Application of the SMART Method in the Smartphone Selection Decision Support System

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ABSTRACT
The rapid development of technology in the smartphone sector in Indonesia has resulted in so many of new smartphone models being launched. IDC Worldwide Quarterly Mobile Phone Tracker noted that in the first half of 2021 smartphone sales growth in the Indonesian market increased by 47% compared to the first half of 2020 and increased by 20% compared to the first half of 2019. This shows that people's need for smartphones is increasing. This condition also makes smartphone manufacturers compete to launch new models to meet people's needs. However, the large number of new smartphone models being launched makes it difficult for people to choose a smartphone that suits their needs. Therefore, this research aims to help consumers choose a smartphone that suits their needs by applying the SMART (Simple Multi-Attribute Rating Technique) method. The criteria needed in this research are performance, camera, price, screen and battery. Meanwhile, alternative smartphones that will be used as comparative data include the Xiaomi 12T, Samsung Galaxy A54 5G, Xiaomi Poco F5, and Samsung Galaxy A34 5G. Assessment of criteria data for each alternative is obtained through web benchmarks such as AnTuTu Benchmark and DxOMark. This research resulted in a ranking and the Xiaomi 12T received the highest total score based on predetermined weighting criteria. Data calculations using manual calculations and the Android application have almost the same results, with a maximum difference of value is ±0.03. Based on these results, it can be concluded that the calculation performance of the Android application based on manual calculation results has an accuracy rate of 99.94%, which means the Android application has successfully implemented the SMART method.

General Terms
SMART Method, Decision Support System, Smartphone, Application, Android.

Keywords
Decision Support System (DSS), Simple Multi Attribute Rating Technique (SMART), Smartphone Selection, Smartphone Comparison, Android, Application.

1. INTRODUCTION
The rapid development of technology in the smartphone sector in Indonesia has resulted in many new smartphone models being launched. According to Riska Abdilana and Indra Gunawan, the smartphone population in Indonesia reaches 58.6% of the total population. It can be concluded that the penetration of information technology in society has reached more than half of the population [1]. According to Aurelia in the IDC Worldwide Quarterly Mobile Phone Tracker, it was noted that in the first half of 2021 smartphone sales growth in the Indonesian market increased by 47% compared to the first half of 2020 and increased by 20% compared to the first half of 2019 [2]. This shows that people's need for smartphones is increasing. This condition also makes smartphone manufacturers compete to launch new models to meet people's needs.

Quoted from the StatCounter GlobalStats website, it was noted that the market share of unknown producers in Indonesia increased from 1.76% in April 2023 to 5.27% in May 2023, then in June 2023 it increased again to 10.76% until most recently in October 2023 to 14.78%. This value almost matches Xiaomi, which controls 14.82% of the Indonesian market share [3].

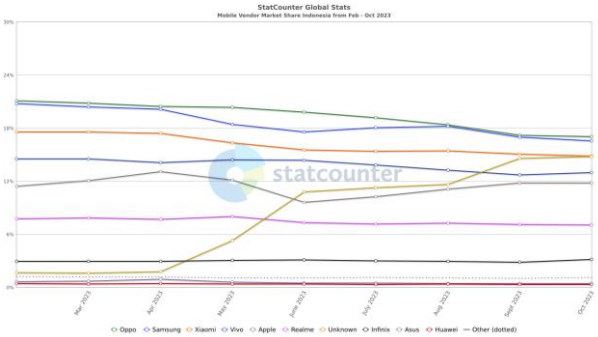

Figure 1. Line Chart of Indonesian Mobile Vendor Market Share 2023

These unknown producers are new producers entering the Indonesian market. In April 2023 they will still rank 8th compared to other well-known manufacturers in Indonesian market share. Then in October 2023, they succeeded in ranking 4th and almost matched Xiaomi's figure which was in 3rd place.

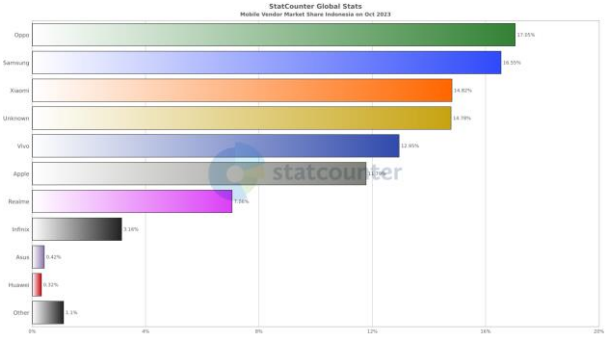

Figure 2. Bar Chart of Indonesian Vendor Market Share October 2023

The results of research conducted by the Counterpoint Team show that in Q2 (quarter 2) 2023, only Infinix experienced an increase in shipments of 17% compared to the previous year. Infinix is now focusing on a price range of less than IDR 3 million, which offers better specifications in its price class.

Apart from that, shipments of 5G smartphones priced less than IDR 6 million also increased by 11% [4].

Infinix is part of Transsion Holdings, which includes other names that are also quite popular recently such as Tecno and iTel. Looking at StatCounter data, it is possible that the name of this unknown manufacturer is the Transsion Holdings group which includes three names of new smartphone manufacturers or vendors in Indonesia.

These figures prove that the smartphone market share in Indonesia has many new manufacturers who can compete with old manufacturers who have already dominated and built a reputation in Indonesia.

The number of new smartphone manufacturers and models being launched makes it difficult for people to choose a smartphone that suits their needs. Therefore, this research aims to help consumers choose a smartphone that suits their needs by applying the SMART (Simple Multi-Attribute Rating Technique) Decision Support System method.

According to Nofriansyah, a Decision Support System is a computerized information system that produces various alternative decision options to help management to handle various semi-structured and unstructured problems using models and data [5].

According to Boy, the Simple Multi Attribute Rating Technique (SMART) method is a multi-criteria decision making method developed by Edward in 1977. This multi-criteria decision making technique is based on the theory that each alternative consists of a number of criteria that have values and each criterion has a weight that describes how important the criterion is compared to other criteria. This weighting is used to assess each alternative in order to obtain the best alternative [6].

Research on Decision Support Systems conducted by Raafi Haryadi Putera and Afrizal Zein in 2022 entitled "Decision Support System for Selecting Mobile Phones Using the Web-Based Simple Additive Weighting Method", aims to help the public in selecting the right mobile phone and in accordance with their respective criteria. each. each user. The criteria in question are based on price, vendor, depreciation, RAM, screen, camera, battery and features [7].

Another research that discusses a similar topic is research conducted by Abdul Rahman with the title "Mobile Phone Purchase Decision Support System Using the Analytical Hierarchy Process (AHP) Method", which aims to assist in selecting a mobile phone using several criteria including price, network, battery, features, size, audio, camera, and screen [8].

The criteria needed in this research are performance, camera, price, screen and battery. Meanwhile, alternative smartphones that will be used as comparative data include the Xiaomi 12T, Samsung Galaxy A54 5G, Xiaomi Poco F5, and Samsung Galaxy A34 5G. Assessment of the data criteria for each alternative is obtained through web benchmarks such as AnTuTu Benchmark and DxOMark.

2. RESEARCH METHODS

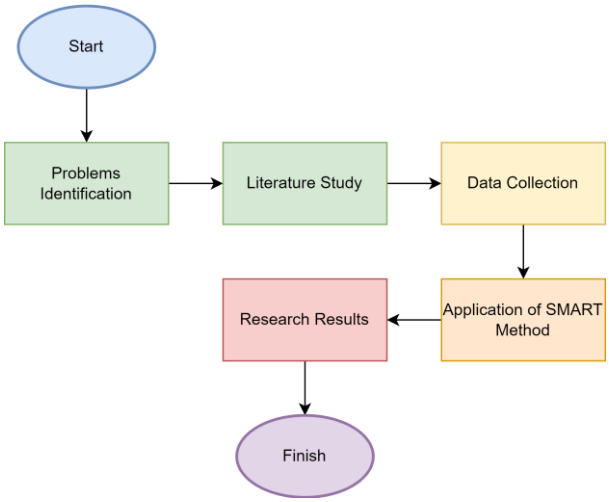

Figure 3. Research Flow

Based on Figure 3, the following is an explanation of the flow of this research:

1. Identify the Problem

At this stage, researchers carry out a process to identify the problems that occur. The existing problem is that there are so many vendors and new smartphone models being launched, which makes people confused about choosing a smartphone that fits their criteria or needs.

2. Literature Study

Next, the researcher studied the theories in books and journals related to the problems and solutions to the problems in the research carried out. Literature studies used by researchers include Decision Support Systems and the SMART (Simple Multi Attribute Rating Technique) method.

3. Data Collection

Data collection was carried out by means of literature studies through online information media platforms such as AnTuTu Benchmark, DxOMark, official websites of smartphone manufacturers, as well as other online media that provide information related to smartphone specifications and prices. The data in question includes specifications for performance criteria, camera, screen and battery, as well as price data related to the smartphone model used as an alternative in this research.

4. SMART method

After the researcher obtains the necessary data, the data will then be processed using the SMART (Simple Multi Attribute Rating Technique) method and discussions will be held to produce a ranking of the test smartphone models based on predetermined weight criteria.

5. Research Results

The final stage is for the researcher to draw conclusions based on the results and discussion of the SMART method that has been carried out and provide suggestions. Conclusions were obtained from the results of ranking smartphone models that should be considered for purchase based on needs criteria. Meanwhile, suggestions are given based on the researcher's personal recommendations aimed at future researchers who will carry out research with similar studies.

2.1 SMART Method

The SMART method is a decision-making model using qualitative and quantitative data. Parameters will determine decisions and have different weight and value ranges. The stages are as follows [9]:

1) Determine the criteria that will be used as reference parameters in decision making and assign weight to each criterion.
2) Calculate the normalized value of the criteria weights, namely comparing the weight value of each criterion with the sum of the weights of all criteria, with the equation:

$$W_j = \frac{w_j}{\sum_{j=1}^{m} w_j}$$

explanation:
W_j = normalization of the weights of the j-th criterion
w_j = weight value of the j-th criterion
$\sum_{j=1}^{m} w_j$ = the sum of the weights of all criteria

3) Determine the data value of all alternatives for each criterion based on the data collection that has been carried out.
4) Calculate the normalized value of all alternatives by comparing the value of each alternative on each criterion with the sum of the values of all alternatives on each criterion and then multiplying by 100 to get a normalization in the value range 0-100, with the equation:

$$a_i(C_i) = \frac{c_i}{\sum_{i=1}^{m} c_i}$$

explanation:
$a_i(C_i)$ = normalization of the i-th alternative value on the i-th criterion
c_i = value of the i-th alternative on the i-th criterion
$\sum_{i=1}^{m} c_i$ = the sum of the values of all alternatives on the i-th criterion

5) Calculate the utility value for each alternative value in each criterion with the condition that the utility value depends on the nature of the criterion itself, namely:
   a) Criteria with the property that the smaller the value, the better (cost), with the equation:

$$u_i(a_i) = \left(\frac{C_{max} - C_{out}}{C_{max} - C_{min}}\right)$$

   b) Criteria with the characteristic that the greater the value, the better (benefit), with the equation:

$$u_i(a_i) = \left(\frac{C_{out} - C_{min}}{C_{max} - C_{min}}\right)$$

explanation:
$u_i(a_i)$ = utility value of the i-th alternative for the i-th criterion
C_{out} = value of the i-th alternative for the i-th criterion
C_{max} = maximum alternative value for the i-th criterion
C_{min} = minimum alternative value for the i-th criterion

6) Calculate the alternative utility value for each criterion against the normalized weight of the criterion itself, with the equation:

$$w_j(u_i(a_i)) = u_i(a_i) \times$$

explanation:
$w_j(u_i(a_i))$ = the result of the utility value of the i-th alternative multiplied by the weight of the j-th criterion
$u_i(a_i)$ = alternative utility value
W_j = normalization of criteria weights

7) Calculate the final alternative result value by adding up all alternative values for all criteria, with the equation:

$$\sum w_j(u_i(a_i))$$

explanation:
$\sum w_j(u_i(a_i))$ = the sum of an alternative values from all criteria

3. RESULTS AND DISCUSSION

In this section, we will discuss the results of data collection, manual calculations, and Android application calculations for the SMART (Simple Multi Attribute Rating Technique) method Decision Support System in smartphone selection.

3.1 Data Collection Results

This research succeeded in collecting data on performance, camera, price, screen and battery criteria for four alternatives, namely Xiaomi 12T, Samsung Galaxy A54 5G, Xiaomi Poco F5, and Samsung Galaxy A34 5G obtained from various sources such as performance obtained from GSMArena and AnTuTu Benchmark , camera, screen and battery were obtained from DxOMark and GSMArena, and prices were obtained from the official websites of each manufacturer and several e-commerce sites in Indonesia such as Shopee and Tokopedia.

3.2 SMART Method Manual Calculations

Manual calculations using the SMART method will be carried out based on the explanation of the steps in the previous section.

1) Determine the Type of Criteria
The used criteria and their characteristics or types are as shown in Table 1.

Table 1. Type of Criteria

Code	Criteria	Type
C1	Performance	*Benefit*
C2	Camera	*Benefit*
C3	Price	*Cost*
C4	Display	*Benefit*
C5	Battery	*Benefit*

2) Determine Criteria Weights
Determining the criteria weights for SMART method calculations is determined from the value range 0-100 as shown in Table 2.

Table 2. Criteria Weights

Code	Criteria	Weight
C1	Performance	90

C2	Camera	85
C3	Price	70
C4	Display	50
C5	Battery	65
Total		**360**

3) Calculating Normalized Criteria Weights
The normalized calculation of criteria weights is carried out based on Table 2 by comparing the weight of each criterion with the total weight of the criteria and multiplying by 100, which can be described as follows:

$$C1 = \frac{90}{360} \times 100 = 25{,}00$$

$$C2 = \frac{85}{360} \times 100 = 23{,}61$$

$$C3 = \frac{70}{360} \times 100 = 19{,}44$$

$$C4 = \frac{50}{360} \times 100 = 13{,}89$$

$$C5 = \frac{65}{360} \times 100 = 18{,}06$$

The results of this description can be presented in Table 3 below.

Table 3. Normalized Criteria Weights

Code	Criteria	Normalized
C1	Performance	25,00
C2	Camera	23,61
C3	Price	19,44
C4	Display	13,89
C5	Battery	18,06
Total		**100**

4) Alternative Data
This research uses alternatives in the form of four smartphone models which can be seen in Table 4.

Table 4. Alternative

Code	Alternative
A1	Xiaomi 12T
A2	Samsung Galaxy A54 5G
A3	Xiaomi Poco F5
A4	Samsung Galaxy A34 5G

The alternative value data for each alternative for each criterion can be seen in Table 5 to Table 9.

a) Table 5 is an alternative value for the performance criteria obtained from the AnTuTu Benchmark score.

Table 5. Alternative Data on Performance Criteria

Alternative	Criteria
	Performance (C1)
A1	835913
A2	570000
A3	1134558
A4	538000
Total	**3078471**

b) Table 6 is an alternative value for the camera criteria obtained from DxOMark in the camera quality score section.

Table 6. Alternative Data on Camera Criteria

Alternative	Criteria
	Camera (C2)
A1	115
A2	107
A3	94
A4	92
Total	**408**

c) Table 7 is an alternative value for the price criteria obtained from the manufacturer's official website and e-commerce.

Table 7. Alternative Data on Price Criteria

Alternative	Criteria
	Price (C3)
A1	6099000
A2	5599000
A3	4999000
A4	5099000
Total	**21796000**

d) Table 8 is an alternative value for the screen criteria obtained from the DxOMark screen quality score section.

Table 8. Alternative Data on Display Criteria

Alternative	Criteria
	Display (C4)
A1	131
A2	120
A3	117
A4	114
Total	**482**

e) Table 9 is an alternative value for the battery criteria obtained from the DxOMark battery endurance score section.

Table 9. Alternative Data on Battery Criteria

Alternative	Criteria
	Battery (C5)
A1	118
A2	113
A3	115
A4	129
Total	**475**

5) Calculating Alternative Data Normalization
Normalization of alternative data is carried out to equalize the range of alternative values for each criterion so as to avoid inconsistent calculation results. In this study,

normalization was carried out with a maximum alternative value range of no more than 100 for each criterion. The following is a description of the calculation:

a) Normalized Alternative Data on Performance Criteria

$$A1 = \frac{835913}{3078471} \times 100 = 27{,}15$$

$$A2 = \frac{570000}{3078471} \times 100 = 18{,}52$$

$$A3 = \frac{1134558}{3078471} \times 100 = 36{,}85$$

$$A4 = \frac{538000}{3078471} \times 100 = 17{,}48$$

b) Normalized Alternative Data on Camera Criteria

$$A1 = \frac{115}{408} \times 100 = 28{,}19$$

$$A2 = \frac{107}{408} \times 100 = 26{,}23$$

$$A3 = \frac{94}{408} \times 100 = 23{,}04$$

$$A4 = \frac{92}{408} \times 100 = 22{,}55$$

c) Normalized Alternative Data on Price Criteria

$$A1 = \frac{6099000}{21796000} \times 100 = 27{,}98$$

$$A2 = \frac{5599000}{21796000} \times 100 = 25{,}69$$

$$A3 = \frac{4999000}{21796000} \times 100 = 22{,}94$$

$$A4 = \frac{5099000}{21796000} \times 100 = 23{,}39$$

d) Normalized Alternative Data on Display Criteria

$$A1 = \frac{131}{482} \times 100 = 27{,}18$$

$$A2 = \frac{120}{482} \times 100 = 24{,}90$$

$$A3 = \frac{117}{482} \times 100 = 24{,}27$$

$$A4 = \frac{114}{482} \times 100 = 23{,}65$$

e) Normalized Alternative Data on Battery Criteria

$$A1 = \frac{118}{475} \times 100 = 24{,}84$$

$$A2 = \frac{113}{475} \times 100 = 23{,}79$$

$$A3 = \frac{115}{475} \times 100 = 24{,}21$$

$$A4 = \frac{129}{475} \times 100 = 27{,}16$$

Based on the normalization process that has been carried out, the results of all normalization of alternative values can be seen in Table 10 below.

Table 10. Normalized Alternative Data

Alternative	Criteria				
	C1	C2	C3	C4	C5
A1	27,15	28,19	27,98	27,18	24,84
A2	18,52	26,23	25,69	24,90	23,79
A3	36,85	23,04	22,94	24,27	24,21
A4	17,48	22,55	23,39	23,65	27,16
Total	**100**	**100**	**100**	**100**	**100**

6) Calculating Alternative Utility Values

Before calculating the utility value, it is necessary to determine the maximum value and minimum alternative value for each criterion, the following is the description.

$C1_{max} = max(27{,}15;\ 18{,}52; 36{,}85;\ 17{,}48) = 36{,}85$
$C1_{min} = min(27{,}15;\ 18{,}52; 36{,}85;\ 17{,}48) = 17{,}48$

$C2_{max} = max(28{,}19;\ 26{,}23; 23{,}04;\ 22{,}55) = 28{,}19$
$C2_{min} = min(28{,}19;\ 26{,}23; 23{,}04;\ 22{,}55) = 22{,}55$

$C3_{max} = max(27{,}98;\ 25{,}69; 22{,}94;\ 23{,}39) = 27{,}98$
$C3_{min} = min(27{,}98;\ 25{,}69; 22{,}94;\ 23{,}39) = 22{,}94$

$C4_{max} = max(27{,}18;\ 24{,}90; 24{,}27;\ 23{,}65) = 27{,}18$
$C4_{min} = min(27{,}18;\ 24{,}90; 24{,}27;\ 23{,}65) = 23{,}65$

$C5_{max} = max(24{,}84;\ 23{,}79; 24{,}21;\ 27{,}16) = 27{,}16$
$C5_{min} = min(24{,}84;\ 23{,}79; 24{,}21;\ 27{,}16) = 23{,}79$

After determining the minimum and maximum values, the next step is the process of calculating alternative utility values based on the alternative normalized values and criteria in Table 10 and Table 3 according to the type of criteria, which can be described as follows.

a) Alternative Utility Value on Performance Criteria

$$u_1(a_1) = \left(\frac{27{,}15 - 17{,}48}{36{,}85 - 17{,}48}\right) = 0{,}50$$

$$u_1(a_2) = \left(\frac{18{,}52 - 17{,}48}{36{,}85 - 17{,}48}\right) = 0{,}05$$

$$u_1(a_3) = \left(\frac{36{,}85 - 17{,}48}{36{,}85 - 17{,}48}\right) = 1{,}00$$

$$u_1(a_4) = \left(\frac{17{,}48 - 17{,}48}{36{,}85 - 17{,}48}\right) = 0{,}00$$

b) Alternative Utility Value on Camera Criteria

$$u_2(a_1) = \left(\frac{28{,}19 - 22{,}55}{28{,}19 - 22{,}55}\right) = 1{,}00$$

$$u_2(a_2) = \left(\frac{26{,}23 - 22{,}55}{28{,}19 - 22{,}55}\right) = 0{,}65$$

$$u_2(a_3) = \left(\frac{23{,}04 - 22{,}55}{28{,}19 - 22{,}55}\right) = 0{,}09$$

$$u_2(a_4) = \left(\frac{22{,}55 - 22{,}55}{28{,}19 - 22{,}55}\right) = 0{,}00$$

c) Alternative Utility Value on Price Criteria

$$u_3(a_1) = \left(\frac{27{,}98 - 27{,}98}{27{,}98 - 22{,}94}\right) = 0{,}00$$

$$u_3(a_2) = \left(\frac{27{,}98 - 25{,}69}{27{,}98 - 22{,}94}\right) = 0{,}45$$

$$u_3(a_3) = \left(\frac{27{,}98 - 22{,}94}{27{,}98 - 22{,}94}\right) = 1{,}00$$

$$u_3(a_4) = \left(\frac{27{,}98 - 23{,}39}{27{,}98 - 22{,}94}\right) = 0{,}91$$

d) Alternative Utility Value on Display Criteria

$$u_4(a_1) = \left(\frac{27{,}18 - 23{,}65}{27{,}18 - 23{,}65}\right) = 1{,}00$$

$$u_4(a_2) = \left(\frac{24{,}90 - 23{,}65}{27{,}18 - 23{,}65}\right) = 0{,}35$$

$$u_4(a_3) = \left(\frac{24{,}97 - 23{,}65}{27{,}18 - 23{,}65}\right) = 0{,}18$$

$$u_4(a_4) = \left(\frac{23.65 - 23{,}65}{27{,}18 - 23{,}65}\right) = 0{,}00$$

e) Alternative Utility Value on Battery Criteria

$$u_5(a_1) = \left(\frac{24{,}84 - 23{,}79}{27{,}16 - 23{,}79}\right) = 0{,}31$$

$$u_5(a_2) = \left(\frac{23{,}79 - 23{,}79}{27{,}16 - 23{,}79}\right) = 0{,}00$$

$$u_5(a_3) = \left(\frac{24{,}21 - 23{,}79}{27{,}16 - 23{,}79}\right) = 0{,}12$$

$$u_5(a_4) = \left(\frac{27{,}16 - 23{,}79}{27{,}16 - 23{,}79}\right) = 1{,}00$$

Based on the utility value calculation process that has been carried out, the results can be seen in Table 11.

Table 11. Alternative Utility Values

Alternative	Criteria				
	C1	C2	C3	C4	C5
A1	0,50	1,00	0,00	1,00	0,31
A2	0,05	0,65	0,45	0,35	0,00
A3	1,00	0,09	1,00	0,18	0,12
A4	0,00	0,00	0,91	0,00	1,00

7) Calculate the Final Value based on the Alternative Utility Value against the Criteria Weight
Calculation of the final value based on alternative utility values against the criteria weights is carried out using the equation previously explained. The calculation process can be described as follows.

a) Alternative utility value against the weight of performance criteria

$$A1 = 0{,}50 \times 25{,}00 = 12{,}48$$

$$A2 = 0{,}05 \times 25{,}00 = 1{,}34$$

$$A3 = 1{,}00 \times 25{,}00 = 25{,}00$$

$$A4 = 0{,}00 \times 25{,}00 = 0{,}00$$

b) Alternative utility value against the weight of camera criteria

$$A1 = 1{,}00 \times 23{,}61 = 23{,}61$$

$$A2 = 0{,}65 \times 23{,}61 = 15{,}40$$

$$A3 = 0{,}09 \times 23{,}61 = 2{,}05$$

$$A4 = 0{,}00 \times 23{,}61 = 0{,}00$$

c) Alternative utility value against the weight of price criteria

$$A1 = 0{,}00 \times 19{,}44 = 0{,}00$$

$$A2 = 0{,}45 \times 19{,}44 = 8{,}84$$

$$A3 = 1{,}00 \times 19{,}44 = 19{,}44$$

$$A4 = 0{,}91 \times 19{,}44 = 17{,}68$$

d) Alternative utility value against the weight of display criteria

$$A1 = 1{,}00 \times 13{,}89 = 13{,}89$$

$$A2 = 0{,}35 \times 13{,}89 = 4{,}90$$

$$A3 = 0{,}18 \times 13{,}89 = 2{,}45$$

$$A4 = 0{,}00 \times 13{,}89 = 0{,}00$$

e) Alternative utility value against the weight of battery criteria

$$A1 = 0{,}31 \times 18{,}06 = 5{,}64$$

$$A2 = 0{,}00 \times 18{,}06 = 0{,}00$$

$$A3 = 0{,}12 \times 18{,}06 = 2{,}26$$

$$A4 = 1{,}00 \times 18{,}06 = 18{,}06$$

Based on the calculation process that has been carried out, the results can be seen in Table 12.

Table 12. Alternative Final Score on Each Criterion

Alternative	Criteria				
	C1	C2	C3	C4	C5
A1	12,48	23,61	0,00	13,89	5,64
A2	1,34	15,40	8,84	4,90	0,00
A3	25,00	2,05	19,44	2,45	2,26
A4	0,00	0,00	17,68	0,00	18,06

8) Calculating the Final Results of Alternative Values
The final result of the alternative value is the total value obtained by each alternative on all criteria. The final calculation of the total value obtained by the alternative can be described as follows.

$$A1 = 12{,}48 + 23{,}61 + 0{,}00 + 13{,}89 + 5{,}64 = 55{,}63$$

$$A2 = 1{,}34 + 15{,}40 + 8{,}84 + 4{,}90 + 0{,}00 = 30{,}48$$

$$A3 = 25{,}00 + 2{,}05 + 19{,}44 + 2{,}45 + 2{,}26 = 51{,}21$$

$$A4 = 0{,}00 + 0{,}00 + 17{,}68 + 0{,}00 + 18{,}06 = 35{,}73$$

Therefore, the final results of the total value obtained by each alternative can be seen in Table 13.

Table 13. Total Alternative Value

Code	Alternative	Total Value
A1	Xiaomi 12T	55,63
A2	Samsung Galaxy A54 5G	30,48
A3	Xiaomi Poco F5	51,21
A4	Samsung Galaxy A34 5G	35,73

The ranking order based on the total alternative value can be seen in Table 14.

Table 14. Alternative Ranking

No.	Alternative	Total Value
1	Xiaomi 12T	55,63
2	Xiaomi Poco F5	51,21
3	Samsung Galaxy A34 5G	35,73
4	Samsung Galaxy A54 5G	30,48

Based on the ranking order in Table 14, the Xiaomi 12T gets the highest total score, namely 55.63. Then in second place is the Xiaomi Poco F5 with a total score of 51.21, third place is the Samsung Galaxy A34 5G with a total score of 35.73, and the last rank with the lowest total score is the Samsung Galaxy A54 5G with a total score of 30.48.

This ranking result is based on the weighting of the criteria carried out before the calculation process. The results of this ranking are not definite ranking results because they are influenced by the weighting of the criteria where each person has different preferences for the importance of the criteria according to their individual needs.

3.3 Implementation in Android Application

The SMART method decision support system is implemented into an Android application which has an interface that makes it easier to make a decision.

a) First Page
This page is the page that will be displayed when the user has just installed or has never opened the application.

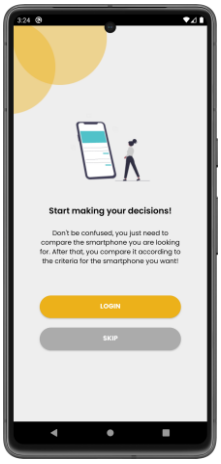

Figure 4. First Page of Android Application

b) Login Page
This is what the login page will looks like if the user has already created an account.

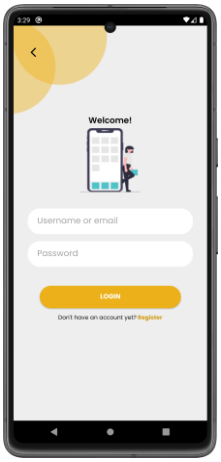

Figure 5. Login Page of Android Application

c) Register Page
This is what the registration page looks like if the user has never created an account.

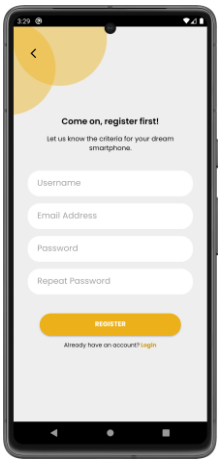

Figure 6. Register Page of Android Application

d) Home Page
This is the display of the main page if the user has logged in or pressed the skip button on the first page.

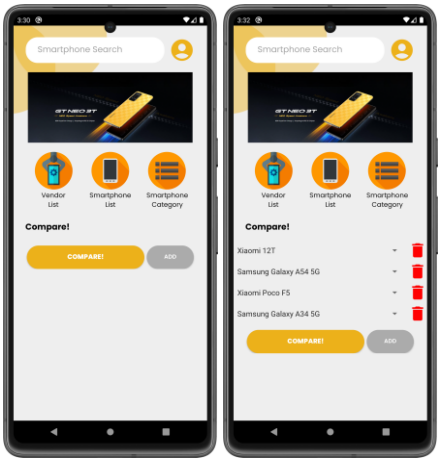

Figure 7. Home Page of Android Application

e) Comparison Page
This is the display for the comparison page that will perform all the SMART method calculation steps in the

background based on input weights of criteria and alternatives specified by the user.

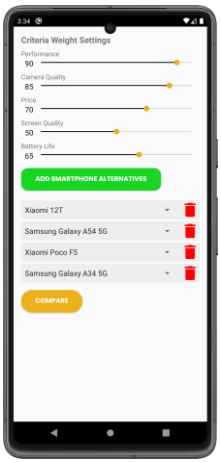

Figure 8. Comparison Page of Android Application

f) Comparison Results View
This display will appear if the user performs calculations by inputting the weights of criteria and alternatives then pressing the compare button.

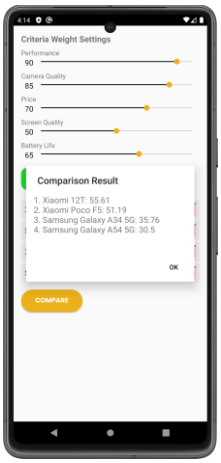

Figure 9. Comparison Results View of Android Application

4. CONCLUSION

Based on the ranking order in Table 14, the Xiaomi 12T gets the highest total score, namely 55.63. Then in second place is the Xiaomi Poco F5 with a total score of 51.21, third place is the Samsung Galaxy A34 5G with a total score of 35.73, and the last rank with the lowest total score is the Samsung Galaxy A54 5G with a total score of 30.48.

Data calculations using manual calculations and the Android application have almost the same results, with a maximum difference of value is ±0.03. Based on these results, it can be concluded that the calculation performance of the Android application based on manual calculation results has an accuracy rate of 99.94%, which means the Android application has successfully implemented the SMART method.

This ranking result is based on the weighting of the criteria carried out before the calculation process. The results of this ranking are not definite ranking results because they are influenced by the weighting of the criteria where each person has different preferences for the importance of the criteria according to their individual needs.

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