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Recommendation Decision Support System Smartphone Selection By Method Web-Based *Simple Additive Weighting* (SAW)

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Abstract

Smartphones are already a must-have communication technology to make it easier to live your daily life. However, with so many choices can make consumers confused in determining the appropriate choice. The Simple Additive Weighting (SAW) method can help in the simple process that can be applied to decision-making cases such as in smartphone selection recommendations with a wide range of attributes. In the case of this study, the results were obtained that the Realme X3 Superzoom smartphone scored the highest preference with a value of 22. With this research, it is hoped that this decision support system can help potential consumers to more easily consider in the selection of smartphones that suit their wishes or needs

Keywords: *Smartphone, Simple Additive Weight, Decision Support System, Recommendations, Web-based*

1. Introduction

The application of communication technology such as smartphones, is already a must-have to make it easier to live daily life. This is due to the high demand for the proper and rapid exchange of information. With the higher demand required, more and more companies are competing against each other to provide the level of security and comfort that consumers are most interested in. However, these circumstances can make consumers confused in determining their choice. This is also supported by the many factors to be considered in smartphone purchases.

In previous research, there is a smartphone selection recommendation system using Collaborative filtering and Content-based filtering methods combined using Mixed Hybrid and using rating as a reference in providing recommendations. The difference is that this study uses Simple Additive Weighting and provides a predictive value for the results of its recommendations. There is also a research system supporting mobile selection decisions with the web-based SAW method. A fundamental difference is found in the parameters of the criteria, sub-criteria, and data used in the system[1].

SAW is a weighted calculation method or method that provides certain weighted criteria so that each sum value of the weight of the result obtained will be the final decision [2]. The advantages of SAW with a simple and simple warking process can be applied to decision-making cases such as in smartphone selection recommendations with a wide range of attributes[3][4]

The hope is that this research can make it easier for consumers who want to buy a smartphone with some established criteria and provide the results in the form of desired smartphone data information to help in the decision-making to determine which smartphone to buy.

2. Research Methods

In this research, the system creation model used a linear sequential model or commonly called the waterfall model. The scope of the waterfall model process must complete a stage until it is completed before moving on to the next stage[5]. The waterfall model framework can be seen in Figure 1.

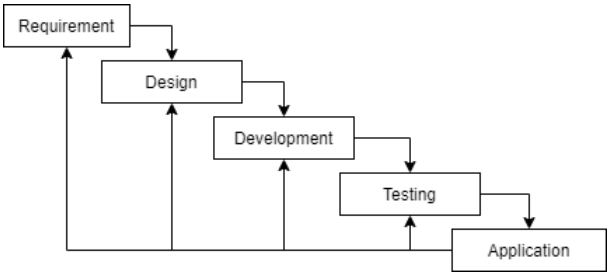

Figure 1 Waterfall diagram

Starting with the specification of needs, then to the planning and design stage. Specifications of requirements at the previous stage will be studied at this stage. Continued at the manufacturing and testing stage to make the application complete. The flowchart of the smartphone recommendation system can be seen in figure 2.

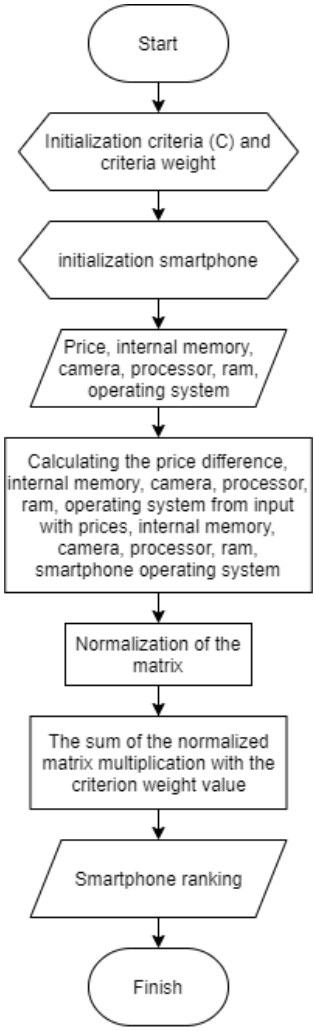

Figure 2 Smartphone recommendation system flowchart

Figure 2 is the main process of the system. When the system starts (1), the initialization of the criteria and weights of each of the specified criteria (2) is performed. After that, the initialization of the smartphone was used in the study (3). Then enter the values of the initialized attribute (4), accompanied by calculating the difference from the previous value input with the value of the rule that has been created, then the difference value is converted back into the actual ilia according to the conduction of the difference value(5). If already, normalize the conversion result of the previous value on each criteria and alternative smartphone (6). The summation process of the

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previous normalized matrix value with the weight value of each specified criterion (7). The process displays the result of the summation process of the previous normalized matrix value with the weight value of each criterion and makes the highest value of the process as the best smartphone (8). And the program is finished (9).

3. Result and Discussion

3.1. Determining Criteria and Weight Criteria Values

a. Criteria Table

Criteria data that contains code, criteria, descriptions, weights. The weight of the criteria determines how important those criteria are. The criteria attribute consists of benefit or cost, where the benefit means the greater the value the better, while the smaller the cost the better the value.

Table 1 Criteria Table

Code	Criteria	Description	Weight
C1	Price	Cost	5
C2	Internal memory	Benefit	4
C3	Camera	Benefit	3
C4	Processor	Benefit	4
C5	RAM	Benefit	4
C6	Operating System	Benefit	2

b. Criteria weight value

Table 2 Criteria weight value

Criteria	Sub Criteria	Weight
Price	<2 Million	5
	2-4 Million	4
	4-6 Million	3
	6-8 Million	2
	>8 Million	1
Internal memory	>128 GB	5
	64-128 GB	4
	16-64 GB	3
	4-16 GB	2
	0-4 GB	1
Camera	> 32 MP	5
	24-32 MP	4
	16-24 MP	3
	5-16 MP	2
	0-5 MP	1
Processor	Octacore	5
	Quadcore	3
	Dual-core	1
RAM	>8 GB	5
	6-8 GB	4
	3-4 GB	3
	2-3 GB	2
	0-1 GB	1
	> Android 9.0	5

Operating System	Android 8.0 - Android 9.0	4
	Android 7.0 - Android 8.0	3
	Android 6.0 - Android 7.0	2
	<Android 6.0	1

2. Case Study

In this study, case studies will be used with the following:

a. Alternative data Options

The Alternate value records the value of each alternative based on all criteria data.

Table 3 Alternative data Options

Criteria	C1	C2	C3	C4	C5	C6
Oppo Reno	4.999.000	128	64	Octa-Core	8 GB	Android 10
XIAOMI NOTE 9 PRO	3.899.000	128	64	Octa-Core	8 GB	Android 10
Samsung Galaxy Tab A 8 plus	4.499.000	32	8	Octa-Core	3 GB	Android 9
Realme X3 SUPER ZOOM	7.999.000	256	64	Octa-Core	12 GB	Android 10
Vivo V19	4.999.000	128	48	Octa-Core	8 GB	Android 10

b. Weight value of each criterion

Based on the table adjusts to the weight value of the criteria, thus obtaining results such as table 4.

Table 4 Weight value of each criterion

Alternative	C1	C2	C3	C4	C5	C6
A1	3	4	5	5	4	5
A2	4	4	5	5	4	5
A3	3	3	2	5	2	4
A4	2	5	5	5	5	5
A5	3	4	5	5	4	5

c. Matrix Normalization

To normalize the table at the analysis stage, we need to understand formula 1, so that results such as table 5 and table 6 are obtained[3].

$$rij = \begin{cases} \frac{x_{ij}}{\max\limits_{i} x_{ij}} & if\ j\ is\ a\ benefit\ attribute \\ \frac{\min\limits_{i} x_{ij}}{x_{ij}} & if\ j\ is\ a\ cost\ attribute \end{cases} \quad (1)$$

Table 5 Matrix normalization

Alternative	C1	C2	C3	C4	C5	C6
A1	0.66666666666667	0.8	1	1	0.8	1
A2	0.5	0.8	1	1	0.8	1
A3	0.66666666666667	0.6	0.4	1	0.4	0.8
A4	1	1	1	1	1	1
A5	0.66666666666667	0.8	1	1	0.8	1

d. Matrix Prefensi

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Table 6 Matrix present value

Alternative	C1	C2	C3	C4	C5	C6
A1	3.3333333333333	3.2	3	4	3.2	2
A2	2.5	3.2	3	4	3.2	2
A3	3.3333333333333	2.4	1.2	4	1.6	1.6
A4	5	4	3	4	4	2
A5	3.3333333333333	3.2	3	4	3.2	2

3. Implementation

a. Admin login page
This page is a form that admins must input to access the system.

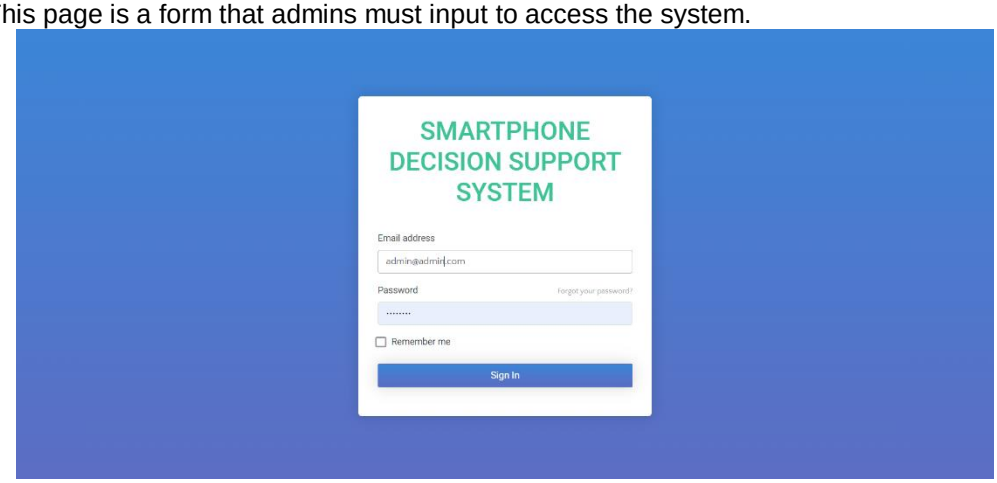

Figure 3 Admin login page

b. Criteria setting page
On this page, admins can specify criteria that have benefit/cost attribute values. Admins can also choose the criteria of each attribute from very low to very high.

Figure 4 Criteria setting page

c. Matrix value page
On this page displays the matrix value that has been obtained.

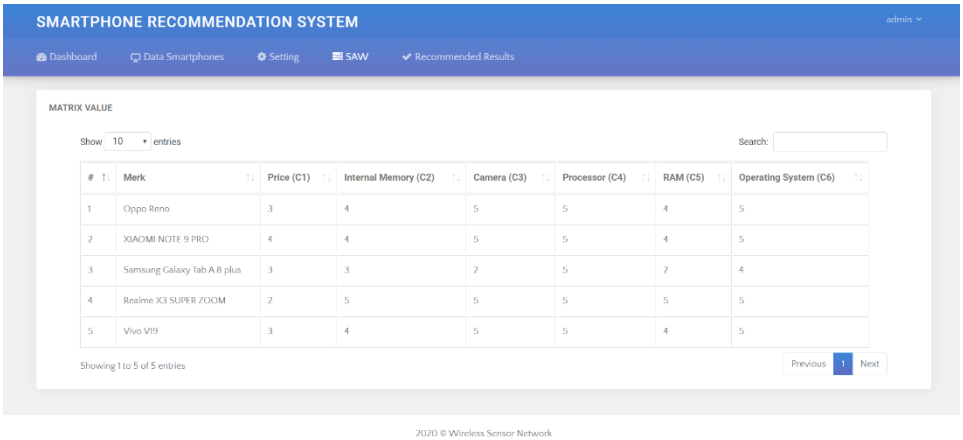

Figure 5 Matrix value page

d. Matrix Normalization Page
This page displays matrix normalization based on formula 1.

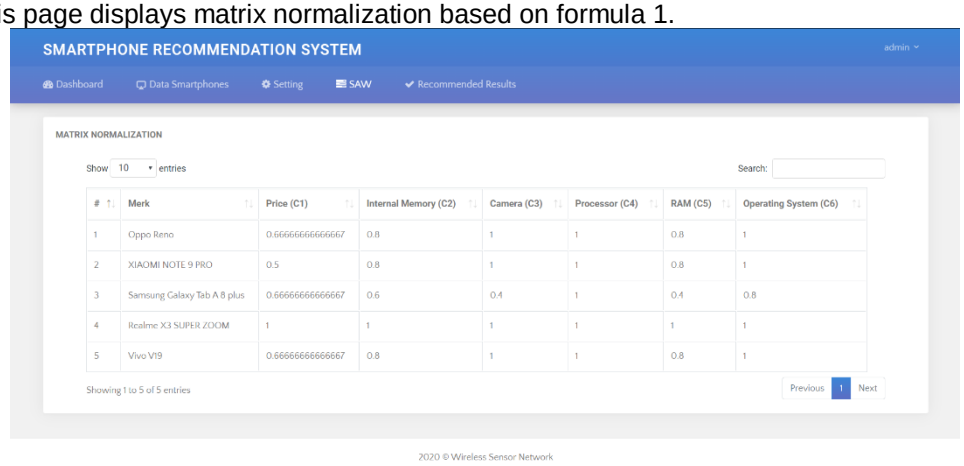

Figure 6 Matrix Normalization Page

e. Recommended Results Page
The last page is the recommendation results page. On this page displays the order and results of smartphone recommendations.

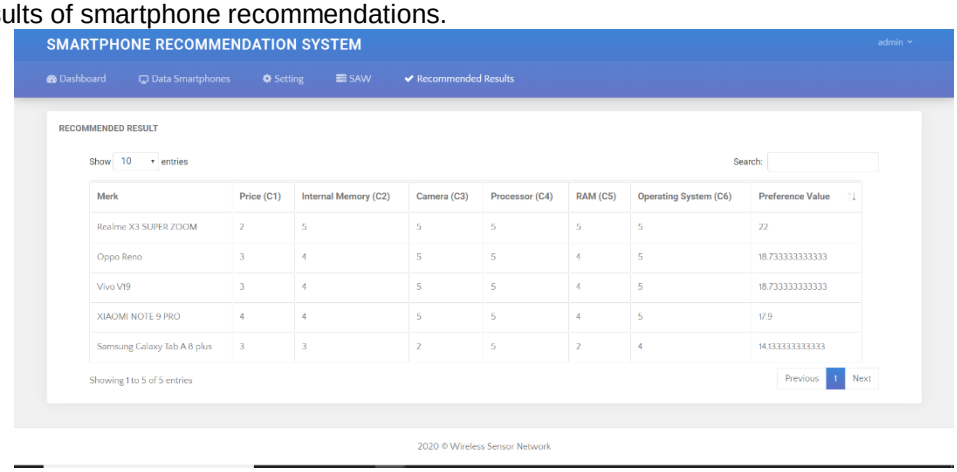

Figure 7 Recommended Results Page

4. Conclusion

Based on the background and the above problems, it can be concluded that the system successfully calculates and processes by simple additive weighting method in determining the selection of smartphones to fit the specified criteria and weights such as price, internal memory,

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RAM, camera, processor, and operating system. In this study obtained the results that the Smartphone Realme X3 Superzoom got the highest preference score (22). With this research, it is hoped that this decision support system can help potential consumers to more easily consider in the selection of smartphones that suit their wishes or needs.

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