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Decision Support System for Selection of Virtual Reality Head-Mounted Display Using the WASPAS Method

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Abstract−Virtual reality is a technology that allows one to carry out simulations by presenting three-dimensional visuals and atmosphere through a device called a Head-Mounted Display (HMD) or VR HMD. To make a VR HMD selection, users must know one by one the specifications of the product to be selected, this of course makes the selection process long and makes it difficult to make a choice. This study aims to develop a decision support system by implementing the Weighted Aggregated Sum Product Assessment (WASPAS) approach for selecting VR HMDs, in order to make it easier for users to make decisions. The WASPAS method can determine the best alternative through prioritization that is relevant to the weighting used. Based on the case study conducted, the best alternative results were Shinecon 6.0 VR Box with a value of 0.9021, followed by Enric VR Box with a value of 0.8965, Yoko VR Box with a value of 0.8179, VRPark VR Box with a value of 0.8158 and BoboVR Z5 VR Box with a value of 0.7827. The built decision support system has produced valid calculations, this is because the calculations obtained by the system with manual calculations produce the same value. On the results of usability testing get an average value of 90% and fall into the good category. This shows that the developed system is easy to use and feasible to implement.

Keywords: Decision Support System; Head-Mounted Display; VR HMD; Weighted Aggregated Sum Product Assessment; WASPAS

1. INTRODUCTION

In an era that is as sophisticated as it is today, new technologies have sprung up that can facilitate human activities. One of the technologies currently being developed is metaverse. The term metaverse refers to open, permanent, and shareable virtual worlds that provide access to three-dimensional virtual locations, solutions, and environments [1]. The virtual metaverse technology that is often encountered is Virtual Reality (VR). Virtual reality is a technology that allows one to carry out simulations by presenting three-dimensional visuals and atmosphere [2]. Through VR one can enjoy games, exercise, or watch live music virtually. To run VR requires a device called a Head-Mounted Display (HMD) or also known as VR HMD. VR HMD is a device in the form of a headset that is used to experience the sensation of virtual reality [3]. Many HMD VR products issued by various companies offer various specifications. So, carefulness is needed in selecting VR HMD in order to get the right product to suit your needs. However, to make a VR HMD selection, users must know one by one the specifications of each VR HMD to be selected, then compare it with what they need. Of course, this results in the length of time in determining the right VR HMD. For this reason, a system is needed that can make it easier to help in choosing a fast and precise VR HMD.

Decision Support System (DSS) is described as knowledge-based software that can be used to assist in making a decision or making a choice [4]–[6]. DSS is only a supporting software in making decisions based on data that is controlled through modeling in the form of mathematics and statistics to produce precise and fast conclusions [7]. DSS is usually used in solving problems that have semi-structured or unstructured properties by presenting information in the form of considering the best alternative [8]. To solve decision problems in decision support systems, a model or method is needed to determine the best solution. Previous research regarding the selection of camera devices implemented the Simple Additive Weighting (SAW) approach [9]. The approach used can obtain the best alternative based on weighted sums through the assessment of the performance rating for each alternative across all attributes. The next research is regarding the selection of laptop devices using the Simple Multi Attribute Technique (SMART) method [10]. The SMART approach can produce the best alternative based on determining the weight of each criterion, then doing a comparison and providing an assessment of the level of importance of each criterion, how important the criterion affects the other criteria. The next research is research on DSS development for selecting Smartphone devices with the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) approach [11]. The implemented method can solve decision-making problems by calculating the shortest and farthest distances from positive and negative ideal solutions.

The difference between previous research and research conducted is that this research focuses on solving cases of choosing VR HMD using the Weighted Aggregated Sum Product Assessment (WASPAS) method. The WASPAS method can be used to determine priorities for alternative choices that are very relevant to the weighting used [12]. WASPAS is an approach that is able to minimize errors and maximize the assessment for the selection of the highest and lowest values [13]. This is shown from previous research using the WASPAS method in developing a decision support system that is able to determine the best alternative from a number of alternatives

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with several attributes [14]–[16]. In addition, in this study in determining the weighting using the Rank Order Centroid (ROC) method, where in this approach the weighting is determined based on the level of importance or priority of the criteria. The ROC approach gives weight to each criterion according to the ranking based on the priority level [19].

This study aims to develop a decision support system by implementing the Weighted Aggregated Sum Product Assessment (WASPAS) approach for selecting VR HMDs, in order to obtain appropriate and appropriate alternatives and make it easier for users to make decisions. The WASPAS method has the ability to determine the best alternative through prioritization that is relevant to the weighting used. In this research, a website-based system was developed to facilitate its use and access. The criteria used to select the VR HMD were taken from articles that have been validated by Gaming Content Creator practitioners, namely Faynilla [17], these criteria include: Viewing Angle, Price, Lens Diameter and Screen Size.

2. RESEARCH METHODOLOGY

2.1 Research Stages

The stages in this study can be seen as a methodical strategy employed in the stages of research required so that research implementation can be carefully planned and arranged. The stages of research are procedures or stages that are methodically organized to accomplish the research's goals [18]. These phases are visualized in Figure 1.

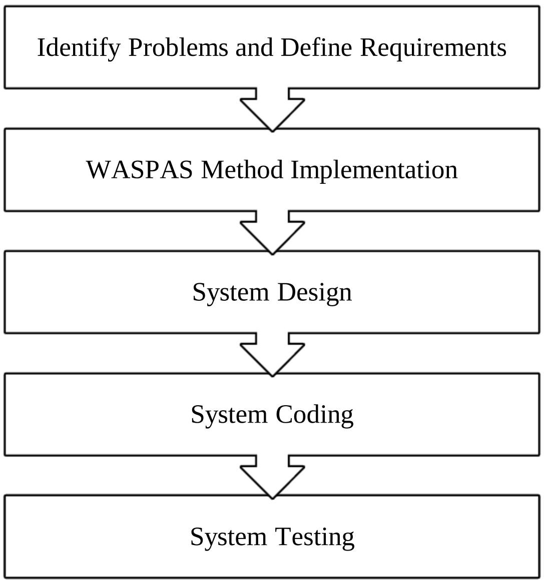

Figure 1. Research Stages

Figure 1 illustrates the stages of the research process. The following is a more extensive account of the steps of the research carried out, including the following:

1) Identify Problems and Define Requirements
   The limitations experienced in the case study will be investigated in order to pinpoint the issue [19]. After knowing the problems to be solved then proceed with the analysis of system requirements. To conduct a system requirements analysis, a requirement statement in the form of a functional requirements analysis is made [20]. The output of this analysis is a statement about the functions and what the system can do.
2) WASPAS Method Implementation
   The approach used to complete the HMD VR selection case study in this study was to use the Weighted Aggregated Sum Product Assessment (WASPAS) method. The WASPAS method can be used to determine priorities for alternative choices that are very relevant to the weighting used. WASPAS is an approach that is able to minimize errors and maximize the assessment for the selection of the highest or lowest scores.
3) System Design
   System design is the act of organizing and visualizing the system to make it easier to comprehend software requirements. In order to generate a system design at this point that will subsequently be turned into software.
4) System Coding
   This stage is the process of system coding and system implementation. This implementation process is carried out by realizing the results of the analysis and design into the system [21]. The development of a decision support system for selecting VR HMD is built on a website, so the programming language uses PHP using an editor, namely Notepad++. As for data storage using MySQL.
5) System Testing

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The system test has a function so that it can be ensured that the system being built can work as it should and there are no functions that are not suitable if it is run [22]. The test used is through testing with usability testing, where the purpose of this test is to measure the level of understanding, satisfaction and ease of operation in using the system being developed [23]. This test is part of ISO 9126 regarding software quality assessment. The usability aspect used in this test has 4 (four) sub-criteria including: understandability, learnability, operability and attractiveness.

2.2 Rank Order Centroid (ROC)

In this study, the Rank Order Centroid (ROC) was used for weighting, where in this approach the weighting was determined based on the level of importance or priority of the criteria. The ROC approach gives weight to each criterion according to the ranking based on priority level [24]. In general, to determine the priority is determined based on the statement "Criterion 1 is more important than criterion 2, which is more important than criterion 3" and so on until the nth criterion. To obtain the priority level, rules are given, namely where the highest value is the most important value among the other values. If criterion 1 ≥ criterion 2 ≥ criterion 3 ≥ up to criterion n, then weight 1 (w_1) ≥ weight 2 (w_2) ≥ weight 3 (w_3) ≥ up to weight n (w_n). So, to get the weight value using ROC it can be calculated using equation (1).

$$w_k = \frac{1}{k}\sum_i^k = 1\left(\frac{1}{i}\right) \quad (1)$$

where, w_k denotes the normalized ratio of estimated goal weight scales, i denotes the total number of objectives and k is the ranking of i objectives.

2.3 Weighted Aggregated Sum Product Assessment (WASPAS) Method

The Weighted Aggregated Sum Product Assessment (WASPAS) method which can be used to evaluate several alternatives in several decision criteria or commonly known as Multi-Criteria Decision Analysis. The WASPAS method is a combination of the Multi Criteria Decision Analysis approach, namely the Weighted Sum Model (WSM) and Weighted Product Model (WPM) [25]. The WASPAS method can be used to determine priorities for alternative choices that are very relevant to the weighting used [12]. WASPAS is an approach that is able to minimize errors and maximize the assessment for the selection of the highest and lowest values [13]. The WASPAS method is very efficient in complex decision-making situations and also results in very accurate models [16], [26]–[32]. The stages of applying the Weighted Aggregated Sum Product Assessment (WASPAS) method are as follows:

1) Create a decision matrix
Before compiling a decision matrix, the criteria (C) are first determined, then the weight values for the criteria (W) and alternatives (A) are determined. Next, arrange a decision matrix table using equation (2).

$$x = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ x_{m1} & x_{m1} & \cdots & x_{mn} \end{bmatrix} \quad (2)$$

2) Attempting to find a normalized matrix
In order to normalize the matrix, the criteria used are first identified whether the criteria are benefit or cost criteria. The benefit criteria are the criteria that seek the highest value, whereas the cost criteria are the criteria that seek the lowest value. Matrix normalization for benefit criteria can be calculated using equation (3).

$$\bar{x}_{ij} = \frac{x_{ij}}{max_i\, x_{ij}} \quad (3)$$

where, x_{ij} is the performance value of alternative i on criterion j. While min_i is the alternative's smallest value.
For cost criteria calculated using equation (4).

$$\bar{x}_{ij} = \frac{min_i\, x_{ij}}{x_{ij}} \quad (4)$$

where, x_{ij} is the performance value of alternative i on criterion j. While max_i is the alternative's largest value.

3) Calculate to determine the Qi value
The next stage is to calculate the preference value of each alternative or Qi. To get the Qi value, it can be calculated using equation (5).

$$Q_i = 0.5\ \sum_{j=1}^{n} x_{ij} w + 0.5\ \prod_{j=1}^{n} (x_{ij})^{w_j} \quad (5)$$

where, $x_{ij}w$ is the multiplication of the x_{ij} value with the weight or w. Then, $(x_{ij})^{w_j}$ is the value of x_{ij} raised to the power of weight or w. While Q_i is the value from Q to i.

4) Develop alternative rankings

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Ranking is done by looking at the results of calculating the Qi value. The largest value is determined to be the best alternative.

3. RESULT AND DISCUSSION

Solving decision problems using the WASPAS method for selecting a VR HMD begins with determining the criteria first. The criteria for selecting a VR HMD in this case study were taken from articles that had been validated by a practitioner of gaming content creator, namely Faynilla [17], these criteria include: Viewing Angle, Price, Lens Diameter and Screen Size. Based on these criteria, the weight value or level of importance is then determined. Before the weight is determined, the type of criteria used is analyzed first. There are two types of criteria, namely benefit criteria and cost criteria. Based on the existing criteria, the benefit criteria are Viewing Angle, Lens Diameter and Screen Size, while the cost criteria are Price. Furthermore, to determine the weighting the ROC method is used where in this approach the determination of weight is based on the level of importance or priority of the criteria. In this research, as a case study, the priority order of criteria from top priority to last is: Viewing Angle (C1), Price (C2), Lens Diameter (C3), and Screen Size (C4). Based on the order of priority, the criteria values are weighted using the ROC method using equation (1). The following is the process of calculating the search for weight values using the ROC approach:

$$w_1 = \frac{1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}}{4} = 0.521$$

$$w_2 = \frac{0+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}}{4} = 0.257$$

$$w_3 = \frac{0+0+\frac{1}{3}+\frac{1}{4}}{4} = 0.146$$

$$w_4 = \frac{0+0+0+\frac{1}{4}}{4} = 0.063$$

Based on the results of weighting using the ROC approach, it is arranged into the weighting criteria presented in Table 1.

Table 1. Criteria Weight

Criteria ID	Criteria	Criteria Type	Weight
C1	Viewing Angle	Benefit	0.521
C2	Price	Cost	0.257
C3	Lens Diameter	Benefit	0.146
C4	Screen Size	Benefit	0.063

Table 2 shows the criteria, types of criteria and criteria weights that have been determined by the decision maker. The next step is to determine which alternative to choose. In this case study, there are 5 (five) alternatives to be selected, including: Shinecon 6.0 VR Box (A1), BoboVR Z5 VR Box (A2), VRPark VR Box (A3), Enric VR Box (A4) and Yoko VR Box (A5). Based on these alternatives, an assessment is then given based on alternative specifications against the existing criteria. The results of the assessment for each alternative can be seen in Table 2.

Table 2. Values for Each Alternative

Alternative ID	Alternative	Criteria			
		C1	C2	C3	C4
A1	Shinecon 6.0 VR Box	120º	223,000	6 inches	40 mm
A2	BoboVR Z5 VR Box	120º	442,000	6 inches	42 mm
A3	VRPark VR Box	110º	280,000	6 inches	40 mm
A4	Enric VR Box	100º	167,000	7 inches	35 mm
A5	Yoko VR Box	100º	223,000	6 inches	40 mm

The case study of the VR HMD selection above was completed using the WASPAS approach, where the first step begins by loading the decision matrix using equation (1), based on the criterion values of each alternative in Table 4. The results of the initial decision matrix can be seen in the following matrix:

$$x = \begin{bmatrix} 120 & 223000 & 6 & 40 \\ 120 & 442000 & 6 & 42 \\ 110 & 280000 & 6 & 40 \\ 100 & 167000 & 7 & 35 \\ 100 & 223000 & 6 & 40 \end{bmatrix}$$

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After the decision matrix has been formed then proceed with normalizing the matrix. To obtain a normalized matrix, the criteria used must first be identified. At the completion of the VR HMD case study for the benefit criteria, namely Viewing Angle (C1), Maximum Screen Size (C2) and Lens Diameter (C3), while for the cost criteria, namely Price (C4). To get the normalized value of the benefit criteria matrix using equation (2) and for cost criteria using equation (3). The process for obtaining matrix normalization can be calculated as follows:

$$\bar{x}_{11} = \frac{120}{\max\{120; 120; 110; 100; 100\}} = \frac{120}{120} = 1$$

$$\bar{x}_{21} = \frac{120}{\max\{120; 120; 110; 100; 100\}} = \frac{120}{120} = 1$$

$$\bar{x}_{31} = \frac{110}{\max\{120; 120; 110; 100; 100\}} = \frac{110}{120} = 0.9167$$

$$\bar{x}_{41} = \frac{100}{\max\{120; 120; 110; 100; 100\}} = \frac{100}{120} = 0.8333$$

$$\bar{x}_{51} = \frac{100}{\max\{120; 120; 110; 100; 100\}} = \frac{100}{120} = 0.8333$$

$$\bar{x}_{12} = \frac{\min\{223000; 442000; 280000; 167000; 223000\}}{167000} = \frac{223000}{167000} = 0.7489$$

$$\bar{x}_{22} = \frac{\min\{223000; 442000; 280000; 167000; 223000\}}{167000} = \frac{442000}{167000} = 0.3778$$

$$\bar{x}_{32} = \frac{\min\{223000; 442000; 280000; 167000; 223000\}}{167000} = \frac{280000}{167000} = 0.5964$$

$$\bar{x}_{42} = \frac{\min\{223000; 442000; 280000; 167000; 223000\}}{167000} = \frac{167000}{167000} = 1$$

$$\bar{x}_{52} = \frac{\min\{223000; 442000; 280000; 167000; 223000\}}{167000} = \frac{223000}{167000} = 0.7489$$

$$\bar{x}_{13} = \frac{6}{\max\{6; 6; 6; 7; 6\}} = \frac{6}{7} = 0.8571$$

$$\bar{x}_{23} = \frac{6}{\max\{6; 6; 6; 7; 6\}} = \frac{6}{7} = 0.8571$$

$$\bar{x}_{33} = \frac{6}{\max\{6; 6; 6; 7; 6\}} = \frac{6}{7} = 0.8571$$

$$\bar{x}_{43} = \frac{7}{\max\{6; 6; 6; 7; 6\}} = \frac{6}{7} = 1$$

$$\bar{x}_{53} = \frac{6}{\max\{6; 6; 6; 7; 6\}} = \frac{6}{7} = 0.8571$$

$$\bar{x}_{14} = \frac{40}{\max\{40; 42; 40; 35; 40\}} = \frac{40}{42} = 0.9524$$

$$\bar{x}_{24} = \frac{42}{\max\{40; 42; 40; 35; 40\}} = \frac{42}{42} = 1$$

$$\bar{x}_{34} = \frac{40}{\max\{40; 42; 40; 35; 40\}} = \frac{40}{42} = 0.9524$$

$$\bar{x}_{44} = \frac{35}{\max\{40; 42; 40; 35; 40\}} = \frac{35}{42} = 0.8333$$

$$\bar{x}_{54} = \frac{40}{\max\{40; 42; 40; 35; 40\}} = \frac{40}{42} = 0.9524$$

The following is the result of the matrix that has been normalized:

$$x = \begin{bmatrix} 1 & 0.7489 & 0.8571 & 0.9524 \\ 1 & 0.3778 & 0.8571 & 1 \\ 0.9167 & 0.5964 & 0.8571 & 0.9524 \\ 0.8333 & 1 & 1 & 0.8333 \\ 0.8333 & 0.7489 & 0.8571 & 0.9524 \end{bmatrix}$$

The next stage is to calculate the preference value of each alternative or *Qi*. To get the *Qi* value, it can be calculated using equation (4). The weight values are obtained based on Table 2, where the criterion weight for C1 is 52.1% or 0.521; C2 is 25.7% or 0.257; C3 is 14.6% or 0.146 and C4 is 6.3% or 0.63. The process for finding the *Qi* value is as follows:

$$\begin{aligned} Q_1 &= 0.5 \times \big((1 \times 0.521) + (0.7489 \times 0.257) + (0.8571 \times 0.146) + (0.9524 \times 0.63)\big) + \\ &\quad 0.5 \times \big((1^{0.521}) \times (0.7489^{0.257}) \times (0.8571^{0.146}) \times (0.9524^{0.63})\big) \\ &= 0.9021 \end{aligned}$$

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$$
\begin{aligned}
Q_2 &= 0.5 \times \left((1 \times 0.521) + (0.3778 \times 0.257) + (0.8571 \times 0.146) + (1 \times 0.63)\right) + \\
&\quad 0.5 \times \left((1^{0.521}) \times (0.3778^{0.257}) \times (0.8571^{0.146}) \times (1^{0.63})\right) \\
&= 0.7827 \\
Q_3 &= 0.5 \times \left((1 \times 0.9167) + (0.5964 \times 0.257) + (0.8571 \times 0.146) + (0.9524 \times 0.63)\right) + \\
&\quad 0.5 \times \left((0.9167^{0.521}) \times (0.5964^{0.257}) \times (0.8571^{0.146}) \times (0.9524^{0.63})\right) \\
&= 0.8158 \\
Q_4 &= 0.5 \times \left((0.8333 \times 0.521) + (1 \times 0.257) + (1 \times 0.146) + (0.8333 \times 0.63)\right) + \\
&\quad 0.5 \times \left((0.8333^{0.521}) \times (1^{0.257}) \times (1^{0.146}) \times (0.8333^{0.63})\right) \\
&= 0.8965 \\
Q_5 &= 0.5 \times \left((0.8333 \times 0.521) + (0.7489 \times 0.257) + (0.8571 \times 0.146) + (0.9524 \times 0.63)\right) + \\
&\quad 0.5 \times \left((0.8333^{0.521}) \times (0.7489^{0.257}) \times (0.8571^{0.146}) \times (0.9524^{0.63})\right) \\
&= 0.8179
\end{aligned}
$$

After the *Qi* value has been obtained, then make a ranking of the calculation results from the *Qi* value. The largest value is determined to be the best alternative. For more details, the ranking results for the selection of VR HMDs use the WASPAS method, which are arranged from the highest to the lowest values, which are presented in Table 3.

Table 5. Alternative Ranking Results

Alternative Code	Alternative	*Qi* Value	Ranking
A1	Shinecon 6.0 VR Box	0.9021	1
A4	Enric VR Box	0.8965	2
A5	Yoko VR Box	0.8179	3
A3	VRPark VR Box	0.8158	4
A2	BoboVR Z5 VR Box	0.7827	5

It can be seen in Table 3, it was found that the highest Qi preference value was Shinecon 6.0 VR Box (A1) with a value of 0.9021, followed by Enric VR Box (A4) with a value of 0.8965, Yoko VR Box (A5) with a value of 0.8179, VRPark VR Box (A3) with a value of 0.8158 and BoboVR Z5 VR Box (A2) with a value of 0.7827. So, the best alternative in this case study is Shinecon 6.0 VR Box (A1).

After the analysis and implementation of the WASPAS approach has been carried out, then proceed with building decision support software. The HMD VR selection software is built on a website basis, so the programming language is PHP with the editor used is Notepad++. Then, the MySQL database is used to store the data. To access the decision support system for selecting VR HMD the first time the user must log in to the login form. If the user has entered into the system, the main menu user interface will be displayed. The main menu form interface can be seen in Figure 2.

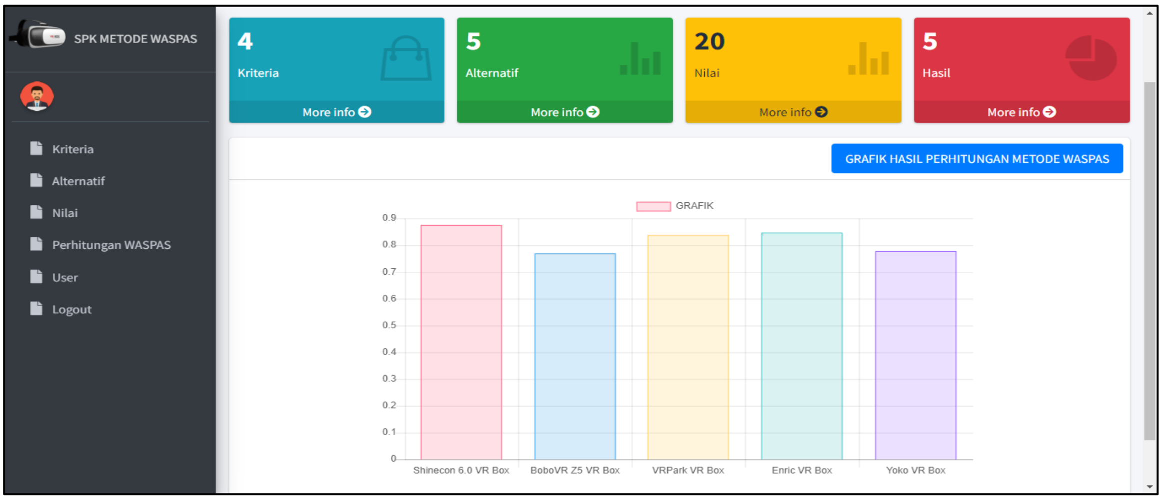

Figure 2. Interface of the Main Menu Form of the Decision Support System for the Selection of VR HMD

Figure 3 shows the display of the main menu of the SPK for choosing VR HMD, where this menu displays a graph of the results of the calculation of the WASPAS approach as well as the main features such as criteria, alternative, value and user menus. To start selecting a VR HMD, the user must first manage the criteria data through the criteria menu. On the criteria menu the user can add, change and delete criteria data. Furthermore, the user can perform alternative data management on alternative menus. In this menu the user can add, change and delete alternative data. Alternative form interface can be seen in Figure 3.

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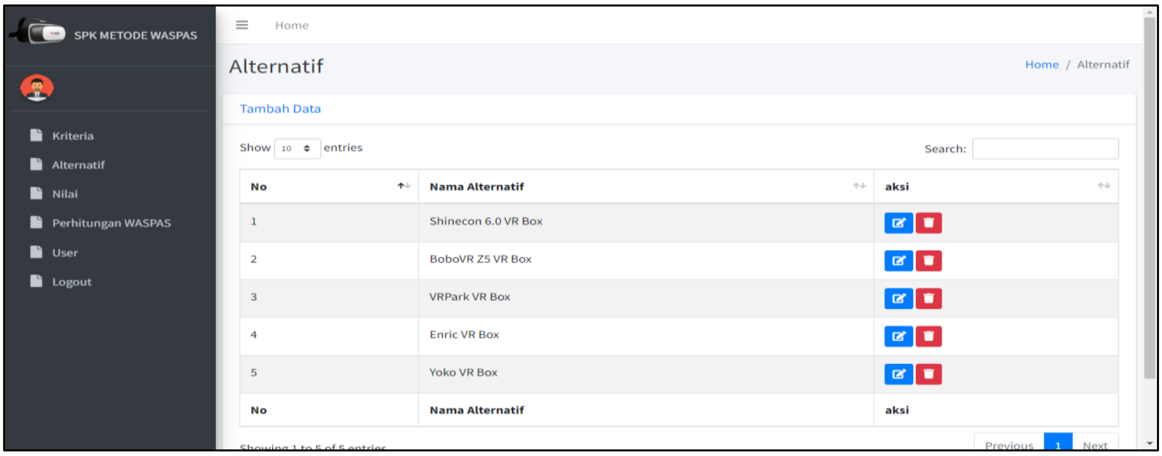

Figure 3. Alternative Data Form Interface

The user can manage the alternative value data after the alternate data is accessible, as depicted in Figure 3. The user can evaluate the alternatives in the alternative value form by comparing each alternative's specs to the existing criteria. The form interface for inputting alternative value data can be seen in Figure 4.

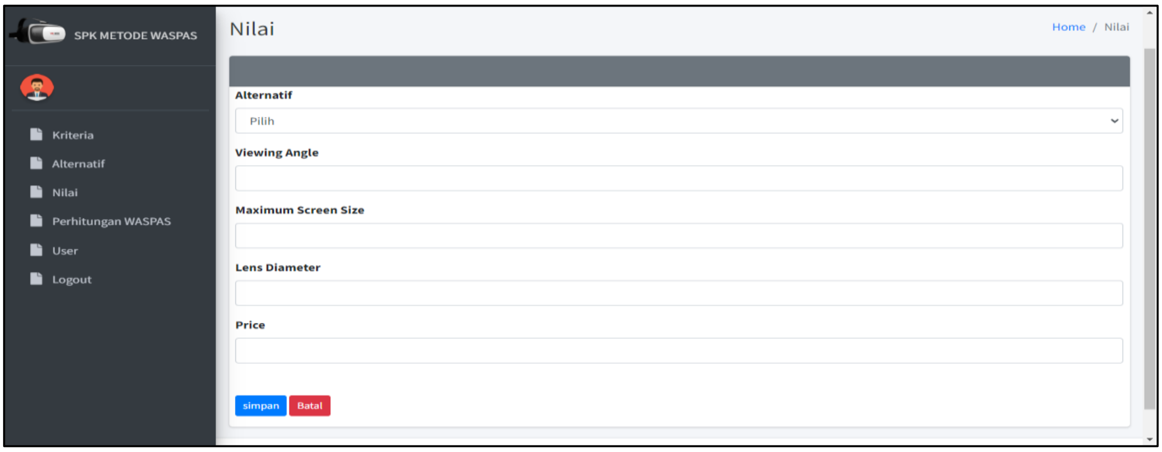

Figure 4. Form Interface for Adding Alternative Value Data

The value data entry form is shown in Figure 4. If all possible values for each criterion have been provided, the user can use WASPAS to calculate the best option. The user will be presented the WASPAS method's computation step-by-step in the WASPAS calculation procedure form. The best alternative ranking results based on the WASPAS approach will also be displayed to the user. The user interface for the WASPAS calculation menu is presented in Figure 5.

Figure 5. WASPAS Method Calculation Form Interface

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In Figure 5 it can be seen that the results of system calculations using the WASPAS approach show that the highest score is Shinecon 6.0 VR Box with a value of 0.9021, followed by Enric VR Box with a value of 0.8965, Yoko VR Box with a value of 0.8179, VRPark VR Box with a value of 0.8158 and BoboVR Z5 VR Box with a value of 0.7827. So, the Shinecon 6.0 VR Box alternative is the best alternative. The calculation results obtained by the decision support system with manual calculations show the acquisition of the same value. This means that the decision support system built has produced valid calculations.

Furthermore, the developed decision support system is tested to ensure that the system is feasible to use. The test used is through usability testing. The usability aspects used include understandability, learnability, operability and attractiveness. From these aspects there are 10 questions which are then arranged into a questionnaire. The scale used for the questionnaire is the Guttman scale, where the scale is extreme so that this scale only consists of two answers, agree and disagree. The questionnaire was distributed to 20 people who will choose the VR HMD. The results of the usability testing then calculated the percentage of respondents who answered agree and disagree, then made it in graphical form as shown in Figure 6.

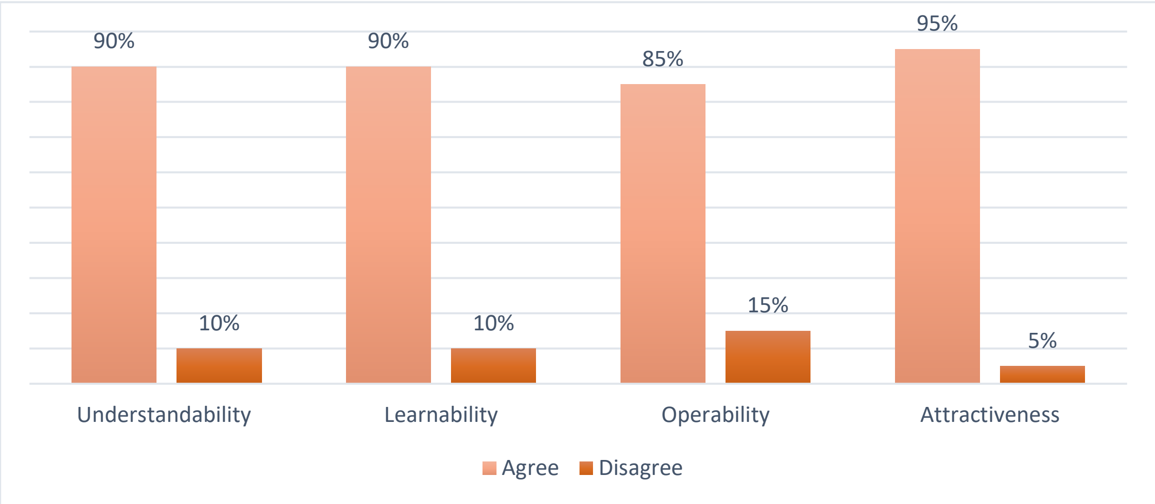

Figure 6. Usability Testing Results

In Figure 6, it is shown that the respondents who answered agreed to the understandability criterion of 90%, learnability of 90%, operability of 85% and attractiveness of 95%. If the average value is calculated, the results of usability testing get a value of 90%. This value is then converted into criteria with the following guidelines: Good, if you get a score between 76% and 100%; Enough, if you get a score between 56% to 75%; Not Good, if you get a score between 40% to 55%, and Not Good, if it's less than 40% [33]. Based on the conversion value guidelines, the decision support system for selecting VR HMD is in the good category. This means that the developed system is considered easy to use and feasible to implement.

4. CONCLUSION

This study implemented the Multi-Criteria Decision Making (MCDM) approach with Weighted Aggregated Sum Product Assessment (WASPAS) on the decision support system for selecting VR HMD. The WASPAS method can determine the best alternative through prioritization that is relevant to the weighting used. Based on the case studies conducted, the WASPAS method for selecting the best VR HMD obtained the best alternative results, namely Shinecon 6.0 VR Box with a value of 0.9021, followed by Enric VR Box with a value of 0.8965, Yoko VR Box with a value of 0.8179, VRPark VR Box with a value of 0.8158 and BoboVR Z5 VR Box with a value of 0.7827. The decision support system built has resulted in valid WASPAS method calculations, this is because the calculations obtained by the decision support system using manual calculations show the same value. On the results of usability testing using aspects such as understandability, learnability, operability and attractiveness, an average value of 90% is included in the good category. This shows that the developed system is easy to use and feasible to implement.

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