Design of an Inclusive Elderly Care Service (LANTERA) Based on Verbal and Non-Verbal Communication Methods

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Abstract

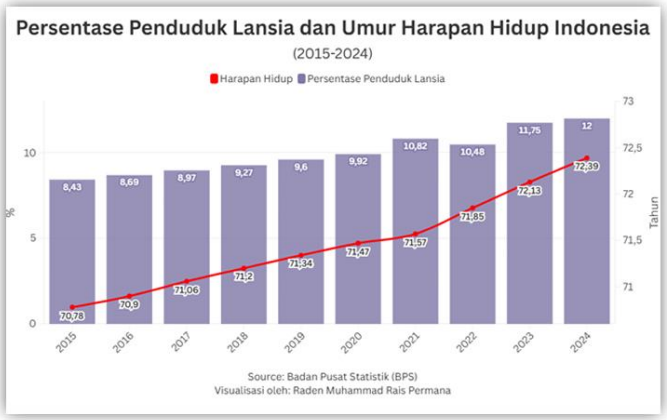
The increasing number of elderly populations in Indonesia has become a major concern for the government, leading to the formulation of the National Strategy for Ageing. This demographic shift presents significant challenges, particularly in terms of welfare and healthcare services, in order to achieve independent, prosperous, and dignified elderly lives.The rapid development of public service digitalization in Indonesia also raises challenges related to inclusivity, especially for elderly individuals who face limitations in accessing technology. A service approach based on local wisdom, incorporating both verbal and non-verbal communication, offers an innovative solution to improve accessibility and quality of elderly care services. Therefore, it is necessary to develop a digitalization model that integrates local cultural aspects to ensure effectiveness and elderly-friendly services.The urgency of this study is driven by the lack of technology adaptation that considers the characteristics of elderly users in accessing public services. This study aims to develop an inclusive digital service model called Lansia Tangguh Sejahtera (LANTERA) based on local wisdom and supported by verbal and non-verbal communication approaches.

This research employs a mixed-method approach (quantitative and qualitative). Data were analyzed using NVivo to measure digital literacy levels. The output of this study is a prototype design of a digital elderly care service application, which can be implemented by stakeholders through policy recommendations to establish a sustainable and inclusive elderly care system.

Keywords: *digitalization , inclusivity, verbal communication, non-verbal communication,*

1. INTRODUCTION

The increasing number of elderly populations in Indonesia has become a growing concern for the government, leading to the formulation of policies such as the National Strategy on Ageing. This demographic shift presents various challenges, particularly in terms of welfare and healthcare services, in order to achieve independent, prosperous, and dignified elderly individuals. The growth of the elderly population in Indonesia, according to WHO data (%) from 2015 to 2024, is presented in the following table.



Sumber : BPS, 2024

Figure 1**.** Indonesian Elderly and Life Expectancy (2015–2024)

According to Statistics Indonesia (BPS), the number of elderly individuals in Indonesia continues to increase annually in line with rising life expectancy (4). In general, elderly individuals tend to rely on assistance from others in carrying out daily activities due to declining physical conditions, making elderly care a significant challenge for families (6). The provision of care for the elderly is therefore essential as an effort to improve their quality of life, considering their limitations in performing social functions (7). The digitalization of public services has become an urgent necessity, including the provision of services for the elderly that are inclusive, adaptive, and grounded in local wisdom. However, there is currently a lack of government programs that directly address elderly users through culturally based digital services. Consequently, elderly individuals face a digital divide that hinders their access to healthcare, social services, and overall well-being. Moreover, information delivery remains a major challenge in the implementation of elderly services, particularly in terms of empowerment (8). Service innovation is therefore crucial, as it enables the public to access information more easily and contributes to improving public service delivery procedures (9). The digitalization of elderly services offers an innovative solution to enhance both the efficiency and effectiveness of service provision, making it an increasingly relevant area for further development (10).

Furthermore, advancements in information technology, particularly in computer vision—such as object detection and image processing (18)—have encouraged the application of technology in elderly services through the development of the *Lansia Tangguh Sejahtera (LANTERA)* system. The term “LANTERA,” meaning “a lamp that provides light,” symbolizes its role in accelerating access to information and healthcare services, while also accommodating communication needs through both verbal and non-verbal approaches.

2. RESEARCH METHODS

This study employs a mixed-method approach, integrating quantitative and qualitative methods with an exploratory-descriptive design to investigate the needs of elderly individuals in digital-based services and to align them with local wisdom in rural areas.

Data were collected through questionnaire surveys, in-depth interviews, participatory observations, and Focus Group Discussions (FGDs) involving elderly individuals, family members, caregivers, and relevant stakeholders. These methods were applied to comprehensively identify the needs, challenges, and barriers in the digitalization of elderly care services.

The collected data were processed and analyzed using NVivo to assess digital literacy levels, technology acceptance, and the effectiveness of the proposed digital service model. This methodological approach provides a robust analytical framework and generates descriptive insights into user perceptions within technology-based service contexts.

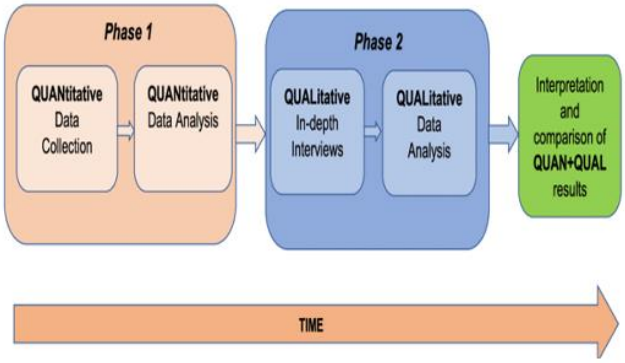


Figure 2. Research Flow, Creswell, J. W. (2014).).

2.1. Data Collection Techniques

Data were collected using the following methods:

- In-depth interviews: Conducted with elderly individuals, families, healthcare providers, and community leaders to explore their needs, challenges, and expectations regarding digital elderly services.
- Participatory observation: Used to examine communication patterns and social interactions of elderly individuals in daily activities.
- Questionnaire surveys: Administered to measure digital literacy levels, communication limitations, and preferences for digital services.
- Focus Group Discussions (FGDs): Conducted with stakeholders to collaboratively design a digital system aligned with elderly needs and local wisdom.

2.2 Data Analysis Techniques

The data were analyzed using:

- Thematic analysis for qualitative data
- Descriptive statistical analysis for quantitative data

The analysis was conducted through the following stages:

- Identification of verbal and non-verbal communication needs and how digitalization can be adapted to local cultural contexts
- Descriptive statistical analysis to measure digital literacy levels and specific needs for digital services among elderly individuals in Bandung Regency

3. RESULTS AND DISCUSSION

This study proposes the development of an innovative digital-based elderly service model, namely ‘Lansia Tangguh Sejahtera (LANTERA)’, through an approach that integrates information technology (face detection) with both verbal and nonverbal communication. The model is designed by incorporating local wisdom principles as a foundation to ensure an inclusive, accessible, and elderly-friendly service system, particularly for those with physical, cognitive, and technical limitations. Accordingly, the conceptual framework for designing this innovation emphasizes the integration of technological, social, cultural, and psychological dimensions."

3.1 Design of Digitalized Elderly Service System

The Lansia Tangguh Sejahtera (LANTERA) system is designed as a digital ecosystem that accommodates both verbal and nonverbal communication while preserving elements of local wisdom. The system encompasses the following components:

- A culture-based approach, incorporating the use of the Sundanese language as a primary option within the application and services.
- User-friendly digital accessibility, ensuring ease of use for elderly users through voice- and visual-based navigation features.
- Integration of verbal and nonverbal communication, supported by assistive communication tools such as large-text displays, speech-to-text functionality, and interactive video features.
- **Community-based services**, connecting elderly users with local communities, healthcare professionals, and family members through a digital platform."

3.2 Main Menu Design of the Digital Elderly Service Application

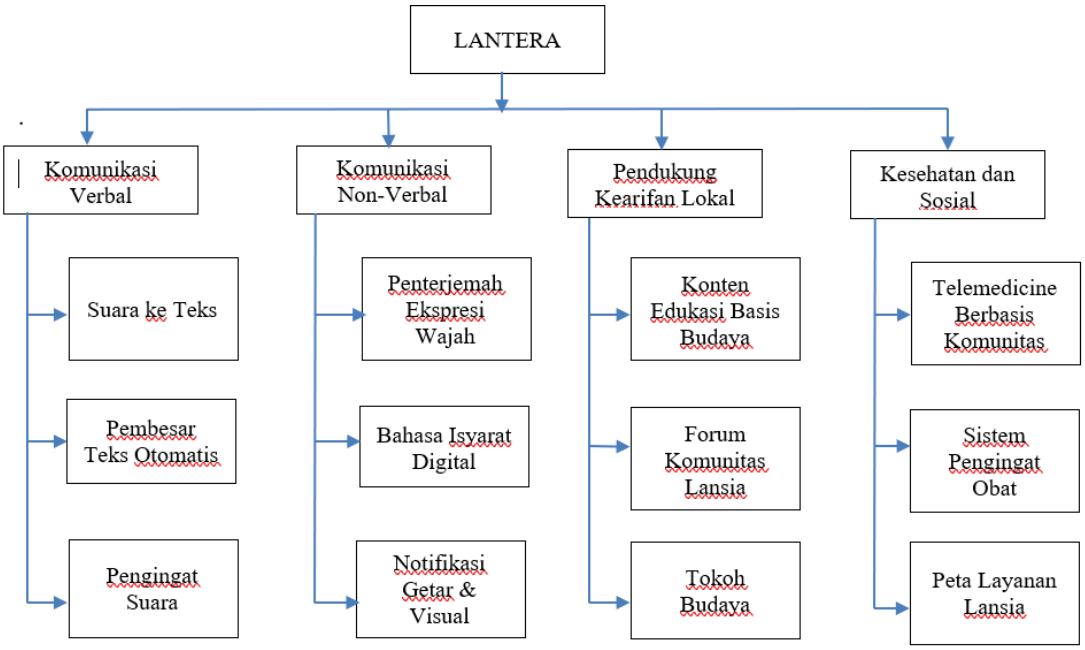


Figure 3. Main Menu Structure of the LANTERA Application

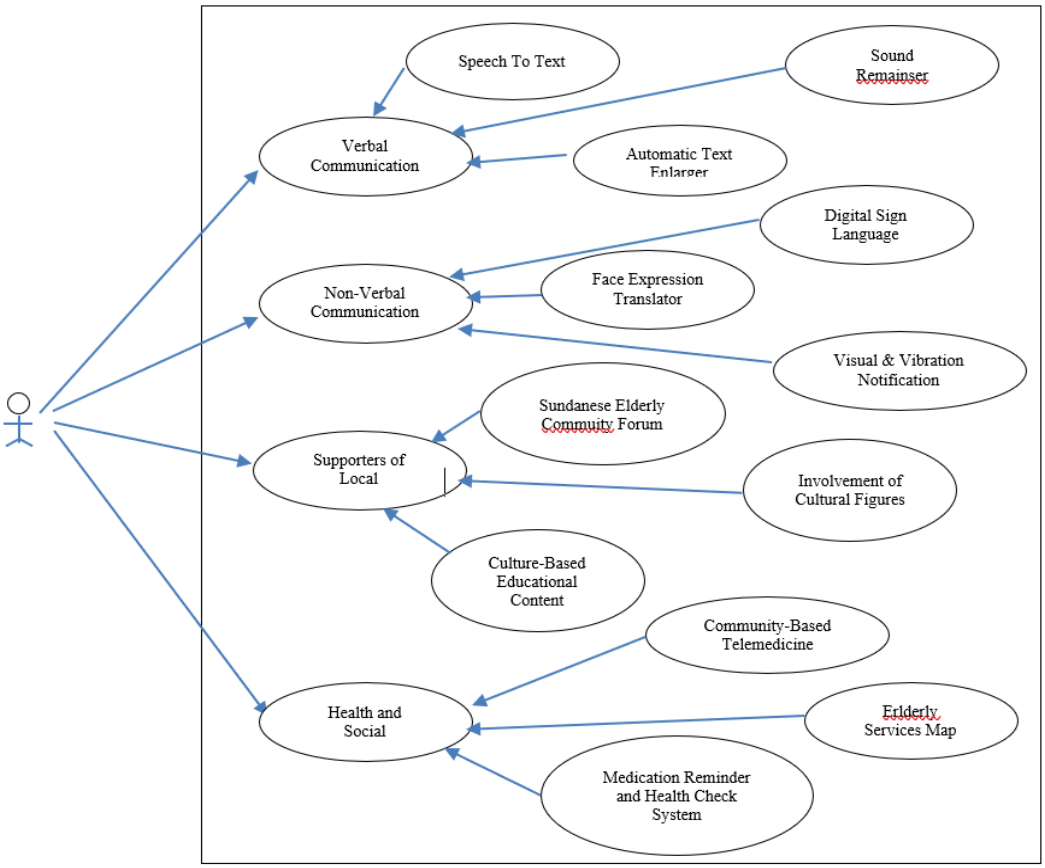


Figure 4. Use Case Diagram of the LANTERA Application

The results of the design of the LANTERA service innovation application can be described as follows :



Figure 5. Home Page Feature Flow of the LANTERA Application

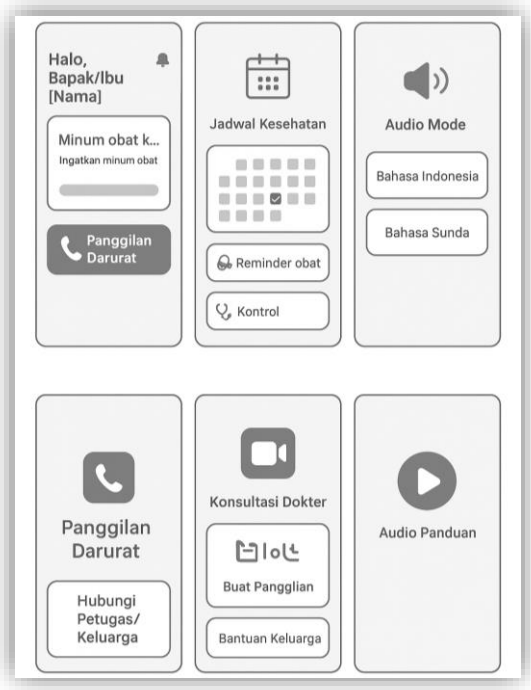


Figure 6. Home Screen Interface of the LANTERA Application



Figure 7. Schedule and Routine Health Services Interface

4. CONCLUSION

The proposed digitalization model offers several key benefits as follows:

1. It facilitates elderly users in utilizing the digital elderly service application, considering their physical limitations and varying levels of digital literacy.

2. It is expected to provide policy recommendations for local governments in implementing digital services based on local wisdom to enhance the well-being of the elderly population.

3. In the future, the model can be developed into a mobile-based application program accessible via smartphones.

4. This culturally-based digital elderly service application can be implemented in pilot areas before being expanded to a wider regional scale."

5. SUGGESTED

For future research, several considerations are identified as follows:

1. The LANTERA application should be accessible to elderly users in areas with limited internet connectivity.

2. It is necessary to encourage policymakers and technology stakeholders to provide adequate internet access to facilitate elderly users in accessing the LANTERA application.

3. The application's performance can be further enhanced, particularly in terms of access speed, through the implementation of appropriate programming techniques.

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