implementation of digital nervous system (DNS) in South-East federal Universities. The respondents were in affirmation that all the identified fourteen items are problems affecting the implementation of digital system services in South-East-federal university libraries. Looking at the mean score, the major challenges are frequent power blackout(3.31), high cost of implementation(3.30), poor

maintenance and update culture(3.14), insufficient equipment/facilities(3.09), bureaucratic procedures(3.09), obsolete digital facilities(3.02). Others are poor technical assistance, low ICT skills of staff, non-involvement of software experts, inadequate planning.

Discussion of findings

The major finding of this study with respect to the digital facilities available shows that there are digital facilities available in these libraries. This development portends enhanced digital environment in university libraries when compared to the situation a decade ago. This is in line with the findings of Eke, Orji and Okorie (2010) Gbaje (2007) and Ugonneya et al (2012) who submitted that Nigerian University libraries have facilities to provide enhanced information services delivery. The above findings therefore mean that university libraries in South-East Nigeria recognize the essence of providing digital facilities in the libraries and equally make them available for utilization for enhanced information services delivery. However, the non-availability of these facilities in these libraries may lead to inefficiency in the discharging of library services and operations. Hence, it is to the detriment of the parent institutions. This is in line with Ballmer (1998) who opines that digital facilities give greater flexibility in information networking, communication, sharing, access and use.

As clearly indicated on the response of the respondents, the study reveals that majority of these digital system services are minimally rendered in universities in South-East Nigeria, in spite of the availability of digital facilities in these libraries. In line with this, Gbaje (2007) opines that a more radical and positive approach to the provision of digital services must be adopted as presently there is limitation in terms of access, to students in most instances, access of internet to students is not open. Moreso, it is evidenced from the data collected and analyzed that the librarians in these libraries under study possess these additional skills and knowledge needful for enhancing information services delivery using digital library system. These skills include downloading of electronic library resources which ranked highest in the data followed by use of search engine and communication via e-mail. However, this does not agree with the findings of Ugwuanyi (2009) who noted that the level of ICT skills possessed by librarians in academic libraries is low while Anderson (2006) submits that librarians who show a good sense of professionalism with good integrity are needed to ensure effective services. Regarding the problems associated with the digital nervous system application in libraries, there is high level of agreement on the various problems outlined which include frequent power blackout, high cost of implementation, poor maintenance and update culture, low internet connectivity. These are in consonance with Yusufu (2011) who identified the barriers to effective library services as high cost of basic digital facilities, low internet connectivity, erratic power supply, poor maintenance of available facilities, unskilled manpower.

Conclusion/Recommendation

The findings of the study revealed that digital facilities such as photocopiers, workstations (internet enabled), online databases, printers, CD-ROM, computer server, e-books, e-journals, library website, web browsers, flash drives, projector screen, library e-mail, library management software, telephones, adobe acrobat readers, floppy diskettes, multimedia/digital projector, Pdf document viewers, Tv/video player, audiotape player and scanners are available; printing and photocopying services, internet services, online bibliographic search services, web enabled OPAC services, e-mail reference services, online chat services are rendered to a great extent, librarians possess good skills in downloading of electronic library resources, use of search engines and communication via e-mail; there is a general strong agreement by respondents on the problems associated with the implementation of digital nervous system of which frequent power outage is the major problem. The study therefore suggested that the government and university administration should not just apportion fund but make fund available for libraries to enhance information services delivery, library management should maintain a regular and consistent upgrade of the digital facilities etc. On a general note, there is strong agreement on the strategies that could be used to enhance information services delivery using digital library system. From these findings, it has become pertinent to make dedicated decision to ensure an appropriate electronic – communication environment in these libraries to facilitate the use of digital nervous systems to disseminate information and build communication. Digital nervous systems, though, may not be a magical tool towards enhancing information services delivery (the attitude of librarians too matter) but university libraries need to consider the trend. However, this is called the era of digital renaissance. A myriad use of IT can provide maximum services with minimum effort. University libraries in the South-East Nigeria need to forge ahead with the rapid pace of technology change despite all odds.

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