Sustainability of digital collections for Nigerian academic libraries: An exploration of conception, indicators for fulfillment and accrued benefits

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ABSTRACT

Collection management in libraries has evolved alongside the developments of the new technologies effecting libraries. As digital collections are increasingly becoming the preferred resources by remote library users, librarians are faced with the challenge of proving a seamless continuation of efficient accessibility to these digital collections over time. This study aims to explore librarians' understanding of the sustainability of digital collections, the criteria for its fulfilment, and their perspectives on the accrued benefits of the practice. The study employs a qualitative approach, with purposive sampling of 25 experienced librarians and library ICT personnel from three federal universities in Nigeria. Semi-structured interviews and focus groups discussions were used in the data collection. Result reveals that the academic librarians are insightful about what it means by sustaining digital collections in their respective universities. The themes generated are the provision of access, digitization, preservation, task functions, and services. The criteria to be achieved for the sustainability of digital collections, includes skilled manpower, professional development, defined roles, ICT infrastructure, funding, and maintenance. The movement for sustaining digital collections in academic libraries in Nigeria will benefit the library's reputation, improve the services offered, aid in the preservation of the collections, promote resource sharing, and reduce time and cost. The study suggests that academic librarians need ongoing training to keep them abreast of the latest technology for crucial understanding in a bid to sustain their digital collections.

Keywords: Sustainability; Sustainable development; Digital collections; Institutional repositories; Academic libraries.

INTRODUCTION

Sustainability is the process of continuous development, enhancement, and non-disruptive flow of a particular event or action. This is the uncompromised continuity of the set goal. Sustainable information denotes the assets which facilitate the integration of all three

elements of justifiable growth, such as social, economic, and environmental, and their contributions to the harmonisation of the procedures in which society is transformed, grounded in ideologies of workable progress (Chowdhury 2016).

Librarians' understanding and perspectives on the benefits of practising the sustainability of digital collections are crucial to fostering leverage on the expected gains for sustaining digital collections. Ideally, librarians are in a better position to educate university library stakeholders on the importance and sustainability of digital collections and their sustainability (Charney 2014; Nworie et al. 2018). On the other hand, their understanding and perspectives on the benefits of practising sustainability of digital collections could be achieved through training and education (conferences, in-house, symposia, and workshops), either locally, nationally, or internationally.

However, it has been documented in the literature that one challenge of promoting sustainability in library and information science (LIS) research and practices is a lack of clarity about what the term 'sustainability' means (Eschenfelder et al. 2016). Furthermore, the authors found that sustainability as a concept was not a popular topic, as expected, and the majority of LIS authors discussed it at a shallow level, such as skill, administration, affiliation, and funding. Several studies have been conducted on the sustainability of digital collection (SDC); however, these studies were mainly conducted in Europe (Beutelspacher and Meschede 2020; Ciurea, Pocatilu and Filip 2020; Drucker 2021; Preuss 2016; Seele 2016). Other parts of the world have conducted related studies, including the United States (Adolp et al. 2020; Ajao 2018; Bode, Rogan and Singh 2019; Currano 2015; Ghorbani, Babalhavaeji and Nooshingard 2016; Jankowska and Marcum 2010; Lowe 2020; Montoya 2016; Mount 2017), Canada (Beasely and Rosseel 2016; Sorensen and Sarjeant-Jenkins 2016), Australia (Bradley 2006 and 2007), and Nigeria and Africa (Diso 2016).

In Nigeria, Diso (2016) reported on a digitisation project to develop digital collections initiated by ITHAKA (JSTOR) under the MacArthur Foundation, with two other Nigerian university libraries. Among the challenges regarding the continuity or sustainability of the project were funding, availability and selection of digitizable materials, operational matters such as training, recruitment and retention, equipment maintenance and replacement, and service delivery. The lack of a proper policy on the management of digital collections indicates the need for relevant stakeholders to play a more important role, especially librarians as custodians of the collections.

Nigeria is a multi-ethnic and culturally diverse country which is experiencing socioeconomic developmental challenges. The ongoing decline in university and library budgets has impacted funding for developing and maintaining digital collections. Okunlola (2021) cautioned that academic libraries in Nigeria cannot afford any wastage and neglect electronic/digital collections under such circumstances. Although the self-perceived knowledge and competency of Nigerian librarians in building digital collections and digital preservation has been reported to be highly competent (Okeji, Tralagna and Obi 2019), Usman and Kiran (2021), in their investigation of the management of institutional repositories (IR) in Nigeria, found that most Nigerian universities had no specific strategy or policy regarding preservation – an issue closely related to the sustainability of digital collections. There is little or no trace of a significant investigation conducted on librarians' understanding and their perspectives on the benefits of practicing sustainability of digital collections, particularly from the context of a developing country such as Nigeria Understanding entails numerous issues such as insightfulness, technology adoption, software upgrade and update, system maintenance, subscription to relevant and up-to-

date databases that suit the curricula of the parent institution, copyright issues, to mention a few. This is where the conduct of this research becomes imperative to explore their knowledge on understanding the sustainability of digital collection and the criteria that must be met for its fulfilment, as well as perspectives on the accrued benefits of sustaining digital collections.

LITERATURE REVIEW

In this study "sustainability of digital collections" is defined as an ability to maintain a standard in providing access to resources and services, experts, technological and software components, storage and retrieval system over a long time to satisfy the information needs of future generations. The literature reports various conceptions of sustainability that imply a lack of a standard definition. Ajao (2018) revealed three core elements in sustainability that need to be considered: social, insightful content accessibility, and ecological factors. Nevertheless, Bradley (2007) viewed digital sustainability as a commitment to promoting, simplifying, and synchronising the application of policies geared toward sustainability through the storage, accessibility, and delivery of digital information resources to users. Bradley (2006) later analysed the sustainability of digital collection as procedures embarked on to ascertain maintenance, regulation, enhancement, and tackle the issues of environmental and socio-economic factors to sustain digital information resources. Determining the importance of sustaining digital collection (DC) is essential for librarians in this era. Hughes (2012b) highlighted the benefits of DC to different people at different times and in different situations such as creating, maintaining and sustaining 'digital content' that may have value for future scholars, historians; accessibility; supporting preservation, provision of a digital surrogate to rare and fragile materials; collection development, et cetera. However, SDC requires a blueprint that guides the direction of the structure, services, and resources of libraries (Phillips, 2016).

Another reason stressing the importance of sustaining DC is the need for a new generation of students who are digitally natives. According to DeGraff (2014), this generation of students was born during or after the rise of digital technologies. However, Maron and Pickle (2013) conducted a study on the investment of digital resources, and the results showed that most librarians acknowledged the importance of digitising special collections, but few attested to its underfunding. Similarly, University of North Texas Libraries (UNTL) librarians undertook a self-auditing study based on the criteria of Trusted Repositories Audit and Certification (TRAC) to find that the libraries had preserved 1.5 million exclusive digital objects comprising 21 million pages of digital content in 2015. This reinforces their goal, dedication, and commitment to long-term SDC through three core policies: digital preservation, collection development, and statements pertinent to usage, privacy, redaction, and access to digital collections (Krahmer and Phillips 2016). Montoya (2016) observed that the content management system (CMS) used at the University of California, Los Angeles (UCLA), is long overdue because of its cumbers, is hard to preserve, and does not fit into rapidly evolving technologies. The author utilised the history of the book and literacy technologies project at UCLA to demonstrate the need for librarians to canvass for more dynamic, flexible, orderly, and productive forums that can be sustainable for a long period. Furthermore, the study conducted by Beutelspacher and Meschede (2020) indicated that government-funded libraries in Germany can play concerted efforts in the ecological sustainability of digital collection via prepaid meters as an instrument for sensitisation of the public in terms of data collection, while the study revealed that the bottlenecks are finance and expertise. This means that German public libraries have

intensified their efforts toward the sustainability of digital information resources, even though they are confronted with some challenges.

Sustainability generally can be viewed in the aspect of emphasising the involvement of end-users with regard to planning, implementation, and transferability of tangible cultural artefacts to online display in terms of their objectives, behavioural interests, expertise, and abilities (Ciurea, Pocatilu and Filip 2020). This means that having prior knowledge of users and requiring their participation is paramount to sustainability. Similarly, Lowe (2020) opined that these sustainable measures entail transforming the mode of operation via regular, financial, and vigorous ventures to acquire new skills and knowledge toward the actualisation of sustainability. The author's investigation revealed that hat preservation could be achieved by relying on sustainability formats. Similarly, Drucker (2021) asserted that sustainability has become the subject of the day because of its significance in terms of ecologically associated factors of production and, therefore, should be understood from the purview of how people-oriented and conventional approaches could be avoided for impending use.

OBJECTIVE AND METHOD

This study explored Nigerian academic librarians' conceptions of the sustainability of digital collections. In the context of Nigerian university libraries, digital collections refer to institutional digital repositories, including theses and dissertations, pre-and post-print journal articles, conference proceedings; databases; e-journals; e-books; e-encyclopaedias; open-access journal articles; digital seminar papers; digitised speeches; digital local or indigenous collections and digital rare and special collections. To address the research objective, the following research questions were posed.

(a) What do academic librarians understand about the sustainability of digital collections and the criteria that must be met for their fulfilment?
(b) What are their perspectives on the accrued benefits of practicing sustainability of digital collections?

The study utilised a qualitative approach, employing focus group discussions (FGD) and interviews. Data were gathered from three federal universities in Nigeria situated in the northwestern geopolitical zone. The selection was limited because of time constraints, distance in the geographical location of the institutions, and security reasons due to insurgencies and banditries. The purposive sampling technique was used based on the following criteria: (a) university librarians are the general administrators of the library, (b) digital librarians are the administrators of the digital library unit/section, or (c) ICT staff and other related staff with good work experience in activities about the sustainability of the digital collections. A total of 21 participants were gathered in the FGD and four individual interview sessions. They comprised 16 librarians and 6 ICT staff members. The focus group discussions consist of 6-7 participants per group from each university and lasted for 40-60 minutes in each session. Individual interviews were conducted because of the inability of participants to join the FGD. Each interview session lasted for approximately 20-30 minutes for each session. Both sessions were audio-recorded with the consent of all the participants.

Permission was obtained from the appropriate constituted authority, supported by consent letters which were duly endorsed before the commencement of the data collection sessions. Participants were given a consent letter before the FGD and interview

sessions to help them confirm and understand their involvement in the study so they could determine whether they wished to participate. A preliminary study was conducted between August and September 2017, while the actual investigation was conducted over a stretch of six months (May –October 2018).

Table 1 presents the interview guides used in this study based on the research questions. Additional probe questions were used to elicit the relevant responses.

Table 1: Research Questions and Interview Guides

Research Questions	**Interview Question Guide**	**FG Questions Guide**
What do academic librarians understand by the sustainability of digital collections and the criteria that must be met for its fulfilment?	What do you understand by SDC?	What do you understand by SDC?
	What are the prerequisites or criteria for a standard SDC?	What is the need to have a standard SDC?
	What types of DC do you have in your library?	What are the functions of a DC?
	What software/tools/ applications do you use in SDC?	What are the services involved in DC?
		What are your roles in the Digital Library?
		How do you organise your DCs?
	What types of training do librarians undergo for effective management and sustainability of digital collections?	What is the nature of training you received in digital collection sustainability?
	How has the training of your staff impacted positively on SDC?	In what ways users are given training on the access and use of DC?
What are their perspectives on the accrued benefits of sustaining digital collections?	What are the benefits of SDC to the stakeholders of a library?	What are the benefits of sustaining DC?
	Why do you think it is important to sustain digital collections in your library?	

*DC: Digital collection; SDC: Sustainability of digital collections.

The FGD and interview data were manually transcribed and returned to the participants to ensure that the conversations were correctly recorded. Data were coded, and thematic analysis was conducted to generate themes using NVIVO software. The themes that emerged from the data were validated using the member-checking method by two academic members. To ensure anonymity of the responses, the participants were coded based on their interview/focus group session and university. The three universities were coded as A, B, and C. The interview participants were coded as INT1A (INT = interview, 1 = participant no, A = university code) or FG1A (FG = focus group, 1 = participant no, A = university code).

Table 2 presents the demographic characteristics of the participants. Among the participants, one was a professor of library and information science (LIS), three had a PhD in LIS, eight had masters in LIS/Information Science/Information Management, 11 had an undergraduate degree, and two had a higher/national diploma in computer science. In

terms of their working experience, two participants had 30-35, 20-25 (1), 20-15(1), 10-5 (18), and less than 5 (2) years.

Table 2: Demographic Attributes of the Participants

No	Code	Job Position	Gender	Age	Academic Qualification	Experience (Year)
1	INT1A	University Librarian	Male	47	PhD in LIS	25
2	INTA2	ICT Coordinator	Male	38	Master's in information management	7
3	FG1A	Digital Librarian	Female	35	Master's in information management	10
4	FG2A	Technical Librarian (FDL)	Female	31	Master's in information science	7
5	FG3A	Senior Library Officer	Male	35	Master's in information management	10
6	FG4A	Higher Library Officer	Male	28	Bachelor of Library and Information Science	5
7	FG5A	Higher Library Officer	Male	37	Bachelor of Library and Information Science	5
8	FG6A	Higher Library Officer	Male	35	Bachelor of Library and Information Science	3
9	FG7A	Senior Library Assistant	Male	29	Diploma in Computer Science	5
10	INTB3	University Librarian	Male	58	PhD in LIS	33
11	FG1B	H.O.D Automation	Male	46	B.A Library Science	9
12	FG2B	System analyst	Male	33	Master Computer science	6
13	FG3B	Digitisation Librarian	Male	49	B.A Library Science	4
14	FG4B	Multimedia Librarian	Male	35	HND Computer sci.	6
15	FG5B	System Analyst	Male	53	B.Sc. Computer science	15
16	FG6B	System Analyst	Male	34	B.Sc. Computer science	6
17	FG7B	System Analyst	Male	32	B.Sc. Computer science	3
18	INT4C	University Librarian	Male	58	Professor of LIS	32
19	FG1C	Librarian I	Male	35	Ph.D. LIS	6
20	FG2C	Librarian I	Male	35	Master's in library science	8
21	FG3C	Librarian II	Male	37	B. Sc. Computer Science	6
22	FG4C	Librarian II	Male	36	Master's in library science	8
23	FG5C	Senior Library Officer	Male	37	Master's in information management	8
24	FG6C	Assistant Operations Manager	Male	31	B.SC. Computer Science	6
25	FG7C	Assistant Operations Manager	Male	29	B.SC. Computer Science	6

FINDINGS

The findings of the study are based on two main research questions that guided this investigation. The sustainability of digital collections in Nigerian universities is reported in the context of librarians' understanding of the concept, the practices that sustain digital collections, and the benefits they perceive in sustaining digital collections.

Academic Librarians' Understanding of Sustainability of Digital Collections

The concept of sustainability of librarians is an important aspect of sustainability initiatives. Digital collections have become part of the library collection building's responsibility to ensure seamless access. Librarians are familiar with the preservation of collections, but

sustainability extends beyond preservation. Therefore, this study first investigated what Nigerian university librarians understood through the sustainability of digital collection. The following themes emerged from their responses: provision of access, digitisation, preservation, tasks involved (functions), and SDC as a service. In the following section, each of these is elaborated.

(a) Provision of Access

The goal of any library is to ensure full access to and use of the collection for both print and electronic materials. The provision of access in SDC is the ability of the digital librarian to ensure that users have easy access to and use digital collections. Findings indicated that understanding of SDC is reflected in providing open access to digital collections remotely, as exhibited in the following verbatim: *"Sustainability of the digital collection means any information one can be able to access even when he/she is not close to the main source"* (FG6A). In a digital format, access can be granted via various access points with simultaneous, remote, and seamless access to digital collections. The participants conceived that access was ensured through open and long-term access to digital collections.

Open Access

This study discovered that these institutions are highly dependent on open access; that is, they leverage the Internet to utilise open-access resources. For instance, when enquired on how they subscribed to databases, a participant (INT2A) emphatically stated: *"We have leveraged on the internet to get some open access (OA) databases that we have used over time…. We rely basically on OA, this is how we survive".*

The participants further disclosed that the majority of their databases were OA, such as a free library and jurn. org. e-granary, Access to Global Online Research on Agriculture Program-AGORA (https://research4life. org/tacsgr1agora_research4life_org/), Research for Development and Innovation Program-ARDI (https://login. research4life. org/tacsgr1ardi_research4life_org/), LIBRARY GENESIS (https://libgen.is/), Open Knowledge Repository (https://openknowledge.worldbank.org/), Open Access Theses and Dissertations (https://oatad. org/), Open Knowledge Repository, LIBGEN, science. gov. Khan Academy and the virtual library are in-house offline databases. A participant further enumerated three types of subscriptions: *"firstly, through membership registration... If you register as a member, such as "research4life". Secondly, we subscribed to Open Source, this does not require payment, they are open to everybody. Thirdly we also subscribed to open access journals…".*

Long Term Access

The participants demonstrated that maintenance can lead to long-term accessibility through simultaneous, remote, and seamless access to digital collections, as mentioned by one participant: *"Sustainability of digital collections is seen as a process of continuous maintenance of both physical hardware and software for onward accessibility and usability of digital collections"* (FG1A). In addition, INT1C revealed that the library has resorted to subscribing to a database that provides a backup copy so that if they cannot renew it at the end of the subscription time, the contents are still accessible, even though it may lack the latest update; this is to ensure long-term access to the users. INT1A mentioned, "….. DC *also takes care of a shortage of items, once you have a copy of an item, it can be used simultaneously by several users"* (INT1A).

(b) Digitization

The participants viewed SDC as an ongoing process of digitisation, such as in the retrospective conversion of rare manuscripts and other invaluable collections in university possession into digital formats: *"SDC is the digitization of information resources by scanning and converting them into portable format* (FG1B). Another participant mentioned that: *"SDC is a digitization process in which materials are converted from hard copies to electronic copies to enhance access and improve the preservation of library materials*' (FG4B). Similarly, another participant revealed that they normally use an art scanning machine-like XEROX DOCUMENT 752.4 for scanning, then uploaded the digitised content into an institutional repository developed using DSPACE (FG4C).

(c) Preservation

The participants expressed their opinions on the meaning of SDC by associating it with digital preservation. All participants explained the importance of preserving DC by making it possible for long-term access and use: *"SDC aids in resource preservation because we now have a lesser concern about preserving and conserving physical materials so, it is easier"* (INTB2). Some participants highlighted the preservation strategies that could facilitate the retention of uninterrupted access and use of DC: *"To maintain perpetual access, migration is a very important aspect of ensuring the preservation of the digital collection, encapsulation, and other strategies are equally important for preservation"* (FG1C). Other participants, such as FG3C and FG6B, explained that preservation includes storing information on a cloud server that enables numerous shared access points which are impossible with physical books.

(d) Task functions

Librarians' understanding of SDC is also reflected in their ability to detail the tasks involved in the sustainability of digital collections. Respondents (FG4A, FG6B, and FG3C) mentioned the following task: guiding users on how to operate the systems and software in the development of institutional repositories, depositing materials in the institutional repositories, assisting users in accessing, facilitating the search for relevant resources, and downloading them from the repositories.

Respondents from University B highlighted their responsibility for identifying users' digital information needs, providing information literacy, ensuring that relevant resources are digitised, including digitising special collections, theses, and dissertations, guiding users in online searching, and providing awareness to users on how to use digital collections. Participants mentioned their task as attending to users who find it difficult to connect online, search, or browse, thus assisting them in obtaining relevant digital information resources. *"We have created digital library services. It is a form of online interactive (questions and answers) forum via telegram. We also have research clinic for teaching users on how to write their project, thesis, dissertation, research articles as well as guiding users on how to access and use digital information resources" (FG5A).* They also mentioned about their work relationship with faculty members: *"We liaise with the HODs to ask the lecturers and students to submit to us what they need, we gather their information needs, cross-check and see if the university cannot afford all or not, then from there we select and afford the ones based on university's financial capability; the same thing is also applicable to digital collection contents" (INT2B).*

Another participant affirmed that: *"Usually we have our own research that are being conducted in university, we select them based on the output of that research, submit, process from the department to faculty, to PG school, then to the university library. In the*

library, we select and send to research and bibliography division, digitization unit, go there to process, upload onto the university library portal" (FG4C). Several pertinent tasks and functions of librarians related to digital collection services are evident.

(e) SDC as Services

One participant described SDC as services provided to the users: *"It (digital collection) enables resources to be shared with the global audience; it provides a means of accessing state-of-the-arts information; it also provides a platform for communication, digital collection also solves the problem of space, it houses resources….."* (INT1A).

SDC also provided a platform for communication as mentioned *by* INT1A which was also agreed by FG3A: "….*yeah, these (DC) include online reference services where we answer queries online …and we have a platform like an educational forum in our website where we communicate to all users".*

The responses indicated a diverse, yet collective, understanding of the sustainability of digital collections. The librarians' responses clearly included an indication of provision to (open) access, digitisation, preservation, and an understanding of sustainability to involve librarians' tasks and functions in sustainability as part of a service.

The criteria that must be met for fulfilment of sustainability digital collections

The criteria that must be met for SDC fulfilment are highlighted by several themes that emerged from the analysis, such as skilled manpower, training for digital librarians, infrastructure, technology, and funding.

(a) Skilled Manpower

Skilled manpower is required to ensure the success of the SDC. These are digital librarians who administrators of various services in the library. They are experts who manage the affairs of DC and maintain sustainability. The respondents delineated that having skilled staff or experts who have technical knowledge for quality service delivery is one of the criteria for the fulfilment of the SDC. For instance, two participants stated, *"Having skilled manpower, because if you have everything but you don't have skilled manpower, then there is a problem. Once they are skilled, they know what to do, how to manipulate a computer and can impart their knowledge to end-users* '(INT1A); "*Expert that will manage the resources and service is part of SDC"* (INT3B). FG participants' view of skilled personnel validates the above excerpts: *"An aspect of SDC considered is by having experts that can download, install and customise for you"* (FG1C). *"If you don't have skilled manpower, it is a problem; we need trained/skilled manpower"* (FG2B).

(b) Professional Development of Digital Librarians

Not only are librarians skilled, their skills need to be further enhanced over time. Participants have mentioned different types of training they undergo in discharging their duties in SDC: *"There are three approaches or types of training such as on-the-job training when they are doing the work, we try to show them, in-house and external training. Moreover, we follow trends, when we notice any conference, seminar or workshop that will add value; we send our staff for the training"* (INT1A). FG7C mentioned the key areas of training digital staff, such as network, server, and system administrations while FG6C, opined that training is focused on digital libraries and their collections due to the digital nature of their work.

One participant admitted that he went for training in a sister institution on digitisation and conversion of information resources into digital formats (FG3B). Training is very important in SDC because it is through training digital librarians to be acquainted with the technology and software update, including new systems, relevant equipment for digitisation, and the available databases that need to be subscribed in line with the university curricula. Other areas mentioned by the participants were acquiring literacy skills in information, computer, and digital which are considered valuable guides that can be used to assist users (FG5A, GF7B, and GFFG4C).

The participants also indicated that: *"The training has positive impact in the transformation of digital library and its collections…."* (FG1C). FG1B expressed his views on how training has transformed their digital collection services as they were introduced to new technologies, contemporary ways of digitising library materials, and software needed for digitisation. Other discoveries by the findings concerning the positive impact the training has on DC services, resources and users; is that many users are not aware of the DC contents due to lack of reading culture, but with their trainings, the DC staff take it as a responsibility upon themselves to create awareness by reaching out to the users especially the academic staff: Furthermore, queried on the aspect of users' training, findings disclosed that users (students) are trained through orientation of fresh students upon entry, and taking a course known as 'introduction to the use of library', while the university staff are trained from one faculty to another.

(c) Defined Roles of Digital Librarians

The participants, especially in the focus group discussion, highlighted the roles and responsibilities needed in SDC. These were in the form of guiding users in online searching, instructing, searching, and scanning for digitisation. Several participants (FG2A, FG7B and FG5C) stated digitisation of resources, scanning and converting them to portable document format (PDF), theses and dissertations, Arabic manuscripts, rendering of e-services, creation of a local network for users as duties of digital collections staff: *"I used to digitise print resources, scan and convert them to a portable document format (PDF) that our patrons normally use"* (FG4C). *"We are digitising theses and dissertations, Arabic manuscripts, we render e-services, where e-documents are kept and created a local network in which the users can come and get access to the collections"* (FG3B).

(d) Information Technology Infrastructure

These are the necessities that must be put in place before the commencement of SDC projects, including computing technology, software, telecommunication infrastructure, and sufficient storage. A participant summarised the basic infrastructure needed for a successful SDC: *"We need computing technology, a complete kit and all the peripheral devices; a robust telecommunication infrastructure for the purpose of communicating from one end to another. It is central in networking; a reliable storage device, storage technology; an ISP subscription (internet service providers); subscription to internet access"* (INT1A).

The findings also showed that other considerations enumerated by the participants were 24/7 electricity supply, alternative power sources, and sunlight energy (INT2A, FG5A, FG2C, and FG4B). Infrastructural facilities are very important components in SDC, in the sense that without adequate necessities in place, DC cannot be sustained.

(e) Funding for SDC

The participants listed funding as the top priority or criterion for a successful SDC, as stated by INT1A, INT2A, INT3B, and INT4C, as it is the root of infrastructure, DC, and its sustainability. Infrastructure for the SDC could be developed and maintained without the provision of funds by the constituted authority. Other considerations by the participants are training and retraining of staff for knowledge update also needs fund as mention by FG1A "….*we are supported in the areas of staff training, funding for the training of staff to attend workshop or conferences…*".

(f) Management of Maintenance

To be successful in SDL, participants indicated adequate maintenance of both equipment and the information resources therein: *"It is a process of continuous maintaining both the physical hardware and software for onward accessibility and usability"* (FG4A). Two other participants affirmed that the SDC required a reliable operating system as well as regular upgrades and updates of the system software and information resources. FG2A mentions having a proper maintenance unit that takes charge of repair, installation, system update, and upgrade (FG7B). FG1C indicated that having a maintenance unit in charge of the DC to ensure several backup plan options for continuous access and use, *"There are requirements for setting up a digital collection. Based on that, we prepare for 10 years, if we have multiple collections, we have to look at who are the users, if we have 50 thousand students, so we prepare for 1 million access, so in case of backups, we use about 20 terabyte (TB) instead of gigabyte (GB)….we do not have an issue of the system down, because we plan for options A, B, C, and D. If option A is not working, we go for option B, so we prepare for that."* Adequate maintenance also occurs through multiple backups: offline server where materials are kept, copied, uploaded back to online, external hard disk while digitisation staff have their personal computers in which information is copied into their PC, and the use of anti-virus (INT1A, INT4C, FG1B, and FG1C).

Generally, the participants revealed that SDC could be fulfilled by focusing on the resources, namely the human resource skill and continuous training with designated clear roles of digital librarians. Additionally, funding, IT infrastructure, and continual maintenance management are crucial for the SDC.

Benefits from Sustaining the Digital collections

The themes identified on the benefits of sustainability of digital collection are reputation, improving library services, ease of access, saving time, reducing cost, impacting learning, and paradigm shift.

(a) Enhanced Library Reputation

The participants were aware of benefits from SDC: *"It enhances the reputation of the library … it optimises multiple usage/access, requires little space and is active 24/7"* (INT2A). Another participant mentioned that: *"SDC has transformed the trinity of acquisition, organisation and dissemination of ages into more proactive roles of information subscription and acquisition; knowledge management, preservation and organisation; information delivery and retrieval system"* (INT1A). These excerpts confirm the benefits of SDC in academic libraries. It has been shown that SDC promotes the image of academic libraries and provides remote access to library resources.

(b) Impacts on Learning

The advent of ICT in institutions and SDC in academic libraries has created room for academic librarians to scout for open access, subscribe, and digitise information material in

conformity with university curricula. This has reduced the challenges usually faced by institutions during accreditation exercises to the minimum. The findings indicated: *"It has assisted in accreditation exercise of the courses offered in the university by scoring good grades" (INT1A). SDC promotes the image of the universities globally (INT3B). It increases research visibility and enable students score to high marks in examination"* (INT1C). From the excerpts, it could be deduced that SDC creates a chance to pass accreditations, enhances students' performance, and makes the research of the institution visible.

(c) Improved Library Services

The SDC created room for interconnections between staff and users, thereby bringing people together, bridging the gap in geographical distance, and eliminating barriers**.** Below are several assertions made by the study's participants in conformity with the improvement of services: *"SDC helps us reach more people within a little space. So, we don't need them to come to the library. They can be at their various offices, hostels and access information without coming to the library. If you have a device that can be connected to the network, it means you can access information at any time of the day"* (FG5B). *"SDC has improved the reputation of information services whereby users can easily access, download, copy and edit information for their academic pursuit" (FG3A*)**.**

Several participants (FG7A and FG3C) emphasised that students can search, browse, and access digital collections from the hostel with their smartphones or laptops to see what the library has, read online or even download it, and enhance communication with other libraries. This implies that the SDC has made it possible for users to access digital collections outside the academic library premise, curtail physical contact, and carry heavy books.

(d) Ease of Access

The findings also reveal the advantages of SDC for users, such as portability and various connection points. Participants enumerated reasons why SDC is fundamental to users in this digital era such as it facilitates continuous, simultaneous, flexible, easy and quick access that grant them the opportunities of graduating with good results: *"It eases access and is very flexible, you can have as many access points as possible, it provides 24/7 services, quick, simultaneous and remote access and it makes them have good grades"* (FG6A).

Another participant disclosed that: *"By using file transfer protocol (FTP), you know, one can download it even in his/her cell phone, computer, at the same time other people can download it. That is, multiple copies can be downloaded at the same time"* (FG4B). DC users are a fundamental reason for the establishment of DC and their sustainability. The various assertions made by the participants clearly demonstrated the benefits users stand to gain in using SDC services: *"Several users can have access to the same material simultaneously without one affecting the other. Secondly, there is an issue of remote access. You can access material regardless of your location in as much as you have the login details for those that require such. Some do not need username and password (login details), automatically you can have access without restriction"* (FG1C,). In addition, FG2C delineated that DC can easily be shared, distributed, copied, edited, and manipulated. All these, among others, confirm the benefits an academic library stands to gain by shifting from conventional library services to innovative services of incorporating ICT into the library generally and SDC in particular.

(e) Resource Preservation

The findings also indicate that SDC enables the preservation of information resources in an updated format, contrary to the conventional preservation and conservation of physical materials. Physical materials are liable to wear and tear because they are damp or moist, respectively. A participant expressed: *"With SDC, we can preserve a lot of resources. We now have lesser concern on the issues of preservation and conservation of physical materials so, SDC makes it easier"* (FG7C). Based on these findings, SDC in academic libraries has made the issue of preservation and conservation easier because hard copies were converted into soft copies and allowed multiple access to them.

(f) Promotes Information Resource Sharing

SDC enables the sharing or even distribution of information resources between connected academic libraries and users. Participants affirmed that SDC promotes resource sharing among reputable institutions or academic libraries: *"It enhances resource sharing, multiple usage/access, requires little space, is active 24/7, resource preservation and retrieval of information"* (FG3A); while another participant reveals that: *"SDC enhances resource sharing and boosts university rankings"* (FG6B).

The above excerpts corroborate other reasons listed by the participants for SDC in the library. These include supporting interlibrary loan, offering opportunities for resource sharing among reputable institutions, minimising space, portability, currency, accuracy, digital preservation, speedy, elevating library reputation, makes tedious work easy, security of information resources and facilitating library activities: *"In SDC, we have physical and logical security. Physical security has to do with inaccessibility, permission or authorisation to touch resources. It is only the staff of technical unit that is meant to do that, and these include all network infrastructures, scanners, digital resources in the library. Logical security is concerned with configuration of the systems basically on pre-determined rules set within the staff" (FG4C).*

(g) Saves Time

Many participants expressed that SDC saved time and eased their tasks in the library; therefore, they could offer services more effectively. Participants noted that: "*… We can serve several users at the same time. It saves our time and energy and improves our services"* (FG5C). FG4A opined: *"It has eliminated the boring routine and duplication of efforts because with SDC, there is no way two persons will be doing the same work at the same time"* (FG4A).

(f) Reduces Cost

The findings indicate that SDC is cost-effective for institutions. Academic libraries usually have a large number of users, and purchasing the required amount of relevant and up-to-date information resources is cumbersome. But with the advent of SDC, subscription to authentic databases, downloading of relevant open access, digitisation of rare copies and most essential materials to the dictate of the university curricula will definitely reduce cost implication of purchasing hardcopies *"With SDC, it means we can get so much for so little, meaning that we can have so much information at a very minimal cost. For example, open access databases, you have millions of peer-reviewed articles that can be accessed within the university community without the university paying a dime for them (open access)"* (FG1A). Another participant emphasised that: *"Books are expensive, and the resources are not there for the university to buy current books for faculties and departments. But with digitising some of these materials, having access to digital contents is also very important because it reduces cost"* (FG3B). Another consideration highlighted by the participants with

respect to cost reduction is that some digital resources do not require payment of money; they are cheaper than books because they can be accessed free of charge through open access channels.

(g) Paradigm Shift

Participants acknowledged that users are the number one criterion for sustaining DC because they perceived that current library users can no longer be satisfied with conventional library services and resources. This implies that the mindset of modern library users has been inculcated in the use of digital collections: *"Yeah, we are in the 21st century, which is characterised by the generation of nowadays students known as digital natives who always want their information needs at the tip of their fingers; as a librarian, you have to go in line with the users' need."* (FG2A). Another participant stated, *"They like to cut and paste, speedy access to online information resources compared to manual that waste their times. There is a paradigm shift in access and use of information"* (FG7A). Some participants (FG3A, FG5A, and FG6C) stated that users preferred to use ICT in attaining library services and resources which enabled them to access, download documents, copy, and edit information for their academic pursuits. Apart from the academic librarians' perspectives on the accrued benefits for practising SDC, one of their motivational reasons is that the 21st century demand has initiated a paradigm shift in such a way that 90% of students of this generation prefer online resources to manual resources because of their flexibility (cut and paste, download, add and delete) (FG7A and FG3C).

DISCUSSION

This study corroborates previous scholars' stand on the concept of SDC, as Bradley (2006; 2007) considers digital sustainability as a determination to set a standard by means of promoting, simplifying, and synchronising the application of policies geared toward sustainability. The author further described the sustainability of digital information resources as a way of ensuring maintenance, regulation, enhancement, and tackling the issues of environmental and socioeconomic factors leading to sustainability. The results of these findings conform to Chowdhury's (2016) definition of sustainability as the uncompromised continuity of a set goal. However, Eschenfelder et al., 2016 research contradict this study as the authors stated in their investigation that the term 'sustainability' as a new concept in the field of LIS and library practitioners lack definition. In other words, these categories of library stakeholders could not conceptualise sustainability. The findings reveal that the studied academic librarians provided insight into the meaning of sustainability. Congruent to Eschenfelder et al. (2016), Ajao (2018) opined that sustainability has no established meaning. The results clearly indicate that SDC entails the provision of access, digitisation, preservation, and the various tasks required. Evans and Baker (2013) emphasised that sustainability requires critical thinking and planning for its manifestation of long-term benefits to major stakeholders through rightful investment. Krahmer and Phillips (2016) conceded the findings of this study in the area of preservation, as it indicated that the University of North Texas Libraries (UNTL) had preserved 1.5 million purely digital objects of 21 million pages of digital information resources. Again, Matusiak (2012) attested that research on understanding and perspectives on the benefits of practising SDC offers an intuition into practical sustainability.

The findings of this study are in line with Prescott's (2012) assertion that the end of the library is by corner until and/or unless precautionary means are taken, particularly in the areas of technological innovation, knowledge acquisition and management, collaboration,

and scholarly communication. Nevertheless, Maron and Pickle (2013) and Beutelspacher and Meschede (2020) confirmed that a study on investment of digital resources and the results portray that most librarians acknowledged the importance of digitising special collections, but few attested to its underfunding, while German public libraries would have played a crucial role in sustaining digital collection if not confronted with financial and expert challenges, respectively. This shows that funding, as one of the criteria for SDC, is very important.

The results of this study support previous scholars' viewpoints on the accrued benefits from SDC, as Hughes (2012b) highlighted the benefits of SDC to different people, different times, and different situations. DeGraff (2014) stressed that there is a need to sustain digital collections due to the needs of the new generation, known as digital natives, whose preference is for digital information resources.

CONCLUSIONS

The study discusses the findings on librarians' conception of SDC, the criteria for its fulfilment, and what they perceived as the benefits of sustaining digital collections at the three selected Federal University Libraries in northwestern Nigeria. The findings of the two research questions generated a number of themes and sub-themes, as shown in Figure 1. These include provision of access (open and long-term access), digitisation, preservation, and tasks involved (functions); for criteria that must be met for its fulfilment, the themes are skilled manpower, training of digital librarians, duties of digital librarians) infrastructures (technology- maintenance); for benefits, the themes are reputation, improves services (ease of access aids in resource preservation, saves time, promotes information resource sharing, reduces cost, and impacts learning.

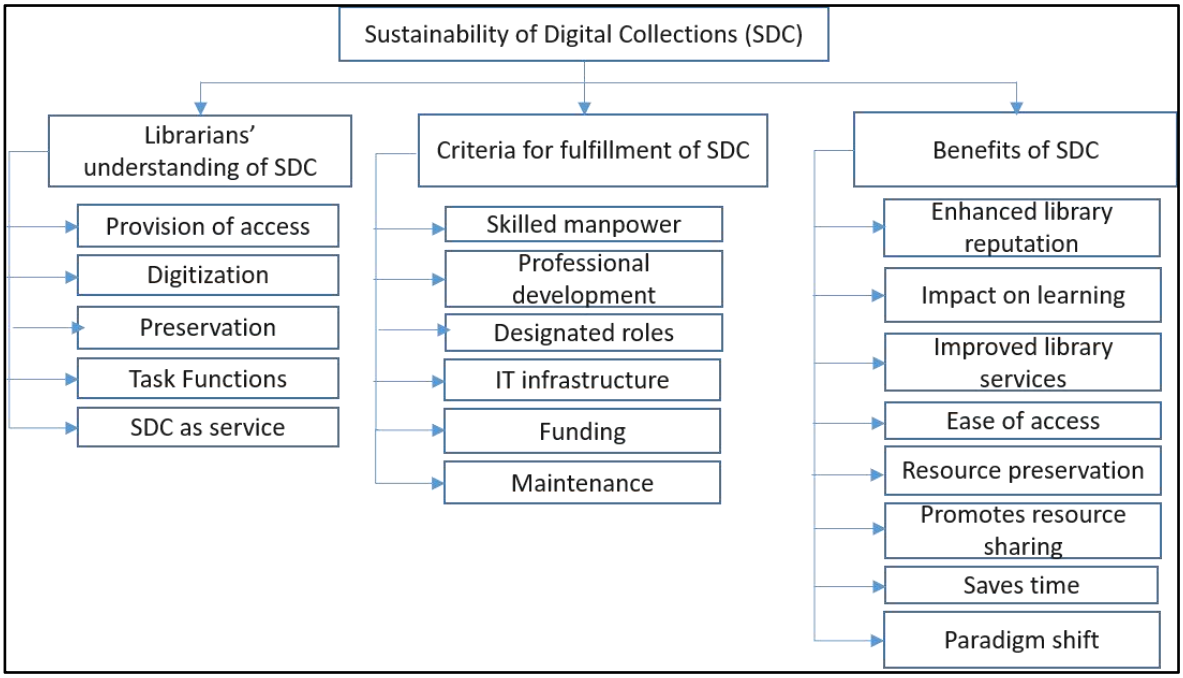

Figure 1: Dimensions for Sustainability of Digital Collections

The study analysed and presented the results of the findings on academic librarians' understanding, the criteria that must be met for its fulfilment, and the perceived benefits for sustaining digital collections. All necessary parameters were utilised. The study recommends adequate training of digital librarians to keep abreast of the latest technology and software. This will not only enhance their performance but also go a long way in imparting knowledge to end-users for easy access to digital collections. This study has illustrated the concept of SDC from the purview of Nigerian academic librarians which was hitherto unknown to the public. The sustainability of digital collection is a relatively new concept in the fields of LIS and librarianship. This study will serve as a pacesetter and guide future researchers to conduct similar research on the sustainability of digital collections and related topics.

The study covers only three out of seven federal universities situated in the northwestern geopolitical zone because of time constraints, limited resources, and distance in the geographical location of the institutions. It does not cover state or private institutional libraries. The collection of data is from university librarians, digital collection/library staff, and ICT personnel designated to the library. Therefore, the results of the findings cannot be generalised to a related study among state and private academic libraries, as well as academic libraries in other tertiary institutions.

There is a need to investigate users' behaviour, awareness, and accessibility when using university databases in their academic pursuits. This is essential as it goes a long way in not only fostering SDC but also embraces the culture of improving the resources and services of DC on the part of librarians on a sturdy basis. There are many untapped issues regarding the SDC in the Nigerian context. Further research can be conducted to assess the impact of DC in academic libraries. Consequently, further study will improve the current status of SDC, as well as the awareness and comprehensive understanding of all stakeholders regarding SDC.

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