

# Enhancing Elderly User Experience: Video-Based Social Media Selection using Analytical Hierarchy Process (AHP)

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**Abstract**—In today's digital era, social media has become an important means of social interaction and exchange of information. However, for older parents, choosing a social media platform that suits their preferences and needs can be a challenge. In this study, an approach is proposed to improve the experience of elderly users by selecting video-based social media using the Analytical Hierarchy Process (AHP) method. The AHP method is used to build a framework for selecting video-based social media that considers criteria and sub-criteria that are relevant to the needs of parents. The criteria considered include an elderly-friendly user interface, technological sustainability, availability of relevant content, ease of use, and safe social interactions. The sub-criteria and their weights are determined through a scoring and ranking process based on expert judgment and user experience. In the development stage, we implemented the AHP framework in the form of a video-based social media recommendation system. This system allows senior users to choose the social media platform that best suits their preferences, taking into account the individual preferences and needs of the users. In the trial, we engaged a group of older parents to use the proposed recommendation system. The results show that the AHP approach can help improve the experience of senior users in choosing a social media platform that suits their needs. Individually tailored recommendations allow them to find relevant social circles, increase connections with family and friends, and increase engagement in online activities. Facebook is 0.4092; YouTube is 0.3912; WhatsApp is 0.1996. The final priority result of social media that is right to be used with the first order is Facebook.

**Keywords**— Elderly User Experience, Video-Based Social Media Selection, Analytical Hierarchy Process (AHP), loneliness

## I. INTRODUCTION

The psychological problem that is often experienced by the elderly is loneliness. Loneliness is a feeling of isolation or alienation in which a person feels separated from others and feels different [1]. This loneliness can cause social disruption in individuals and can hurt physical and mental health. Seniors who feel lonely often don't have anyone to shop and eat with, which affects their overall health[2].

The main cause of loneliness in the elderly is the loss of a loved one. This can be caused by family conflicts, the presence of a third party in the relationship, the death of a spouse or child, or even exclusion by the family. Information from the orphanage staff also confirms that many elderly people feel lonely because of a lack of attention from their families. In addition, aloofness, lack of understanding, and frequent peer conflicts further exacerbate relationships and increase feelings of loneliness. As a result, the elderly tend to be alone more often, reflect, cry, and even experience stress due to the lack of effective ways to deal with loneliness[3]. Although the orphanage staff tried to get rid of feelings of loneliness, these efforts were temporary due to limited time and activities at the orphanage. On Saturdays and Sundays, when there are no activities at the orphanage, feelings of loneliness in the elderly reach their peak[4].

In Indonesia, loneliness in the elderly is the second biggest psychosocial problem after forgetfulness. Older people in cities usually deal with loneliness by using social media as a way to stay connected with others and expand their social network[5]. By using social media, they can interact with old friends and

family and even form new relationships with people who share the same interests and hobbies. Social media also allows them to share experiences, stories, and pictures with others. This can help reduce feelings of loneliness and improve the quality of life of the elderly by expanding their social network through online platforms[1][2][6]. The social media most frequently used by the elderly in big cities are Facebook, YouTube, WhatsApp, Instagram: and so on.

The lack of expertise in using digital media as a tool to access social media is just one reason why older people are reluctant to use the technology. Many other, more complex reasons make older people reluctant to use social media. Even though internet penetration among the elderly is still low, it is not uncommon to find elderly people who actively use social media to interact with their environment. This differentiates the experience of the elderly in this group from that of the elderly in general[7]. Therefore, it is important to know the experience of the elderly in this group when learning to use social media.

Four criteria representing the selected video-based social media for the elderly, including:

1. Social media should have a simple and intuitive user interface. Users should easily find the main features and simple navigation. In addition, privacy and security must also be taken seriously[4][1].
2. Responsive Design and Effective Search: Social media must have a responsive design for optimal viewing across a variety of devices, including mobile phones, tablets, and computers[6][8].

3. **Easy Content Sharing:** Social media should provide content-sharing features that are simple and easy to use. Users need to be able to quickly share text, photos, videos, links, and other multimedia content with their friends[4].
4. **Rich Social Interaction:** Social media should support complete social interactions, such as comments, likes, shares, and direct messages between users. These features allow users to easily interact with friends, family, or the community[9].

This research aims to address this need by proposing an approach to enhance the user experience of the elderly in selecting video-based social media through the application of the Analytical Hierarchy Process (AHP). AHP is a decision-making method that allows for the systematic evaluation and prioritization of criteria and sub-criteria. By leveraging AHP, a framework for selecting video-based social media will be developed, considering relevant criteria and sub-criteria that cater to the needs of the elderly[6][10].

The criteria to be considered in the framework include user-friendly interfaces for the elderly, technological sustainability, availability of relevant content, ease of use, and safe social interactions [11]. The sub-criteria and their respective weights will be determined through expert assessments and user experiences. This comprehensive approach will enable the development of a recommendation system that suggests video-based social media platforms tailored to the individual preferences and requirements of elderly users[10][12].

The results will demonstrate how the AHP approach can improve the user experience of the elderly in selecting video-based social media platforms that cater to their needs.

## II. METHODOLOGY

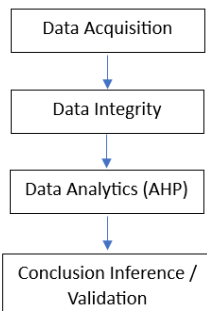


Fig. 1. Research flow

### A. Data Acquisition

Data acquisition is the main activity in research carried out using observation, in-depth interviews, and documentation or a combination of the three (triangulation). This research was conducted in the Jakarta area, Indonesia, where the number of elderly who generally use Android devices/smartphones for their communication purposes is 40 male elderly and 170 female elderly with an average age of 51 to 70 years[13][14]. The interviews used were unstructured, namely free interviews that did not use a systematic arrangement of interview guidelines but only an outline of the problems that would be asked and later added questions that would arise along with the circumstances during the interview process regarding the use of social media-based videos among the elderly.

### B. Data Integrity

The qualitative method is more appropriate to use the term authentic (trustworthy or valid) rather than validity. Because authentic means more to providing fair and honest descriptions, information, and information. It must be ensured that the results obtained and their interpretation are correct. Interpretation must be based on the information submitted by the participant and not the researcher's composition. The size of the data position means that the validity of the data requires an inspection technique, namely an examination using data triangulation. Triangulation in testing data from various sources in various ways and at various times. Thus there is a triangulation of sources, triangulation of data collection techniques, and time. In this study, researchers used triangulation of data sources by comparing and re-checking data obtained from different sources, such as comparing data obtained through observation with interviews, so that they can conclude whether the data is valid or not.

- **Data Reduction/data reduction** is a selection process, focusing attention on simplifying, abstracting, and transforming raw data that emerges from written records in the field[1].
- **Data Display/Presentation** of data, presenting data is several structured information and provides the possibility of drawing conclusions and further actions. Presentation of data tends to lead to simplification of data so that it will be easy to understand[15].

### C. Data Analytics (AHP)

This method uses qualitative methods, while the research used is a descriptive approach. The descriptive approach is data analysis which is carried out by collecting data, managing data, and then presenting observation data.

- **Decomposition**, making complex system hierarchies easy to understand by breaking them down as supporting elements, arranging elements hierarchically, and combining them or synthesizing them. This study was divided into four criteria used in this assessment, namely Intuitive User Interface (A), Features Responsive Design and Effective Search (B), Easy Content Sharing (C), and Rich Social Interaction (D)[16].
- **Comparative judgment.** Assessment of criteria and alternatives is carried out by pairwise comparisons. A scale of 1 to 9 is the best scale for expressing opinions. The definition and Value of Qualitative opinion from the comparison scale can be measured using an analysis table[17].
- **Synthesis of Priority.** For each criterion and alternative, pairwise comparisons must be made. With predetermined judgment, the relative comparison values of all alternative criteria can be adjusted to produce priorities and weights. Priorities and weights are calculated by manipulating the matrix or by solving mathematical equations[1].[7]
- **Logical Consistency,** Consistency has two meanings, the first being that the same objects can be grouped according to their relevance and uniformity. The second concerns the level of a relationship between objects based on certain criteria[14].

In the decision-making process, it is very important to know how good the consistency is. The AHP method considers a

logical consistency value in the assessment used to determine a priority.

The consistency value is calculated based on the following equation. (1),(2)

$$CI = \frac{\lambda - n}{n - 1} \quad (1)$$

$\lambda$  maks = number of results

$n$  = many criteria

CI = Consistency Index

$$CR = \frac{CI}{IR} \quad (2)$$

CI = Consistency Index

CR = Consistency Ratio

IR = Indeks Rasio (ratio index value depends on matrix size)

The resulting consistency ratio must be less than 10%, if the consistency value exceeds 10% then the data provided by the decision maker must be corrected again.

D. Conclusion Drawing/Verification, (conclusion and verification), the conclusion is the last step in preparing a report. Concluding is an attempt to find or understand the meaning and regularity of explanation patterns, causal flows, or a proposition. The results of the research will be compiled, and further discussion will be carried out by referring to the opinions of experts regarding the research carried out, and finally conclusions will be drawn.

#### E. Social Media

The social media most often used by the elderly in big cities including:

- Facebook has a wide and diverse user base, including the elderly. This platform allows seniors to connect with old friends, family, and relatives who may be in distant locations. In addition, Facebook also provides features such as community groups that allow the elderly to join communities that share the same interests, such as discussion groups about their hobbies or school alumni groups. Thus, Facebook has become one of the most popular social media choices for the elderly in big cities[7][4][5].
- WhatsApp: WhatsApp is an instant messaging application that is popular among all age groups, including the elderly. Through WhatsApp, seniors can send text messages, share photos, and make voice or video calls with friends, family, and groups they belong to[3][19].
- YouTube: YouTube is a broad video-sharing platform. Seniors can access interesting content such as music, tutorials, lectures, and much more. They can also create and upload videos according to their interests and experiences[4][3].

### III. RESULTS AND DISCUSSION

#### 1. Decomposition

The problem of choosing video-based social media for the elderly must meet several criteria and alternatives. Through data processing using the Decomposition, Comparative, and Synthesis of priority Consistency methods, four criteria must be considered, namely:

- A. Intuitive User Interface.
- B. Responsive Design with Features and Effective Search.

- C. Ease of Sharing Content.
- D. Rich Social Interaction.

Meanwhile, three video-based social media alternatives can be considered the best, namely: YouTube, WhatsApp, and Facebook.

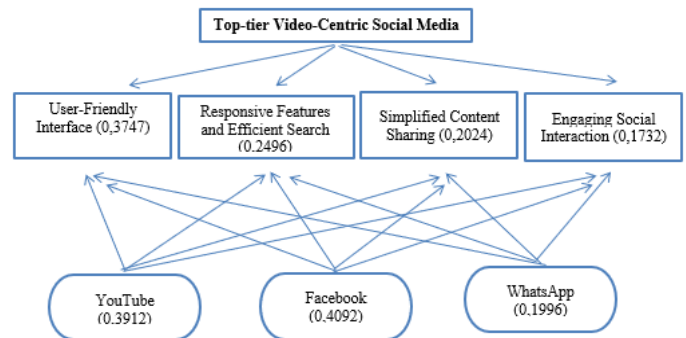


Fig. 2. Decomposition

The line that connects the boxes between levels is a representation of the relationship that needs to be measured through pairwise comparisons with directions to a higher level. Level 1 is the aim of the research, namely choosing alternative social media listed at level 3. Factors at level 2 are measured through pairwise comparisons with directions to level 1. The hierarchy above describes problem-solving, which is divided into several parts, namely objectives, criteria, and alternatives.

#### 2. Comparative Judgement

Each element in the criteria and alternatives is compared in pairs to obtain an assessment of the relative importance of the two elements and is written in the form of a pairwise comparison matrix (Pairwise Comparison). The numbers that will be included in the pairwise comparison matrix are obtained from the questionnaires that have been filled out by the respondents.

PAIR COMPARISON MATRIX BETWEEN CRITERIA				
	A	B	C	D
A	1	1.95997	1.56508	1.96631
B	0.51021	1	1.52467	1.49018
C	0.63894	0.65588	1	1.20644
D	0.50857	0.67106	0.82889	1
Jumlah	<b>2.65772</b>	<b>4.28691</b>	<b>4.91864</b>	<b>5.66293</b>

#### 3. Synthesis of Priority

After making a pairwise comparison matrix, the next thing is to determine the vector or average value (Local Priority) of each pairwise comparison matrix. Synthesis is carried out as many as the number of comparison matrices that have been made, including:

TABLE I. Normalized

NORMALIZATION AND EIGEN VECTOR/LOCAL PRIORITY						
	A	B	C	D	amount	Eigen vector/local priority
A	0.37626	0.45720	0.31819	0.34722	1.49888	0.37472
B	0.19197	0.23327	0.30998	0.26315	0.99837	0.24959
C	0.24041	0.15300	0.20331	0.21304	0.80976	0.20244
D	0.19135	0.15654	0.16852	0.17659	0.69300	0.17325

The value in each column will be divided by the number of columns. From this step, we will get normalized relative weights; the sum of all columns is 1. Next, determine the average value of each row to get the priority vector value; the calculation results can be seen in Table 2. In the next step, the value for each column for each criterion in Table 3 is obtained from the matrix multiplication, namely between the pairwise comparison matrices on the main criteria and the priority vector.

### 3. Consistency

The Consistency Process will determine the truth of the eigenvector values obtained from the Synthesis of the Priority process that has been made.

a. The pairwise comparison matrix is multiplied by the eigenvectors. The pairwise comparison matrix used has not been normalized

$$\begin{pmatrix} 1 & 1,9599 & 1,5650 & 1,9663 \\ 0,5102 & 1 & 1,5246 & 1,4901 \\ 0,6389 & 0,6558 & 1 & 1,2064 \\ 0,5085 & 0,6710 & 0,8288 & 1 \end{pmatrix} \times \begin{pmatrix} 0,3747 \\ 0,2495 \\ 0,2024 \\ 0,1732 \end{pmatrix} = \begin{pmatrix} 1,5214 \\ 1,0076 \\ 0,8145 \\ 0,6991 \end{pmatrix}$$

Then the result of the multiplication is added to the eigenvectors

$$\begin{pmatrix} 1,5214 \\ 1,0076 \\ 0,8145 \\ 0,6991 \end{pmatrix} + \begin{pmatrix} 0,3747 \\ 0,2495 \\ 0,2024 \\ 0,1732 \end{pmatrix} = \begin{pmatrix} 1,8961 \\ 1,2572 \\ 1,0170 \\ 0,8723 \end{pmatrix}$$

b. Looking for value *Maximum Eigenvalue*

$$\lambda_{\max} = \text{Total Ratio} / n$$

$$\lambda_{\max} = \text{Maximum Eigenvalue}$$

n = Number of elements or number of criteria

$$\lambda_{\max} = (1,8961 + 1,2572 + 1,0170 + 0,8723) / 4 = 1,2606$$

Calculating the consistency index (CI)

$$\text{Formulas: } CI = (\lambda_{\max} - n) / (n - 1)$$

N is the number of rows or columns of the pairwise comparison matrix

$$(1,2606 - 4) / (4 - 1) = 0,9131$$

c. Calculating the consistency ratio (Consistency Ratio = CR)

$$\text{Formulas: } CR = CI / RI$$

Where the RI value is a random value obtained from the Random Consistency Index table at a certain n. Based on the calculation above, the results of the CR value < 0.1 (10%) then the Consistency Ratio of the calculation is acceptable, meaning that the level 1 pairwise comparison matrix based on the main criteria has been filled with consistent considerations of the resulting eigenvectors reliable.

TABLE 2. Eigenvectors

CONSISTENCY INDEX (CI) DAN CONSISTENCY RATIO (CR)			
	Amount Per Line (x)	Eigen Vector / Bobot Prioritas (y)	λ max (x + y)
A	1.52141	0.37472	1.89613
B	1.00760	0.24959	1.25720
C	0.81458	0.20244	1.01702
D	0.69911	0.17325	0.87236
λ max			1.260675454
CI = (λ max - n) / n - 1			-0.91311
CR = CI / RI			-1.01

Priority weighting among all alternative comparisons X priority weighting Criteria for all comparisons

Criteria	A	B	C	D	Total	Ratings
Priority Weight	<b>0.3747</b>	<b>0.2496</b>	<b>0.2024</b>	<b>0.1732</b>		
YouTube	0.3828	0.3875	0.4198	0.3812	0.3912	2
Facebook	0.4443	0.3823	0.3708	0.4169	0.4092	1
WhatsApp	0.1728	0.2302	0.2094	0.2019	0.1996	3

Based on the Global Priority calculations and the Hierarchical structure chart above, it is known that the best video-based social media based on the criteria discussed above is WhatsApp, with a total priority of 0.4092.

## IV. CONCLUSION

A conclusion, this research contributes significantly to enhancing the user experience of the elderly in selecting video-based social media. The AHP method and the developed recommendation system serve as valuable tools to assist the elderly in navigating and effectively utilizing social media. Furthermore, this research opens opportunities for further development in utilizing other analysis methods and improving the accuracy of social media recommendations for elderly users. By empowering the elderly in their social media usage, this research aims to promote their social connections, engagement, and overall well-being in the digital age. The implementation of the AHP framework will be carried out through the development of a video-based social media recommendation system. This system will empower elderly users to select the most suitable social media platform based on their preferences, considering their unique needs and interests. The proposed system will be evaluated through user trials involving a group of elderly individuals. Facebook has a wide and diverse user base, including seniors. This platform allows seniors to connect with old friends, family, and relatives who may be in distant locations. In addition, Facebook also provides features such as community groups that allow the elderly to join communities that share the same interests, such as discussion groups about their hobbies or school alumni groups. Thus, Facebook has become one of the most popular social media choices for the elderly in big cities.

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