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"Towards Sustainable Future Libraries"

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Perpustakaan Hamzah Sendut
Universiti Sains Malaysia
11800 USM, Penang, MALAYSIA

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Exploring User Engagement with Drs in The Federal University Libraries in Northwest Nigeria: Applying TPB & RUSA Standards

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ABSTRACT

This study explores user engagement with digital reference services in federal university libraries across Northwest Nigeria, applying the theory of planned behavior and aligning with reference and user services association, standards. Despite the growing adoption of DRS globally, libraries in the region face challenges such as poor ICT infrastructure, inadequate librarian competencies, and limited user awareness. The main research question investigates how factors like librarian skills, technological competence, complex tasks, and user attitudes influence satisfaction with DRS. A quantitative research design was employed, surveying 376 undergraduate and postgraduate students across eight federal universities using structured questionnaires. Data analyses via SPSS revealed that librarian communication, clarity in instruction, and digital tool navigation significantly affect user satisfaction. While users showed high confidence in using DRS and appreciated its accessibility, response delays and interface complexity remained barriers. The study extended TPB by integrating four new constructs Librarian Skills, Technological Competence, Complex Tasks, and User Attitude providing a more nuanced understanding of digital engagement behaviors. Key findings highlight the importance of enhancing infrastructure, streamlining user interfaces, and integrating real-time support tools. Recommendations include continuous training for librarians, promotional campaigns for DRS, and implementation of feedback loops to drive iterative service improvement. Practical applications lie in using the extended TPB framework to guide DRS policy and design in academic libraries. Future research could focus on AI-powered DRS systems, cultural influences on user behavior, and longitudinal assessments of satisfaction trends.

Keywords: Digital Reference Services; User Satisfaction; Theory of Planned Behavior; Federal University Libraries; Librarian Skills; RUSA Standards

1 INTRODUCTION

The advancement of information and communication technologies has significantly transformed the delivery of library services, particularly through the emergence of digital reference services. These services allow users to interact with librarians in real time or asynchronously via digital platforms as observe by Isa et al., (2025), enabling them to access timely information and professional assistance remotely. In academic environments, DRS have become vital tools for supporting research, teaching, and learning by bridging the gap between users and information resources, regardless of location or time constraints (Sinhababu & Kumar, 2021b). However, effective engagement with these services depends not only on their availability but also on how users perceive, adopt, and interact with them. In Nigeria, federal university libraries have embraced DRS as part of efforts to modernize information service delivery and meet the evolving needs of their academic communities. Despite these efforts, user engagement with DRS in the Northwest region comprising the states of Kano, Kaduna, Katsina, Sokoto, Jigawa, and Kebbi, and Zamfara remains underexplored Mustapha, (2023). This region faces unique challenges, including infrastructural limitations, security threats, inconsistent digital literacy levels, and varying quality of service delivery, all of which can significantly affect user participation and satisfaction (Ahmed, 2017; Mogaji, 2019). This study seeks to explore user engagement with DRS in federal university libraries across Northwest Nigeria by applying the theory of planned behavior and the reference and user services association standards as theoretical and professional frameworks. (Ajzen, 1991; RAUSA, 2017) TPB provides a behavioral lens to understand the psychological factors attitude, subjective norms, and perceived behavioral control that influence users intentions and actual use of DRS. Meanwhile, the RUSA Standards offer a professional benchmark for evaluating the quality of digital reference interactions in terms of accessibility, responsiveness, communication skills, and follow up support. RUSA, (2003), By integrating these frameworks, the study aims to assess how user perceptions, librarian competencies, technology readiness, and service quality impact engagement with DRS. The findings will contribute to a deeper understanding of user behavior in the context of digital reference environments and provide actionable recommendations for enhancing the effectiveness and sustainability of DRS in federal university libraries within the region.

1.1 Digital Reference Services

DRS facilitate communication between librarians and users through electronic platforms. According to the IFLA, (2005), DRS, also known as virtual reference, e-reference, or real-time reference, utilize computer technology to deliver information services. These services can be classified into two main types. 1. Asynchronous DRS. Users submit their queries through email, online forms, or discussion boards, and librarians respond later. This method allows users to send inquiries at any time, ensuring flexibility and convenience. However, it may result in delays in response time, which can affect users who require immediate assistance such as (Sinhababu & Kumar, 2021b) 2. Synchronous DRS. Users interact with librarians in real time through live chat, video conferencing, or phone calls, enabling immediate assistance. This method enhances engagement and provides instant feedback, which is beneficial for users with urgent or complex inquiries. Additionally, it requires the availability of both the librarian and the user at the same time, which can be a limitation in cases of differing time zones or scheduling added by (Sinhababu & Kumar, 2021b) However, digital reference services offer numerous benefits, including convenience, cost effectiveness, and enhanced access to digital resources. Moreover, the successful implementation of DRS requires adequate technological infrastructure, trained personnel, and awareness among library users.

1.2 Statement of the Problem

DRS are increasingly vital to academic libraries worldwide, but their adoption in African universities especially in Northwestern Nigeria faces significant challenges. These include inadequate digital infrastructure due to chronic underfunding Anyim, (2018) , lack of technological competencies among librarians Mustapha, (2023), and low digital literacy among users (Adewumi & Oladele, 2023). As a result, DRS platforms are often underutilized, with poor service delivery and user engagement. Additionally, limited promotion and integration of DRS within academic institutions contribute to users lack of awareness and confidence in using the services (Madu et al., 2018; Mustapha, 2023). Despite these issues, DRS have proven effective globally in improving access to library resources and enhancing academic research (Majanja, 2020; Saib et al., 2023). In Northwestern Nigeria, however, persistent insecurity, unstable electricity, and weak ICT infrastructure further hinder DRS effectiveness (Mogaji, 2019; Song, 2019). Factors such as librarian skills, user digital competency, and platform usability all influence service quality and satisfaction (Chang et al., 2009; Hamad et al., 2023). This study aims to evaluate user interaction with DRS in federal university libraries across the region, examining user perceptions, infrastructural and operational barriers, and the impact of service quality on satisfaction. The goal is to offer evidence based recommendations for improving DRS accessibility, usability, responsiveness, and sustainability (Isa et al., 2025).

1.3 Research Questions

1. How do librarians skills influence user satisfaction with DRS?
2. What is the relationship between technology competency and user satisfaction with DRS?
3. How do complex tasks affect user satisfaction with DRS?
4. What is the impact of user attitudes on satisfaction with DRS?

1.4 Research Objectives

The study aims to investigate the impact of various factors on user satisfaction with DRS in federal university libraries in Northwest Nigeria. The objectives include:

1. To examine the impact of librarians skills on user satisfaction with DRS.
2. To determine the relationship between technological competency and user satisfaction with DRS.
3. To assess the impact of complex tasks on user satisfaction with DRS.
4. To evaluate the influence of user attitudes on satisfaction with DRS.

2 RELATED REVIEW LITERATURE

DRS have become integral to academic libraries, reshaping how users interact with librarians and access information. Studies globally acknowledge the benefits of DRS such as speed, convenience, and improved resource accessibility yet highlight persistent challenges and notable research gaps. In Nigeria, (Bagudu & Sadiq, 2013) found that while users appreciated the usefulness of DRS, their adoption was influenced by social norms and levels of awareness. Dadzie et al., (2021) emphasized the importance of faculty involvement and awareness campaigns in Ghana but noted a lack of long term impact studies. Connaway et al., (2011) revealed a strong user preference for DRS due to its accessibility, yet did not address how AI-driven personalization could further enhance the experience.

The theory of planned behavior (Ajzen & Fishbein, 2010) has been widely used to understand DRS adoption, focusing on attitudes, subjective norms, and perceived behavioral control. However, its application across diverse cultural and institutional settings remains limited. (Al Hatmi & Nor, 2022) found DRS acceptance was driven by perceived ease of use and usefulness, though they underscored the need for technical support and librarian training. Faculty engagement also plays a pivotal role. (Nicholas & White, 2012) highlighted that faculty support in the UK influenced DRS success, yet their study did not explore collaborative DRS development. Singh, (2012) observed that DRS improved research productivity in Indian universities but called for comparative, cross-institutional research to establish scalable best practices. Faizan, (2023) explored the use of artificial intelligence in DRS and found improvements in response speed and user personalization, though ethical concerns like algorithmic bias remain underexplored. Lin et al., (2005) identified user training and technical problems as early barriers to DRS in Taiwan, while Davis et al., (2009) recommended real-time feedback tools to improve service quality features still largely absent in modern academic platforms. Chang et al., (2009) confirmed that DRS supported research in China, though effectiveness depended on librarian expertise and excluded analysis of mobile DRS platforms. In conclusion, literature underscores the value of DRS but points to key gaps in long term promotion, faculty collaboration, AI ethics, and mobile service delivery. This study will address these gaps by examining the roles of librarian skills, technological competence, user attitudes, and complex information needs in the use and effectiveness of DRS in federal university libraries in Northwest Nigeria.

2.1 Framework

This study builds on the theory of planned behavior (TPB) proposed by Ajzen (1991), which explains users engagement with DRS in university libraries through three key constructs attitude toward behavior, subjective norms, and perceived behavioral control. Positive attitudes, shaped by factors like perceived usefulness and satisfaction, along with peer influence and user confidence, play significant roles in motivating DRS use (Baker et al., 2007; Yakasai & Jusoh, 2015). To tailor the model to the context of federal university libraries in Northwest Nigeria, the framework integrates four additional variables such as librarian skills, technology competencies, complex tasks, and user attitude (Ahmed, 2017; Isa et al., 2025) exemplified, librarian skills encompass not just technical knowledge but also communication and responsiveness, while technology competencies refer to the digital proficiency of both users and librarians Saifullah et al., (2024) .The framework also accounts for the complexity of users academic tasks and their openness and adaptability to digital tools (Sadaf & Gezer, 2020). A dynamic feedback mechanism ensures that user behavior informs ongoing improvements in DRS design and delivery (Ajzen & Fishbein, 2010). Furthermore, the model contextualizes the role of communication technologies, highlighting a shift from asynchronous tools like email and FAQs to synchronous platforms such as Zoom, Google Meet, and instant messaging apps like WhatsApp (Sinhababu & Kumar, 2021a; Ubogu, 2020). To meet growing user expectations, the study advocates a hybrid model that blends traditional services with cutting edge technologies, including AI-powered chat assistants, for more personalized and responsive service Kalbande et al., (2024).

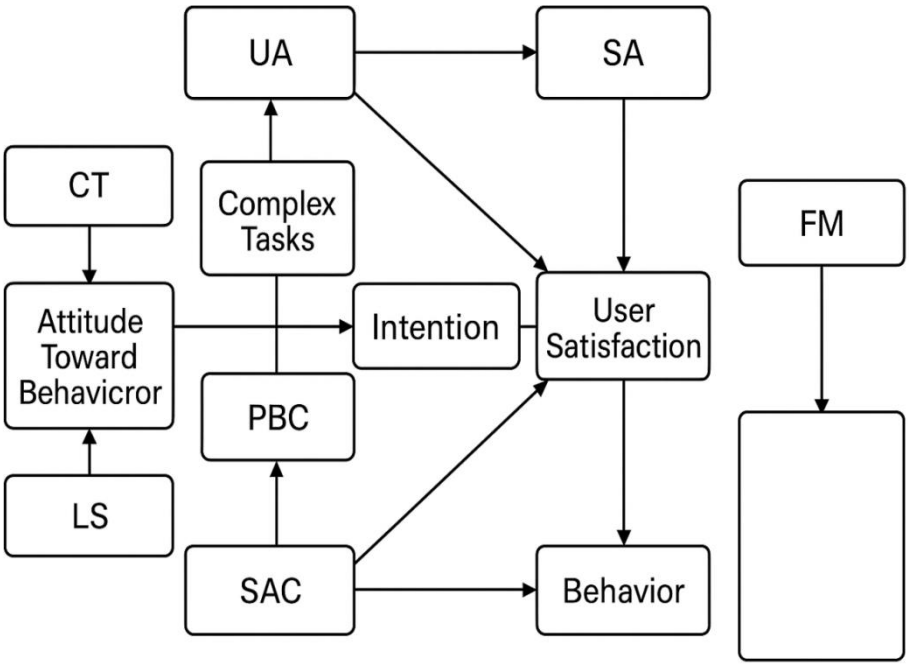

Figure 1: Theoretical framework by Ajzen, (1991)

2.2 Integrated Model of Drs Based on Tpb And Rusa Standards

This presents a model that integrates synchronous and asynchronous DRS in academic libraries using the TPB and RUSA standards. The model emphasizes a user centered approach by blending communication tools like chatbots, email, IM, FAQs, video conferencing, and live chat. It accounts for user attitude, librarian skills, technological competence, and task complexity to influence user satisfaction. Feedback mechanisms and institutional support are included to enhance service delivery and foster continuous improvement. The theoretical implications involve the extension of TPB through the integration of constructs such as librarian skills, technological competence, complex tasks, and user attitude to predict satisfaction. It offers deeper behavioral insights into how digital service users form intentions, emphasizing the role of perceived behavioral control, attitudes, and subjective norms as Hani et al.,(2021), the model inclusion of feedback loops adds a new dimension to TPB applications in library contexts. Methodologically, the study adopts a quantitative, user centered design using structured questionnaires based on TPB and RUSA standards Taherdoost, (2019). It employs purposive sampling across eight federal universities to ensure contextual relevance. The RUSA guidelines serve as structured evaluation metrics, providing systematic and practical tools for assessing service quality (Nezha, 2014; Johnson, 2023). The RUSA standards themselves Inclusion, Approachability, Engagement, Searching, Evaluation, and Closure offer a professional framework for guiding digital reference services. These standards ensure accessible, responsive, and high quality user interactions, and they are thoroughly embedded in both the evaluation and implementation aspects of the model RUSA, (2017).

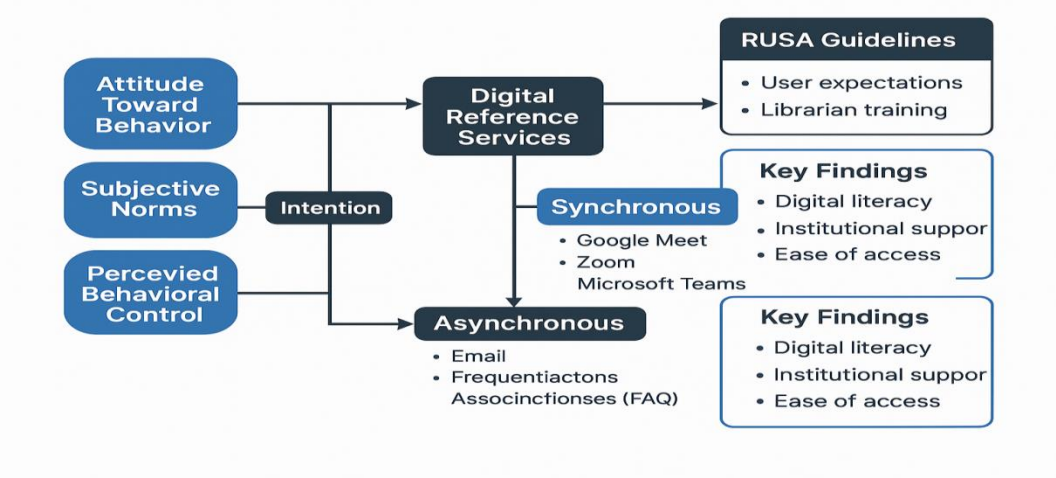

Figure 2: Model

3 METHODOLOGY

3.1 Research Design

The study explored user satisfaction with the implementation of DRS in federal university libraries across Northwest Nigeria. A structured and systematic methodology guided the research process. The researcher adopted a quantitative approach, drawing insights from beginning with an in-depth discussion statement of the problem and a clear articulation of the study objectives (Patel & Nitin, 2019). The theoretical framework was grounded in the TPB, which was selected to explore and understand the behavioral intentions of users regarding the use of DRS. A comprehensive review of relevant literature was conducted, encompassing previous studies on DRS within the country, as well as globally. This included an evaluation of existing practices in university libraries, with particular attention to the guidelines provided by the RUSA, (2017). These guidelines were adapted to develop and validate the research model and instruments. The findings were thoroughly analyzed and discussed in light of the objectives, providing valuable insights into user satisfaction with DRS.

3.2 Population of The Study

The population of this study comprises library users postgraduate and undergraduate students from eight federal university libraries located across the Northwest zone of Nigeria. A total of 376 actively utilizing DRS, participated in the research. The sample included 280 male and 96 female participants, reflecting the gender distribution of the study population. The respondents consist of both undergraduate and postgraduate students, all of whom were engaged in seeking information and support through DRS platforms. This diverse population underscores the active involvement of users across various academic levels and demographics, providing valuable insights into their interactions, experiences, and levels of satisfaction with the services offered by these libraries.

Table 1: Study Population of eight federal universities

University	Source	No. of student	Total responses
Ahmadu Bello university (ABU) Zaria	http://abu.edu.ng	49,954	43
Bayero university Kano (BUK),	https://www.buk.edu.ng	45,810	125
Usmanu Danfodio university sokoto (UDUS)	https://www.udusok.edu.ng	23,491	19
Nigerian Defence Academy (NDA) Kaduna	https://nda.edu.ng	6,200	13
Federal university Dutsenma (FUDM) Katsina	https://fudutsinma.edu.ng	7,000	93
Federal university Dutse (FUD), Jigawa	https://fud.edu.ng	15,000	51
Federal university Birnin Kebbi (KUBK)	https://fubk.edu.ng	7,000	23
Federal university Gusau (FUG) Zamfara	https://fugusau,edu.ng	8,000	9

3.3 Sample Size and Sampling Technique

The study employed purposive sampling to deliberately select federal university libraries from each state in Northwest Nigeria, including the Nigerian Defence Academy, aligning with the research objectives. Data were collected via Google Forms, yielding 413 responses, of which 376 valid responses were retained after excluding incomplete or invalid entries. Bayero University Kano had the highest representation (33.2%), followed by Federal University Dutsinma (24.7%) and Federal University Dutse (13.6%). Other contributors included Ahmadu Bello University (11.4%), Federal University Birnin Kebbi (6.1%), Usmanu Danfodio University (5.1%), Nigerian Defence Academy (3.5%), and Federal University Gusau (2.4%). This distribution ensured comprehensive regional representation.

4 RESULTS AND DISCUSSION

This section presents the results and interpretations related to the four research objectives, along with a detailed discussion of each. To clarify the coding used in the descriptive statistical graphs particularly those showing mean and standard deviation the following abbreviations represent the key variables librarian skills (LS), technology competencies (TC), complex tasks (CT), user attitude (UA), and user satisfaction (US).

4.1 RO1: Librarians Skills

The analysis presents respondents assessments of librarians skills, with mean scores ranging from 3.67 to 3.93, indicating overall positive perceptions. The top rated competency (LS1, Mean = 3.93) was the ability of librarians to understand users' information needs through active listening and effective communication. This finding supports Cleveland, (2004), who emphasized that communication is a critical component of successful digital reference interactions. Highly rated also were skills like giving clear instructions on accessing and using digital services (LS9, Mean = 3.86) and efficiently navigating databases to provide accurate information (LS2, Mean = 3.85). These outcomes align with Liu, (2013), who found that users highly value practical, hands on support and clear guidance in virtual

environments. Other notable skills include providing clear explanations (LS6, Mean = 3.82), demonstrating knowledge of library collections (LS4, Mean = 3.81), and effectively using virtual platforms (LS10, Mean = 3.79), further indicating librarians' competence in both traditional and digital service delivery (Saib et al., 2023; Carol et al., 2017; Taufiq et al., 2020). The ability to use digital resources to meet specific information needs (LS7, Mean = 3.76) and a willingness to engage with complex queries (LS8, Mean = 3.74) also received favorable ratings. However, LS5 (Mean = 3.67) demonstrating expertise during digital resource interactions was rated lowest, signaling an area for improvement. This reflects the findings of Shu et al., (2021), who argued that evolving digital environments require continuous training and advanced digital literacy among librarians to remain effective. Standard deviations, ranging from 0.903 to 1.024, suggest moderate variability in user responses. This variation could stem from differences in institutional contexts, levels of librarian training, or user expectations Suarez, (2015) . Despite this, the overall data underscores the significant role that well-developed librarian skills play in enhancing user satisfaction with DRS. These results are consistent with the literature emphasizing that effective communication Cleveland, (2004), practical assistance Liu, (2013), and digital competencies Y. Song et al., (2023) are crucial to meeting users evolving information needs in academic libraries. The bar chart below provides a visual representation for better understanding.

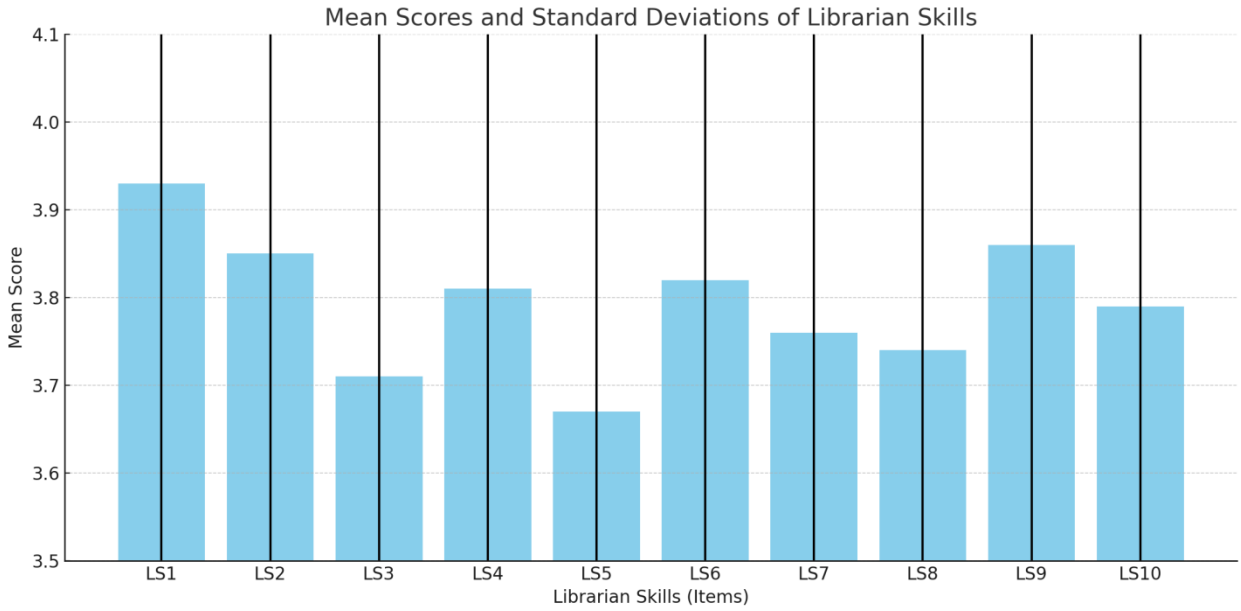

Figure 3: Mean score& SD Of LS

4.2 RO2: TECHNOLOGY COMPETENCE

The analysis of technology competence reveals that respondents generally exhibit strong digital skills, with mean scores ranging from 3.46 to 4.01. The highest-rated item (TC1, mean = 4.01) shows that users are confident in locating information using search engines, reflecting findings by (Omekwu & Echezona, 2009), who noted users' preference for general search engines over specialized library tools. Competence was also high in downloading e-resources (TC5, mean = 3.90), aligning with (Nicholas & White, 2012), who observed user confidence in accessing e-books. Moderate proficiency was observed in navigating library systems (TC3, mean = 3.77), using email for academic communication (TC2, mean = 3.74), and accessing digital resources (TC9 and TC8, mean = 3.75). However, lower scores were

recorded for virtual consultations (TC4, mean = 3.67) and troubleshooting technical issues (TC7, mean = 3.58), suggesting a gap in more advanced digital skills. This supports Egielewa et al., (2022), who emphasized the need for targeted digital literacy programs to enhance user capabilities in virtual communication and technical problem-solving. Similarly, concerns about delayed email response times (TC10, mean = 3.46) reflect Ajani et al., (2023) recommendation to adopt real-time tools like chatbots to improve responsiveness and user satisfaction. While users demonstrate competence in basic digital tasks, there remains a significant need to enhance more advanced skills, including conducting virtual consultations, resolving technical issues, and navigating institutional digital platforms. Bridging these skill gaps will not only empower users but also enhance their overall engagement with digital reference services, as affirmed by existing studies. The accompanying bar chart effectively illustrates and supports the analyzed data.

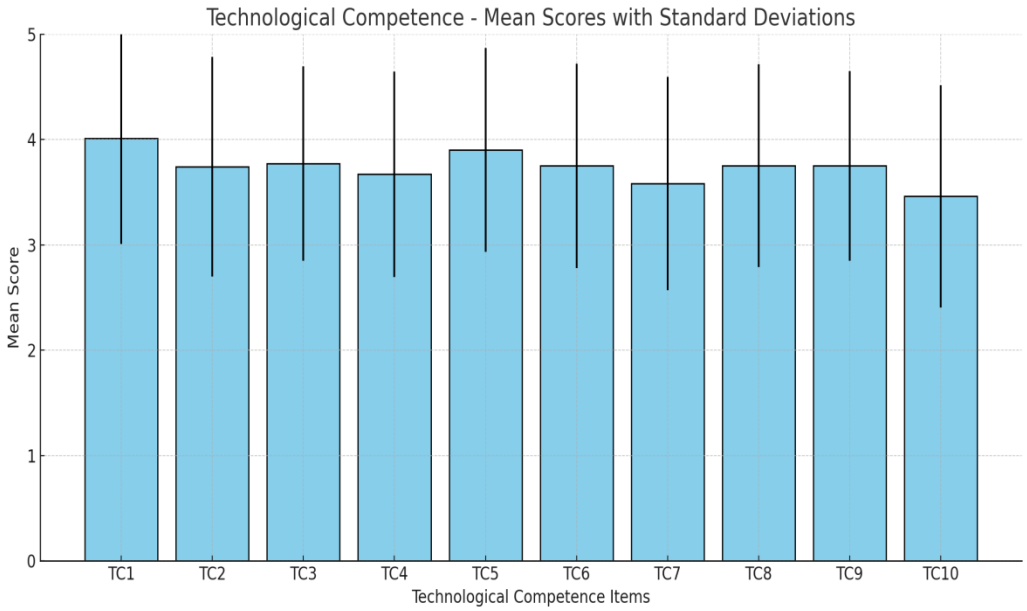

Figure 4: Mean Score & SD of TC

4.3 RO3: Complex Task

The analysis identifies several cognitive and usability challenges faced by users during complex tasks in DRS. The most prominent issue is the lack of intelligent, context-aware search tools (Mean = 3.78), supporting Patrick et al., (2020), who emphasize the need for more interactive and intuitive search systems in academic libraries. Users also expressed frustration over the absence of keyword suggestions (Mean = 3.59) and complex navigation processes (Mean = 3.47), findings that align with Essien et al., (2022), who argue that poorly designed interfaces increase cognitive load and reduce user satisfaction. Technical difficulties such as login issues (Mean = 3.46) and confusion due to unfamiliar academic terminology (Means = 3.30–3.32) were also reported. Problems related to user interface design (Means = 3.24–3.31) further hindered smooth interaction. These issues are consistent with Ajzen & Fishbein, (2010), who contend that emotional discomfort and technical complications deter users from consistently engaging with digital academic services. However, challenges like irrelevant search results (Mean = 3.21) and difficulty with academic vocabulary (Mean = 3.18) were rated lower,

suggesting either improved user skills or reduced frequency of these issues. This trend supports Sadaf & Gezer, (2020), who theorize that experienced users develop coping strategies over time, reducing the impact of initial obstacles. In conclusion, the study highlights the urgent need for DRS platforms to enhance usability through smarter search features, easier navigation, and improved academic language support. These improvements could significantly increase user satisfaction and task success. Meanwhile, the relatively lower concern for certain issues may reflect increasing digital literacy or the success of previous system enhancements.

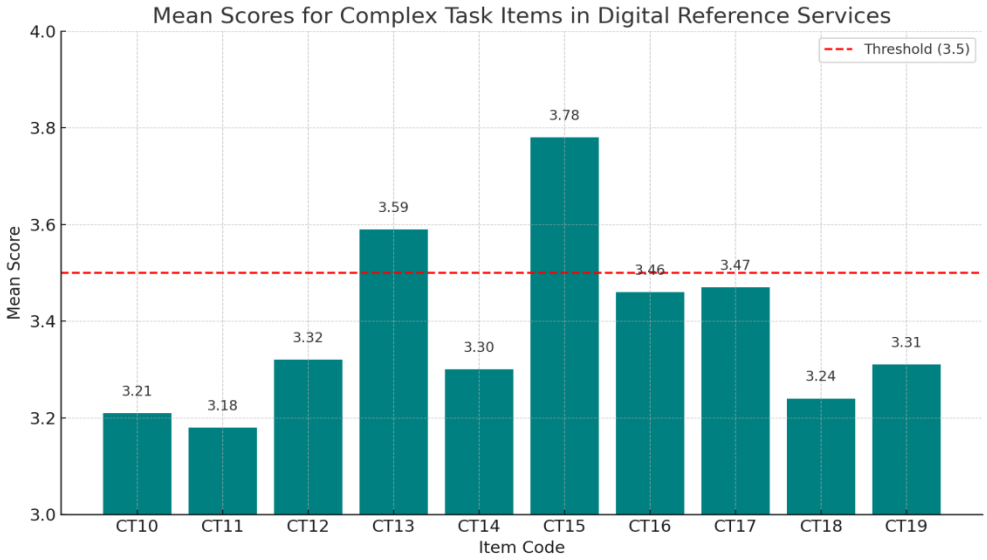

Figure 5: Mean Score & SD for CT

4.4 RO4: User Attitude

The graph illustrates users perceptions of DRS, with all five evaluated items receiving mean scores above 3.70, indicating a generally positive attitude. The highest-rated item (UT1, M = 3.96) reflects users confidence in using DRS for knowledge enhancement, suggesting trust in its reliability and academic support Isa et al., (2025). UT2 and UT3 (M = 3.92) highlight the user friendliness of the platform and users' willingness to participate in virtual training, respectively both essential for reducing technology adoption barriers and fostering continuous learning Isa et al., (2025). UT4 (M = 3.86) shows that users are comfortable interacting with librarians online, emphasizing the importance of human connection in digital environments, even without physical cues. This supports Tenopir et al. (2017), who argued that comfort in online communication significantly influences user satisfaction with library services. Although UT5 (M = 3.76) received the lowest score, it still indicates a positive likelihood of users recommending DRS. The slightly lower score may be linked to usage frequency, peer influence, or limited awareness, aligning with (Caffrey et al., 2022; Liaw & Huang, 2013), who observed that perceptions of digital service usefulness can improve through continuous training and proactive user engagement. The consistency of responses, with standard deviations ranging from 0.930 to 0.995, suggests a shared, favorable perspective among users, enhancing the reliability of the findings and pointing to opportunities for wider adoption and satisfaction Isa et al., (2025).

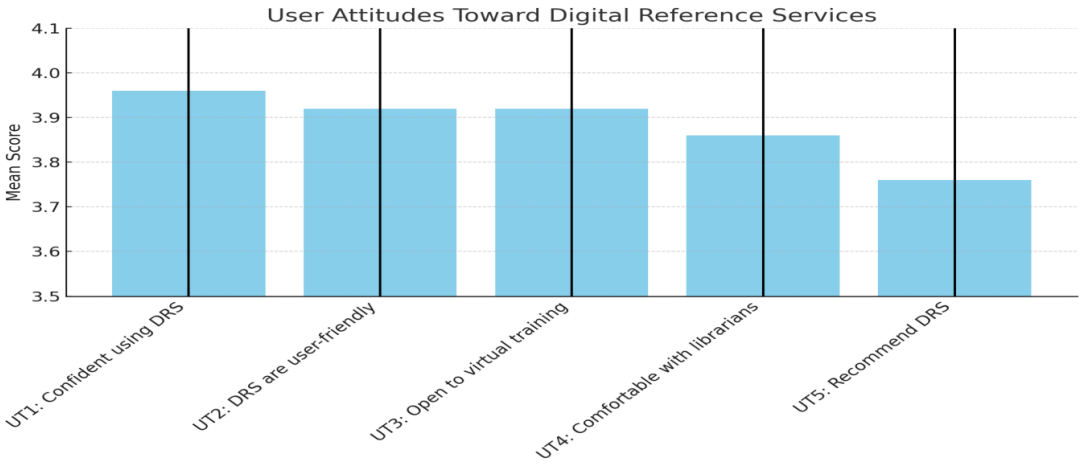

Figure 6: Mean Score & SD of UA

4.5 User Satisfaction

The bar chart illustrates user satisfaction with DRS in federal university libraries in Northwest Nigeria, with mean scores ranging from 3.56 to 3.88, indicating generally positive perceptions. Users expressed the highest satisfaction with the quality of information provided (M = 3.88), followed by the intuitive user interface (M = 3.81) and resource diversity (M = 3.71), consistent with (Soohyung & Namjoo, 2015) and Vasileiou et al., (2012), who emphasized the importance of information quality and system usability in digital library environments. Favorable ratings were also given to service confidentiality (M = 3.76) and librarian-led awareness initiatives (M = 3.77), highlighting the role of trust and promotional efforts, as supported by Taufiq et al. (2020). Moderate satisfaction was observed in response time (M = 3.67) and ICT facility quality (M = 3.69), reflecting the need for improvements in speed and infrastructure, in line with Faniel & Connaway, (2018). The lowest satisfaction scores were for ICT facility quantity (M = 3.56) and internet connectivity (M = 3.59), mirroring findings by Madu et al., (2018) regarding infrastructural challenges in Nigerian university libraries. Standard deviations (0.923–1.128) suggest moderate variability in user responses, likely influenced by disparities in digital literacy, geographic location, or institutional implementation, as also observed by (Mutula & Wamukoya, 2009). Overall, while users are generally satisfied, addressing infrastructure gaps and enhancing ICT support remain critical for improving DRS effectiveness and user satisfaction.

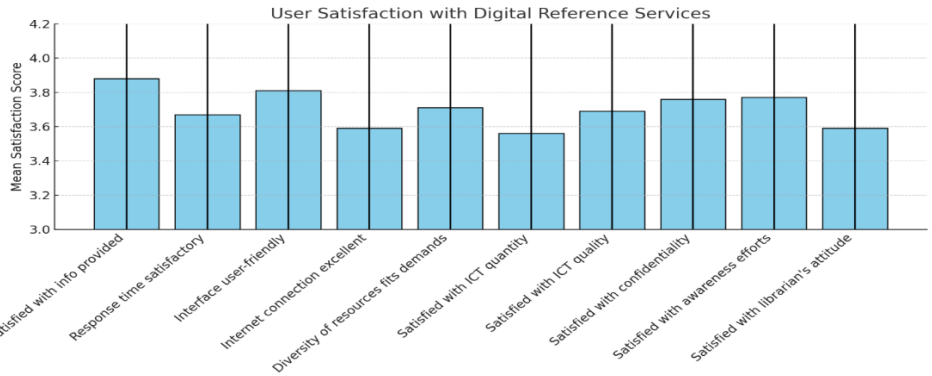

Figure 7: Mean Score & SD of US

5 RECOMMENDATION

I. Improve ICT Infrastructure and Internet Connectivity
Invest in more robust and reliable digital infrastructure to support DRS operations and enhance service speed and reliability.

II. Strengthen librarian digital skills through continuous training
Offer regular workshops and certifications focused on virtual communication tools, database navigation, and AI-assisted services to boost librarian effectiveness.

III. Simplify the DRS User Interface and Enhance Search Features:
Redesign DRS platforms for better usability, including smart keyword suggestions, intuitive navigation, and multilingual support for complex terms.

IV. Promote DRS awareness and user education campaigns
Launch awareness programs, orientations, and digital literacy campaigns to improve student familiarity and confidence in using DRS.

V. Introduce Real-Time Reference Tools. Adopt live chat, AI-powered chatbots, and video consultations to reduce response delays and increase user satisfaction compared to slower email-based systems.

VI. Institutionalize feedback mechanisms regularly collect and analyze user feedback to refine DRS services, aligning with RUSA closure and evaluation standards for quality improvement.

6 CONCLUSION

The study concludes that while DRS in Northwest Nigerian federal university libraries show promising levels of user engagement and satisfaction, several critical areas require improvement. These include upgrading ICT infrastructure, simplifying user interfaces, enhancing librarian competencies, and implementing real-time communication tools. By extending the theory of planned behavior and aligning with RUSA standards, the study offers a robust framework for understanding and enhancing digital reference interactions in academic libraries. Continuous user feedback, targeted training, and infrastructure development are essential to ensure that DRS become more inclusive, efficient, and responsive to user needs. This research contributes to the evolving discourse on digital library services in developing countries and provides practical insights for librarians, policymakers, and academic institutions aiming to strengthen digital reference systems.

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