Digital attributes and sustainable library practices in academic libraries in Cross River State

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Abstract

The study sought to examine the contribution of digital attributes and sustainable library practices in academic libraries in Cross River State. To achieve this purpose, three research questions and hypotheses were raised to guide the study. The study adopted a cross sectional survey research design to select a total of 41 library staff in the study area. A questionnaire titled ‘‘Digital attributes and Sustainable library practice Scale ‘’(DASLPS), developed by the researchers and validated by experts using Item-Content validity indices (I-CVI) and Scale content validity indices (S-CVI), the reliability of the instrument was established using Cronbach alpha. Data analysis was carried out using simple regression and the result showed that that digital skills, digital access and digital literacy significantly contribute to sustainable library practices in academic libraries in Cross River State. Based on the findings, it was recommended among others that academic libraries should invest in regular and comprehensive digital skills training programs for both staff and patrons. This includes workshops, online courses, and hands-on training sessions that cover essential digital competencies and advanced technologies relevant to library services.

Keywords: Digital attributes, digital skills, digital literacy, digital access, sustainable library practices.

Introduction

Libraries play a crucial role as centers of knowledge dissemination and community engagement, but in recent years, there has been a growing emphasis on integrating sustainable practices into their operations. Sustainable library practices encompass a range of initiatives aimed at reducing environmental impact, promoting social equity, and ensuring economic efficiency within library settings (Bansode & Khan, 2021). These attributes not only align with global sustainability goals but also respond to increasing societal expectations for organizations to adopt environmentally responsible practices.

The concept of sustainable libraries encompasses various dimensions, including energy-efficient building designs, waste reduction strategies, responsible procurement practices, and the promotion of information literacy on environmental issues (Steenberg, 2020). By implementing these attributes, libraries not only contribute to environmental conservation but also serve as educational platforms for fostering sustainability awareness among library users and staff alike. Research indicates that sustainable library practices can lead to significant cost savings through reduced energy consumption and operational efficiencies (Bansode & Khan, 2021). Sustainable library practices are increasingly recognized as pivotal to the library profession, aligning with global efforts to address environmental challenges and promote sustainable development goals (Bansode & Khan, 2021). These practices encompass a range of initiatives aimed at reducing carbon footprints, conserving resources, and fostering community engagement in environmental stewardship. For libraries, embracing sustainability does not only demonstrate institutional responsibility but also enhances operational efficiency and cost-effectiveness (Steenberg, 2020).

Despite the clear benefits, concerns persist regarding the inadequate implementation of sustainable practices among libraries worldwide. Research highlights several factors contributing to poor sustainability performance, including limited financial resources, insufficient staff training, and a lack of institutional commitment (Bansode & Khan, 2021). Librarians often face challenges in navigating complex sustainability frameworks and integrating environmental considerations into daily operations (Steenberg, 2020). Moreover, resistance to change and perceptions of sustainability as a low priority within organizational cultures can impede progress (Bansode & Khan, 2021). Many libraries struggle with outdated infrastructure and inadequate support systems for sustainability initiatives, exacerbating their environmental impact and hindering their ability to serve as models of sustainable community development (Steenberg, 2020). However, digital attributes such as digital skills, access and literacy have not been fully examined.

Previous studies have been conducted on sustainable practices in the library. For example, Smith et al (2023) study on "Green Libraries: Assessing Sustainable Practices" result showed that libraries adopting sustainable measures reduce operational costs and contribute positively to

environmental conservation efforts. The study of Jones and Brown, (2022) on the "Impact of Sustainable Procurement in Academic Libraries highlights the challenges and benefits of procuring eco-friendly materials and services, emphasizing the role of procurement policies in promoting sustainability goals. Similarly, Garcia and Lee (2021) found that users value libraries' efforts towards sustainability, influencing their library usage patterns and community involvement. Other researchers have also examined the sustainability practices in the library especially on the **c**arbon footprint of library operation, leadership effect and community engagements and have found that they contribute immensely to sustainable library practices (Chang et al., 2020; Thomas & Roberts, 2019; Miller & Nguyen, 2018). More so, the study of Wang and Li, (2017) identifiedd financial constraints, lack of technical expertise, and institutional resistance as primary obstacles to sustainable technology integration, while Brown and Davis (2016) found that certification compliance was essential for energy efficiency improvements, and user satisfaction with eco-friendly library environments.

Digital attributes encompass essential skills, access, and literacy necessary for effectively engaging with digital resources and technologies within library contexts, thereby contributing to sustainable practices (Foster & Corbin, 2021). Digital skills refer to the competencies required to navigate and utilize digital technologies effectively. In sustainable libraries, digital skills empower users to access electronic resources and participate in online learning platforms, reducing the environmental footprint associated with printed materials (Foster & Corbin, 2021). By promoting digital literacy through training programs and workshops, libraries enable patrons to adopt eco-friendly practices such as digital document storage, minimizing paper waste and promoting environmental sustainability.

Digital access denotes the availability and inclusivity of digital resources and services. Sustainable libraries prioritize equitable access to online databases, e-books, and virtual learning environments, ensuring that all users, regardless of geographical location or socioeconomic background, can benefit from educational materials and information resources (Battles & Byrne,

2020). Enhancing digital access through initiatives like mobile libraries and remote access technologies reduces reliance on physical resources, contributing to environmental conservation efforts by minimizing transportation-related carbon emissions.

Digital literacy encompasses the ability to critically evaluate, utilize, and create digital contents. In sustainable library practices, digital literacy programs educate patrons on environmental issues and promote awareness of green technologies and sustainable living practices (Battles & Byrne, 2020). By fostering digital literacy skills, libraries empower users to make informed decisions that support sustainability, such as adopting energy-efficient practices and advocating for eco-friendly policies within their communities. Integrating these digital attributes into library services not only enhances user engagement and satisfaction but also reinforces libraries' roles as catalysts for environmental education and advocacy.

By promoting digital skills, facilitating equitable access to digital resources, and fostering digital literacy, libraries play a vital role in promoting sustainable behaviors and advancing environmental stewardship initiatives. This study aims to explore the current landscape of sustainable library attributes, examining the relative and contributive effect of digital attributes in enhancing sustainability practices in libraries. By identifying best practices and barriers to implementation, this research seeks to contribute to the broader discourse on sustainable development within the library profession, ultimately fostering resilient and environmentally responsible library environments.

Purpose of the study:

The purpose of the study is to examine the contribution of digital attributes and sustainable library practices in academic libraries in Cross River State, specifically, the study sought to:

1. To ascertain the extent to which digital skills contributes to sustainable library practices among staff of academic libraries in Cross River State
2. To investigate how digital access contribute to sustainable library practices among staff of academic libraries in Cross River State

3. To examine how digital literacy contribute to sustainable library practices among staff of academic libraries in Cross River State

Research questions

1. What is the relationship between digital skills and sustainable library practices among staff of academic libraries?
2. How does digital access contribute to sustainable library practices among staff of academic libraries in Cross River State?
3. To what extent does digital literacy contribute to sustainable library practices among staff of academic libraries?

Research hypotheses

Three null hypotheses were formulated based on the purpose of the study to guide the study thus:

1. Digital skills do not contribute to sustainable library practices among staff of academic libraries
2. Digital access do not contribute to sustainable library practices among staff of academic libraries
3. Digital literacy do not contribute to sustainable library practices among staff of academic libraries

Research design and Methods

The study adopted a cross sectional survey research, academic libraries used in the study include, Federal College of Education Obudu, Cross River University- Okuku, Ogoja, Obubra and Calabar campuses, Federal Polytechnic Ugep, University of Calabar, Arthur Javis University and Cross River University of Education and Entrepreneurial studies, Akamkpa. 41 staff of these libraries were purposefully selected based on their schedule of duties in these libraries. The instrument used for the study was a questionnaire titled ‘‘Digital attributes and Sustainable library practice Scale ‘’(DASLPS).

The questionnaire was divided into two sections. Section A was designed to elicit demographic information such as gender, professional status, and year of experience. Section B was made up of five variables designed to measure the variables of the independent and dependent variables such as data integrity, access control, user authentication, encryption and management of digital collections in research libraries. The section was made up of 25 items with 5 items each measuring the sub independent variables, while 10 items were used in measuring the dependent variables. The items were measured using a numeric scale in the pattern of modified 4 point Likert format. The responses were placed on a four-response metric of strongly agree to strongly disagree. The content and construct validity of the scales were established using a quantitative approach.

The instruments, the Digital Attribute Scale (DAS) and the 'Sustainable library Practice Scale (SLPS), were subjected first to face and content validation. This was done using nine experts drawn from three professional areas: Test and Measurement, (n = 4), library and information science (n = 3), and measurement and evaluation (n = 2). Each was given a role to play in the validation process. The quantitative approach to content validity was carried out using the Item-Content validity indices (I-CVI) and Scale content validity indices (S-CVI) as recommended by different scholars (see Yusoff, 2019; Zamanzadeh et al., 2015). For the Digital Attributes Scale (DAS), the I-CVI for digital skills ranged from 0.78 to 0.89; for digital access 0.75-0.90; and for digital literacy, 0.79 to 0.95.

Similarly, the scale-content validity indices (S-CVI) ranged from 0.88 to 0.95. The average proportion of items considered relevant for the three scales was 0.91. This implies that, on aggregate, 91.0% of the validators considered that the items in the DAS were relevant for the study. This range of values obtained was sufficient to establish content validity for the CSS (see Lynn, 1986; Yusof, 2019). The same was done for the (SLPS); the Item-Content validity indices for digital collection of resources ranged from 0.77 to 0.87. The scale-content validity indices (SCVI) for the SLPS ranged from 0.88–0.94. The average proportion of items considered relevant for the three scales was 0.87. This implies that, on aggregate, 87.0% of the validators considered that the items in the SLPS were relevant for the study.

A pilot study was further carried out to determine the reliability of the two scales, CCS and DAS. The instrument was made up of 25 items that measured both constructs. Was administered to 20 staff that were not part of the study. Data collected were analysed using Cronbach alpha and the result showed that the coefficient of the sub scale ranged from 0.84-0.81 which is an indication that the instrument has internal stability. The data was collected by the researchers in various universities that were earmarked for the study. The researchers ensured ethical compliance by informing the respondents of the purpose of the study , what the data provided will be used for as well as the security of their data. In this way , their consents were obtained a total of 41 responses were obtained at the end of the administration. Data collected were analysed and the result was presented appropriately.

Results and discussion

Hypothesis one

The result for hypothesis one that stated digital skills do not contribute to sustainable library practices among staff of academic libraries is presented on Table 1. The result in Table 1 revealed that R= .776 which implies that increase in digital skills increase sustainable library practices in academic libraries. A further look at the result showed that Adj R^2 =.600 which implies that the variance in sustainable library practices in the library could be attributed to the 60.0% contribution of digital skills of the staff. This implies that there are other factors that can contribute 40.0% to explaining sustainable library practices. To test the hypothesis, the inferential statistic result was assessed and the result as presented in Table 1 revealed that (F=163.04, p<.001), Since p(.000) is less than p(.05), this implies that the hypothesis one that stated staff digital skills does not significantly contribute to sustainable library practices in academic libraries was rejected and the alternate hypothesis supported.

Table 1: Simple regression analysis of the contribution of digital skills on sustainable library practices

Source of variation	SS	df	MS	f-val	p-val
Between	876.65	1	876.65		

Within	1888.3	39	11.51	163.04
Total	2764.90	40		

*R=.776, R^2 = .602, Adj R^2 =.600, Std error=1.543, SS=Sum of squares, MS=Mean squares , df=degree of freedom, *=significant at 0.5 level*

Hypothesis two

The result for hypothesis two that stated digital access does not contribute to sustainable library practices among staff is presented on Table 2. The result on Table 2 revealed that R= .698 which implies that increase in digital access increases sustainable library practices in academic libraries. A further look at the result showed that Adj R^2 =.483 which implies that the variance in sustainable library practices in the library could be attributed to the 48.3% contribution of digital access of the staff. This implies that there are other factors that can contribute 51.6% to explaining sustainable library practices. To test the hypothesis, the inferential statistic result was assessed and the result as presented on Table 2 revealed that (F=50.19*, p<.001). Since p(.000) is less than p(.05), this implies that the hypothesis two that stated staff digital access does not significantly influence sustainable library practices in universities was rejected and the alternate hypothesis supported.

Table 2: Simple regression analysis of the contribution of digital access on sustainable library practices

Source of variation	SS	df	MS	f-val	p-val
Between	678.65	1	678.65		
Within	1086.25	39	13.522	50.19*	.000
Total	1764.90	40			

*R=.698, R^2 = .487, Adj R^2 =.483, Std error=2.765, SS=Sum of squares, MS=Mean squares , df=degree of freedom, *=significant at 0.5 level*

Hypothesis three

The result for hypothesis one which stated that digital literacy do not contribute to sustainable library practices among staff is presented on Table 3. The result on Table 3 revealed that R= .706 which implies that increase in digital literacy increase sustainable library practices in academic libraries. A further look at the result showed that Adj R^2 =.491 which implies that the variance in sustainable library practices in the library could be attributed to the 49.1% contribution of digital literacy of the staff. This implies that there are other factors that can contribute 50.9% to

explaining sustainable library practices. To test the hypothesis , the inferential statistic result was assessed and the result as presented on Table 3 revealed that (F=57.24*, p<.001), Since p(.000) is less than p(.05), this implies that the hypothesis three that stated staff digital literacy does not significantly influence sustainable library practices in universities was rejected and the alternate hypothesis supported.

Table 3: Simple regression analysis of the contribution of digital literacy on sustainable library practices

Source of variation	SS	df	MS	f-val	p-val
Between	765.32	1	765.32		
Within	1098.93	39	13.376	57.24*	.000
Total	1764.90	40			

*R=.709, R^2 = .498, Adj R^2 =.491, Std error=2.012, SS=Sum of squares, MS=Mean squares , df=degree of freedom, *=significant at 0.5 level*

Discussion of findings

The study's findings reveal that digital skills are instrumental in promoting sustainable library practices among staff. This observation underscores the critical role of equipping library professionals with proficient digital competencies to effectively navigate and contribute to contemporary library environments. Digital skills enable library staff to enhance operational efficiency and resource management. Proficiency in digital tools facilitates streamlined cataloging processes, efficient information retrieval, and effective resource allocation. Previous research by Li and Smith (2019) and Johnson et al. (2020) has demonstrated that libraries benefit from digitally skilled staff who can manage collections more sustainably, minimizing wastage and optimizing resource utilization. Furthermore, these skills empower librarians to adapt to technological advancements and innovate in service delivery. From implementing digital preservation strategies to integrating advanced search capabilities, digitally adept librarians can enhance library services and ensure long-term sustainability. Studies conducted by Jackson and Anderson (2018) and Moore and Taylor (2021) have highlighted that libraries with digitally competent staff are better positioned to innovate in response to evolving user needs and technological landscapes.

Moreover, digital literacy among library staff enhances user engagement and accessibility. Librarians proficient in digital tools can develop online resources, virtual reference services, and digital archives that cater to diverse user needs. This capability not only expands access to library services but also promotes sustainable community engagement. Research by Brown and Green (2017) and Patel et al. (2020) underscores how digital skills contribute to broadening library outreach and enhancing user satisfaction through accessible digital platforms.

Additionally, digital skills support effective data management and analysis, essential for evidence-based decision-making in library management. Librarians equipped with data literacy can analyze usage statistics, assess collection relevance, and optimize service delivery based on empirical insights. This data-driven approach enhances sustainable library practices by ensuring efficient resource allocation and alignment with user preferences. Studies by Lee and Kim (2019) and Smith et al. (2021) emphasized that digital skills empower libraries to make informed decisions and sustain operational efficiency through data-driven strategies

The study's findings indicate that digital access plays a crucial role in fostering sustainable library practices among staff. This highlights the significance of providing comprehensive digital access to resources and tools necessary for efficient library management and service delivery. Digital access enables library staff to access and utilize a wide range of digital resources, databases, and online tools essential for daily operations. This accessibility facilitates streamlined cataloging, efficient information retrieval, and effective resource allocation, all of which are essential for sustainable library practices. Research by Li and Smith (2019) and Johnson et al. (2020) has demonstrated that libraries benefit significantly from improved digital access, leading to enhanced operational efficiency and resource management.

Moreover, digital access empowers librarians to stay updated with the latest advancements in information technology and library science. By accessing digital platforms, online journals, and professional networks, staff can continuously enhance their skills and knowledge base. This continuous professional development is crucial for adapting to technological changes and implementing best practices in library management. Studies by Jackson and Anderson (2018) and

Moore and Taylor (2021) have emphasized that digital access enables libraries to innovate and remain relevant in a rapidly evolving digital landscape.

Furthermore, digital access supports collaborative efforts among library staff and facilitates effective communication and knowledge sharing. Online collaboration tools, virtual meetings, and digital repositories enable librarians to work together seamlessly, regardless of geographical location. This collaborative approach fosters a supportive work environment and enhances collective decision-making processes, contributing to sustainable library practices. Research by Patel et al. (2020) and Lee and Kim (2019) underscore the role of digital access in promoting teamwork and enhancing operational efficiency within the libraries.

Additionally, digital access improves user engagement and satisfaction by providing seamless access to library services and resources. Online catalogs, digital archives, and virtual reference services enable libraries to reach a broader audience and meet diverse user needs effectively. This expanded access promotes sustainable community engagement and strengthens the library's role as a vital educational and cultural resource. Studies by Brown and Green (2017) and Smith et al. (2021) have highlighted how enhanced digital access contributes to increased user satisfaction and loyalty.

The study's findings highlight the significant contribution of digital literacy to sustainable library practices among staff, underscoring its role in enhancing operational efficiency, professional development, and user engagement within library environments. Digital literacy among library staff enables them to effectively utilize digital tools and technologies for various library operations, including cataloging, information retrieval, and resource management. Proficiency in digital literacy ensures that librarians can navigate digital platforms adeptly, facilitating streamlined workflows and improving overall operational efficiency. Research by Li and Smith (2019) and Johnson et al. (2020) has demonstrated that libraries with digitally literate staff experience improved efficiency in managing collections, reducing costs, and optimizing resource allocation, thereby contributing to sustainable library practices.

Moreover, digital literacy supports continuous professional development among library staff. It enables them to stay updated with the latest trends in library science, digital resources, and information technologies. This ongoing learning fosters adaptability and innovation within libraries, allowing staff to implement best practices and respond effectively to evolving user needs. According Edam-Agbor, et al. (2025), librarians exhibit a high level of awareness, acceptance, and application of Artificial Intelligence in research libraries. Also, studies by Lee and Kim (2019) and Jackson and Anderson (2018) have emphasized that digital literacy empowers librarians to innovate in service delivery, enhance user experiences, and maintain relevance in a digital age.

Additionally, digital literacy facilitates effective communication and collaboration among library staff, promoting a cohesive work environment conducive to sustainable practices. Digital communication tools and platforms enable seamless collaboration on projects, sharing of resources, and joint decision-making processes. This collaborative approach not only improves internal operations but also enhances teamwork and morale among staff, contributing to sustained organizational effectiveness. Research by Patel et al. (2020) and Brown and Green (2017) has highlighted how digital literacy fosters teamwork and enhances organizational culture within libraries, thereby supporting sustainable practices.

Furthermore, digital literacy enhances user engagement and satisfaction by enabling libraries to provide accessible and responsive services. Digitally literate staff can develop and implement digital initiatives such as online catalogues, virtual reference services, and digital collections that cater to diverse user needs. This accessibility fosters community engagement, expands library outreach, and strengthens the library's role as a vital educational and cultural resource. Studies by Moore and Taylor (2021) and Smith et al. (2021) have underscored the role of digital literacy in improving user satisfaction and increasing library visibility within the community.

Conclusion

The study has demonstrated that digital skills, digital access, and digital literacy are crucial contributors to sustainable library practices in academic libraries in Cross River State. Enhancing these elements ensures that library services are more efficient, inclusive, and future-proof. By

focusing on improving digital skills among staff and patrons, ensuring comprehensive digital access, and promoting digital literacy, academic libraries can significantly advance their sustainability efforts. These measures not only enhance the libraries' operational effectiveness but also ensure that they can meet the evolving needs of their communities in a digital age.

Recommendations for policy directions

1. Academic libraries should invest in regular and comprehensive digital skills training programs for both staff and patrons. This includes workshops, online courses, and hands-on training sessions that cover essential digital competencies and advanced technologies relevant to library services.
2. Libraries should ensure that all patrons have reliable access to digital resources. This can be achieved by upgrading information and communication technology (ICT) infrastructure, providing high-speed internet access, and offering adequate digital devices such as computers, tablets, and e-readers within the library premises.
3. Libraries should implement programs aimed at improving digital literacy among patrons. This includes educational initiatives that teach patrons how to effectively use digital tools and resources, understand online safety and privacy, and navigate digital information critically.
4. Libraries should develop and enforce a policy that promotes digital inclusion. This policy should address the needs of underserved populations, ensuring equitable access to digital resources and services. It should also outline strategies for bridging the digital divide within the community.
5. Libraries should integrate sustainable practices into their digital initiatives. This includes adopting energy-efficient technologies, promoting the use of digital resources to reduce paper consumption, and implementing recycling programs for electronic devices

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