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Enhancing data accuracy with design of a web-based citizen data management application for neighborhood/ residential unit

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ABSTRACT

Citizen data is critical in making appropriate decisions by neighborhoods/residential units (RT/RW) and sub-districts. Therefore, citizen data must have a high level of validity. In Tiban Lama Sub-district, Batam City, at the RT/RW level, citizen data management is still done manually, so problems often occur such as inaccurate data, delays in updating data, limited data access, difficulties in analysis, and difficulties in data coordination, decision-making errors in determining social assistance recipients, and obstacles in data management at Integrated Service Centers (Posyandu). To overcome this problem, a web-based citizen data management application is needed, where residents can upload the required data through the application by attaching supporting documents and the data will be verified by the RT/RW. This application can help villages and RT/RW manage citizen data and make the right decisions for their citizens. Based on the implementation of the activity, a positive response was obtained from the Head of Tiban Lama Village and the RT/RW level of Tiban Lama regarding the use of web-based applications.

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1. INTRODUCTION

In recent years, the development of information technology has significantly impacted various sectors, including government and regional administration. One notable outcome is the national-scale digitization of data, exemplified by the electronic ID card (e-KTP). While this digitalization facilitates population data recording, challenges arise when individuals move from one region to another without reporting their relocation, leading to discrepancies between the actual population in an area and the data in the national e-KTP database.

To address this issue, rules have been implemented at the neighborhood/ residential unit (RT/RW) level, requiring residents to promptly report and submit their data to the local RT/RW administration when they relocate. However, data management at the RT/RW level is still manual, lacking a system to

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assist administrators in handling resident data effectively, restricting the impact to the RT/RW level only. Resident data is crucial for a nation (Fikry, 2016) and serves various purposes such as administration, development, budgeting, and more (Indraswari & Yuhan, 2017). Thus, effective management of resident data is essential to ensure its security and accuracy (Siregar & Sundari, 2016; Sulastri et al., 2020). With the rapid development of information technology, the management of population data can be more efficient and reliable. Information technology can be utilized for online population data management, providing easier data access, improving data accuracy, and ensuring data security (Putri et al., 2020).

The management of resident data can be accomplished using information technology, which combines computer technology consisting of software (programs and applications), networks (connections and communication infrastructure), and electronic data management (Amrizal, 2018). This combination is used to process, store, and distribute information (Zulfah, 2018) to various parties. By leveraging information technology, the management of population data can be more efficient, accurate, and reliable (Jumaida & Metra, 2023; Sitinjak & Suwita, 2020), easing the burden on RT/RW officials in handling resident data.

In the Tiban Lama neighborhood of Batam City, resident data management is still conducted manually. When a resident moves in, they must report to the RT/RW with documents such as a photocopy of their ID card and Family Card (KK) or a photocopy of their passport for foreign residents. Similarly, when a resident moves out, they are expected to report; however, some residents who leave Tiban Lama do not notify authorities, resulting in inaccurate resident data. According to interviews with RT/RW officials, another issue in Tiban Lama is the increase in economically disadvantaged residents, especially during the COVID-19 pandemic, where businesses closed, and some faced layoffs (Dewan Perwakilan Rakyat Republik Indonesia, 2020). This situation impacts the management of data for less privileged residents, requiring RT/RW administrators to conduct a reassessment of all residents when there is government assistance for the poor and less privileged, such as the Rice for the Poor (RASTRA) program, the Smart Indonesia Program for students from elementary to high school, the national health insurance program, the Keluarga Harapan Program, and other emergency assistance programs during the pandemic (Kementerian Komunikasi dan Informasi Republik Infonesia, 2018).

During the COVID-19 pandemic, the government provided various aids to affected communities. Despite these efforts, challenges persisted, such as residents not receiving assistance due to being undocumented by RT/RW officials (Rahmansyah et al., 2020). In Tiban Lama, there were complaints from residents who were not included in social assistance programs, prompting dissatisfaction with RT/RW officials and the local head. Data in Tiban Lama serves not only for social assistance but also for the implementation of posyandu activities. However, issues arise in the management of posyandu data, especially for newly born residents, causing difficulties in accurately counting infants in the Tiban Lama RT/RW. The lack of valid infant data hinders posyandu administrators in designing effective programs for parents and the infants themselves.

Furthermore, as Batam is a gateway city between Indonesia, Singapore, and Malaysia, there is a significant influx of temporary or permanent residents, leading to rapid population turnover. To address these challenges, a training program on population data management, utilizing information technology at the RT and RW levels, is deemed necessary. This training aims to provide knowledge and skills to data administrators, enabling them to manage population data efficiently, accurately, and reliably (Kementerian Pendayagunaan Aparatur Negara dan Reformasi Birokrasi, 2022). Interviews with RT/RW officials in Tiban Lama revealed common issues, including inaccuracies in data during elections or head of region selections. Data are often collected through population surveys conducted by census officers or RT/RW officials, but not everyone can be reached or may provide inaccurate information, leading to data inaccuracies. Another issue is the delay in updating population data at the RT/RW and neighborhood levels. This delay can render information irrelevant and less reliable, impacting

government policy planning, budget management, and social programs. Inaccurate and delayed data renewal may lead to errors in decision-making for determining eligible residents for government or other aid programs. Limited access to data is another problem in Tiban Lama. Not all parties have access to RT/RW and neighborhood-level population data. This poses challenges in government policy planning, decision-making, and research. Difficulty in data analysis is another concern, as the extensive and complex population data may require advanced statistical analysis skills. Coordination issues among institutions, such as the Population and Civil Registration Agency (Disdukcapil) and the Central Statistics Agency (BPS), can lead to data discrepancies. This may result in inaccuracies in the data. To address these issues, a web-based application has been developed, offering features for inputting new resident data, recording relocations, registering births, recording deaths, and documenting aid recipients. This application aims to ease decision-making for RT/RW officials and facilitate posyandu administrators in designing programs tailored to the age and needs of infants.

The implementation of this web-based population data management application is expected to benefit residents by simplifying data collection. With this application, census officers or RT/RW heads can directly input population data online, enhancing data accuracy by rejecting incomplete or improperly formatted information. The application is anticipated to improve efficiency and productivity. It saves time and effort by eliminating the need for manual data collection and inputting. This expedites the data collection process. Additionally, the application enhances data accessibility, making it easier for stakeholders such as the government, research institutions, and the general public to access the compiled data online. This accessibility increases transparency and accountability in population data management by preventing fraud or data manipulation.

2. METHODS

The design of a citizen data management application is divided into three main stages, namely identifying user needs, designing a web-based application, and implementing the application (Setiawan et al., 2023).

Needs Analysis

Needs analysis was carried out by interviews and direct observation of RT/RW officials and the Head of Tiban Lama Village. At this stage, problems were found that occurred when managing citizen data.

Application Design

Prototyping model is utilized for designing the application, since prototyping model provides space for interaction between application designers and potential users. The stages are as follows: (1) Communication. Identifying the needs of residents, RT/RW equipment, and the Head of Tiban Lama Village for a citizen data management system. At this stage, the system's functional requirements are also identified, such as who will manage the system later, who can access it, resource requirements for hardware and software, servers, and users; (2) Quick planning. This stage is the process of creating an application development roadmap, which will be a benchmark for processing time; (3) Quick modeling. At the quick design modeling stage, the focus is on designing aspects that are visible to the end user. Researchers design a user interface in the form of a display format; (4) Construction. Construction is the prototyping stage carried out by implementing the design that has been built using the PHP programming language because it is a programming language that is easy to use for designing a web-

based application, and PHP can be integrated with other programming languages such as Java Script. For databases, use the MySQL database as a medium for storing data because it is free and easy to use. After the prototype is complete, testing is carried out to overcome errors that occur in each feature built; (5) Deployment. This stage is tested by programming experts to find deficiencies and errors in the designed application. The experts used are computer lecturers at Ibnu Sina University, Batam.

Table 1. Stages of implementing the community service program

Meeting 1 (Preparation)		
Activities	-	Introduction of service team members to the Tiban Lama Village apparatus
	-	Explanation of the goals of community service
	-	Visit one of the RT devices to find out the problem
	-	Discussion about citizen data problems faced by RT/RW apparatus in Tiban Lama Village
	-	Discussion of problems that will be the focus of system development
Objectives	-	Introducing the team and the objectives of community service activities
	-	Identify basic problems with RT/RW equipment in managing citizen data
	-	Analysis of information system requirements
Meeting 2 (Designing)		
Activities	-	Presenting the system user interface design to the Tiban Lama Village team to equalize perceptions about the designed application
	-	Discuss system functionality and determine design constraints
	-	Determine who can access the application and their access rights
Objectives	-	Equating user perceptions of the system being designed with the results of the analysis of needs for the information system
	-	Initial validation of the system before coding is carried out
Meeting 3 (Development)		
Activities	-	Creating a web application for managing data for residents of Tiban Lama Village
	-	Create system functionality
	-	Domain purchase and application hosting
	-	Creating a manual book for users
Objectives	-	Designing web applications to manage citizen data
Meeting 4 (Implementation 1)		
Activities	-	Carry out community service activities by inviting RT/RW officials in the Tiban Lama Village
	-	Exposing to RT/RW and Tiban Lama Subdistrict devices the application that has been developed
	-	Test the application with RT/RW devices
Objectives	-	Evaluate the web design that has been developed
Meeting 5 (Implementation 2)		
Activities	-	Providing training to RT/RW and Tiban Lama Village officials to use the website that has been developed
	-	Using the web to input data and other functionalities
Objectives	-	Educate RT/RW and Tiban Lama Village officials on how to use applications to manage citizen data
Meeting 6 (Monitoring and Evaluation)		
Activities	-	Providing further training for those who still don't understand how to use the web
	-	Discussion about the use of the web that has been developed
Objectives	-	Educate RT/RW and Tiban Lama Village officials on how to use applications to manage citizen data
	-	Evaluate partner satisfaction during the service activity process

Implementation

Implementation is the final stage of design where the designed application is ready to be used by users, namely residents, RT/RW officials and Tiban Lama Village. At this stage, domain purchases, hosting servers and installation of web-based applications on the server are carried out. The method for implementing the objectives of the community service program is arranged in stages presented in Table 1.

3. RESULTS AND DISCUSSION

Results

The result of this community service activity is the design of a web-based citizen data management application. Initially, the partner (Figure 1), namely the RT/RW (neighborhood/community unit) in Tiban Lama Village, managed its citizen data manually. During the initial observation, the community service team had direct discussions with Mr. Helmy Haris, S.Kom, the head of Tiban Lama Village, to address the issues in citizen data management. Based on the discussion results, it was found that citizen data was still stored in physical documents, causing accumulation. Retrieving and managing such data posed difficulties, and there were additional challenges in managing posyandu (integrated health service post) data and recipients of aid.

According to the information provided by the village head, the community service team conducted field visits to meet with several RT officials to gather more detailed information about the core issues. The community service team then proposed a solution in the form of designing a web-based citizen data management application.

Based on the initial discussions, a conceptual design was carried out for a web-based citizen data management application. The results of this design were discussed again with the Head of Tiban Lama Village to equalize perceptions of the application's needs. Based on the input provided by the village head, the service team held discussions again to revise the system design and also create an application that uses the PHP (Hypertext Preprocessor) programming language, which is the language used to write website program code (Sulistiati et al., 2020). The results of the design carried out are in Figure 2.

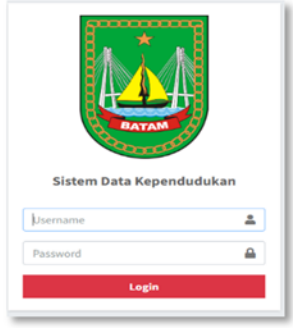

Figure 1. A partner
Figure 2. Login page

After the user logs in using the password and username that has been created by the admin, namely the Tiban Lama Village staff, the RT/RW equipment can carry out the process of inputting citizen data in the add data form, in Figure 3. After the data has been entered in the form above, the system will display a list of citizen data that has been entered in the population data display form in Figure 4.

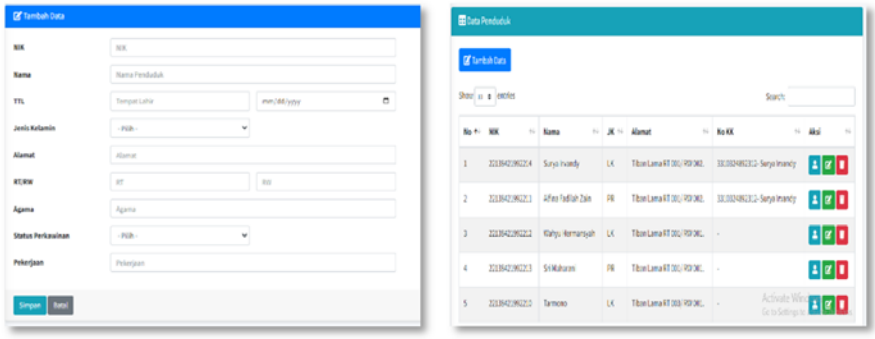

Figure 3. Citizen data input form
Figure 4. Citizen data display page

This page will display citizen data that has been input into the system. On the citizen data display page, RT/RW devices can search citizen data based on NIK, name, gender, address or family card number. If there is an error in the data input process, this can be done using the edit data menu, delete data and view the details of each citizen's data. If a resident needs a domicile certificate, the RT/RW device can print the letter in the system, the letter displays in Figure 5. Citizen birth data can be entered in the birth data menu, where the data entered is the baby's name, date of birth, gender and head of the family or the baby's father (Figure 6).

Figure 5. Image of certificate of domicile
Figure 6. Image of birth data input

After the implementation phase, training was provided to the RT/RW officials and the Tiban Lama Village administration. This training aimed to ensure that the designed application could be easily used and to gather feedback from the RT/RW officials and the Tiban Lama Village administration regarding the application's usability. Based on random interviews, highly positive responses were obtained, where RT/RW officials and the Tiban Lama Village administration felt significantly assisted by the application. In addition to positive feedback, there were corrections and suggestions from some RT/RW officials in Tiban Lama. They suggested that the domicile certificates did not need to be printed through the system because each RT/RW had its own format, allowing for manual handling. Furthermore, the existence of manually issued domicile certificates was seen as fostering closer ties between residents and their respective RT/RW.

Figure 8. (a) Training on using web-based citizen data management applications; (b) Presentation of material by the chief executive; (c) Discussion session with the RT/RW apparatus of Tiban Lama Village; (d) Group photo at the end of the activity session

Discussion

The community data management application at the RT/RW level in Tiban Lama Village is highly relevant to the current situation, where digitalization of data is crucial to facilitate storage, management, and reuse of the data. The designed application features input for new residents, those who have relocated, birth records, death records, records of residents receiving assistance, and the ability for residents to directly print domicile certificates. These features facilitate decision-making for RT/RW officials concerning their residents. Additionally, for posyandu administrators, birth data can be easily obtained, allowing for program planning based on the age and needs of infants.

After the training, there was an improvement in participants' knowledge in digitizing resident data to enhance data accuracy and validity. Another benefit of the designed application is its function as a platform for storing resident data. Throughout the activity, Tiban Lama Village actively facilitated the initiative by inviting RT/RW officials in its vicinity to participate in the training activities.

To evaluate the implemented activities, unstructured interviews were conducted with participants by the outreach team, yielding the following results: (1) Understanding of the Data Collection Process: Residents will have a better understanding of how the data collection process is carried out, from gathering data to updating necessary information; (2) Use of Information Technology: RT/RW officials will become accustomed to the use of information technology in their daily lives, understanding how to utilize web-based applications for administrative purposes related to population data; (3) Basic Technology Skills: RT/RW officials can develop basic skills in using web-based applications, including filling out online forms, uploading documents, and utilizing application features; (4) Understanding of Citizens' Rights

and Responsibilities: Direct interaction with the application will give residents a better understanding of their rights and responsibilities related to population data; (5) Efficiency in Handling Administration: RT/RW officials will be more capable of handling administrative tasks, such as domicile or relocation certificates, more quickly and easily through the application; (6) Understanding the Importance of Data Accuracy RT/RW officials will recognize the importance of accurate data in various government policies and programs, including the distribution of social assistance.

The increased knowledge among residents after using this application will contribute positively to the efficiency of population data management in Tiban Lama Village. It can also foster a more informed, engaged community with greater control over their data.

4. CONCLUSION AND RECOMMENDATIONS

The series of community service activities conducted resulted in an improvement in the partner's knowledge, who initially stored resident data in hard copy format but converted it into digital form. This activity enhanced the understanding of RT/RW officials and Tiban Lama Village regarding the importance of valid and accurate data. The web-based data processing application designed can assist in facilitating the management of resident data. Throughout the activity, Tiban Lama Village strongly supported the use of this application at the RT/RW level to obtain valid resident data. Similarly, RT/RW officials were greatly assisted by this application in managing resident data. However, there were some concerns about potential misuse of the data. Based on interviews with participants, it was found that the partners were satisfied with the conducted activities and hoped that the developed application could be used indefinitely.

There is a need for further training activities for RT/RW officials who are not yet proficient in using the web-based data processing application. The developed application has been handed over to Tiban Lama Village for independent management. It is advisable to establish an IT team to manage, maintain, and provide further socialization to the residents.

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