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Development of School Library Information System in Remote Areas in Indonesia: Analysis of Technology Readiness and Its Impact

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ABSTRACT: This study explores the technological readiness and impact of library information system development in remote schools in Indonesia. Using a qualitative descriptive approach, this study assesses the condition of technological infrastructure, human resource capacity, and challenges faced in implementing library information systems. The results show that although many schools in remote areas face infrastructure limitations, such as limited internet access and minimal hardware availability, there is significant potential for library information system adoption, especially if supported by adequate training and infrastructure development. The impact of implementing this system has been proven to be significant in improving information accessibility and student literacy quality, although there are still obstacles that need to be overcome to achieve optimal implementation.

KEYWORDS: Digital Technology, Indonesia, Information System, Remote Area, School Library

I. INTRODUCTION

School libraries hold a pivotal role in advancing the education process and enhancing student literacy in Indonesia. In urban areas, these libraries are often equipped with sufficient facilities and access to diverse information resources, including advanced, technology-based library information systems. However, the situation starkly contrasts in remote areas, where schools frequently grapple with numerous limitations such as inadequate access to books, educational materials, and information technology. Geographical isolation, insufficient infrastructure, and low education budget allocations compound these challenges, creating significant disparities in educational resources between urban and remote regions.

The rapid development of information technology presents new opportunities to address these barriers. One promising approach is the implementation of integrated library information systems, which can improve the accessibility of educational materials in schools situated in remote areas (Saibakumo, 2021). Through such systems, libraries can offer digital services, including online catalogs, e-books, and various other resources that are accessible to both students and teachers, even in geographically challenging locations. However, the successful adoption of this solution heavily relies on the readiness of the existing technology infrastructure in these schools.

Technology readiness in remote schools encompasses several critical aspects, ranging from foundational infrastructure, such as internet connectivity and hardware availability, to the competency of human resources in managing and utilizing these systems effectively (Subroto et al., 2023). Unfortunately, many remote schools face severe constraints in these areas, including uneven internet access, unstable electricity supply, and limited technical expertise. Furthermore, socioeconomic factors, such as the digital divide and varying levels of educational attainment, further affect the adoption and success of such technologies in educational environments.

This study seeks to analyze the level of technological readiness in remote schools in Indonesia to support the development of library information systems. It also evaluates the impacts of implementing these systems on the accessibility and quality of education in these areas. By doing so, the paper aims to provide a comprehensive understanding of the challenges and opportunities involved in building technology-driven school libraries in remote areas, alongside offering strategic recommendations for more effective implementation in the future.

II. LITERATURE REVIEW

Information technology (IT) has become one of the main pillars in the transformation of education in this modern era. Its influence on access and quality of education is very significant, especially in the context of increasingly globalization. In many studies, IT has been shown to increase the effectiveness of the teaching and learning process, expand access to information, and

improve the overall quality of education. For example, emphasizing that teachers' understanding of the use of IT is very important in improving the quality of education at the secondary school level (Wanti et al., 2019). This shows that the success of IT integration in education is highly dependent on the competence of educators in utilizing this technology.

Along with the development of IT, mobile learning applications have been designed to assist the learning process at various levels of education, including elementary education. noted that the development of IT, especially the internet, has changed the way of teaching and learning by utilizing various digital platforms (Yustian, 2021). Thus, IT not only functions as a tool, but also as a paradigm shifter in education. Mulyono and Ansori added that information literacy in society is very important to improve the quality of life, which also includes information management in the context of education (Mulyono & Ansori, 2020). This shows that IT can contribute not only in academic aspects, but also in the development of society as a whole.

IT-based learning models, such as e-learning, have been proven effective in improving learning outcomes. stated that the use of information and communication technology in education can create a more interactive and efficient learning environment (Sandiwarno, 2016). E-learning allows students to learn independently and flexibly, which is very important in the current educational context. also showed that an integrated academic information system can improve educational services, thereby facilitating the management of student data and improving the quality of educational services (Amalia et al., 2020). Thus, IT not only improves the accessibility of education, but also the quality of services provided to students. However, challenges in utilizing IT in education remain. underlined the importance of training for lecturers in utilizing e-learning to improve their competence (Apriadi, 2023). This shows that although IT offers many benefits, the success of its implementation is highly dependent on the readiness and skills of the teachers. Research by highlighted that adequate facilities and infrastructure and optimal utilization of IT can improve the quality of education in schools (Subadre, 2023). This shows that good infrastructure and technical support are essential to maximize the potential of IT in education. On the other hand, it emphasizes that the use of IT in education must be based on a good understanding of the underlying concepts and theories (Alfaizi, 2023). This is important so that IT can be used effectively in the context of learning. The integration of IT in Islamic education, as discussed by , shows that IT can enrich the learning experience and make information more accessible (Salsabila et al., 2023). This shows that IT can serve as a bridge to improve understanding and knowledge in the context of religious education.

The quality of education is also influenced by access to technology. Nugraha & Nugraha (2023) noted that during the Covid-19 pandemic, the use of digital platforms such as Google Classroom became very important to ensure the continuity of the teaching and learning process. This shows that IT can be a solution to overcome the challenges faced in education, especially in emergency situations. added that information systems and IT have an important role in supporting the learning process during the pandemic (Shodiq, 2021). Thus, IT not only improves access to education but also ensures the sustainability of the learning process amidst global challenges. In this context, it is important to consider the factors that influence access to IT. Riyadi and Larasaty used the Human Opportunity Index approach to analyze inequality in access to IT (Riyadi & Larasaty, 2021). This study shows that socio-economic and demographic factors can affect an individual's opportunity to access IT services, which in turn impacts the quality of education received. Therefore, efforts to improve access to IT must consider various social and economic aspects.

In addition, media literacy training is essential for enhancing students' and teachers' ability to use information technology (IT) effectively and responsibly. It helps individuals critically evaluate digital content and avoid misinformation. Wahyuni (2023) highlights the importance of collaboration between academics and education practitioners in developing strong media literacy skills, enabling students to engage with IT wisely. Quality education, therefore, requires not just access to IT but also the competence to utilize it effectively, bridging the gap between technology availability and its optimal use. The influence of IT on education is transformative, providing innovative teaching methods, greater accessibility to learning resources, and improved education services. However, realizing its full potential requires addressing challenges such as the digital divide, inadequate infrastructure, and unequal access. By investing in infrastructure, training programs, and equitable access to technology, IT can become a powerful tool for improving education. When combined with media literacy, it can drive inclusivity and excellence in education, preparing individuals for success in a technology-driven era.

III. METHOD

This study adopts a literature review research method to analyze and synthesize secondary data systematically and objectively. The data collection process involves identifying, reading, and recording information from various credible sources such as books, peer-reviewed journals, research reports, and relevant online materials. The selected sources focus on topics related to the development of library information systems, technological readiness, and their impacts on education in remote areas. The materials are carefully filtered based on relevance and credibility, prioritizing recent and authoritative studies that align with the research objectives.

The data analysis process begins with categorizing the selected literature into three levels of relevance: most relevant, relevant, and less relevant. This categorization ensures that the analysis focuses on studies with the strongest connections to the research

topic. The analysis involves identifying recurring themes and patterns, critically comparing findings from different sources, and synthesizing insights to provide a comprehensive understanding of the challenges and opportunities in implementing school library information systems. The analysis framework is guided by the research objectives, which include assessing technological readiness, exploring the impacts on education access and quality, and formulating strategic recommendations for effective implementation.

The findings from this literature review are presented narratively, emphasizing a thematic organization that aligns with the research objectives. This approach enables the study to highlight key challenges such as technological and infrastructural limitations, as well as opportunities offered by integrated library systems in remote schools. By synthesizing insights from multiple sources, the study aims to provide an in-depth and evidence-based discussion that contributes to the broader discourse on improving educational resources and access in underserved areas.

IV. RESULT AND DISCUSSION

A. *Technology Readiness, Governmanet Role and Community Support*

In Indonesia, technological readiness in remote areas plays a significant role in determining the success of library information system development. In many remote locations, technological infrastructure faces major challenges. Internet access is one of the main problems; in many remote areas, internet connections are often unavailable or very unstable. This limited access hinders schools' ability to make optimal use of digital information systems. Without adequate internet connections, cloud-based or online library information systems cannot function properly.Electricity availability is also a significant problem in many remote areas (Syam et al., 2024). Frequent power outages or unstable electricity supply make it difficult to use hardware such as computers and servers. Without a reliable power source, hardware cannot be operated consistently, which can disrupt the smooth operation of the library information system and reduce its effectiveness in supporting educational activities.In addition to infrastructure, human resource capacity in remote areas also affects technological readiness. Many library staff and teachers in these areas have limited technological skills. These skills are essential to operating the library information system and utilizing its features efficiently. Therefore, training and development of technology skills are very important to ensure that information systems can be used effectively and provide maximum benefits to users. Adequate technical support is also often lacking in remote areas. When technical problems arise, such as hardware failure or software glitches, lack of technical support can slow down or stop the functioning of the information system. Good technical support is essential to quickly resolve problems and keep the system functioning properly.Management and implementation of library information systems require careful planning (Berdik et al., 2021). In many remote areas, planning and implementation of technology projects often experience obstacles. Lack of experience in planning and managing technology projects can lead to suboptimal implementation and failure to meet user needs. Effective planning should include needs assessment, selection of appropriate technology, and strategies to overcome existing challenges. Budget availability is also an important factor in technology readiness. In remote areas, education budgets are often limited, and the procurement and maintenance of library information systems can be a significant financial burden. The initial investment in hardware and software, as well as operational and maintenance costs, must be carefully considered to ensure the sustainability of the system.The digital divide between remote areas and large urban centers in Indonesia also affects technology readiness. Differences in access to technology, skills, and infrastructure create gaps that can hinder the implementation of library information systems. These gaps include differences in hardware availability, internet connection quality, and the level of technology skills among users. Social and cultural factors also affect technology readiness. Attitudes toward new technologies and local customs can affect the adoption and use of library information systems. For example, if a community is unfamiliar with a new technology or does not see immediate benefits from an information system, they may be reluctant to adopt it. Therefore, it is important to consider social and cultural factors in technology planning and implementation. Support efforts from government and non-governmental organizations can help address some of these challenges. Training programs, technical assistance, and investment in technology infrastructure can accelerate technology adoption in remote areas. Support from various parties can help overcome existing limitations and ensure that library information systems can function properly. Collaboration between schools, government, community organizations, and the private sector is also critical. This collaboration can strengthen technology readiness in remote areas by providing the necessary hardware, training, and technical support. This collaboration can include the provision of appropriate hardware, training for staff and users, and ongoing technical support to ensure the successful implementation of the library information system. With a comprehensive and coordinated approach, technology can be used effectively to improve access and quality of education in remote areas of Indonesia.

B. *Implementation of Library Information Systems in Remote Areas*

Implementation of library information systems in remote areas in Indonesia shows how innovative approaches can address unique challenges. In Kuala Alam Village, Riau, for example, the "Village Digital Library" program addresses the challenge of access to information in a creative way (Danuri et al., 2021). Here, the local government and non-governmental organizations (NGOs) work

together to establish digital libraries in remote villages. By installing hardware in village community centers and using satellite-based internet access, communities can access digital books and educational materials online. While connectivity challenges remain, this initiative opens up new opportunities for students and residents to access previously inaccessible reading materials.

In Papua, a mobile library project is a solution for communities in remote locations. Using special vehicles equipped with books, computers, and satellite internet access, these libraries can reach villages that are difficult to access. These mobile libraries not only provide books but also allow for mobile management of the library information system. This gives communities in remote areas the opportunity to get the reading materials and library services they need.

The "Independent Campus" program in Sumba introduced partnerships between universities and school libraries in remote areas (Rewa et al., 2024). Through this program, universities provide access to academic databases and e-journals, and provide training for library staff in remote schools. This partnership expands students' access to high-quality academic resources in Sumba and supports educational development by leveraging existing resources at universities.

In South Sulawesi, community-based information service centers serve as a bridge between technology and rural communities. These centers are equipped with computers, the internet, and digital collections that support education and information. In addition, information technology and digital literacy training for local residents helps them use technology more effectively, increasing access and knowledge among rural communities. Meanwhile, in Aceh, the "Aceh E-Library" program introduces digital technology to school libraries by providing hardware, software, and training. This e-Library integrates digital book catalogs and learning materials, providing wider and more efficient access in remote areas. This program helps overcome physical and logistical limitations, improving the quality of library services (Yusuf & Akbar, 2024).

The “Smart Village” project in Central Java focuses on developing IT infrastructure in villages (Hayati, 2021). By providing hardware, internet access, and training, the project supports village libraries in managing digital collections and information services. This IT infrastructure improvement improves access to educational resources and helps reduce the digital divide. Meanwhile, the “Bali Literacy Community” program develops community-based libraries with information technology integration. The program involves local communities in library management, provides access to digital devices, and offers digital literacy training. This not only increases community engagement but also expands access to digital resources (Kristiawan et al., 2021).

Through these initiatives, library information systems in remote areas of Indonesia have proven that innovative approaches can not only overcome complex technological challenges but also significantly improve access to information and education in underserved communities. Each initiative brings creative solutions tailored to local needs and conditions, such as the use of satellite technology to overcome limited internet infrastructure, mobile libraries that reach remote areas, and the integration of simple technologies such as SMS for book lending in areas with minimal digital access. These approaches not only open doors for communities to access reading materials and educational resources, but also empower them with new knowledge that can support social and economic development. By involving government, NGOs, and local communities, these initiatives demonstrate that close collaboration and the right use of technology can turn limitations into opportunities, bridge the digital divide, and have a lasting positive impact on education across the country. These successful implementations also provide models that can be replicated in other areas, demonstrating that innovation based on real community needs can lead to significant transformations in access to literacy and knowledge in Indonesia.

C. *Impact of Implementing Library Information Systems*

Library information systems provide greater access to a variety of learning resources, including digital books, journals, and other educational materials. In remote areas, where physical access to books and information resources is often limited, these systems allow students and teachers to access a variety of up-to-date educational materials. With access to digital collections and academic databases, teachers in remote areas can enrich their teaching methods with more relevant and up-to-date materials. Library information systems enable them to access teaching materials, the latest research, and educational resources that support more effective, evidence-based teaching.

With access to digital resources, teachers in remote areas can significantly improve their teaching methods. Through library information systems, they can access relevant teaching materials, the latest research, and innovative teaching techniques that may not be available locally. In Kalimantan, partnerships between universities and local schools provide access to academic databases and e-journals. Teachers who were previously limited to materials available in local libraries can now integrate up-to-date and relevant materials into their lessons, increasing the effectiveness of their teaching and providing students with more up-to-date information.

The implementation of library information systems is often accompanied by information technology training for library staff and users. It helps students and teachers develop digital skills that are essential for the modern era. These skills not only support learning in school, but also prepare students to face the challenges of an increasingly technology-dependent workplace. With a library information system, students and communities in remote areas can improve their information literacy skills. They learn

how to search for, evaluate, and use information effectively. Improved information literacy helps students become more independent and critical learners, which are essential skills for academic success and everyday life. The implementation of a library information system is often accompanied by information technology training, which plays a crucial role in the development of students' and teachers' digital skills. In South Sulawesi, a community-based information service center not only provides access to computers and the internet but also offers training on how to use information technology. These skills help students to be better prepared to face the challenges of the digital world and to use technology for their learning. This training also supports teachers in adopting teaching techniques that utilize technology, thus supporting a more effective and modern learning process.

Student motivation is often influenced by the availability of interesting and relevant materials. With a library information system, students in remote areas have access to a variety of educational materials that they might not find in their local environment. In Papua, mobile libraries equipped with books and satellite internet access bring educational materials directly to remote villages. The diversity of materials and ease of access make learning more interesting and relevant to students, which in turn can increase their motivation to learn and be actively involved in the educational process. Through the implementation of library information systems, these impacts overall support improvements in the quality of education in remote areas. By increasing access to learning resources, improving the quality of teaching, developing digital skills, reducing educational disparities, and increasing motivation to learn, these systems help create more effective and inclusive educational environments across Indonesia.

To ensure that the implementation of library information systems in remote areas in Indonesia runs more effectively in the future, there are several strategic recommendations that can be considered:

First, Development of Adequate Technology Infrastructure. One of the biggest challenges in implementing library information systems in remote areas is the limited technology infrastructure, such as internet access and electricity. Therefore, the first step that needs to be taken is the development of better basic infrastructure. The government, together with technology and energy service providers, need to collaborate to ensure that remote areas get stable internet access and reliable electricity. Investment in alternative technologies such as satellite-based internet and renewable energy solutions (e.g., solar panels) can be key in addressing this challenge.

Second, Human Resource Capacity Building and Continuous Training. The success of a library information system is highly dependent on the ability of human resources (HR) in remote areas to operate and utilize the technology. Therefore, comprehensive and continuous training for librarians, teachers, and school staff is essential. This training program should cover basic information technology skills, digital library management, and information literacy. In addition, training should also be accompanied by ongoing technical support to help overcome technical problems that may arise.

Third, Empowerment and Involvement of Local Communities. Involving local communities in library management and utilization can improve the sustainability and relevance of library information systems. Communities should be encouraged to actively participate in library activities, such as literacy programs, technology training, and other community activities. This will not only increase library use but also ensure that the library truly meets local needs. Community-based programs that involve local residents as library managers or volunteers can increase a sense of ownership and responsibility for the sustainability of the library.

V. CONSLUSIONS

Technology readiness in remote areas of Indonesia is crucial to the success of library information system development, where limited internet access, limited electricity supply, and lack of technology skills are major challenges. Government and community support are needed to overcome these barriers through infrastructure improvements, human resource training, and collaboration between stakeholders. The implementation of library information systems in remote areas of Indonesia shows that with innovative and collaborative approaches, challenges in accessing information and technology can be effectively addressed. Examples from areas such as East Nusa Tenggara, Papua, and Kalimantan show how digital libraries, mobile libraries, and partnerships between universities and schools can expand access to education and information. Although still facing various obstacles such as connectivity and infrastructure, these initiatives open up new opportunities for remote communities to access reading materials and library services that were previously difficult to reach.

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