

Original Article

Optimizing Digital Library Services to Support Teaching and Learning in Higher Education: A Strategic Governance Approach

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Abstract: Digital transformation has redefined university libraries as strategic digital service ecosystems that support teaching, learning, and institutional governance. Despite substantial investments in digital library infrastructure, empirical evidence on users' perceptions of service quality within institutional governance frameworks remains limited, particularly in Indonesian higher education. This study evaluated students' perceptions of digital library service quality within the SMART UNJA institutional governance framework and examined whether these perceptions differed across gender and faculty groups. A quantitative cross-sectional survey was conducted with 303 students selected through stratified random sampling. Data were collected using a validated questionnaire measuring six dimensions of digital library service quality: reliability, responsiveness, assurance, empathy, tangibility, and digital infrastructure. Descriptive statistics, independent-samples *t*-tests, and MANOVA were employed for data analysis. The findings indicate that students generally perceived digital library services positively across all dimensions, with tangibility receiving the highest ratings and empathy the lowest. No statistically significant differences were found across gender or faculty groups, suggesting a consistent service experience among users. These findings provide empirical evidence that the SMART UNJA governance framework supports equitable and user-centered digital library services while highlighting the importance of strengthening personalized service interactions. The study contributes to the growing literature on digital library service quality by offering evidence from an institutional digital governance perspective in higher education.

Keywords :

Academic library services; Digital library; Higher education; Perceived service quality; SMART UNJA.



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INTRODUCTION

The rapid advancement of digital technologies has fundamentally transformed the role of academic libraries in higher education. Once primarily custodial spaces for

managing physical collections, university libraries have evolved into integrated digital knowledge ecosystems that curate, organize, preserve, and provide seamless access to scholarly resources across multiple digital platforms (Kemp, 2014; Cox *et al.*, 2023; Asemi & Asemi, 2024). This transformation has encouraged libraries to shift from collection-centered operations toward user-centered digital service models that support research, collaboration, information literacy, and personalized learning experiences through advanced digital technologies and intelligent information systems (Corrall & Jolly, 2024; Slater *et al.*, 2024). Nevertheless, the expansion of digital library services does not automatically translate into improved learning access or enhanced academic engagement. The educational value of digital libraries depends largely on users' perceptions of service quality, including system reliability, usability, responsiveness, accessibility, and the extent to which digital services align with students' academic needs and expectations (Rafiq *et al.*, 2024; Vassilakaki & Moniarou-Papaconstantinou, 2023; Rahman *et al.*, 2023).

In higher education, digital libraries have evolved beyond their traditional role as repositories of academic information to become integral components of digitally mediated teaching and learning ecosystems. They facilitate students' access to course-related resources, promote independent inquiry, strengthen information literacy, and support flexible learning across diverse temporal and spatial contexts through seamless digital access (Mhlongo *et al.*, 2023; Corrall & Jolly, 2024; Asemi & Asemi, 2024). However, the availability of digital resources should not be interpreted as direct evidence of improved learning outcomes. Rather, digital library services create enabling conditions for academic success, while their educational effectiveness depends on multiple interrelated factors, including service quality, students' digital literacy, instructional integration, user engagement, and the meaningful utilization of available digital resources (Bond *et al.*, 2024; Rafiq *et al.*, 2024; Vassilakaki & Moniarou-Papaconstantinou, 2023). Consequently, evaluating students' perceptions of digital library service quality remains essential for understanding how digital libraries contribute to learning support within contemporary higher education environments.

Further, the movement to digital resources has diversified the landscape of education by expanding opportunities for students and scholars to access academic materials beyond physical library spaces (Peng *et al.*, 2022; Adil *et al.*, 2024). Yet, this expansion remains uneven because students may differ in terms of internet access, digital competence, familiarity with academic databases, and ability to use digital information effectively. This condition shows that digital library development should not be understood only as a matter of providing resources, but also as a matter of ensuring that services are usable, responsive, and aligned with users' academic needs. As libraries are called on to support more than knowledge preservation, institutions are demanding libraries provide more than what can be measured through usage to demonstrate their services are intertwined with the complexities of literacy and academic achievement, and therefore merit continued funding (Collins & Stone, 2014).

From an educational perspective, access to digital library services is closely related to student-centered learning. When students are able to retrieve, evaluate, and use academic materials independently, digital libraries may support information literacy,

critical reading, and self-directed learning practices (Lau & Lim, 2024; Nguyen *et al.*, 2025). However, these outcomes cannot be assumed from access alone. They require usable systems, relevant collections, responsive assistance, and academic guidance that help students transform access into meaningful academic use (Khan & Mahmood, 2024; Ortega & Salinas, 2025). In this sense, the value of digital library services extends beyond resource provision, but it should be examined carefully through specific indicators that are actually measured, such as perceived service quality, user experience, and user satisfaction (Martínez-Caro *et al.*, 2024; Yoon & Kim, 2025).

The rapid adoption of digital technologies has transformed academic libraries from information repositories into strategic partners supporting teaching, research, and institutional development. This transformation accelerated during the COVID-19 pandemic, reinforcing the need for resilient, user-centered digital services that align with institutional priorities and evolving user expectations (Cox *et al.*, 2023; Corral & Jolly, 2024). Contemporary digital libraries are expected to provide reliable, accessible, and intuitive digital environments that enhance user engagement, information access, and academic support through continuous service innovation (Rafiq *et al.*, 2024; Vassilakaki & Moniarou-Papaconstantinou, 2023).

Digital libraries now assist various academic activities, from obtaining current and relevant academic materials to supporting access to digital collections, catalogues, databases, and reference services. Rather than positioning digital libraries as direct producers of learning outcomes, it is more appropriate to view them as academic service systems that may support students' learning-related activities when their services are reliable, usable, and responsive. Moreover, system quality including platform stability, information clarity, and responsive support services has consistently been identified as a central determinant of user satisfaction (Elias & Lubua, 2021; Hasbah *et al.*, 2025). The emerging patterns of use show that user experience is determined by a combination of digital resources and service quality related to accessed, retrieved, and used resources. In order to foster system and service quality, sustainable libraries will be able to fulfil their educational and institutional missions. Yet, more than a technological system is needed for sustainable digital library development (Leventakou, 2024; Paletta & Malheiro, 2021).

As digital services continue to evolve, effective governance has become essential for ensuring that academic libraries align digital transformation with institutional goals, strategic planning, accountability, and equitable access to information resources (Zhou *et al.*, 2024; Farida *et al.*, 2023). In this study, governance refers to the institutional mechanisms through which digital library services are planned, implemented, evaluated, and continuously improved. Governance frameworks that promote collaboration among librarians, faculty, and university leaders strengthen service innovation, responsiveness, and user-centered decision-making, enabling libraries to better support teaching, learning, and research in higher education (Shafique *et al.*, 2024; Meijer & Bolívar, 2024).

Research in the digital competence gaps of the library and the user inconsistency of the support across the digitally underserved developing and middle-income countries has documented the reasons for the digital library initiatives to be ineffective (Bai & Yang, 2025; Nabila *et al.*, 2025). These challenges are also relevant for Indonesian higher

education institutions, where digital transformation may be affected by differences in network stability, digital literacy, resource availability, and students' familiarity with academic information systems. In the absence of adequate governance frameworks, institutions risk inefficiency and failing to achieve desired academic outcomes, even with significant funding. These phenomena are evident with Jambi University's digitally driven transformations. Jambi University, as part of the modernization agenda, adopted the SMART UNJA, focusing on Student Achievement, Management, Agility, Relevance, and Technology.

SMART UNJA seeks to bridge the technological divide in education and research by integrating digital initiatives with institutional priorities and user-centered governance. The framework emphasizes effective digital resource management, service innovation, and continuous support for teaching, learning, and research (Ifenthaler & Schumacher, 2023; Abad-Segura *et al.*, 2023). Despite challenges related to digital infrastructure, literacy, and resource relevance, continuous evaluation remains essential to ensure that digital library services align with institutional goals and users' evolving needs (Lim *et al.*, 2024). Accordingly, this study evaluates students' perceptions of digital library service quality within the SMART UNJA governance framework and discusses its implications for learning support in higher education.

METHOD

This study employed a quantitative descriptive design using a cross-sectional survey to evaluate students' perceptions of digital library service quality at Jambi University. The SMART UNJA framework served as the institutional context rather than as an explanatory variable. Service quality was assessed across six dimensions: reliability, responsiveness, assurance, empathy, tangibility, and infrastructure, adapted from the SERVQUAL framework for the academic library context. These dimensions measured students' perceptions of service dependability, staff responsiveness, user confidence, personalized support, physical and digital facilities, and supporting infrastructure (Teeroovengadum *et al.*, 2022; Nitecki & Davis, 2023).

The study population comprised 34,846 registered users of the Jambi University Library across eight faculties and the postgraduate school. Using stratified random sampling based on faculty affiliation, 303 active library users were proportionally selected to ensure representative participation. Data were collected through a self-administered questionnaire comprising 25 items measured on a four-point Likert scale (1 = strongly disagree to 4 = strongly agree). The instrument was adapted from the SERVQUAL framework to assess six dimensions of digital library service quality: reliability, responsiveness, assurance, empathy, tangibility, and infrastructure. The questionnaire was contextualized to the academic library environment by incorporating indicators related to circulation services, staff assistance, digital resource access, physical facilities, and supporting infrastructure (Teeroovengadum *et al.*, 2022).

Content validity was assessed using expert judgment from three senior faculty members in Library and Information Science. The experts reviewed the relevance, clarity, and appropriateness of the questionnaire items in relation to the service quality dimensions.

and the academic library context. An initial test was performed to assess item clarity and functionality with a sample of 30 students. Internal consistency reliability was assessed using Cronbach's alpha. According to [Cheung *et al.* \(2024\)](#), Cronbach's alpha values above 0.70 are widely used as an indicator of adequate internal consistency reliability, although 0.80 is recommended for most studies. The reliability results should be reported in the final manuscript by presenting the Cronbach's alpha value for the overall questionnaire and, if available, for each service quality dimension.

Collection of data was conducted online through self-administered questionnaires distributed using the university's official communication channels. The respondents submitted their responses voluntarily and anonymously to reduce response bias. No identifying information was collected in the questionnaire, and the responses were used only for research purposes. The data were analysed descriptively to obtain the mean scores for each service quality dimension. Then, independent-samples *t*-tests were performed to examine whether students' perceptions differed by gender. This test was used because gender consisted of two comparison groups. Multivariate Analysis of Variance (MANOVA) was applied to examine whether students' perceptions of the six service quality dimensions differed across faculty groups. MANOVA was selected because the study involved multiple dependent variables, namely the six service quality dimensions, and one categorical grouping variable with more than two groups, namely faculty affiliation.

RESULT AND DISCUSSION

This study evaluated students' perceptions of digital library service quality at Jambi University across six dimensions: reliability, responsiveness, assurance, empathy, tangibility, and infrastructure. Descriptive statistics were used to examine each service quality dimension, while independent-samples *t*-tests and MANOVA assessed whether perceptions differed by gender and faculty. The findings provide an overview of digital library service performance and offer insights into how these services support students' access to academic resources and learning activities within the higher education context.

The library received reliability score of 3.36 on the reliability dimension which shows the dependability of library employees. Participants were considered able to return and check out library materials which indicate the key functioning operational processes of the library. There were no meaningful differences when conducting *t*-tests on reliabilities based on the genders (*t*-test $p=0.427$) and when considering the faculties (MANOVA $p=0.865$). This indicates that students across the surveyed groups reported broadly similar perceptions of service reliability. However, this finding should not be interpreted as direct evidence of equality or equity in service outcomes, because the analysis only examined differences in perceptions. High reliability scores indicate effective service provision due to the presence of functioning systems and competent staff. More than ever, sustained on-site presence will be needed to maintain operational output especially when academic activities are so much heightened. From an educational perspective, reliable library services may provide supportive conditions for students' access to academic resources needed for coursework, assignments, and independent study.

However, the present study does not directly measure the effect of reliability on students' learning outcomes. Such consistency plays an important role in supporting uninterrupted learning processes in higher education.

The descriptive results for each service quality dimension are presented in the following tables. Higher mean scores indicate more positive perceptions of service quality on a four-point Likert scale. The results are reported by dimension to show the specific aspects of library services that were perceived positively by respondents and those that may require further attention. The reliability dimension evaluates students' perceptions of the consistency and dependability of library services, including the efficiency of circulation services, staff competence, adherence to service standards, and access to learning resources. Table 1 presents the descriptive statistics for each reliability indicator to identify aspects of service delivery perceived most positively by students.

Table 1. Reliability dimension

Indicator	Mean	Category
Speed of borrowing/return service	3.36	High
Staff Capacity to Respond the Requests	3.32	High
Adherence to Service Standards	3.28	High
Promptness in Service Delivery	3.31	High
Access to Learning Resources	3.52	Very High

The reliability dimension evaluates students' perceptions of the consistency and dependability of library services. As presented in Table 1, all reliability indicators were rated positively, with mean scores ranging from 3.28 to 3.52, indicating a high level of perceived service reliability. Access to learning resources received the highest mean score ($M = 3.52$), suggesting that students considered the library effective in providing academic resources. Conversely, adherence to service standards obtained the lowest mean ($M = 3.28$), indicating a potential area for improving service consistency. Overall, the findings suggest that students perceived the library as delivering dependable and consistent services that support their academic activities.. This dimension emphasizes prompt service delivery, clear communication, and staff willingness to respond to students' needs. The descriptive results for each responsiveness indicator are presented in Table 2.

Table 2. Responsiveness dimension

Indicator	Mean	Category
Helpful Staff Capacity	3.29	High
Staff Quickness in Reaction to User Requirements	3.31	High
Adherence to Service Standards	3.48	High
Promptness in Service Delivery	3.53	Very High
Access to Learning Resources	3.22	High

Table 2 shows that all responsiveness indicators were evaluated positively, with mean scores ranging from 3.22 to 3.53. The highest score was recorded for library users' adherence to policies ($M = 3.53$), followed by staff clarity in articulating policies ($M = 3.48$), indicating effective communication between library staff and users. The lowest

score was observed for staff calmness when performing services ($M = 3.22$), suggesting that interpersonal interactions during service delivery could be further strengthened. Overall, students perceived library staff as responsive and capable of providing timely assistance. The tangibility dimension assesses students' perceptions of the library's physical and digital environment, including the condition of facilities, organization of collections, and accessibility of digital resources. Table 3 summarizes respondents' evaluations of the library's tangible service attributes.

Table 3. Tangibility dimension

Indicator	Mean	Category
Cleanliness of Libraries	3.60	Very High
Access to digital collections	3.45	High
Strategic Arrangement of the Library Space	3.48	High
Shelves and Collections Being Organized	3.36	High
Availability of Computers	3.34	High

As shown in Table 3, the tangibility dimension received consistently positive evaluations, with mean scores ranging from 3.34 to 3.60. Cleanliness of the library achieved the highest mean ($M = 3.60$), reflecting students' appreciation of a comfortable and well-maintained learning environment. Meanwhile, availability of computers received the lowest score ($M = 3.34$), although it remained within the high category. These findings indicate that both the physical environment and digital facilities generally meet students' expectations and contribute positively to their learning experience. Infrastructure represents the availability and adequacy of supporting facilities that enable effective library services, including reading spaces, internet connectivity, digital systems, and library collections. Table 4 presents students' perceptions of the infrastructure supporting digital library services.

Table 4. Infrastructure dimension

Indicator	Mean	Category
Comfort of Reading Rooms	3.58	Very High
Availability of Spacious Reading Areas	3.56	Very High
Availability of Internet Access	3.41	High
Simplicity of computerized catalogue system	3.37	High
Up-to-Date Collections	3.28	High
Convenience of the Borrowing/Return System	3.39	High

Table 4 indicates that students perceived the library infrastructure positively, with mean scores ranging from 3.28 to 3.58. Comfort of reading rooms recorded the highest mean ($M = 3.58$), followed by availability of spacious reading areas ($M = 3.56$), highlighting the importance of comfortable learning spaces. In contrast, up-to-date collections received the lowest score ($M = 3.28$), suggesting opportunities to further improve the relevance and currency of library resources. Overall, the findings demonstrate that the library provides adequate infrastructure to support students' academic and digital learning needs.

The responsiveness dimension achieved a mean score of 3.33, indicating that students generally perceived library staff as responsive and willing to provide timely assistance. Prompt responses to user requests received positive evaluations, whereas staff patience during service interactions recorded the lowest mean ($M = 3.07$), suggesting opportunities to enhance communication and support when handling more complex user inquiries. Inferential analysis revealed no significant differences in perceived responsiveness across gender (t -test, $p > 0.05$) or faculty groups (MANOVA, $p = 0.608$), indicating consistent service delivery among respondents. These findings suggest that responsive library services provide timely support for students in accessing academic resources and facilitate their engagement with learning activities.

User confidence in employee skills and professionalism that impacts assurance was assessed at a mean of 3.33. Users trusted staff especially in their politeness as well as in their abilities and in the library's supportive atmosphere. Although MANOVA results were marginally significant ($p = 0.084$), they still did not cross the line indicating that there were no significant differences in the demographic variables. Thus the feeling of safety and professionalism is a common characteristic of the user groups. The guarantee of confidence will have to be improved in the comfort of the environment and the closeness of service in order to keep user trust. From a teaching and learning perspective, assurance contributes to students' confidence in utilizing digital library services for academic purposes. A trustworthy and supportive service environment encourages students to engage more actively in accessing scholarly materials and conducting academic work.

User empathy received an average score of 3.25, which indicates an overall mildly positive appraisal of the staff's friendliness, fairness, and communications. Although the score remained within a positive range, empathy was the lowest-rated dimension among the six service quality dimensions. This finding is important because it shows that interpersonal attention, individualized support, and user-sensitive communication may need to be strengthened even when users generally perceive library services positively. Although there were appreciative remarks recognizing the presence of supportive staff, it became clear that greater interpersonal connections were desired. Improving upon emotional intelligence and/or active listening skills may strengthen the user-centred service culture of the library. Statistical analyses did not point to the existence of differences across the demographics which suggest uniform treatment of all user groups. In educational settings, empathetic interactions play an important role in fostering a supportive learning environment. When students feel understood and supported, they are more likely to seek assistance, engage with learning resources, and persist in their academic tasks.

Tangibility had the most encouraging satisfaction score of all the core service dimensions (mean = 3.41). Respondents rated (on average) the cleanliness of the library (3.63), location of the library (3.43), and organization of materials (3.25) positively. Such attributes make the library a place where users can easily engage in studying, and reflect the "Technology" and "Relevance" components of the SMART framework. The absence of significant differences in demographic characteristics also confirms that all users enjoy these tangible benefits equitably. This finding suggests that a well-organized and

comfortable library environment may support students' academic activities by providing favorable service conditions. However, the study does not directly measure students' concentration, study practices, or learning outcomes. Both physical and digital accessibility create conditions that support concentration, academic engagement, and effective study practices.

There were high mean scores for reading spaces (3.47), reading facilities (3.53), and lending system (3.40), giving Infrastructure a mean score of 3.38. These scores suggest both the physical and digital systems are working. The 3.22 score concerning the currency of collections suggests that more digital and print resources must be added and developed. The comparatively lower score for the currency of collections indicates that collection updating remains an important area for service improvement. This is particularly relevant for academic libraries because students and lecturers depend on current resources for coursework, research, and academic inquiry. The data collected did not suggest any considerable demographic differences, indicating that infrastructure was inclusive. The combinations of digital systems that are easy to use and physical spaces that are kept in good order provide a user-friendly experience. Infrastructure must be carefully examined, and gaps must be filled if the further development of learning spaces is to continue. This will provide users with the inclusive and equitable infrastructure which is of value to their diverse needs. From a higher education perspective, strong infrastructure is essential in supporting teaching and learning activities, as it enables students to access digital resources, participate in independent learning, and complete academic tasks efficiently.

The findings demonstrate that the Jambi University Library performs consistently well across all dimensions of service quality, indicating the effectiveness of its service delivery within the SMART UNJA governance framework. High reliability scores suggest that standardized procedures and competent service delivery have strengthened students' confidence in accessing library resources. Similar findings have been reported in previous studies, which emphasize that reliable and well-managed library services enhance users' trust, perceived service quality, and overall effectiveness of academic library operations (Rafiq *et al.*, 2024; Vassilakaki & Moniarou-Papaconstantinou, 2023; Nitecki & Davis, 2023). Consistency in service delivery reduces uncertainty and enables students to access academic resources more efficiently, thereby creating a supportive learning environment. From a higher education perspective, reliable digital library services constitute an important institutional resource that facilitates students' engagement with coursework, research activities, and independent learning while supporting the broader objectives of digital transformation in universities (Bond *et al.*, 2024; Lim *et al.*, 2024).

The findings indicate that the library has established consistent service delivery, reflected in the high reliability scores reported by students. Consistency in operational procedures and service standards enhances users' confidence by providing predictable and dependable access to academic resources, which is a key indicator of service quality in academic libraries (Rafiq *et al.*, 2024; Vassilakaki & Moniarou-Papaconstantinou, 2023). Although the responsiveness dimension was also positively evaluated, comparatively lower ratings for staff patience suggest opportunities to strengthen interpersonal communication and user support during complex service interactions. Previous studies

have shown that responsive and empathetic staff interactions contribute significantly to user engagement, satisfaction, and the effective utilization of digital library services (Kim & Sin, 2024; Shafique *et al.*, 2024). Strengthening communication skills and service procedures, particularly during periods of high user demand, may further enhance service responsiveness while maintaining service quality. In higher education, responsive library services play an important role in facilitating timely access to academic resources, thereby supporting students' learning activities and independent study.

Directly to this end, the dimension of assurance denotes the level of trust users experience towards the staff's skills, professionalism, and to some extent the research which illustrates that confidence in services offered by the library is one of the principal drivers of the users' library satisfaction and the continued utilization of services offered by digital libraries (Rahman *et al.*, 2023). This citation further confirms the edges of the "Student Achievement" and "Relevance" of the pillars of SMART leading to the conclusion that sophisticated guaranteed services and professional staff around the library affects academia and the strategic relevance of the institution positively. The unwavering attitudes towards assurance also validate the positive impact of domain staff training and service protocols have as they tend to create a positive reliable experience which encourages the library's users to sustain the frequent utilization of the library. More to this academia achievement the library has strengthened its position as a facilitator. From an educational standpoint, assurance strengthens students' confidence in engaging with digital library services as part of their academic work. A trustworthy service environment encourages more active use of scholarly resources, which is essential for learning development in higher education.

Furthermore, strengthening the assurance dimension through continuous professional development and systematic service improvement can enhance staff competence, institutional credibility, and users' confidence in library services (Shafique *et al.*, 2024; Teeroovengadum *et al.*, 2022). Well-trained library staff are more likely to deliver accurate, reliable, and trustworthy services, thereby reinforcing users' perceptions of service quality and institutional reliability. Likewise, the findings on empathy suggest that students generally perceived the library as providing fair, respectful, and supportive services. Empathy reflects the extent to which library staff demonstrate personalized attention, effective communication, and responsiveness to individual user needs, all of which contribute to a more inclusive and user-centered service experience (Rafiq *et al.*, 2024; Kim & Sin, 2024).

However, personalized emotional assistance is still needed to enhance the users' experience of inclusion even more. This is consistent with other studies (Rahman & Batubara, 2025; Zakki & Masruri, 2023) the need for emotional responsiveness is essential, as it improves immediate user experience and creates, on more, supportive and inclusive learning space within the long term. In educational environments, empathetic service interactions contribute to a more inclusive and supportive learning experience. When students feel supported, they are more likely to seek help, persist in their studies, and engage more deeply with learning materials.

Closely related, tangibility was the highest scored dimension which speaks to the library's physical environment, spatial comfort, and accessibility that the students highly rated. This result is consistent with other recent studies within the global arena which indicate that the quality of physical space is still a major determiner of user satisfaction; a finding that may not be surprising considering the rapid digital adoption that many libraries are implementing. A multi-university study reported that cleanliness, lighting, comfort of seating, and spatial arrangement exerts a significant influence on students' overall satisfaction, often surpassing the effect of digital resources availability (Gunarathna, 2024). Research done in China also documented that, among other variables, the quality of interior design, comfort of the environment, and the presence of quiet study rooms are some of the strongest predictors of continued engagement and positive user experience towards library services (Peng *et al.*, 2022; Winata *et al.* 2020). This also suggests that the physical and digital environment of the library plays a crucial role in shaping students' learning experiences. A comfortable and accessible environment supports concentration, academic engagement, and effective study practices.

The findings, in their totality, portray that while the digital services that libraries provide are invaluable, the physical space is foundational in the overall positive experience offered to students in terms of academic focus, social learning, and overall well-being. Additionally, the infrastructure results correspond with Gohane & Manikpure (2025), which centralizes the functionality of digital systems to the satisfaction at the top of every hierarchy. Continues collection update retention stands central. Satisfied users expressed that unimpeded system access and ease of use (well-organized and direct) system navigation elevated their participation with the system. These multiple results help to clarify the importance of the synergized physical and digital systems to the systems of the learning practices (education) simple and complex, and this integration of physical and digital learning environments has been shown to enhance flexibility, inclusivity, and engagement across diverse educational settings (Mhlongo *et al.*, 2023; Lestari *et al.*, 2025). When dependable systems are in place, the library will enable continued academic engagement and effectively ease the research processes. In addition, infrastructure performance assessments paired with user experience feedback can inform equitable, strategic investments that maintain the library's ability to meet users' growing educational needs. Also fundamental to that equity is the user's confidence in and consistent engagement with the resources available in reliable digital environments. The feedback received strongly supports a strategic focus on user-deployed design in tandem with other venture-flex resources to assure the user's confidence in and consistent engagement with the available resources. From a teaching and learning perspective, strong infrastructure enables continuous access to academic materials and supports flexible learning practices. This is particularly important in higher education, where students rely heavily on digital resources for coursework, research, and independent study.

In the institutional context of this study, the findings should be interpreted within the SMART UNJA governance framework, which promotes student achievement, effective management, organizational agility, institutional relevance, and digital technology integration. Rather than serving as an explanatory variable, the framework provides the

organizational context in which digital library services are planned, implemented, and continuously improved. Previous studies have emphasized that institutional digital governance plays a crucial role in creating enabling environments for service innovation, resource integration, and user-centered digital transformation in higher education (Meijer & Bolívar, 2024; Ifenthaler & Schumacher, 2023; Abad-Segura *et al.*, 2023). Consistent with this perspective, the present findings indicate that students generally perceived digital library services positively within an institution that actively supports digital innovation and service development. However, these findings should not be interpreted as causal evidence that the SMART UNJA framework directly improved service quality or educational outcomes, as governance variables were not empirically examined in this study. Instead, the results provide contextual evidence that institutional commitment to digital transformation may create favorable conditions for delivering accessible, responsive, and user-centered library services, thereby supporting students' engagement with academic resources in higher education (Fernández *et al.*, 2023; Lu & Lin, 2024). Accordingly, this study extends the literature on digital library service quality by demonstrating how institutional governance can serve as an enabling context for user-centered digital service delivery, while highlighting the importance of distinguishing contextual influence from empirically tested causal relationships (Hanany, 2026; Nugraha & Devi, 2026).

The findings indicate that students consistently perceived digital library services positively across all service quality dimensions, with no significant differences observed across gender or faculty groups. This consistency suggests that library services are delivered in a relatively equitable manner, providing comparable experiences for diverse groups of users. Rather than demonstrating a causal effect of the SMART UNJA framework, the results highlight the importance of an institutional governance environment that encourages standardized service delivery, continuous quality improvement, and user-centered digital services (Ifenthaler & Schumacher, 2023; Meijer & Bolívar, 2024). The consistently positive evaluations across multiple service dimensions also suggest that digital library quality should be managed through an integrated approach, recognizing that reliable infrastructure, responsive services, competent staff, and user-oriented support collectively contribute to a positive service experience (Rafiq *et al.*, 2024; Teeroovengadum *et al.*, 2022). Consequently, continuous monitoring, professional development for library staff, and regular evaluation of users' needs remain essential to sustaining high-quality digital library services in higher education.

Strategic governance, stakeholder engagement, and user-centered service innovation have been widely recognized as key drivers of sustainable digital transformation in academic libraries. Effective governance enables libraries to align digital services with institutional priorities, strengthen organizational accountability, and improve users' learning experiences through continuous service innovation and quality enhancement (McKenzie *et al.*, 2023; Hamad *et al.*, 2023). Within the SMART UNJA context, the positive perceptions reported by students suggest that institutional support for digital transformation provides a favorable environment for delivering accessible, responsive, and user-oriented library services. Although the present study does not establish a causal relationship between governance and service quality, the findings indicate that

governance-oriented digital development can contribute to strengthening library performance and supporting students' access to academic resources.

The findings of this study have important implications for teaching and learning in higher education. The consistently positive evaluation across all service quality dimensions indicates that digital library services function not only as information access systems but also as integral components of the learning environment. Reliable access, responsive services, and adequate infrastructure enable students to engage more effectively with academic materials, complete assignments, and conduct independent study. Digital libraries therefore play a critical role in supporting flexible and student-centered learning. Their ability to provide continuous access to academic resources allows students to extend learning beyond the classroom and engage in self-directed learning processes. This aligns with the increasing demand for digital learning environments in higher education. Furthermore, the findings highlight that strategic governance frameworks such as SMART UNJA can align digital library services with educational goals. By integrating technology, management, and student achievement, governance systems strengthen the role of digital libraries as learning support systems. Therefore, improving digital library services should be viewed not only as a technological development, but also as a strategic investment in enhancing teaching and learning processes. Although this study does not directly measure learning outcomes, the findings suggest that digital library services create enabling conditions for effective learning, particularly by facilitating students' access to academic resources and supporting information-related learning practices (Alam *et al.*, 2026; Rahman *et al.*, 2025). Future research is recommended to explore the relationship between digital library usage, information literacy, and students' academic performance.

CONCLUSION

This study evaluated students' perceptions of digital library service quality at Jambi University within the institutional context of the SMART UNJA framework. The findings indicate that students generally perceived the library services positively across the six service quality dimensions reliability, responsiveness, assurance, empathy, tangibility, and infrastructure. No statistically significant differences were found across gender or faculty groups, suggesting that students shared relatively consistent perceptions of digital library services. Although the study does not establish causal relationships, the findings indicate that reliable, responsive, and accessible digital library services provide supportive conditions for students' access to academic resources and independent learning activities.

This study contributes to the growing literature on digital library service quality by providing empirical evidence from an Indonesian higher education context and by positioning institutional governance as an important contextual factor in digital service development. Rather than demonstrating the direct effects of governance, the findings highlight how an institutional environment that promotes digital innovation and user-centered service delivery may support sustainable library development and enhance students' experiences in accessing academic resources. The study is limited by its focus on students' perceived service quality and does not examine actual library usage, information literacy, or learning outcomes. Future research should investigate the relationships among

digital library utilization, student engagement, information literacy, and academic performance using longitudinal or mixed-method approaches. Expanding the scope to include librarians, academic staff, postgraduate students, and university leaders would also provide a more comprehensive understanding of governance, digital transformation, and service quality in higher education libraries. Continuous evaluation, professional development, and user-centered service innovation remain essential to ensuring that digital library services continue to meet the evolving academic needs of higher education.

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