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ADVANCES IN SOCIAL HUMANITIES RESEARCH

INNOVATING ELDERLY CLOTHING FEATURES FOR ENHANCED WEARABILITY USING A DESIGN THINKING APPROACH

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Abstract

Elderly individuals aged 60 and above often encounter various challenges in daily activities, such as dressing up. These challenges include difficulties in donning and doffing clothing, the need for frequent changes of clothes, struggles with clothing due to tremors, and obstacles faced by some elderly individuals when dressing while seated. As individuals age, there is typically an increase in their level of dependency. This case research is conducted at the Panti Sosial Tresna Werdha Budi Pertiwi (Elderly Care home) in Bandung, focusing on the design of adaptive clothing. Utilizing a design thinking approach, this research identifies the challenges and needs of the elderly population. The design thinking process includes data collection through observations and interviews, analyzing the primary needs of the elderly, ideating and developing potential solutions, and conducting testing with prospective users. The research addresses six key aspects: comfort, ease of use, flexibility of movement, aesthetic appeal, convenience in storage and washing, and safety to minimize the risk of injury. This research was performed to develop adaptive clothing that simplifies the elderly's dressing and undressing process. The adaptive clothing design aligns with the United Nations Sustainable Development Goal (SDG) on "*Good Health and Well-being"* by enhancing the quality of life for the elderly through tailored designs that cater to their unique needs.

Keywords: Elderly, Adaptive Clothing, Design Thinking

Introduction

Elderlies (individuals aged 60 and above) often experience increased dependency as they age due to declining physical, psychological, and social conditions. This decline can hinder their ability to interact effectively with their environment (Siska 2023). The regulation of the Minister of Social Affairs number 12/2012 highlights the government's and senior citizens' shared responsibility in supporting social services for the elderly. In Bandung City, where the elderly population has reached 880,000, the Social Service, led by Soni Bakhtiar, has implemented Regional Regulation Number 2 of 2021, establishing Bandung as an Elderly-Friendly City (Diskominfo Kota Bandung, 2024).

This regulation supports programs and facilities tailored to the needs of the elderly, including nursing homes. Nursing homes provide living arrangements, 24-hour care, activities, and entertainment designed for senior citizens (Ningsih et al., 2018). However, managing nursing homes comes with challenges, particularly for elderly residents facing health issues or psychological disorders. Ageing results in physical changes, such as cellular degeneration and declines in major systems like respiratory, hearing, and vision (Hermawan, 2017).

The needs of the elderly differ from those of younger individuals, requiring specific resources and support. Nursing homes provide a practical solution by offering these resources while adapting to changing societal values. To address these challenges, the government has introduced policies and programs focused on improving the social welfare of senior citizens and addressing their unique needs (Krisman Gea et al., 2024).

The empathize stage revealed several issues faced by Panti Sosial Tresna Werdha Budi Pertiwi (PSTW) residents, particularly physical limitations that impact their ability to carry out daily tasks such as moving, communicating, and meeting personal needs. These limitations often lead to psychological effects, such as dependence on others and requiring caregiver assistance in everyday activities. A common issue involves difficulties with dressing, including challenges in putting on and removing clothes due to tremors, frequent clothing changes, and struggles faced by elderly individuals who dress while seated. This demonstrates the urgent need for adaptive clothing as a practical solution for these challenges.

This initiative supports the Sustainable Development Goals (SDGs) by focusing on improving the quality of life for the elderly. The SDGs aim to promote sustainable development, human rights, environmental protection, and inclusivity to ensure no one is left behind (Bainus & Rachman, 2018). Government efforts to implement these goals can promote equality and sustainability at all societal levels (Hidayahtullah, 2024). Precisely, designing adaptive clothing aligns with SDG Goal 3, "Good Health and Well-being," by enhancing the quality of life for the elderly through improved access to health services, a safe environment, and tailored solutions.

Research Method

This research employed a design thinking approach to identify the challenges and needs of elderly residents at the *Panti Sosial Tresna Werdha Budi Pertiwi* (PSTW). The process was carried out through sequential stages, including data collection, in-depth analysis of user needs, and the development of contextually relevant solutions (Soewardikoen, 2024). In the empathize stage, data were collected through observation and 360-degree interviews, followed by the define stage, where the data were analyzed to identify the primary issues in the nursing home. During the ideate stage, potential solutions were developed and materialized into prototypes, which were then tested in the testing stage with prospective users to evaluate their effectiveness.

A Likert scale was used to measure attitudes, opinions, and perceptions of individuals or groups (Rohmad & Sarah, 2021), enabling the evaluation of sketches based on six criteria derived from the researcher's interpretation of user behavior and preferences. The approach remained user-oriented, focusing on addressing the specific needs of the elderly.

Figure 1 Design Thinking Stages

Source: Hanifah, 2025

Results and Discussion
Emphatize
a. Observation

Figure 2 Panti Sosial Tresna Werdha Budi Pertiwi
Source: Documentation – Hanifah, 2025

Figure 3 Hall of Panti Sosial Tresna Werdha Budi Pertiwi
Source: Documentation – Hanifah, 2023

Panti Sosial Tresna Werdha (PSTW) Budi Pertiwi was founded by Budi Istri Association in Bandung City on December 19, 1947. It is located at Jl. Sancang No. 2, Burangrang, Lengkong District, Bandung City, West Java, 40262.

The PSTW provides a range of activities to improve the well-being and quality of life of its elderly residents. These include medical care on Saturdays, yoga and other sports, weekly religious studies, *angklung* music sessions, and opportunities to pursue hobbies like knitting.

The facility is equipped with six bedrooms, each housing four residents, bathrooms with railings for safety, a garden with shady plants, a hall for events or meetings, a living room, and caregiver facilities such as a kitchen and a drying area.

b. Interviews

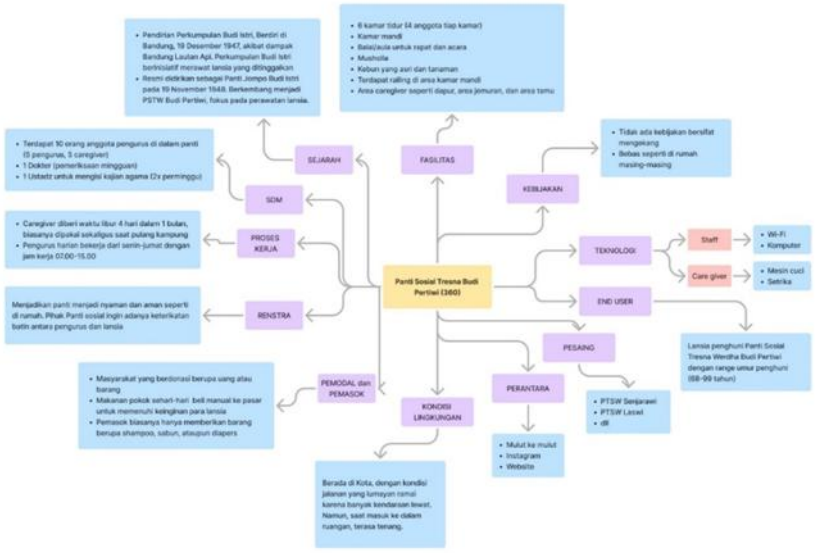

Figure 4 Interview 360
Source: Pre-project Lecture Report, Hanifah 2025

Interviews were conducted with the coordinator of *Panti Sosial Tresna Werdha Budi Pertiwi* (PSTW), caregivers and the elderly. The interview results show that *Panti Sosial Tresna Werdha Budi Pertiwi* (PSTW) has relatively complete facilities, including six bedrooms, a hall for events, and bathrooms with railings to prevent falls. Ten staff members manage the home: five administrators and five caregivers. A doctor visits for routine medical check-ups weekly, and a cleric provides religious studies twice weekly. Caregivers are given four days off each month. At the same time, administrators work Monday to Friday from 07:00 to 15:00. The home's operations are funded by community donations, with supplies such as shampoo, diapers, and soap provided by donors. The home primarily relies on word-of-mouth to promote its activities. Technology includes Wi-Fi and computers for staff, irons and washing machines for caregivers, and televisions in each resident's room. Some challenges the elderly face include frequent falls and difficulties in performing daily tasks, which require assistance from caregivers (INTERVIEW).

Some elderly residents need special care, such as assistance with bathing and dressing. Most elderly individuals dress while sitting, though some need help dressing while lying down. Their clothing is usually designed with a split in the middle to make it easier to wear. While some elderly residents feel uncomfortable using diapers, those with difficulty walking must wear them. Elderly residents who can still walk, however, are not required to use diapers. Elderly individuals dress in three prominent positions: standing briefly, sitting, or lying down for those with special needs. Dressing challenges include difficulties putting on clothes, requiring caregiver assistance, frequent changes for certain conditions, and discomfort caused by tremors or unsuitable fabrics. Materials like cotton, crinkle, and chiffon are commonly worn, but the elderly prefer cotton and rayon for comfort. Popular motifs include floral and plaid designs. Common outfits are two-piece sets (pants or skirts with tops) or one-piece garments like dresses. Clothes are usually changed twice daily (morning and evening), three times in hot weather, or more

often for specific conditions. Preferred features include pockets, a comfortable fit, front openings, and practical designs without buttons (INTERVIEW).

Define

The define stage was the second phase of the design thinking process. In this stage, data gathered from interviews and observations were analyzed to identify the core problems and challenges faced by the *Panti Sosial Tresna Werdha Budi Pertiwi* (PSTW). This stage aimed to synthesize information into actionable insights, forming a foundation for innovative and effective solutions (Soewardikoen, 2024).

SWOT Analysis

The SWOT analysis served as a preliminary strategic tool in the ideation process, offering valuable insights and guidance for designing optimal solutions. At the *Panti Sosial Tresna Werdha Budi Pertiwi* (PSTW), the SWOT analysis results, particularly the cross between threats and opportunities, informed the problem-solving approach. This approach resulted in the design of adaptive clothing tailored to the elderly's needs, enabling them to dress independently while also supporting caregivers in addressing the elderly's complex physical requirements.

Table 1. SWOT Cross Matrix

Strengths-Weakness	***Weakness-Opportunities***
The home has a long and notable history, as Indonesia's first president, Ir Soekarno, once visited it. However, the limited utilization of digital media to raise awareness has restricted information dissemination about the institution.	Fostering a sense of unity and familial connection among residents remains challenging. Consequently, there is an urgent need to develop programs that promote the emotional and physical well-being of the elderly.
Threats - Opportunities	***Strengths- Threats***
The physical needs of the elderly, such as their vulnerability to health issues, risk of falls, and mobility limitations, necessitate adaptive products that are easy for them to use. These products can assist caregivers in providing better care while reducing the risk of injuries.	The home operates without financial burdens due to community donations. However, this reliance on external donors renders the funding inconsistent and highly dependent on the goodwill of benefactors to cover daily operational needs.

After conducting SWOT analysis at *Panti Sosial Tresna Werdha Budi Pertiwi* (PSTW) and getting the results of the SWOT crossover, problem-solving is carried out using a combination of threats and opportunities. The result of this combination is designing adaptive clothing that is easy for the elderly to wear on their own while making it easier for caregivers to fulfill the complex physical needs of the elderly.

Ideate
Mind Map and Concept

Figure 5. Mind Map
Source: Hanifah, 2025

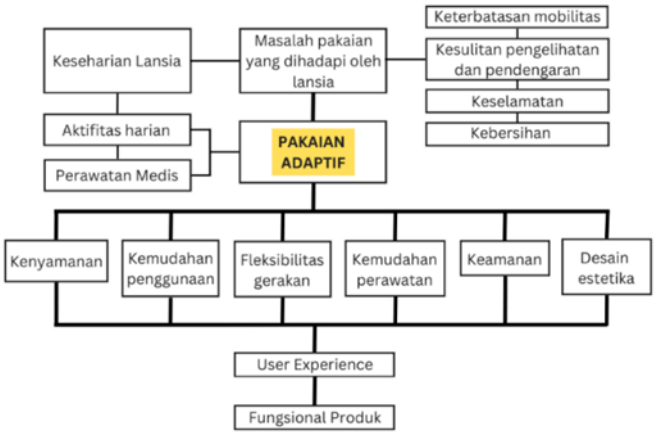

Figure 6 .The Concept of Adaptive Clothing
Source: Hanifah, 2025

The elderly at the *Panti Sosial Tresna Werdha Budi Pertiwi* (PSTW) need comfortable everyday clothing. Currently, the clothes they wear are mostly donated; however, some of the clothing does not fully support the daily needs of the elderly. Their challenges with clothing include limited mobility, safety, and cleanliness. Therefore, the elderly need clothing that prioritizes comfort, ease of use, flexibility of movement, ease of care (washing and storage), aesthetics, and safety (to prevent the risk of injury).

Moodboard

Figure 7 Moodboard
Source: Hanifah, 2025

The moodboard showcased visual elements reflecting the needs of elderly individuals aged 69-99, focusing on clothing designed to enhance comfort during daily activities. It also depicted the living environment of the elderly and the activities they typically engage in. Additionally, the moodboard included details on the types of fabrics, patterns, and clothing features, such as garments with A-line silhouettes and practical openings equipped with zippers or hook-and-loop fasteners at the front and on the arms.

Sketch

The following are 10 sketches created based on the moodboard. These sketches encompass designs for both two-piece garments, such as combinations of tops with pants or skirts, and one-piece garments, such as dresses. All designs prominently feature openings on the front and arms to enhance ease of wear and accessibility.

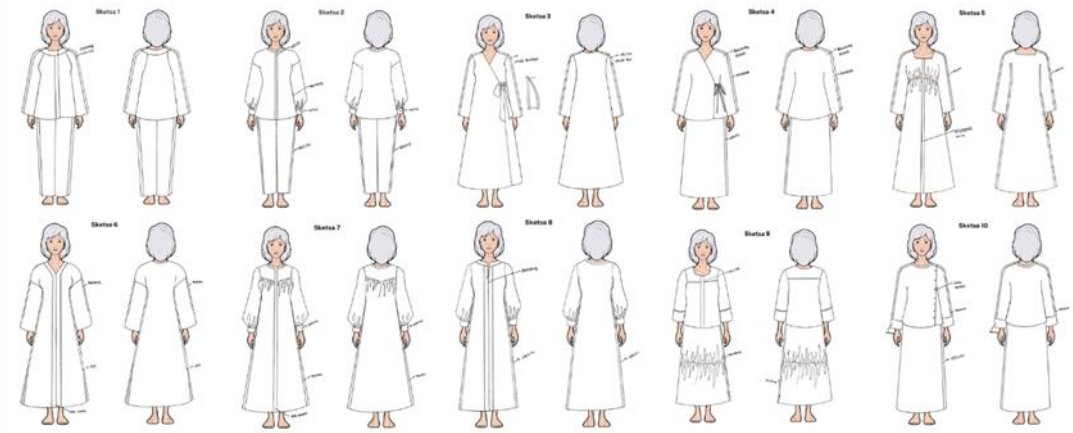

Figure 8. 10 Sketches
Source: Hanifah, 2025

Table 2. Scoring Sketch

Score 1-5	**Criteria**	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
1: Highly uncomfortable 2: Uncomfortable 3: Comfortable 4: Quite comfortable 5: Highly comfortable	Comfort	4	4	5	4	4	4	4	5	4	4
1: Highly difficult to use 2: Difficult to use 3: Easy to use 4: Quite easy to use 5: Highly easy to use	Ease of Use	4	3	4	3	5	5	4	4	3	4
1: Highly restrictive 2: Restrictive 3: Moderately restrict movement 4: Somewhat supportive 5: Highly supportive	Flexibility	4	4	5	4	3	4	4	4	3	4
1: Highly unattractive 2: Unattractive 3: Attractive 4: Somewhat attractive 5: Highly attractive	Design	3	4	4	4	5	3	5	5	3	3
1: Highly difficult to maintain 2: Difficult to maintain 3: Easy to maintain 4: Somewhat easy to maintain	Maintenance	4	4	4	3	4	4	4	4	5	5

5: Highly easy to maintain											
1: Highly unsafe 2: Unsafe 3: Safe 4: Somewhat safe 5: Highly safe	Safety	5	4	5	4	5	5	4	5	4	4
Total		24	23	**27**	22	**26**	25	25	**27**	22	24

Based on the 10 sketches that have been created, a scoring process was carried out using six criteria such as comfort, ease of use, flexibility of movement, aesthetic design, ease of care, such as washing and storage, and safety, such as avoiding the risk of injury or discomfort. The scoring results identified three sketches as the top performers in the evaluation of each criterion.

After that, a presentation was made to the client regarding the three selected sketches to determine the most superior sketch according to the needs of the elderly; besides that, the nursing home also provided input regarding the sketches so that the design solution achieved optimal results.

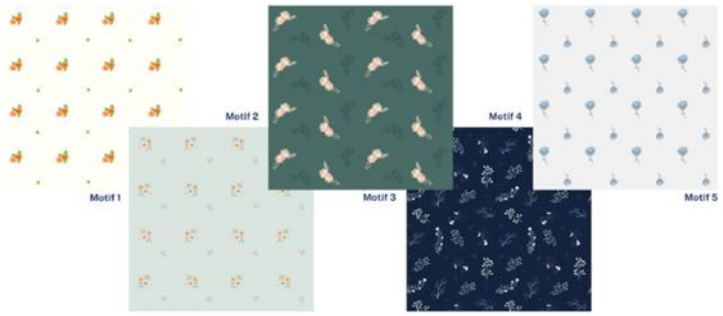

Figure 9 Design Motifs
Source: Hanifah, 2025

The motif design was informed by interview findings, which revealed that most elderly residents preferred small floral patterns. The selected motif, motif 4, featured a navy base color paired with white fabric. The navy color was chosen for its calming properties, which can help reduce stress and anxiety often experienced by the elderly. The white color provided sufficient contrast, making the design easily recognizable, especially for elderly individuals with mild visual impairments. The final sketches and motifs were based on direct discussions with the elderly residents and the nursing home coordinator. The outcome was the adaptive clothing design tailored to meet the specific needs of the elderly population:

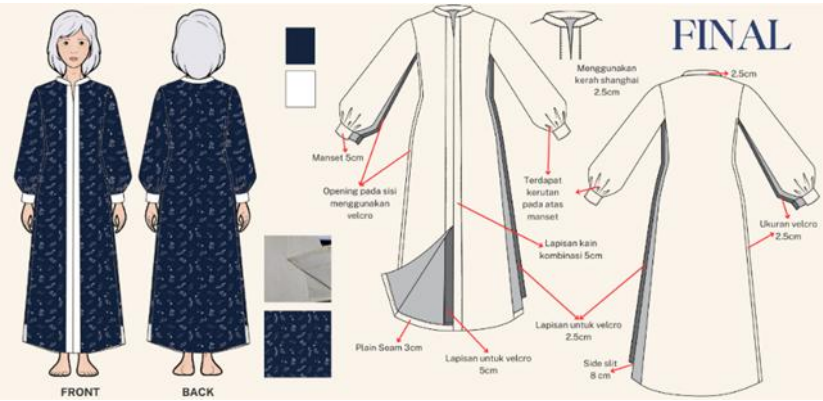

Figure 10 Final Design
Source: Hanifah, 2025

Prototype

The prototype in this research was developed based on a selected sketch identified through discussions with the *Panti Sosial Tresna Werdha Budi Pertiwi* (PSTW). The chosen sketch featured an opening design at the center of the front and along the side, extending from the wrist to the bottom of the skirt. The adaptive clothing was made using cotton fabric with printed motifs selected by the elderly and produced in standard sizes L-XL. To enhance accessibility, the opening design underwent an exploration phase, testing four different opening features to determine the most practical and user-friendly option for the elderly.

Table 3. Opening Exploration

Opening Feature	Results	Description
Magnet		The magnetic closure lacks sufficient strength, making it prone to coming off easily.
Hoop and Loop		Hoop and loop fasteners are the most user-friendly option for the elderly.

Zipper		Invisible zippers, commonly used by the elderly, often get stuck, creating difficulties. Therefore, replacing them with standard jacket zippers could be a more practical solution.
Snap Button		Snap buttons are excessively tight, causing challenges for the elderly in fastening or securing them properly.

The trial of these opening features revealed that the hoop-and-loop fastening system was the most effective solution. This feature makes it easy for the elderly to fasten and unfasten independently and quickly without requiring significant effort, unlike other options. Based on this finding, the hoop-and-loop feature was incorporated into the garment's pattern, including a beff or additional fabric to ensure practicality and comfort.

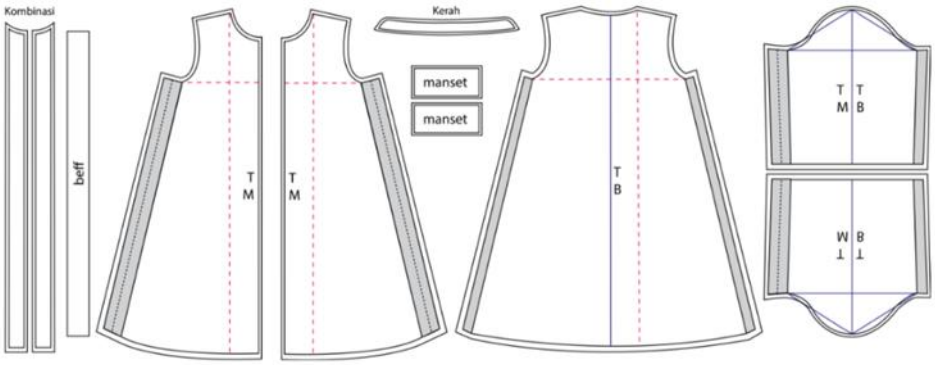

Figure 11 Design pattern
Source: Hanifah, 2025

The final prototype included completed garments in sizes L-XL and 3D visualizations of the design. The results of the adaptive clothing design prototype demonstrated its functionality and suitability for the elderly's needs.

Figure 12 Prototype
Source: Hanifah, 2025

Tesing

The testing phase was conducted directly at the *Panti Sosial Tresna Werdha Budi Pertiwi* and involved four elderly individuals and one caregiver. The following results were observed: the elderly were able to wear the clothes while standing, but they could not remain standing for prolonged periods. The use of hook-and-loop fasteners proved to be more practical than buttons, significantly aiding ease of use. The elderly participants preferred the color and motif, finding them visually appealing. The clothing was noted to feel loose but comfortable for walking. The fabric, made from Toyobo cotton, provided comfort and was not overly warm for the elderly. However, the prototype had some shortcomings, particularly with sizing. The standard L-XL sizes did not fully accommodate the elderly participants' body shapes, resulting in a poor fit.

Figure 13. Testing
Source: Hanifah, 2025

Conclusions

The design thinking process that consisted of empathize, define, ideate, prototype, and testing stages successfully addressed the needs and challenges faced by the elderly at the *Panti Sosial Tresna Werdha Budi Pertiwi* (PSTW). This research started with observations and interviews during the empathize stage, followed by data analysis in the define stage, concept and sketch development in the ideate stage, and culminating in the creation and testing of a functional prototype. The research highlighted the primary

obstacle of physical limitations among the elderly. These limitations often create difficulties in performing basic tasks, such as wearing everyday clothing.

The conclusion of this research on the design and development of adaptive clothing for the elderly emphasizes that clothing design must address the unique needs of elderly individuals, particularly their limited mobility, which impacts daily activities. The goal of adaptive clothing is not only to provide comfort but also to enhance the elderly's quality of life by facilitating their daily routines. From the user's perspective, adaptive clothing should prioritize comfort, ease of use, and aesthetic appeal to boost self-confidence. The flexible clothing design should accommodate various situations, as the *Panti Sosial Tresna Werdha Budi Pertiwi* (PSTW) frequently hosts events involving the participation of the elderly.

The clothing design must also ensure ease of donning and doffing the clothes, considering the physical limitations of the elderly. The material choice is crucial, as it must prevent irritation and discomfort, particularly for the elderly's sensitive skin. Regarding safety, the clothing design should minimize the risk of falls and be suitable for use when sitting or lying down. All design elements must aim to foster independence and improve the quality of life for the elderly. Suggestions for improving the design of adaptive clothing include offering a wider range of sizes, such as XS, S, M, L, and XL, or tailoring sizes to individual body measurements to ensure a better fit and comfort. Additionally, incorporating elastic materials or adjustable features like straps or rubber in certain areas of the clothing could enhance flexibility and comfort. For smaller sizes, elastic materials should be carefully selected to avoid discomfort such as itching.

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