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Population Data Collection System in the Digital Era by Utilizing the Advantages of the Web to Improve Data Quality

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Abstract: In the digital era, population data collection plays a vital role in effectively managing and utilizing demographic information. This paper presents a system for population data collection that leverages the advantages of web technology to enhance data quality. The system utilizes web-based platforms, specifically harnessing the power of the web and its associated technologies, such as PHP and MySQL. The system allows for real-time data collection, ensuring that demographic information is up-to-date and accurate. The advantages of web-based data collection methods include increased accessibility, enhanced efficiency, and the potential for real-time data updates. By leveraging the web, population data can be collected through online surveys, registration systems, and interactive data portals. These platforms allow for convenient data collection, ensuring broader participation and reducing geographical barriers. Through user-friendly web interfaces, individuals can easily input their personal data, eliminating the need for manual paper-based processes. This not only improves data accuracy but also improves efficiency in data collection. Furthermore, the system incorporates data validation mechanisms to ensure the integrity of the collected information. It employs automated validation processes to minimize errors and inconsistencies in the data. Additionally, the system includes security measures to protect the privacy of individuals' data, safeguarding against unauthorized access or data breaches. The use of web technology, particularly PHP and MySQL, in the population data collection system offers several benefits. These include improved data accuracy, real-time data updates, efficient data analysis, and enhanced accessibility for both data input and retrieval. Moreover, the system facilitates seamless integration with other data management systems, enabling better collaboration and information sharing. Overall, the implementation of a web-based population data collection system demonstrates the potential to leverage the advantages of web technology in enhancing data quality. By embracing digital solutions, organizations and institutions can streamline their data collection processes, ensuring more accurate and reliable demographic information for effective decision-making and policy formulation.

Keywords: population data collection , digital era, web-based system, data quality enhancement, web technology

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INTRODUCTION

Based on Law No. 6 of 2014 concerning improving the quality of population services, the Central Government requires government officials at the village or sub-district level to change the village administration service delivery system from conventional to digital-based [1]. In the digital era, the availability and accessibility of population data is becoming increasingly important for informed decision making, policy formation, and the development of targeted interventions [2] . Advances in information and communication technology occur in all countries in the world, including Indonesia [3] . Currently, Indonesia has entered the era of digital technology. The percentage of

internet penetration in Indonesia shows an increasing graph from year to year [4] [5]. With rapid technological advances, traditional methods of population data collection have evolved, giving rise to new opportunities and challenges. In this article, we explore the use of web-based technologies to improve village population data collection and improve the quality of village data.

Websites are information technology that is multi-platform and can work optimally in a network. Websites have revolutionized the way we communicate, access information, and carry out various activities [5] [7]. Its transformative potential extends to include village population data collection, offering benefits previously unattainable through traditional approaches. Web-based platforms provide a versatile and efficient means to collect, manage, and analyze population data, enabling decision makers to gain valuable insights into demographic trends and patterns [6] . In this context, this article aims to discuss population data collection systems in the digital era that utilize the advantages of the web to improve data quality. By utilizing web technologies, such as PHP and MySQL, this system has the potential to increase accuracy, speed, and efficiency in collecting, processing, and analyzing population data.

One of the main advantages of utilizing web-based technology in village population data collection is increased accessibility [7] [10]. Online surveys, registration systems and interactive data portals make it possible to reach broader segments of the population, bypassing geographic boundaries and ensuring inclusivity [8] [12]. Individuals can easily participate in data collection efforts, contributing to a more comprehensive representation of diverse communities.

Additionally, the web enables real-time updating and validation of data, which is critical for improving the quality of villager data. When information is delivered and processed instantly, decision makers can access up-to-date population statistics, enabling timely responses to emerging challenges and dynamic societal needs [8] . The automated data validation mechanisms implemented in the web platform help minimize errors and inconsistencies, leading to increased accuracy and reliability of the data collected.

Collaboration and data sharing between stakeholders is also facilitated through web-based platforms [9] [14]. Researchers, policymakers, and organizations can easily access and exchange population data, encouraging transparency, collaboration, and evidence-based decision making. The integration of web-based technologies creates a more interconnected ecosystem of data collection and analysis, enabling a holistic understanding of population dynamics [10] .

However, apart from the benefits, challenges also need to be overcome when exploiting the advantages of the web in collecting population data. Issues of privacy, data security and the digital divide are important factors that need to be considered carefully [11] . Safeguarding personal information, ensuring data confidentiality, and bridging gaps in internet access and digital literacy are essential for the ethical and fair implementation of web-based data collection methods [12] [18].

Through this article, we aim to explore the potential of web-based technology to improve population data collection in the digital era. By examining best practices, innovations, and challenges, we seek to provide insights and recommendations for policymakers, researchers, and practitioners involved in population studies and data-driven decision making. Because of this, village population data is considered very important and necessary by village administrators. Because of this, the author conducted research on Population Data Collection Systems in the Digital Era by Utilizing the Advantages of the Web to Improve the Quality of Salatiga Village Data.

RELATED RESEARCH

There are several related studies that discuss website-based population data collection, including research entitled " Designing a website-based population service information system in rw 010, Keagungan Village, Tamansari District - West Jakarta". This research aims to simplify and improve the quality of services to residents in terms of administration and public services at the village level. This system is designed using website technology as the main platform to facilitate various services needed by residents. A detailed description of the

design of a website-based population service information system in RW 010, Keagungan Village, Tamansari District - West Jakarta. First, Needs analysis: in the design The website-based population service information system in RW 010, Keagungan Village, Tamansari District - West Jakarta involves a deep understanding of the needs and challenges faced in current population services. In needs analysis there is identification of service needs, system evaluation, challenges faced, hopes and needs population and regulatory review. Second , Interface Design : Interface design for the website-based population service information system in RW 010 Keagungan Village, Tamansari District - West Jakarta is an important step to ensure users can easily interact with the system. Third. Database Development : Database development in designing a website-based population service information system in RW 010, Keagungan Village, Tamansari District - West Jakarta is a very important step for storing and managing population data efficiently. Database development includes identifying Entities and Attributes, designing database structures, normalization, creating tables, relationships between tables, indexes, security and access rights, testing, maintenance and monitoring. Fourth, system functionality in designing a website-based population service information system in RW 010 Keagungan Village, Tamansari District - West Jakarta involves a series of features and capabilities possessed by the system to meet user needs. Fifth, data security: is an important aspect in designing a website-based population service information system in RW 010 Keagungan Village, Tamansari District - Jakarta [19]

Meanwhile, in the research: "Website-Based Population Data Collection in Salatiga Village, Mandor District, Landak Regency" aims to implement a population data collection system that uses a website as the main platform. This research focuses on the process of collecting, managing and maintaining population data in Salatiga Village, Mandor District, Landak Regency. The main objective is to obtain accurate and up-to-date information about population numbers, demographic profiles and characteristics of village residents. This research chose Salatiga Village as the research location, located in Mandor District, Landak Regency, which was chosen as the research subject to analyze and understand the need for population data collection in the area. This research uses a website technology approach as the main platform for implementing the population data collection system. The website will act as an interface that allows residents to access, fill in, and submit their personal information, as well as a means to manage and process resident data. The aim of this research is to design and implement an effective and efficient website-based population data collection system. The system is expected to improve the quality of population data, speed up the process of collecting and updating data, and provide easy access for citizens to interact with the data collection system. Benefits This research is expected to provide practical benefits for Salatiga Village, Mandor District, Landak Regency in increasing the efficiency of population administration. By implementing a website-based population data collection system, it is hoped that there will be an increase in the accuracy, speed and accessibility of population data, as well as facilitating data-based decision making at the village level [14] .

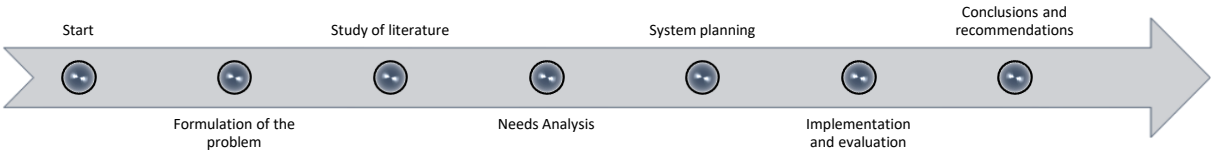
Another research on "Utilization of Village Information Systems (SID) to Create Smart Villages in Panggungharjo District, Sewon, Bantul, DI Yogyakarta". This research refers to a study which aims to utilize the Village Information System (SID) to implement the Smart Village concept in Panggungharjo Village, Sewon, Bantul, DI Yogyakarta. This research focuses on the use of the Village Information System (SID) as a tool for integrating and managing information related to administration and services in the village. SID will be used as the main platform to support the transformation of Panggungharjo Village into a Smart Village. The aim is to realize the Smart Village concept in Panggungharjo Village. Smart Village refers to the use of information and communication technology to improve the quality of life of the community, the efficiency of village government, and sustainable

development in the area. This research chose Panggungharjo Village as the research subject which is located in Sewon District, Bantul Regency, DI Yogyakarta Province. Panggungharjo sub-district was chosen as the research location to analyze and implement the use of SID in a specific village context. The researcher's aim in writing this article is to identify the potential and needs of Panggungharjo District in implementing SID as a supporter of the Smart Village concept. This research also aims to design and implement an appropriate system in SID, as well as measure its impact on improving the quality of life of the community and the efficiency of public services. Utilization of SID will increase the efficiency of village government, increase community participation, improve accessibility of public services, and speed up data-based decision making at the village level [7] [21].

Another research on "Web-Based Population Data Collection Information System for Kampung Mesjid Village" discusses the development and implementation of a web-based population data collection information system in Kampung Mesjid Village. This information system aims to increase efficiency and accuracy in the population data collection process in the sub-district. This article will explain the background regarding the problems and needs for a population data collection information system in Kampung Mesjid Village. Possible problems encountered, such as difficulties in data collection, lack of data integrity, and slow data collection processes, will be described. The aim is to explain the purpose of developing a web-based population data collection information system in Kampung Mesjid Village. This goal includes increasing the efficiency, accuracy and quality of population data as well as facilitating data access and processing by related parties. Methods used in developing population data collection information systems. This method includes requirements analysis, system design, web application development, implementation, and system testing. Benefits and Impact of this research is the implementation of a web-based population data collection information system in Kampung Mesjid Village. These benefits can include increased efficiency of the data collection process, faster data processing, increased data accuracy, and improved services to the community [15] .

METHOD

The research flow generally carried out in this research consists of problem formulation, literature study, needs analysis, system design , implementation and evaluation, conclusions and suggestions.



In this research flow, the problem is formulated by conducting interviews with village officials , after obtaining the problem formulation, then looking for related literature studies to solve the existing problems. After that, a needs analysis is carried out to prepare the things needed to achieve the goal of creating a population data collection website. This stage involves analyzing the needs of a web-based population data collection system. Researchers will identify user needs, functional and non-functional requirements, as well as security and privacy aspects that must be considered in system development, such as software

requirements and hardware requirements in the form of the XAMPP application to process databases using MySQL, and the theme is BOOSTRAP.

Next, system design is carried out by designing the website creation. Based on the needs analysis, researchers will design the architecture of a web-based population data collection system. This includes database design, design, and workflow of the data collection process. The selection of web technology such as PHP and MySQL will be carried out to build the required system components. Then carry out development , at this stage it involves developing web-based population data system software. researchers will use the PHP programming language and MySQL database to implement the necessary features in the system, including data collection, automatic validation, data analysis, and data security.

Next, carry out implementation and evaluation. After testing and validation, the web-based population data collection system will be implemented in the production environment. Users will be involved in using the system, and evaluations will be carried out to measure the effectiveness and user satisfaction with the system. This evaluation will also consider the improvements in data quality that have been achieved.

After implementation, the system will require regular maintenance and updates to ensure system availability and sustainability. The research team will also continue to make improvements and adjustments based on user feedback and the latest web technology developments. And finally conclusions and suggestions are obtained.

RESULTS AND DISCUSSION

System analysis

System analysis is a process of research and evaluation of existing or future systems. The goal is to understand the components of the system, the interactions between them, and the needs and requirements that must be met to effectively achieve the system's goals. Systems analysis involves a deep understanding of business processes, user needs, as well as the technology involved in the system. In the context of a Population Data Collection System in the Digital Era by Utilizing the Advantages of the Web to Improve the Quality of Village Data, system analysis includes several important aspects, including:

1. Needs Identification. This stage involves collecting and understanding system requirements from stakeholders, both end users and system owners. These needs include functionality, performance, security, and other requirements that must be met by the system.
2. Business Process Analysis. By understanding in depth the business processes involved in population data collection. This involves mapping current workflows, identifying weaknesses or areas that can be improved, as well as identifying processes that can be automated or improved using web-based systems.
3. Technologist Analysis. By evaluating the technology used in the system, such as the PHP programming language, MySQL database, and other web development tools. This analysis aims to ensure that the selected technology meets system needs, is able to carry out the desired functionality, and can ensure good data quality.
4. User Interface Analysis: Evaluate the user interface that will be used in the system. This includes appearance design, user interaction, and ease of use of the interface. This analysis aims to ensure the user interface is intuitive, easy to understand, and provides a good experience to users.
5. Security Analysis: Conduct an evaluation of system security, including protection of personal and confidential data, protection against cyber attacks, and appropriate security policies. This analysis aims to ensure that the system has adequate security layers to protect sensitive resident data.
6. Performance Analysis: Assess system performance, including access speed, response time, and system capacity to handle high workloads. This analysis aims to ensure that the system can run well, provide a fast response, and be able to handle a large number of users.

7. Maintenance and Upgrade Analysis: Evaluate the system's maintainability as well as the possibility of future development and upgrades. This analysis involves identifying routine maintenance needs,

   By carrying out careful system analysis, the design and implementation of a web-based population data collection system can be adapted to user needs and ensure improved data quality. This analysis also helps in identifying and resolving potential problems and optimizing overall system performance [16] .

Needs Analysis Plan

To run the designed system, several supporting factors are needed as follows

Software Requirements Analysis

The software to run this program is:

1. Windows 10 operating system
2. XAMPP Application (PHP + Jquery)
3. MySQLI as database
4. BOOSTRAP to define a template

Hardware Requirements Analysis

Recommendations for being able to use the designed system, the required hardware specifications are as follows:

1. Core i3 3.4GHz,
2. 4GB RAM,
3. 500 GB hard disk,
4. SVGA monitor with a minimum screen resolution of 1024 x 768,
5. Keyboards and monitors

User Needs Analysis

The requirements for the admin are to have the skills to run the program and understand and master the Windows operating system. The admin will have the right to manage this data collection website. Admins can add content to the website, update population data, and manage the information or data displayed. Apart from that, you will also be able to receive messages from users for further development, and any problems experienced by users. Admin users must have knowledge of computer programming applications, such as Microsoft Office and PHP (WEB-Based Programming) which are used for new systems. Users will become users of this data collection website. Users will have access rights to view the information provided on the website, input data, and edit data.

Proposed System Analysis

In designing the proposed population data collection website, the aim is to improve the quality of population data for Salatiga village. The main feature that will be provided is village population data management. The system provides a village population data management feature that allows users to view, search and manage resident data easily. This feature enables efficient data processing, such as searching based on specific criteria, report generation, and statistical analysis.

This website provides easy and fast access for users to search for data information. Apart from that, a very important feature is data security to avoid data loss or duplicate data.

Website Planning and Design

Website planning and designing refers to the process of planning and creating the appearance, structure, and functionality of a website. This involves careful thought about how the website will be structured, how it will look, and how users will interact with the content and features provided.

Website designing involves a conceptual stage that involves a deep understanding of the website's purpose, target audience, and user needs. In this stage, it is necessary to provide a general description of the construction diagram regarding the system process flow and interactions with external entities.

After the conceptual stage, website design continues to the design stage. This involves selecting visual elements such as colors, typography, layout, and other graphic elements that will

reflect the identity and purpose of the website. Apart from that, design also includes creating website prototypes or mockups that provide a visual representation of the appearance and user interactions.

Context Diagram

A context diagram is a form of diagram that describes the process and scope of work of a system [17] . The context diagram is the highest level of DFD which describes all input to the system or output from the system which provides an overview of the entire system [18] .

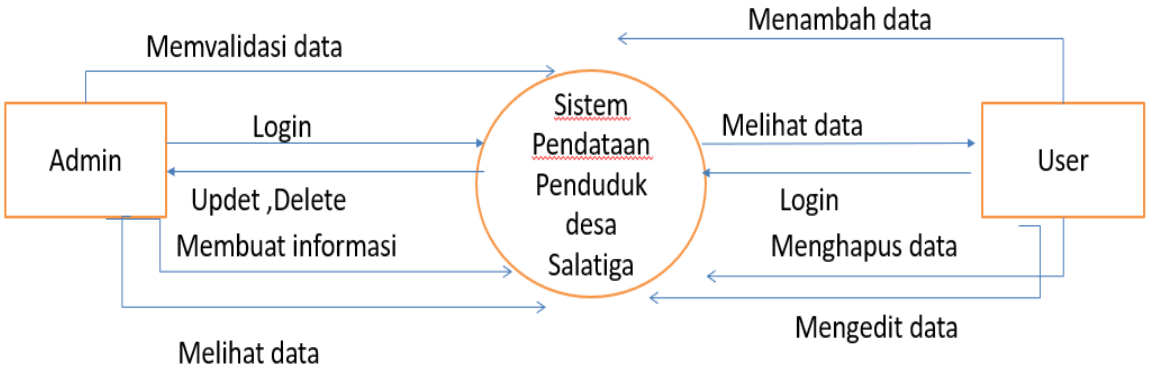
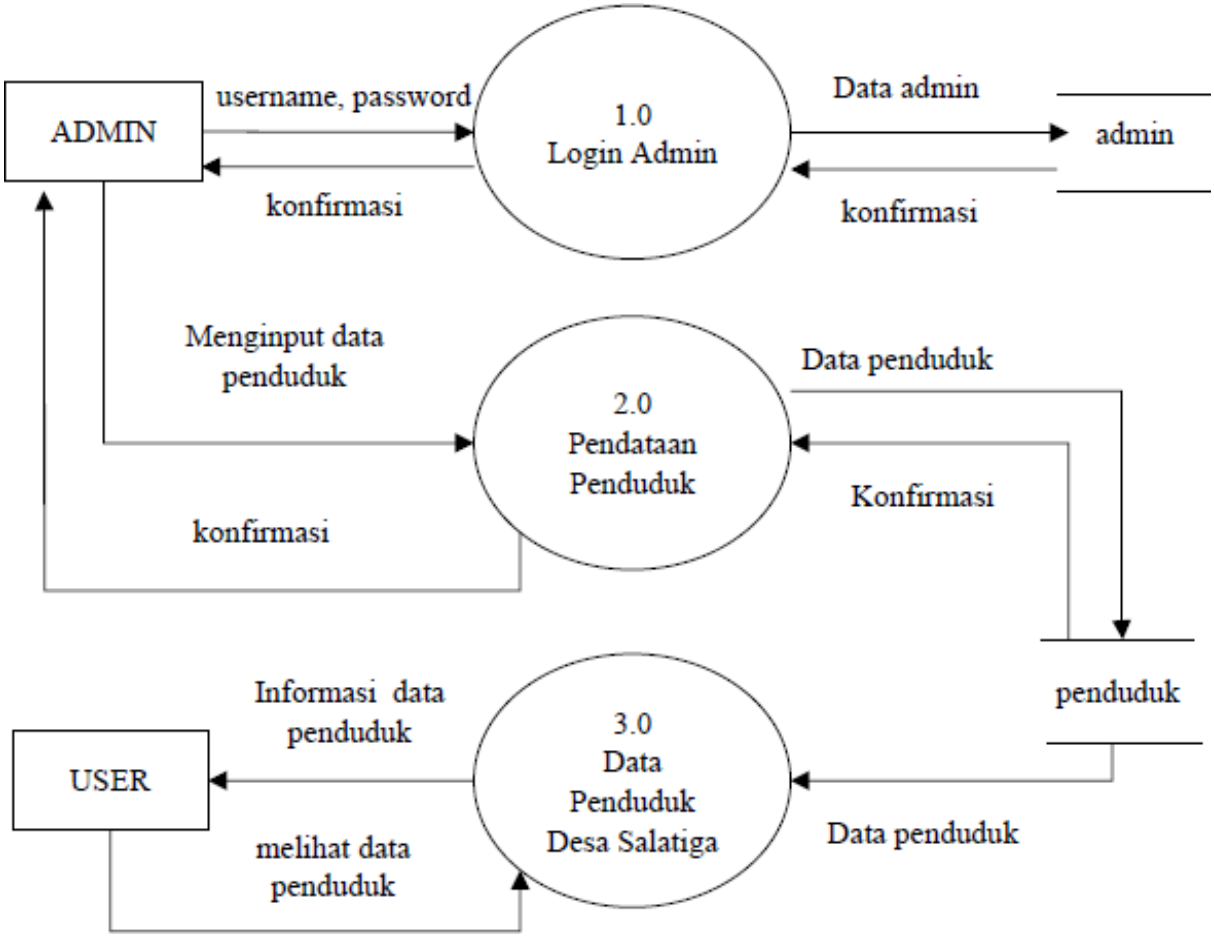


Figure 1Context Diagram or DFD Level 0

DFD (Data Flow Diagram)

Data Flow Diagram (DFD) is also called Data Flow Diagram (DAD) [19] . DFD is a data or process logic model created to describe: where the data comes from, and where the data that comes out of the system is going, where the data is stored, what process produces the data, and the interaction between the stored data, and the processes applied to the data [19] .

Data Flow Diagram (DFD) is a modeling method used to describe data flow in information



systems [20] . DFD uses main components, namely processes, data flows, external entities, and data storage. Processes describe activities or actions that occur with data, while data flows indicate the movement of data between processes, external entities, and data stores. External entities represent external sources or destinations of data flows, while data stores represent places where data is stored in the system. DFD helps in understanding how data moves within the system, identifies the processes involved, and shows the relationships between processes, external entities, and data stores [21] . DFD is often used in system analysis and design to describe business logic and interactions between system components. In designing this website, there are DFD levels that can be created, as follows:

Picture 2 is design details Which explained based on context diagrams or DFD level 0. Consists from the admin and user side. Admin logs in by doing login Then admin can do process data collection resident. Data resident Which inputed by admin will enterin the population database then the data has been entered by admin Also will is displayed on the side user so that users or the Salatiga village community can see the data- data resident village the. There is also design activity admin that can be done on resident data can be seen on picture 3.

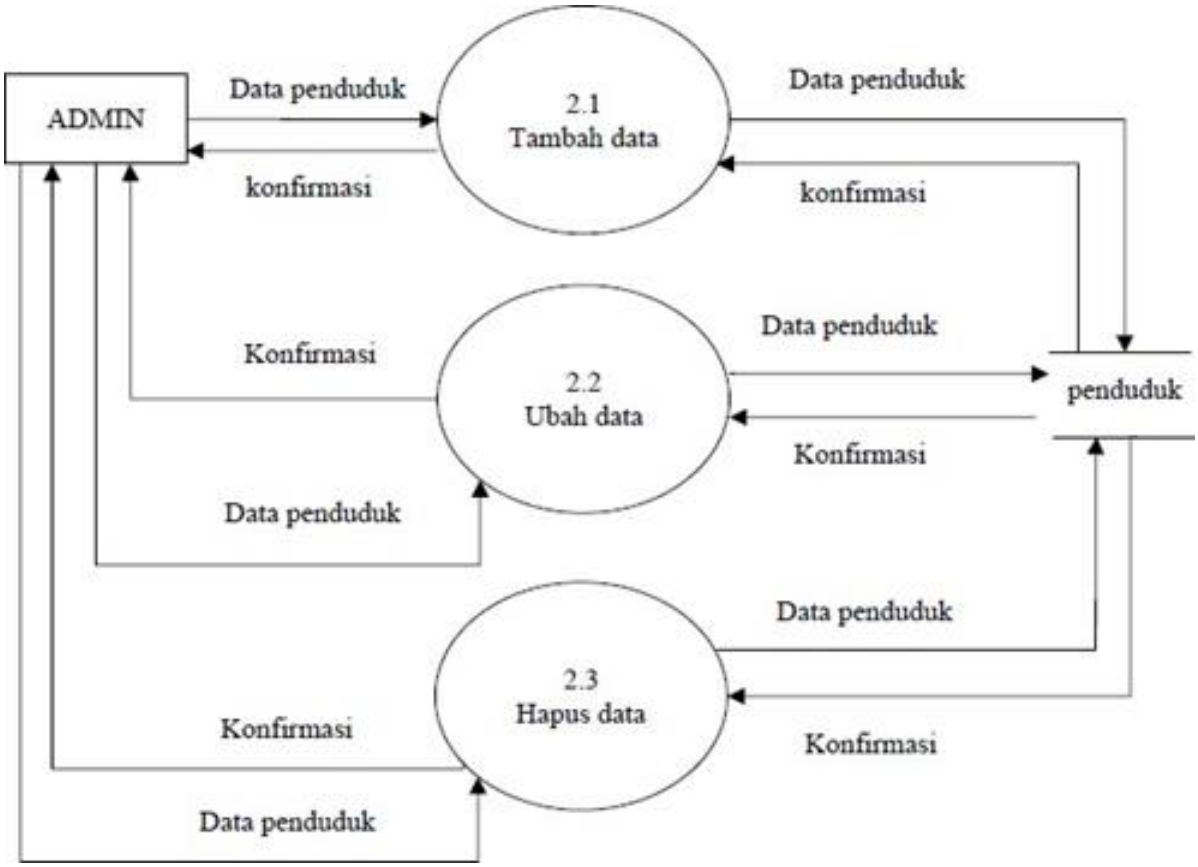


Figure 2DFD Level 2

Picture 4 is explanation or possible activities done admin, that is add, change or *updates* , And delete population data

Entity Relationship Diagram (ERD)

Entity-Relationship is a data base design model that is often used [22] . Entity Relationship Diagram (ERD) is a modeling that describes data as a collection of entities, attributes and relationships [23] . Entity can be interpreted as an entity, while Relationship is a relationship, these two components are described further through an attribute or property. Entities are individuals that represent something real (existence) [24] . And it can be distinguished from something else. Relationships indicate the existence of relationships between a number of different entities . In the entity-relationship model, the universe that exists in the real world is translated by utilizing a number of conceptual devices into a data diagram, which is generally called an ER Diagram. The following is a design in the form of an entity relationship diagram (ERD)

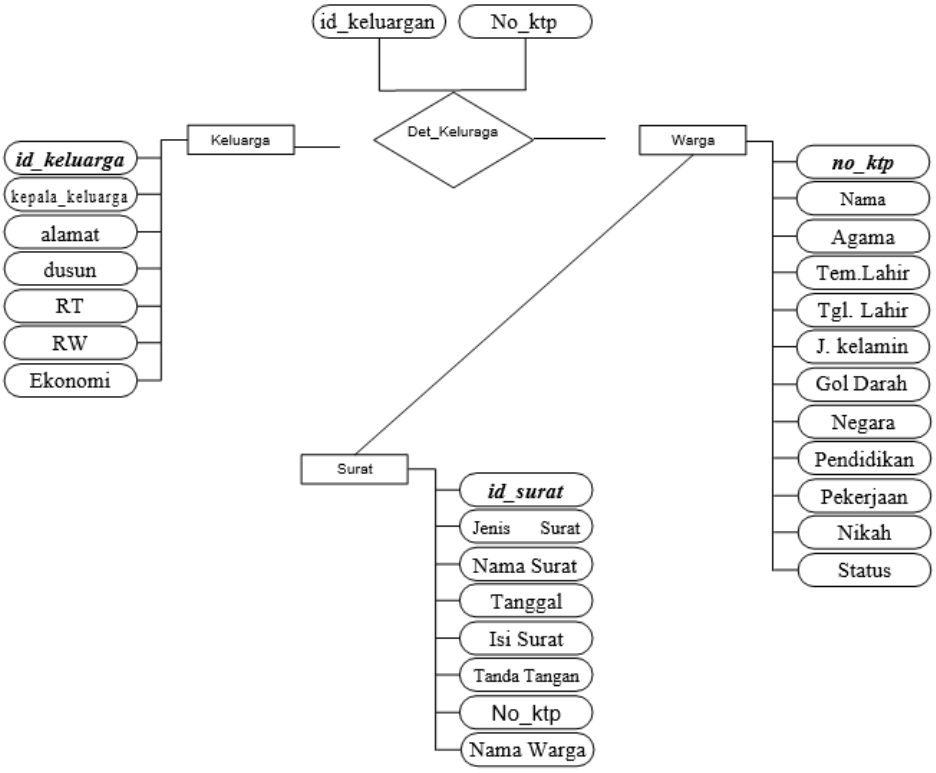


Figure 3ERD

Activity Diagrams

In this research there are 19 activity diagrams including login activity diagram, activity diagram managing user accounts, activity diagram managing population data, activity diagram managing family card data, activity diagram managing birth data, activity diagram printing birth certificates, activity diagram managing death data, activity diagram for printing death certificates, activity diagram for managing e-KTP registration data, activity diagram for printing e-KTP registration letters, activity diagram for managing temporary resident data, activity diagram for printing domicile letters, activity diagram for managing data for moving residents, activity diagram for printing transfer letters, activity the diagram manages incoming population data, the activity diagram manages population recapitulation data, and the logout activity diagram.

Database Design

Table 1Admin

Field Name	*Data Type*	*Information*
id	*int(11)*	*primary key*
username	*varchar(50)*	
password	*varchar(255)*	

Table 2Population

Field Name	*Data Type*	Information
Population_id	int(5)	*primary key*
no_kk	varchar(50)	
Nick	varchar(20)	
Name	*Varchar(50)*	

gender	*Varchar(10)*	
place of birth	*Varchar(50)*	
birthdate	*Date*	
current_year	*Int(5)*	
age	*Int(5)*	
religion	*Varchar(50)*	
education	*Varchar(50)*	
work	*Varchar(50)*	
blood type	*Varchar(5)*	
marital status	*Varchar(20)*	
wedding_date	*Date*	
family_hub	*Varchar(50)*	
citizenship	*Varchar(10)*	
ethnic group	*Varchar(20)*	
help	*Varchar(50)*	
ket	*Varchar(20)*	
picture	*Varchar (50)*	

Output and Input Design

A. Output Design

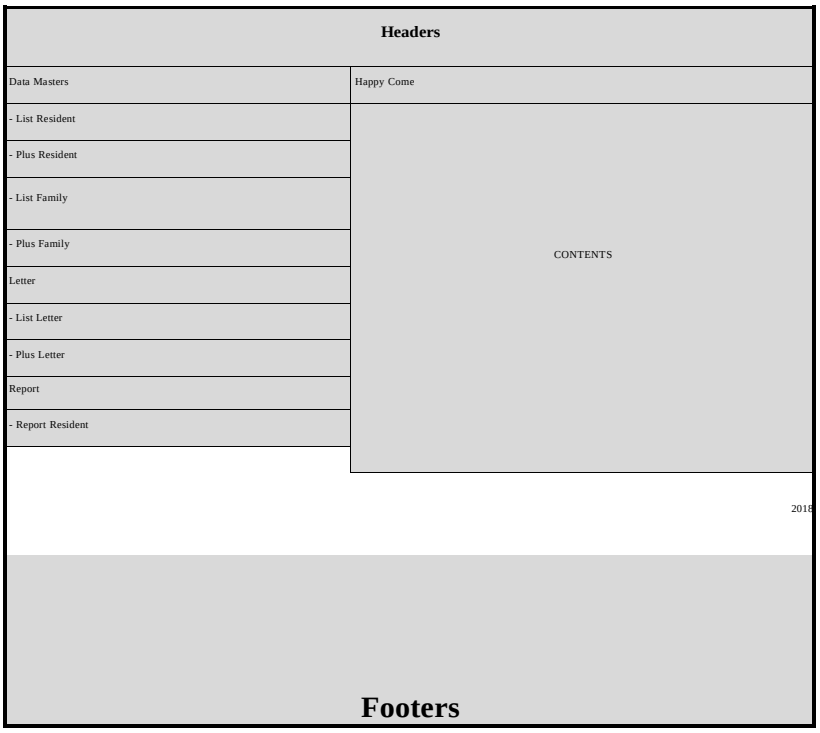
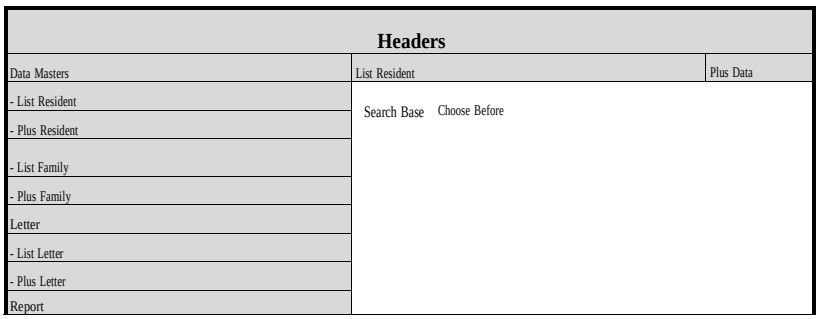


Figure 4Main page



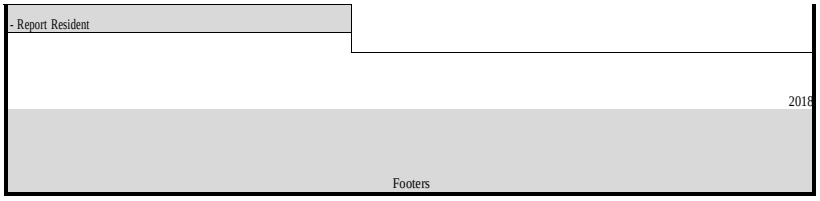


Figure 5Population List Page

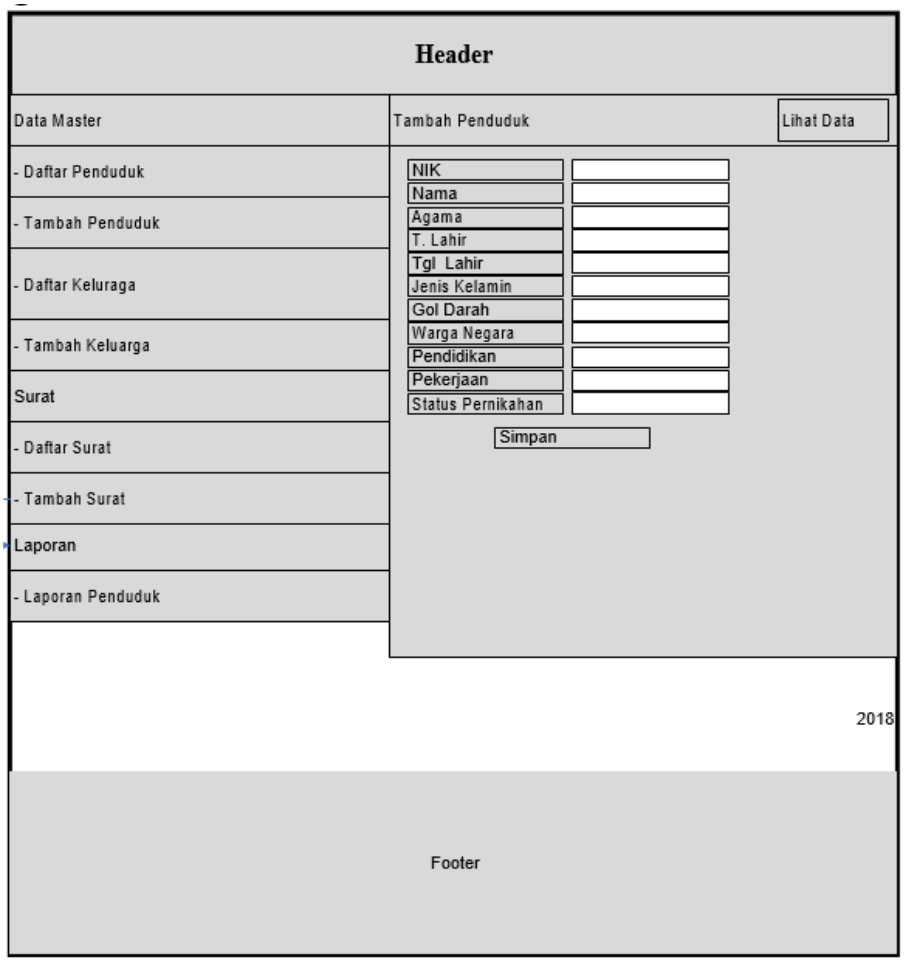


Figure 6Population Addition Data Page

B. Input Design / Input

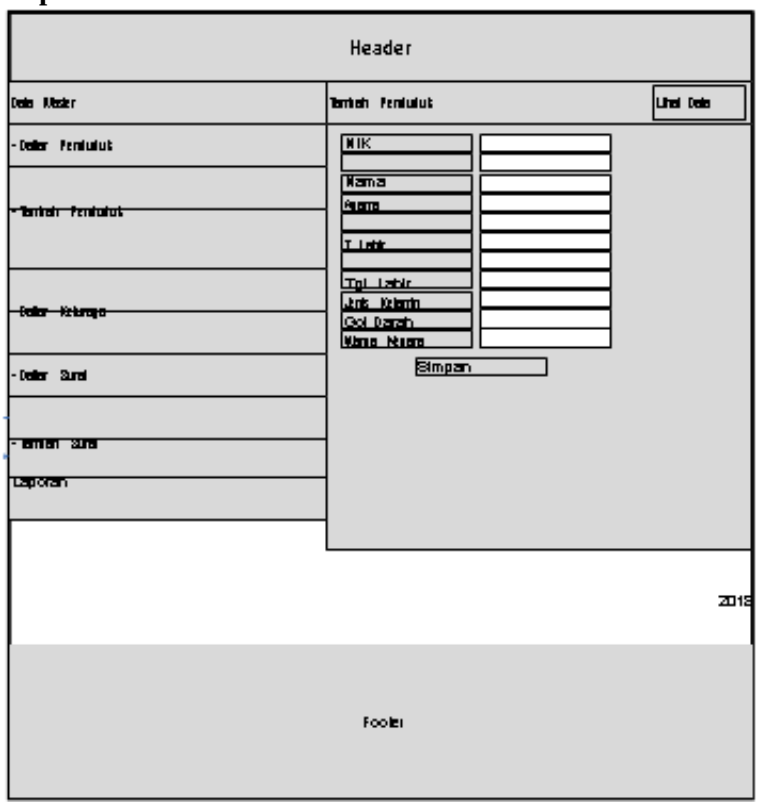


Figure 7Add Population Data

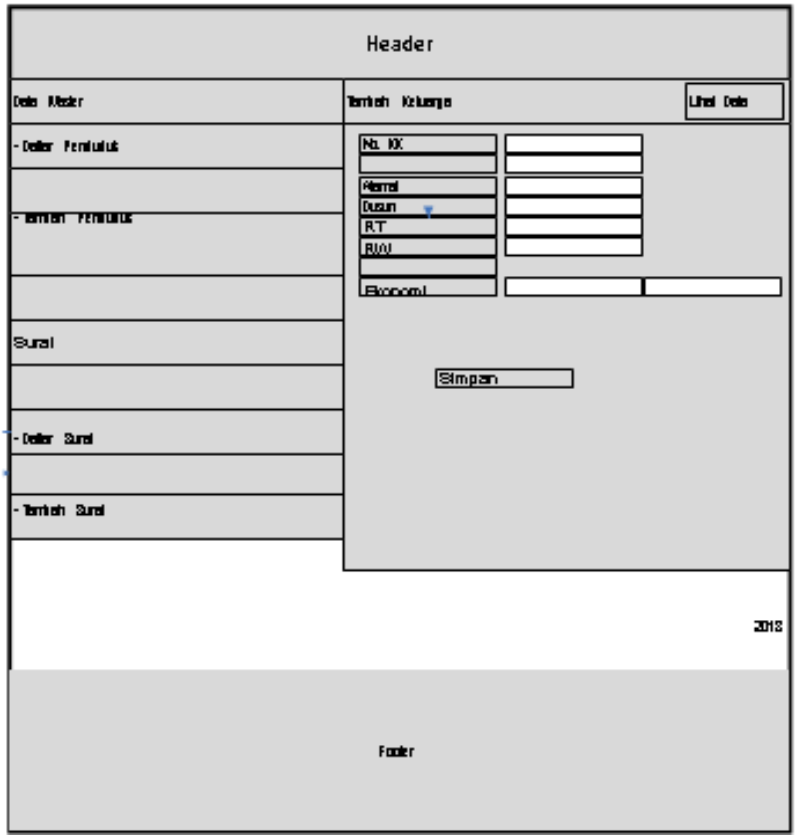


Figure 8Add Family Data

Implementation and Evaluation

System implementation is carried out by preparing several infrastructure including the installation process and system settings on personal computers that will be used by admins, users, as well as carrying out operational trials on the user's operating system.

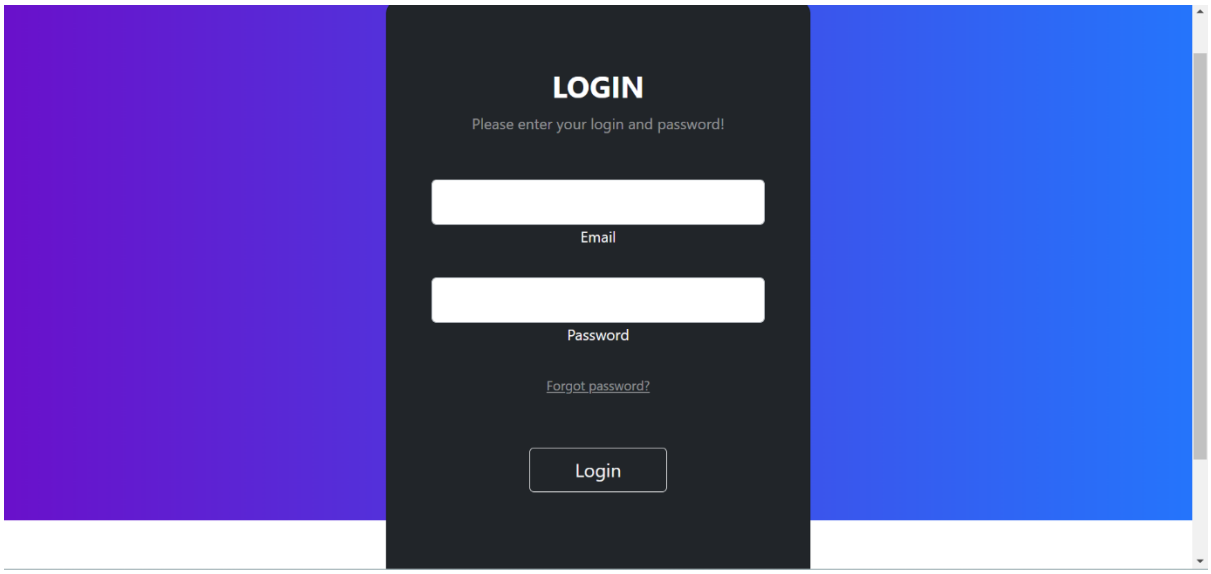


Figure 9Login Form

Figure 8 is a display of the login form which is used to identify registered system users by inputting their username and password. When a user wants to input data, they must sign in first.

Figure 10Main Menu

The main menu display in Figure 6 will appear if the user successfully logs in with a special code that has been registered in the system. On the main menu menu options will appear in the population registration and data collection system.

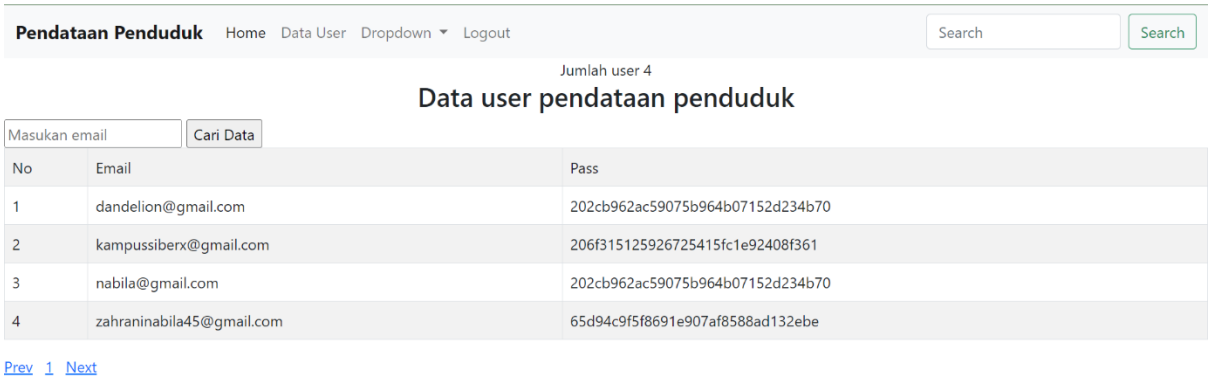


Figure 11User Data Form

CONCLUSION

Research on population data collection in the digital era by utilizing the power of the web to improve data quality shows that web-based population data collection has great potential to improve the quality of population data. Population data collection in the digital era is an important step in collecting, managing and utilizing population data effectively. In this case, utilizing the advantages of the web, such as PHP and MySQL, is an efficient solution in improving the quality of population data. The use of PHP as a programming language and MySQL as a database management system allows the development of reliable and responsive web applications for population data collection. Both provide advantages in terms of security, flexibility and performance needed in managing population data. The integration of PHP and MySQL in population data collection enables real-time data collection, fast data processing, easy accessibility for users, accuracy and efficiency of data collection. Web-based population data collection allows wider participation from various segments of the population, because respondents can easily fill in data via the devices they own. This produces more representative data and reduces bias in demographic analysis. In this way, data input errors can be reduced, data updates can be done quickly, and data accuracy can be increased. The advantage of the web in collecting population data also provides easy access for residents. They can fill out forms or submit their personal information through a user-friendly web interface. This reduces administrative burden, speeds up the data collection process, and increases community participation in data collection.

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