

Implementation of the North Sumatra Drone Application by the North Sumatra Provincial Library and Archives Service in Digital Communication to Improve Library Data in North Sumatra

Nur'aini¹, Iskandar Zulkarnain², Humaizi³, Suwardi Lubis⁴
¹²³⁴Faculty of Social and Political Sciences, Universitas Sumatera Utara

Corresponding Author: nuraini@usu.ac.id, iskandar.zulkarnain@usu.ac.id

Abstract

This study aims to determine how the implementation of the Drone North Sumatra application in digital communication improves library data in the North Sumatra region. In the context of digitalization, this application offers an innovative solution for the collection and distribution of library information, which is crucial for improving data accessibility and accuracy. This research method uses a qualitative descriptive approach. Data collection in this study involved interviews, documentation, and literature review. Data validity was verified using theory and source triangulation. The results indicate that this application has a positive impact on improving data accuracy, increasing information accessibility, and increasing communication efficiency between managers and the public. The implementation of the Drone Sumut application has great potential to strengthen the role of libraries in supporting library data improvement and information dissemination in the North Sumatra region. This study recommends that policymakers conduct training for library managers in the region on the use of the Drone North Sumatra application to support library services and regularly update the accuracy of library collection data.

Keywords: Digital Application, Digital Communication, Drone Application

INTRODUCTION

Digital transformation has become driver main innovation in various sectors, including libraries and archives. Institutions This now faced with demands For No only become warehouse collection physical, but rather center dynamic, adaptive, and connected knowledge digitally (Lankes, 2016). In the context of In this, digital communication holds role important as bridge for disseminate information, facilitating interaction with librarians, as well as manage data assets in more efficient and transparent. North Sumatra Province, with characteristics its vast and diverse geography, facing challenge unique in effort documenting, mapping, and accessing physical data from various type library, start from library general district / city, library college high, library village, as well as archives scattered throughout the region.

Condition data collection libraries in North Sumatra are still dominated by manual methods, which results in data not being managed with good, difficulty in validation and coordination, as well as absence system centralized capable presenting data in a *real-time* (Library and Archives Service North Sumatra

Province, 2025). Problems This in a way direct impact on invalid data quality, slow and inaccurate processes efficient, coordination between weak libraries, as well limited access to public data. The situation This hampering the Library and Archives Service North Sumatra Province in formulate appropriate policies targets and provide optimal service to society. Answer challenge said, the North Sumatra Drone Application made as solution innovative for optimize system information data collection libraries in North Sumatra. Application This designed as a " Single Library Data Directory " which will presenting data in a complete and credible, equipped with photos, tabulations, and graphs.

Library data collection in North Sumatra currently faces several significant obstacles that hamper the development of the region's literacy sector. One of the main problems is low data quality and validity, where the manual and poorly managed data collection process results in information that is not *real-time* and often inaccurate. This manual data collection process is also inefficient and slow, not only consuming significant time and resources but also prolonging the data update cycle, so that available information is often outdated by the time it is needed. As a result, coordination between libraries at various levels, from provincial, district/city, sub-district, to village, is weak due to the lack of a centralized, integrated information system. Finally, limited access to public data makes it difficult for the public to obtain comprehensive and *up-to-date library information*. This directly reduces transparency, hinders public participation, and limits efforts to promote literacy and maximize the use of library resources by the wider community.

This study aims to determine the implementation of the North Sumatra Drone Application by the North Sumatra Provincial Library and Archives Service in digital communication to improve library data in North Sumatra. Based on this objective, this study will examine the concept and implementation of the North Sumatra Drone Application as an efficient, transparent, and supportive library data collection information system for improving literacy in North Sumatra.

THEORETICAL FRAMEWORK

Libraries, which have evolved over centuries, are now in the midst of a digital transformation that fundamentally alters their essence and function. The modern concept of libraries transcends their traditional role as physical book repositories. Libraries have transformed into dynamic centers of information, community, and learning (Lankes, 2016). This transformation requires libraries to be more adaptive, inclusive, and connected to the digital ecosystem. Digitization in the library context includes the integration of physical collections into digital formats, providing online access to information resources, and implementing technology-based library management systems (Chowdhury, 2020). Furthermore, digitization also means managing library data digitally, from membership data and circulation to physical asset inventory. Borgman (2017) emphasized the importance of a robust information infrastructure to support access and preservation of digital knowledge. In the context of the North Sumatra Drone Application, library data digitization encompasses not only collections but also location data, physical conditions, visitor statistics, and the types of services offered. Accurate and well-

managed data is the foundation for data-driven decision making, which is essential for effective library development (Keen, 2021).

Digital communication is exchange information through use digital technology and the Internet. In the modern era, digital communication has become interaction social, economic, and political. Castells (2020) in the theory about public network, depicting the way in which technology information and communication from a certain era form structure social and patterns interaction. Digital communication offers distribution fast and extensive information, facilitating two-way communication, and support collaboration between various individuals and organizations without looking at geographical boundaries. Van Dijck (2023) noted that digital platforms are not only channel communication but also the way for organize, organize, and understand information.

On the North Sumatra Drone Application In this case, digital communication has two dimensions main: (1) Communication Internal organization: coordination and exchange Library and Archives Service information North Sumatra Province with library at the level district / city, sub-district, and village. Hierarchy access users (Super Admin, Provincial Admin, Regency /City Admin, Sub-district /Village Admin) are designed for overcome weak coordination between library. (2) Increase transparency and public access to library information. By presenting complete and credible data, this application functions as a communication bridge between the government and the public, in line with the aspirations of transparency and availability of public services "Asta Cita".

Bertot, Jaeger, and Grimes (2020) emphasize that digital communication is crucial for governments to increase transparency, accountability, and efficiency in the provision of public services. By using digital platforms, governments can provide easily accessible information, facilitate citizen participation, and respond more quickly to public needs. The "Sumut Drone Application," designed as a "One Library Data Directory," with data presented in visualizations and statistics, is a concrete example of the government's efforts in digital communication to achieve this. It is expected to address the problem of lack of access to public data. Unmanned Aerial Vehicle (UAV) or drone technology has developed into a multifunctional tool used in various fields such as surveying, mapping, agriculture, logistics, and documentation (Floreano & Wood, 2022; Watts et al., 2022).

One of the most significant applications of drones is collecting geospatial and visual data from air with resolution high. Colomina and Molina (2014), stated that about UAV photogrammetry, explained that drones can used for produce map ortho photos, digital elevation models (DEMs), and 3D representations of object or area with accuracy tall. Sensors installed on drones, such as RGB, multi-spectral, or other cameras thermal allows collection various types of data that can be integrated to in System Information Geographic Information System (GIS). Evans and Campos (2020) describe how drones can used in journalism for fast and efficient visual data collection. The same principle can applied to documentation and communication at the level library and archiving system information is part from organization for collection, storage, processing and distribution information in support management, and decision making decisions (Laudon & Laudon, 2016). In context this, system information designed for overcome problem manual and fragmented

data collection in libraries. The system integrated information make data interconnected connected and managed in a way centralized.

Effective data management is crucial to ensuring the integrity, security, and availability of information. The Single Source of Truth (SSOT) or Single Data concept is a data architecture principle in which all data originates from a single, consistent, and accurate authoritative source (Inmon, 2005). The implementation of SSOT in the North Sumatra Drone Application means that all information about libraries in North Sumatra, including visual data from drones, will be managed in a single, centralized system. With SSOT, every stakeholder will access the same version of the data, ensuring consistency and facilitating "Real-Time and Credible Data Utilization" for "Data-Driven Policymaking." Keen (2021) emphasizes that in a competitive business and government environment, data-driven decision-making is key to achieving efficiency and effectiveness.

In information systems involving multiple users with different roles and responsibilities, user access management is critical for security, data integrity, and operational efficiency. Role-Based Access Control (RBAC) is a model in which access rights to human resources are granted based on the roles held by users within the organization (Sandhu et al., 2022). RBAC simplifies access rights management, improves security, and reduces the risk of errors.

The implementation of the North Sumatra Drone Application technological innovation is not without challenges. A theoretical perspective can help understand and formulate mitigation strategies. Limited digital infrastructure, particularly internet connectivity in remote areas, is a real obstacle. Theoretically, this relates to the concept of the digital divide (Norris, 2001), which refers to the gap in access and utilization of information technology between community groups or regions. Addressing this requires infrastructure investment and strategies that consider accessibility in offline or low-bandwidth areas. Inadequate Human Resources (HR) readiness is a barrier to technology adoption. Rogers' (2003) Diffusion of Innovation Theory explains that the adoption of new technology is influenced by the characteristics of the innovation itself (relative advantage, compatibility, complexity, trialability, observability). Buchanan (2019) emphasizes the importance of organizational literacy for librarians to adapt to technological change. The process of migrating legacy, manual or non-standardized data to a new system is a complex task. Theoretically, this involves the principles of data management and data quality (Wang & Strong, 2022), where data integrity, accuracy, and consistency must be maintained throughout the transfer process. The introduction of new systems often triggers resistance to change from users accustomed to legacy methods. Kotter (2022) states the importance of effective communication and creating a clear vision to overcome resistance. Effective socialization and coordination, as well as demonstrating the tangible benefits of the application, are crucial mitigation strategies.

METHODOLOGY

Study This use approach qualitative with type descriptive approach qualitative chosen Because allows in -depth exploration to context study this. Research

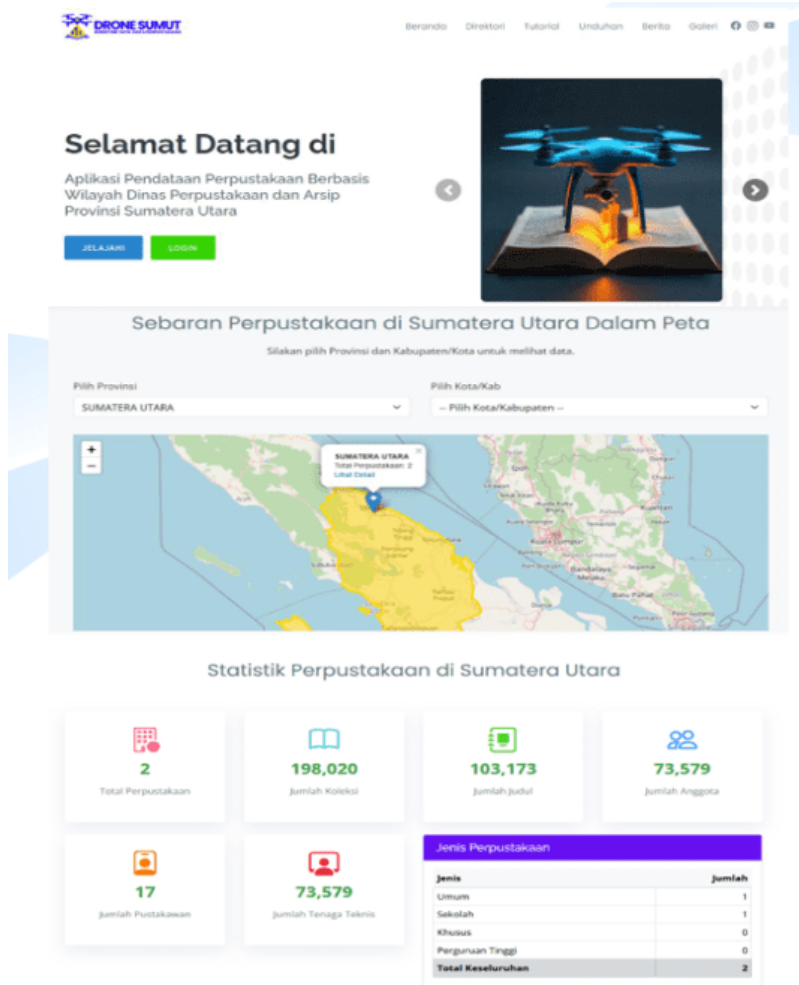
descriptive aim for describe in a way systematic facts and characteristics object or research subjects in a way accurate, without test hypothesis or connection cause and effect (Creswell, 2014). Research This using two types comprehensive data sources. First, primary data was obtained in a way direct from interview with employee Library and Archives Service library North Sumatra Province management drone applications. Second, secondary data originate from studies literature like books, articles journal scientific international reputable, documentation collected field. Literature This used for build framework contextualizing theory findings from primary data. Data collection methods, research This use interviews, studies documentation and studies literature. Study methods documentation in a way special applied to two primary documents that have been mentioned. While that, study literature done with search systematic for find sources relevant theoretical analysis of research data This using two techniques. First, analysis content used for explore implementation North Sumatra drone application. Second, analysis descriptive used for describe findings in a way narrative and interpretive. Triangulation of research data This use triangulation theory and triangulation source.

RESULTS AND DISCUSSION

Implementation North Sumatra Drone Application

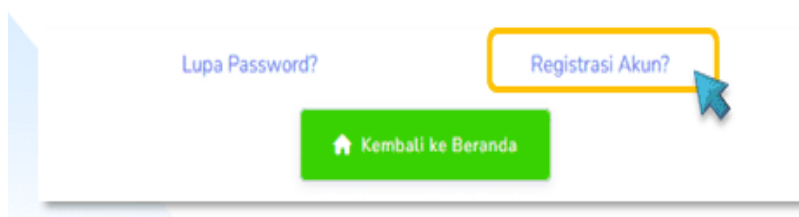
North Sumatra Drone Application No only as tool data collection just but also functions as a digital communication platform that aims to increase public accessibility to library information, providing credible and reliable data. The following is the implementation North Sumatra Drone Application as following:

1. To be able to access the Drone Sumut application for library data collection in North Sumatra, please ensure that you have entered the application's Home Page as shown in the image below.

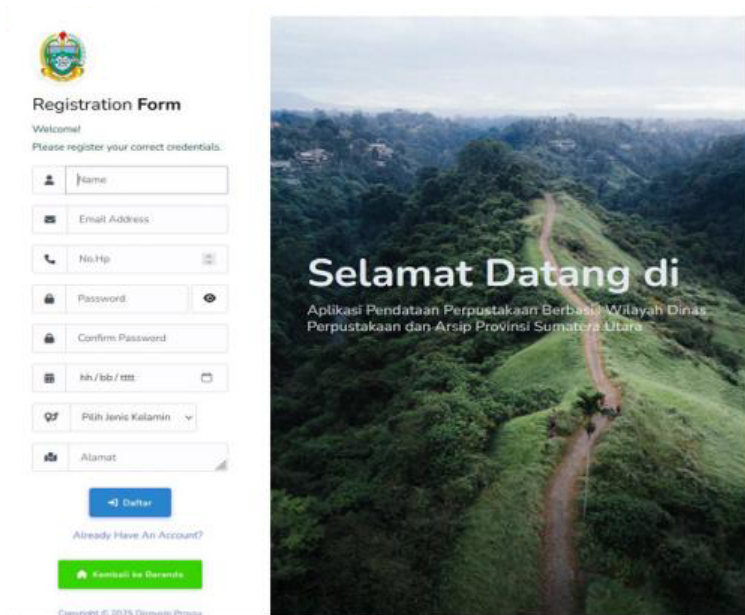


Picture 1: Home Page

2. Click the 'Register / Sign Up' Account button as shown below

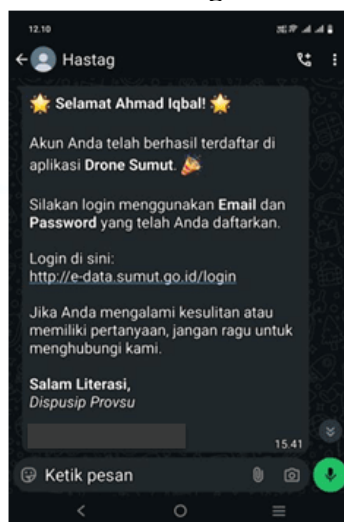


Picture 2: View Registration



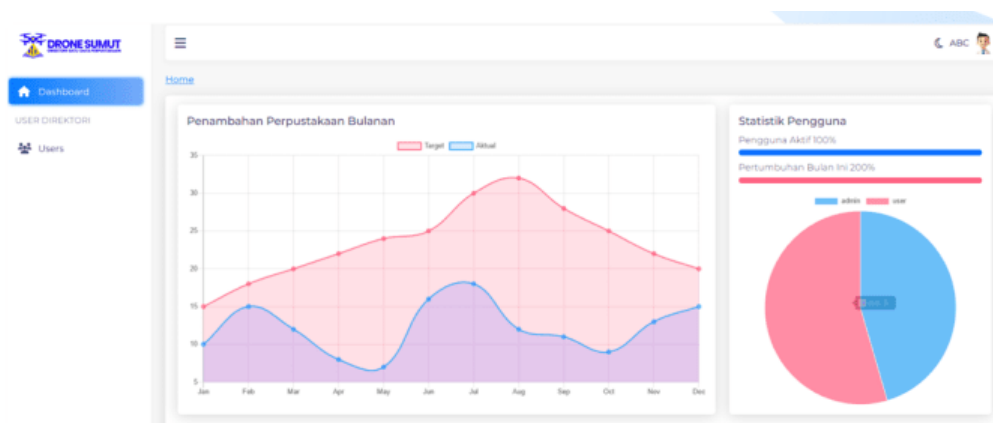
Picture 3: Registration Form

To register, please enter your details in the fields on the "Registration Form" page, including your name, email address, mobile phone number, password, password confirmation, date of birth, gender, and address. Once you've filled in the information, click the "Register" button, which will display a notification sent to your WhatsApp and email, as shown in the image below.



Picture 4: Whatsapp Confirmation

3. After completing the registration, the user will immediately enter the user home page, which will appear as follows:



Picture 5: User Page

The access granted is for user access to display library data only. There are several types of user registration options: Regular Users, Provincial Admins, Regency/City Admins, and Sub-district Admins. Access for users other than regular users requires confirmation from the Provincial Admin.

4. After successful registration and account verification, the user will automatically be taken to the 'Login Page' as shown below:

Picture 6: Login Page

Log in by entering your registered email address and password, then click the 'Login' button. If the information entered is correct, you will be taken to the user dashboard.

5. To enter data, ensure the library you manage is not already registered in the application. Select "Add Data" to add the library's data. Then, enter the library's data, including general information, location, contact information, additional information, and library statistics, correctly and completely, as shown below.

Picture 7: Add New Library

For general library information, fill in data regarding the name of the library, NPP, type of library, subtype, year of establishment and status.

Picture 8: Add Library Location

For library location data, fill in the data by entering the Address, Province, Regency/City, Sub-district, Village/District and Postal Code information.

Picture 9: Add Contact and Additional Library Information

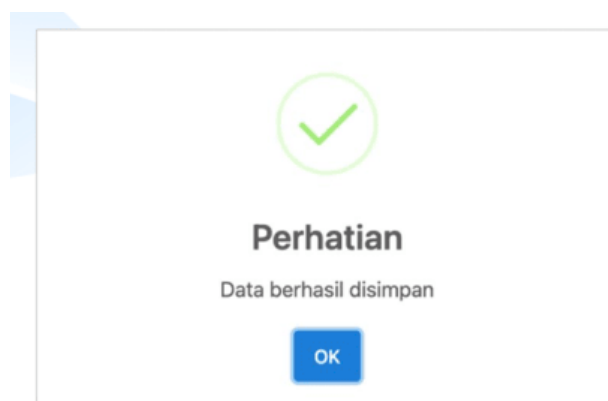
For contact data and library information, please fill in the data by entering the telephone number, email, website and service hours*

Picture 10: Library Statistics

For library statistics, enter the number of collections, titles, members, librarians, technical staff, and library photos. Once all fields have been filled in, click the Save Data button.

Picture 11: Save Data

Save the data by clicking the “Save Data” button located at the bottom of the last scroll of data input, then a notification will appear as follows.



Picture 12: Successful Data Notification Saved

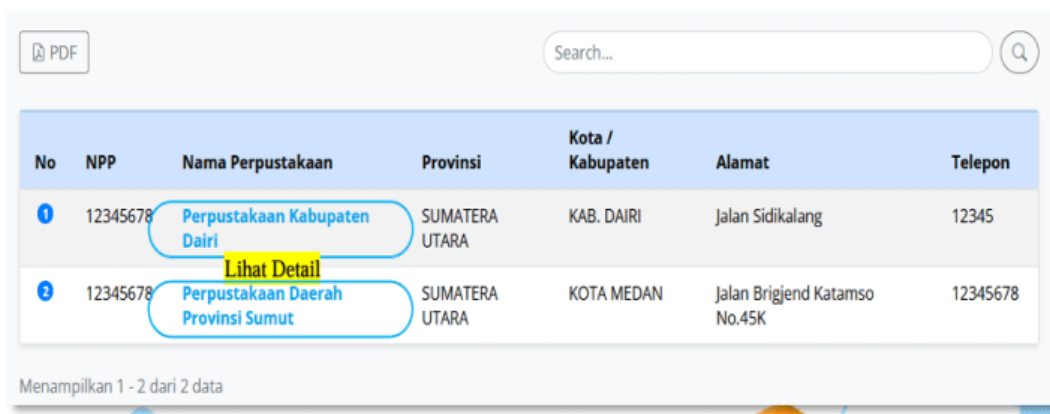
6. Furthermore after the library data has been entered by the user saved , Users can search for library data by accessing the search page and using the library data search menu, as in the following image .



Picture 13: Library Search /Filter Page

Users can search using 2 methods:

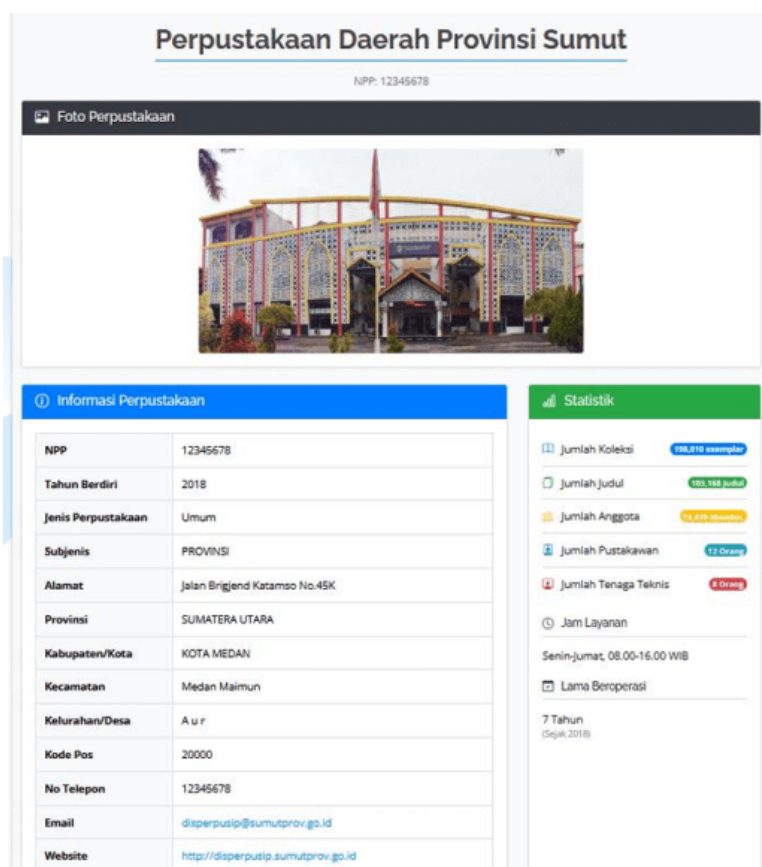
1. The user enters a keyword then clicks the magnifying glass button, then the search will be processed.
2. Users perform searches by filtering data based on location and library type, the instructions are as follows:
 - a. Select By Library Type
 - b. Select by Province (Library Location)
 - c. Select by District (Library Location)
 - d. Select by Library SubType
 - e. Select by City / Regency (Library Location)
 - f. Select by Sub-district / Village (Library Location)



Picture 14: Search Page

After filtering the search and then clicking the filter button, the data display will be found/existing, then the general data of the library being searched for will appear as shown in Picture 14.

7. Next, the selected library data will appear as shown in the following image with various information that has been entered into the system.



Picture 15: Detailed Library Data Search

Based on the description above that North Sumatra Drone Application is an integrative digital platform web -based designed as " One Library Data Directory ". Application This set data authority based on region, application This create channel structured digital communication and collaboration. This in line with Castells' (2020) theory on public network, where technology information form repeat pattern coordination and flow information in something organization, although in context government area.

North Sumatra Drone Application input data manually systematic and comprehensive. The data obtained includes: general data (name, NPP, and type), detailed location data (by date) with level sub-district/village), contact data, statistical data (collections, titles, members, librarians), and description and photos library. This data entry aim for overcome problem Previous data No is real-time and invalid and data collection that is still ongoing is manual. Standardization of data input is step first of all, it is important to achieve a single source of truth (Inmon, 2022), which is the starting point of the data.

This application has a flexible search menu that can use keywords or structured filters, for example by library type and location: province, district, sub-district, village/sub-district/village. By providing flexible search options, Drone Sumut able to solve the problem of public data accessibility difficulties. By simplifying access for users (the public) to search and visualize data, this application serves as a digital communication tool to increase transparency and public accountability, as stated by Bertot, Jaeger, & Grimes (2020). the role of ICT in push culture

transparency government. This demonstrates an awareness of the complexities surrounding organizational change in the adoption of new technologies, in line with Rogers' (2023) Diffusion of Innovation theory and Kotter's (2021) change management principles. Successful implementation depends not only on its technical attributes but also on the relevant organizational literacy in adopting it (Buchanan, 2019).

Overcome Problem Data Quality and Building Single Source of Truth

The main problem is that data is not real-time, valid, and fragmented. The Drone Sumut application offers a solution by building a system with a centralized platform (single source of truth) that can be used for data input, storage, and access. The standardized input process by administrators at every level (reducing manual errors) and accompanied by a faster update cycle, allows for greater data neutrality and accuracy. This single source of truth concept is a fundamental prerequisite for data-driven decision-making (Keen, 2021). Centralized data on the collections, membership, and physical condition of all libraries, visualized graphically, empowers the Library Service to conduct more precise needs analysis to support targeted policy formulation.

The availability of search features and access to data visualization by ordinary users (the public) shifts the paradigm from closed data to open data. This offers advantages, for example, for a researcher or student wanting to map the distribution of community libraries in Karo Regency, they can easily use the provided filters for location and type of library to obtain a fairly comprehensive list along with contact information. access This No only fulfil right public on information but also has the potential increase utilization service library, which is expected can support improvement literacy.

Challenge Sustainability and Recommendations

Challenge sustainability and recommendations from study This can seen as following :

1. Infrastructure and the Digital Divide: How application reach area with limited internet connectivity. Proposed mitigation strategies like budget need strengthened with plan technical, for example feature *offline mode* or use more mobile applications light.
2. Capacity Human Resources: Training should not only focus on how to operate the application, but also on the importance of accurate data and a data-driven work culture. As stated by Buchanan (2019), digital literacy for librarians and regional administrators become key.
3. Data Migration and Integrity: The process of migrating old data to system new is point critical at risk produce *single source of error* if no handled with good validation . Formation team validation is the right step.

CONCLUSION

The creation of the Drone Sumut application from the North Sumatra Provincial Library and Archives Service to overcome the problem of library data collection which is still done manually and unsystematically. In the initial development stage, this application is still in the planning stage as a tool to record and automatically

present library data in digital form and map libraries in the North Sumatra Region which can be accessed through the Drone Sumut application. This application is an Integrative Digital Platform. Users can search for data based on keywords and filter or filter based on the range of Library Areas at the Provincial, Regency/City, Sub-district, Village/Kelurahan levels, as well as at the library type/sub-type level.

REFERENCES

- Bertot, J. C., Jaeger, P. T., & Grimes, J. M. (2010). Using ICTs to create a culture of transparency: E-government and social media as openness and anti-corruption tools for governments. *Government Information Quarterly*, 27(3), 264-271. <https://doi.org/10.1016/j.giq.2010.03.001>
- Buchanan, S. (2019). *Organizational literacy for librarians*. Facet Publishing. <https://doi.org/10.29085/9781783303997>
- Castells, M. (2010). *The rise of the network society: The information age: Economy, society, and culture, Vol. I* (2nd ed.). Wiley-Blackwell.
- Colomina, I., & Molina, G. (2014). Unmanned aerial systems (UAS) for photogrammetry and remote sensing: A review. *ISPRS Journal of Photogrammetry and Remote Sensing*, 92, 79-91. <https://doi.org/10.1016/j.isprsjprs.2014.03.009>
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Sage Publications.
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage.
- Dinas Perpustakaan dan Arsip Provinsi Sumatera Utara. (2025). *Modul Pengelolaan: Aplikasi Direktori Perpustakaan Sumut (DRONE)*. Dinas Perpustakaan dan Arsip Provinsi Sumatera Utara.
- Inmon, W. H. (2005). *Building the data warehouse* (4th ed.). Wiley.
- Keen, P. G. W. (2021). *Every manager's guide to information technology: A glossary of key terms and concepts for today's business leader* (3rd ed.). Harvard Business Review Press.
- Kotter, J. P. (2022). *Leading change*. Harvard Business Review Press.
- Lankes, R. D. (2016). *The new librarianship field guide*. MIT Press. <https://doi.org/10.7551/mitpress/10866.001.0001>
- Laudon, K. C., & Laudon, J. P. (2016). *Management information systems: Managing the digital firm* (14th ed.). Pearson.
- Norris, P. (2001). *Digital divide: Civic engagement, information poverty, and the Internet worldwide*. Cambridge University Press.
- Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.
- Voigt, P., & von dem Bussche, A. (2017). *The EU General Data Protection Regulation (GDPR): A practical guide*. Springer.
- Wang, R. Y., & Strong, D. M. (2022). Beyond accuracy: What data quality means to data consumers. *Journal of Management Information Systems*, 12(4), 5-33. <https://doi.org/10.1080/07421222.2022.11518105>
- Zuboff, S. (2019). *The age of surveillance capitalism: The fight for a human future at the new frontier of power*. PublicAffairs.