

Prediction of 2020 Mobile Sales Trends Using the Weighted Product Method

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ABSTRACT

Mobile is a communication tool that has the ability like a computer with a variety of functions that is easy to carry anywhere and anytime. The current trend of cellphones is marked by the emergence of increasingly sophisticated types, models and brands with increasingly diverse features such as games, music, cameras, videos and social media. Therefore, nowadays there are many cellphone shops that sell cellphones, in addition to that the development of cellphones has made choosing a cellphone a long and complicated process to produce the best choice that suits your needs. This study aims to produce a decision for the selection of mobile phones using the weighted product method. Weighted product uses the multiplication technique to relate the attribute rating, where the rating of each attribute must be ranked first with the weight of the attribute concerned to produce the largest value that will be selected as the best alternative. The application of the Weighted Product method uses criteria, namely camera (C1), ram (C2), rom (C3), price (C4), weight (C5), and battery (C6). The results of this study indicate that the recommended alternative is A3, namely OPPO type OPPO A9 2020 with a V value of 0.093.

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1. Introduction

Mobile is a communication tool that has the ability like a computer that is easy to carry anywhere with a variety of functions for human life. Mobile has features such as games, music media, media cameras, video media, social media that can be used anywhere and anytime. The current trend of cellphones is marked by the emergence of increasingly sophisticated types, models and brands with increasingly diverse features according to human needs. Decision Support Systems are interactive information systems that provide information, modeling, and data manipulation. This system is used to assist decision making in semi-structured and unstructured situations [1]. Computer-based information systems (including knowledge-based systems) that are used to support decision making in an organization or company, can also be said to be a computer system that processes data into information for making decisions [2]. Some of the characteristics of a decision support system are: a computer-based system, used to assist decision makers, to solve complex problems that are impossible with manual calculations, and data and analysis models as the main components. various environmental changes that occur and user needs [3].

Based on previous research Dyna Marisa Khairina, Dio Ivando, Septya Maharani in the title Method Implementation Weighted Product For Selection Applications Smartphone Android states for the selection process android smartphone it takes some criteria for consideration. As for that criteria obtained from the results of the questionnaire, namely price, internal memory, RAM, camera, and battery capacity. The result of this research is a system application recommendations to user as an ingredient consideration for decision making in choosing android smartphone by applying the method weighted product in the system analysis process in order to obtain the best results in decision making. [4].

Weighted Product (WP) is a method that completes the Multi Attribute Decision Making (MADM). Weighted Product (WP) is a popular multi-criteria analysis decision and is a multi-criteria



decision-making method. The choice of the Weighted Product (WP) method is also based on its ability to provide optimal solutions in the ranking system. The choice of this method is also based on the computational complexity which is not too difficult so that the time needed to produce calculations is relatively short[5]. This method evaluates several alternatives to a set of attributes or criteria, where each attribute is independent of one another[6]. The Weighted Product (WP) method uses the multiplication technique to relate the attribute rating, where the rating of each attribute must be ranked first with the attribute weight in question.[7].

The purpose of this study is to design a decision support system for predicting cellphone sales trends in 2020 so that cellphone intersections can decide which cellphone brands are trendy in 2020, applying the Weighted Product method to analyze the criteria desired by consumers according to their needs and system implementation. at the intersection of cellphones in the trend of cellphone sales in 2020 using the Weighted Product method as a calculation that uses multiplication to produce the largest value that will be selected as the best alternative. The benefits of this research are as a medium to transform insights and find out about cellphone sales trends for 2020, complementary literature in the field of research regarding predictions of cellphone sales trends in 2020 and recommendations to Simpang Ponsel to determine consumer interest in cellphone selection

2. Method

2.1 Research Framework

The research framework discusses the research implementation model which is the steps that will be taken in solving research problems. The stages in this research are as follows:

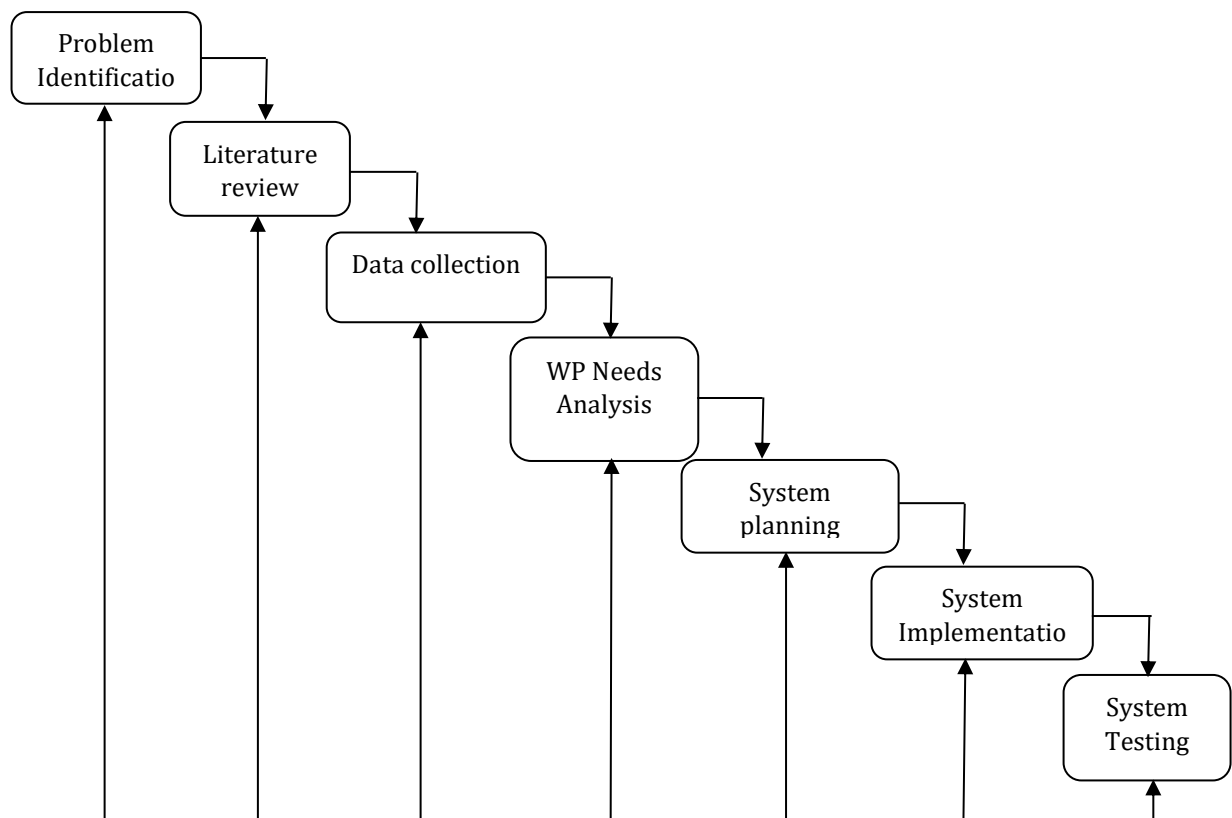


Figure 1. Research Framework

Based on the research method used in Figure 1 above, the discussion of each of these stages can be described as follows:



2.2 Data Collection

At this stage the author collects the data needed in the research needs by directly reviewing and gathering information from the parties concerned to the object of the problem that occurs in determining what cellphones are in demand by the community for each purchase.

2.3 Analysis Method with Weighted Product

The steps in calculating the Weighted product (WP) method are as follows [6] :

- a) Normalization or repair of weights

Perform normalization to produce a value of w_j where the value of $j = 1, 2, \dots, n$, where n is the number of alternatives and $\sum w_j$ is the total number of weights of the criteria:

formula:

$$W_j = \frac{w_j}{\sum_{j=1}^n w_j} \quad (1)$$

- b) Determine the value of the vector S

The value of the vector S is obtained by multiplying all criteria by the weight that has been normalized. Where is the preference criteria, is the criterion value and is the number of criteria.

formula:

$$S_i = \prod_{j=1}^n x_{ij}^{w_{ij}} \quad (2)$$

- c) Determine the vector value V

Formula:

$$V_i = \frac{\prod_{j=1}^n x_{ij}^{w_{ij}}}{\prod_{j=1}^n x_{ij}^* w_{ij}} \quad (3)$$

3. Results and discussion

3.1 Analysis and Application of the Apriori Algorithm

The application of the weighted product method using mobile phone sample data is as follows:

Table 1
Preliminary data

No.	Type	Camera	RAM	ROM	Price	Weight	Battery
1.	Galaxy A10s	13MP	2 GB	32 GB	Rp. 1,749,000.00	168 g	4000
2.	Galaxy A20s	13 MP	4 GB	64 GB	IDR 2,399,000.00	178 g	4000
3.	Galaxy A30s	25 MP	4 GB	64 GB	Rp. 2,999,000.00	169 g	4000
4.	Galaxy A50s	32 MP	4 GB	128 GB	Rp. 3,399,000.00	166 g	4000
5.	Vivo Y91C	13 MP	2 GB	32 GB	Rp. 1,499,000.00	163.5g	4030
6.	Vivo Y12	13 MP	3 GB	32 GB	Rp. 1,799,000.00	190.5 g	5000
7.	Vivo Y15	16 MP	4 GB	64 GB	Rp. 2,299,000.00	190.5 g	5000
8.	Vivo Y17	20 MP	4 GB	128 GB	Rp. 2,399,000.00	190.5 g	5000
9.	Vivo Y19	16 MP	6 GB	128 GB	Rp. 2,999,000.00	193 g	5000
10.	Vivo V17 Pro	48 MP	8GB	128 GB	Rp. 4,999,000.00	201.8 g	4100
11.	Vivo V19	48 MP	8 GB	128 GB	Rp. 4,299,000.00	176 g	4500
12.	OPPO A1k	8 MP	2 GB	32 GB	Rp. 1,599,000.00	170 g	4000
13.	OPPO A5s	13 MP	3 GB	32 GB	Rp. 1,899,000.00	170 g	4230
14.	OPPO A5 2020	12 MP	4 GB	128 GB	Rp. 2,799,000.00	195 g	5000
15.	OPPO A92020	48 MP	8 GB	128 GB	Rp. 3,699,000.00	195 g	5000
16.	OPPO Reno2 F	48 MP	8 GB	128 GB	Rp. 4,999,000.00	195 g	4000
17.	OPPO Reno2	48 MP	8 GB	256 GB	Rp. 7,999,000.00	189 g	4000
18.	Realme C2	5 MP	2 GB	32 GB	Rp. 1,399,000.00	166 g	4000

No.	Type	Camera	RAM	ROM	Price	Weight	Battery
19.	Realme 5	12 MP	3 GB	64 GB	Rp. 1,999,000.00	198 g	5000
20.	Realme 5 Pro	48 MP	4 GB	128 GB	Rp. 2,999,000.00	184 g	4035
21.	Realme XT	64 MP	8 GB	128 GB	Rp. 4,199,000.00	183 g	4000
22.	Realme X2 Pro	64 MP	12 GB	256 GB	Rp. 7,799,000.00	199 g	4000
23.	Redmi Note 8	48 MP	3 GB	32 GB	Rp. 2,049,000.00	190 g	4000
24.	Redmi Note 8 Pro	64 MP	6 GB	64 GB	Rp. 3,099,000.00	199.8 g	4500

3.2 Application of the Weighted Product

Here are the final steps for determining value using a Weighted Product (WP):

a) Determining Alternatives

Table 2
Alternative handphone

Alternative	Information
A1	Samsung
A2	Vivo
A3	OPPO
A4	Realme
A5	Xiaomi

b) Define criteria

Table 3
Mobile criteria

Criteria	Information	Type
C1	Camera	Benefit
C2	RAM	Benefit
C3	ROM	Benefit
C4	Price	Cost
C5	Weight	Benefit
C6	Battery	Benefit

c) Determining the Match Rating

1) Camera criteria (C1)

Table 4
Criteria Camera (C1)

Camera	Fuzzy Numbers	Score
$Kamera \leq 10 MP$	Very low	0
$10 MP < 30 MP camera \leq$	Low	0.25
$30 MP < 45 MP camera \leq$	Enough	0.5
$45 MP < 55 MP camera \leq$	High	0.75
$Kamera \geq 55 MP$	Very high	1

2) RAM Criteria (C2)

Table 5
Ram Criteria (C2)

RAM	Fuzzy Numbers	Score
$RAM = 2 GB$	Very low	0
$2 GB < 3 GB RAM \leq$	Low	0.25
$3GB < 5GB RAM \leq$	Enough	0.5
$5 GB < 8 GB RAM \leq$	High	0.75
$RAM \geq 8 GB$	Very high	1

3) ROM Criteria (C3)

Table 6
Criteria Rom (C3)

ROM	Fuzzy Numbers	Score
$ROM = 32 GB$	Very low	0
$32GB < 60GB ROM \leq$	Low	0.25
$60GB < 80GB ROM \leq$	Enough	0.5
$80GB < 100GB ROM \leq$	High	0.75



$ROM \geq 100 GB$	Very high	1
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4) Price Criteria (C4)

Table 7
Price Criteria (C4)

Price	Fuzzy Numbers	Score
$Harga \leq 1.500.00$	Very low	1
$1,500,000 < Price 3,000,000 \leq$	Low	0.75
$3,000,000 < Price 5,000,000 \leq$	Enough	0.5
$5,000,000 < Price 7,500,000 \leq$	High	0.25
$Harga \geq 7,500,000$	Very high	0

5) Weight Criteria (C5)

Table 8
Weight Criteria (C5)

Weight	Fuzzy Numbers	Score
$130 g < Weight 150 g \leq$	Very low	0
$150 g < Weight 165 g \leq$	Low	0.25
$165 g < Weight 175 g \leq$	Enough	0.5
$175 g < Weight 185 g \leq$	High	0.75
$Berat \geq 185 g$	Very high	1

6) Battery Criteria (C6)

Table 9
Battery Criteria (C6)

Battery	Fuzzy Numbers	Score
$Baterai \geq 1,500 mAh$	Very low	0
$1,500 mAh < 3,000 mAh battery \leq$	Low	0.25
$3,000 mAh < Battery 4,000 mAh \leq$	Enough	0.5
$4,000 mAh < 5,000 mAh battery \leq$	High	0.75
$Baterai \geq 5000 mAh$	Very high	1

d) Determine the weight of preference or level of importance (W) of each criterion.

W = [1.00 (C1); 0.5 (C2); 1 (C3); 0.25 (C4); 1.00 (C5); 0.75 (6)]

e) Make a rating table of the suitability of each alternative on each criterion Normalization or weight improvement.

Table 10
Fuzzy Weight of Each Criterion

No.	Type	C1	C2	C3	C4	C5	C6
1.	Galaxy A10s	0.25	0	0	0.75	0.5	0.75
2.	Galaxy A20s	0.25	0.5	0.5	0.75	0.75	0.75
3.	Galaxy A30s	0.25	0.5	0.5	0.75	0.5	0.75
4.	Galaxy A50s	0.5	0.5	1	0.5	0.5	0.75
5.	Vivo Y91C	0.25	0	0	1	0.25	0.75
6.	Vivo Y12	0.25	0.25	0	0.75	1	1
7.	Vivo Y15	0.25	0.5	0.5	0.75	1	1
8.	Vivo Y17	0.25	0.5	1	0.75	1	1
9.	Vivo Y19	0.25	0.75	1	0.75	1	1
10.	Vivo V17 Pro	0.75	1	1	0.5	1	0.75
11.	Vivo V19	0.75	0	1	0.5	0.75	0.75
12.	OPPO A1k	0	0.25	0	0.75	0.5	0.75
13.	OPPO A5s	0.25	0.25	0	0.75	0.5	0.75

No.	Type	C1	C2	C3	C4	C5	C6
14.	OPPO A5 2020	0.25	0.5	1	0.75	1	1
15.	OPPO A92020	0.75	1	1	0.5	1	1
16.	OPPO Reno2 F	0.75	1	1	0.5	1	0.75
17.	OPPO Reno2	0.75	1	1	0	1	0.75
18.	Realme C2	0	0	0	1	0.5	0.75
19.	Realme 5	0.25	0.25	0.5	0.75	1	1
20.	Realme 5 Pro	0.75	0.5	1	0.75	0.75	0.75
21.	Realme XT	1	1	1	0.5	0.75	0.75
22.	Realme X2 Pro	1	1	1	0	1	0.75
23.	Redmi Note 8	0.75	0.25	0	0.75	1	0.75
24.	Redmi Note 8 Pro	1	0.75	0.5	0.5	1	0.75

f) Normalization or repair of weights

$$Rumus : W_j = \frac{w_j}{\sum_{j=1}^n w_j}$$

- 1) $W1 = \frac{1}{1+0.5+1+0.25+1+0.75} = \frac{1}{4.5} = 0.2222$
- 2) $W2 = \frac{0.5}{1+0.5+1+0.25+1+0.75} = \frac{0.5}{4.5} = 0.1111$
- 3) $W3 = \frac{1}{1+0.5+1+0.25+1+0.75} = \frac{1}{4.5} = 0.2222$
- 4) $W4 = \frac{0.25}{1+0.5+1+0.25+1+0.75} = \frac{0.25}{4.5} = 0.0555$
- 5) $W5 = \frac{1}{1+0.5+1+0.25+1+0.75} = \frac{1}{4.5} = 0.2222$
- 6) $W6 = \frac{0.75}{1+0.5+1+0.25+1+0.75} = \frac{0.75}{4.5} = 0.1666$

g) Determine the vector value S

$$Rumus : S_i = \prod_{j=1}^n x_{ij}^{w_{ij}}$$

- 1) $S_1 = (0.25^{0.2222}) (0^{0.1111}) (0^{0.2222}) (0.75^{(-0.055)}) (0.5^{0.2222}) (0.75^{0.1666}) = 0$
- 2) $S_2 = (0.25^{0.2222}) (0.5^{0.1111}) (0.5^{0.2222}) (0.75^{(-0.055)}) (0.75^{0.2222}) (0.75^{0.1666}) = 0.5296$
- 3) $S_3 = (0.25^{0.2222}) (0.5^{0.1111}) (0.5^{0.2222}) (0.75^{(-0.055)}) (0.5^{0.2222}) (0.75^{0.1666}) = 0.4843$
- 4) $S_4 = (0.5^{0.2222}) (0.5^{0.1111}) (1^{0.2222}) (0.5^{(-0.055)}) (0.5^{0.2222}) (0.75^{0.1666}) = 0.6738$
- 5) $S_5 = (0.25^{0.2222}) (0^{0.1111}) (0^{0.2222}) (1^{(-0.055)}) (0.25^{0.2222}) (0.75^{0.1666}) = 0$
- 6) $S_6 = (0.25^{0.2222}) (0.25^{0.1111}) (0^{0.2222}) (0.75^{(-0.055)}) (1^{0.2222}) (1^{0.1666}) = 0$
- 7) $S_7 = (0.25^{0.2222}) (0.5^{0.1111}) (0.5^{0.2222}) (0.75^{(-0.055)}) (1^{0.2222}) (1^{0.1666}) = 0.6059$
- 8) $S_8 = (0.25^{0.2222}) (0.5^{0.1111}) (1^{0.2222}) (0.75^{(-0.055)}) (1^{0.2222}) (1^{0.1666}) = 0.6910$
- 9) $S_9 = (0.25^{0.2222}) (0.75^{0.1111}) (1^{0.2222}) (0.75^{(-0.055)}) (1^{0.2222}) (1^{0.1666}) = 0.7229$
- 10) $S_{10} = (0.75^{0.2222}) (1^{0.1111}) (1^{0.2222}) (0.5^{(-0.055)}) (1^{0.2222}) (0.75^{0.1666}) = 0.9281$
- 11) $S_{11} = (0.75^{0.2222}) (0^{0.1111}) (1^{0.2222}) (0.5^{(-0.055)}) (0.75^{0.2222}) (0.75^{0.1666}) = 0$
- 12) $S_{12} = (0^{0.2222}) (0.25^{0.1111}) (0^{0.2222}) (0.75^{(-0.055)}) (0.5^{0.2222}) (0.75^{0.1666}) = 0$
- 13) $S_{13} = (0.25^{0.2222}) (0.25^{0.1111}) (0^{0.2222}) (0.75^{(-0.055)}) (0.5^{0.2222}) (0.75^{0.1666}) = 0$
- 14) $S_{14} = (0.25^{0.2222}) (0.5^{0.1111}) (1^{0.2222}) (0.75^{(-0.055)}) (1^{0.2222}) (1^{0.1666}) = 0.6892$
- 15) $S_{15} = (0.75^{0.2222}) (1^{0.1111}) (1^{0.2222}) (0.5^{(-0.055)}) (1^{0.2222}) (1^{0.1666}) = 0.9737$
- 16) $S_{16} = (0.75^{0.2222}) (1^{0.1111}) (1^{0.2222}) (0.5^{(-0.055)}) (1^{0.2222}) (0.75^{0.1666}) = 0.9281$
- 17) $S_{17} = (0.75^{0.2222}) (1^{0.1111}) (1^{0.2222}) (0^{(-0.055)}) (1^{0.2222}) (0.75^{0.1666}) = 0$
- 18) $S_{18} = (0^{0.2222}) (0^{0.1111}) (0^{0.2222}) (1^{(-0.055)}) (0.5^{0.2222}) (0.75^{0.1666}) = 0$
- 19) $S_{19} = (0.25^{0.2222}) (0.25^{0.1111}) (0.75^{0.2222}) (0.75^{(-0.055)}) (1^{0.2222}) (1^{0.1666}) = 0.6002$



$$\begin{aligned}
20) S_{20} &= (0.75^{0.2222}) (0.5^{0.1111}) (1^{0.2222}) (0.75^{(-0.055)}) (0.75^{0.2222}) (0.75^{0.1666}) = 0.7889 \\
21) S_{21} &= (1^{0.2222}) (1^{0.1111}) (1^{0.2222}) (0.5^{(-0.055)}) (0.75^{0.2222}) (0.75^{0.1666}) = 0.9281 \\
22) S_{22} &= (1^{0.2222}) (1^{0.1111}) (1^{0.2222}) (0^{(-0.055)}) (1^{0.2222}) (0.75^{0.1666}) = 0 \\
23) S_{23} &= (0.75^{0.2222}) (0.25^{0.1111}) (0^{0.2222}) (0.75^{(-0.055)}) (1^{0.2222}) (0.75^{0.1666}) = 0 \\
24) S_{24} &= (1^{0.2222}) (0.75^{0.1111}) (0.5^{0.2222}) (0.5^{(-0.055)}) (1^{0.2222}) (0.75^{0.1666}) = 0.8215
\end{aligned}$$

h) Determine the vector value V

$$\text{rumus : } V_i = \frac{\prod_{j=1}^n x_{ij}^{w_{ij}}}{\prod_{j=1}^n x_{ij}^* w_{ij}}$$

$$V1 = \frac{0}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0}{10.3653} = 0$$

$$V2 = \frac{0.5296}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0.5296}{10.3653} = 0.051$$

$$V3 = \frac{0.4843}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0.4843}{10.3653} = 0.046$$

$$V4 = \frac{0.6738}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0.6738}{10.3653} = 0.063$$

$$V5 = \frac{0}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0}{10.3653} = 0$$

$$V6 = \frac{0}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0}{10.3653} = 0$$

$$V7 = \frac{0.6059}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0.6059}{10.3653} = 0.058$$

$$V8 = \frac{0.6910}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0.6910}{10.3653} = 0.066$$

$$V9 = \frac{0.7229}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0.7229}{10.3653} = 0.069$$

$$V10 = \frac{0.9281}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0.9281}{10.3653} = 0.089$$

$$V11 = \frac{0}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0}{10.3653} = 0$$

$$V12 = \frac{0}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0}{10.3653} = 0$$

$$V13 = \frac{0}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0}{10.3653} = 0$$

$$V14 = \frac{0.6892}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0.6892}{10.3653} = 0.066$$

$$V15 = \frac{0.9737}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0.9737}{10.3653} = 0.093$$

$$V16 = \frac{0.9281}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0.9281}{10.3653} = 0.089$$

$$V17 = \frac{0}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0}{10.6353} = 0$$

$$V18 = \frac{0}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0}{10.6353} = 0$$

$$V19 = \frac{0.6002}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0.6002}{10.6353} = 0.057$$

$$V20 = \frac{0.7889}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0.7889}{10.6353} = 0.076$$

$$V21 = \frac{0.9281}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0.9281}{10.6353} = 0.089$$

$$V22 = \frac{0}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0}{10.6353} = 0$$

$$V23 = \frac{0}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0}{10.6353} = 0$$

$$V24 = \frac{0.8215}{0+0.5296+0.4843+0.6738+0+0+0.6059+0.6910+0.7229+0.9281+0+0+0+0.6892+0.9737+0.9281+0+0+0.6002+0.7889+0.9281+0+0+0.8215} = \frac{0.8215}{10.6353} = 0.077$$

i) Ranking

Table 11
Ranking

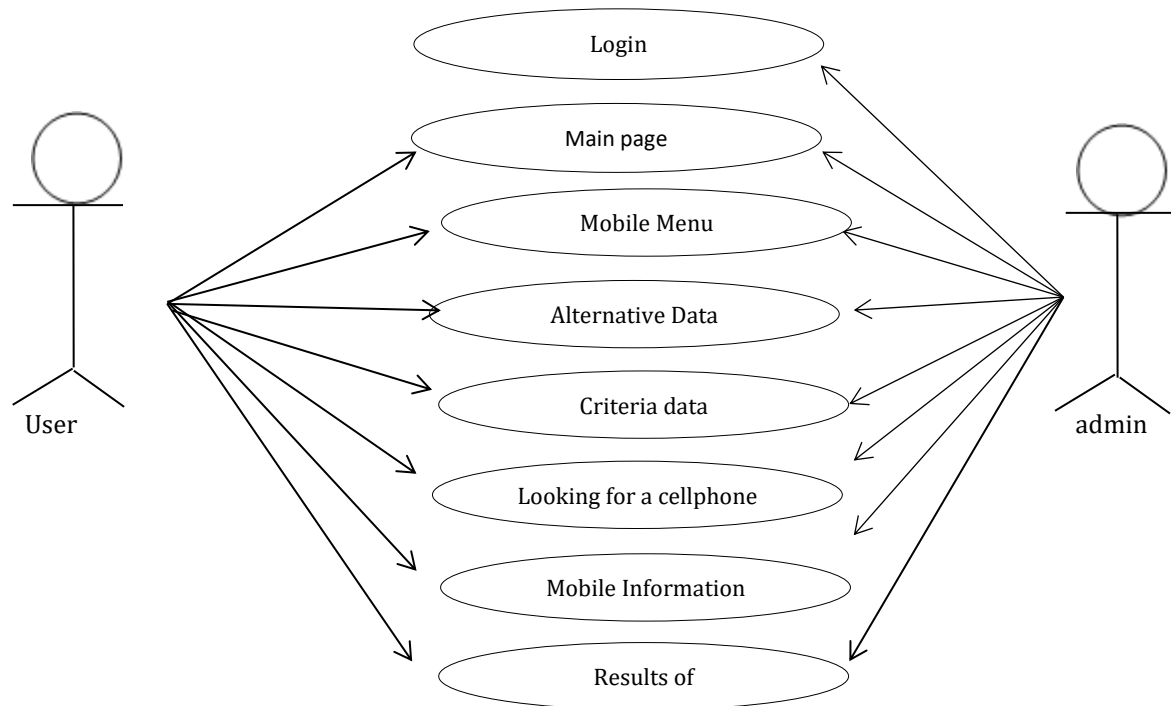
No.	Type	Vi
1.	OPPO A92020	0.093
2.	Vivo V17 Pro	0.089
3.	OPPO Reno2 F	0.089
4.	Realme XT	0.089
5.	Redmi Note 8 Pro	0.077
6.	Realme 5 Pro	0.076
7.	Vivo Y19	0.069
8.	OPPO A5 2020	0.066
9.	Vivo Y17	0.066
10.	Galaxy A50s	0.063
11.	Vivo Y15	0.058
12.	Realme 5	0.057
13.	Galaxy A20s	0.051
14.	Galaxy A30s	0.046
15.	Galaxy A10s	0
16.	Vivo Y91C	0
17.	Vivo Y12	0
18.	Vivo V19	0
19.	OPPO A1k	0
20.	OPPO A5s	0
21.	OPPO Reno2	0
22.	Realme C2	0
23.	Realme X2 Pro	0
24.	Redmi Note 8	0

3.2 System Implementation

a. Use case diagram

Use case diagram describes a typical interaction between system users and the system itself, by providing a narrative of how the system is used [8]. The use case diagram model can be described in a use case diagram, but keep in mind, the diagram is not indicative of the model because the model is wider than the diagram [9]. The following is the use case diagram in this study:



**Figure 2.** Use case diagram**Table 10**
Description of the Use Case Diagram

Use Case Name	Description
Login	Admin opens the display on the main menu
Main page	User and Admin will be on the main page
Mobile Menu	The user is on the menu display to find options from the various brands that have been prepared
Alternative data	The user will enter the type of cellphone desired and the admin will input the alternative data that has been determined
Criteria Data	The user is on the menu display to search for criteria from various brands that have been prepared and the admin will input the predetermined criteria data.
Looking for Mobile	The user will search for a cellphone according to the criteria
Mobile Information	Users will receive cellphone information and admin will input cellphone information data
Results of Recommendations	The user is on the menu display for recommendations on cellphones

b. Interface Design

Interface design consists of The six forms are the main menu, alternative form, criteria form, weight form, calculation form, and decision result form.

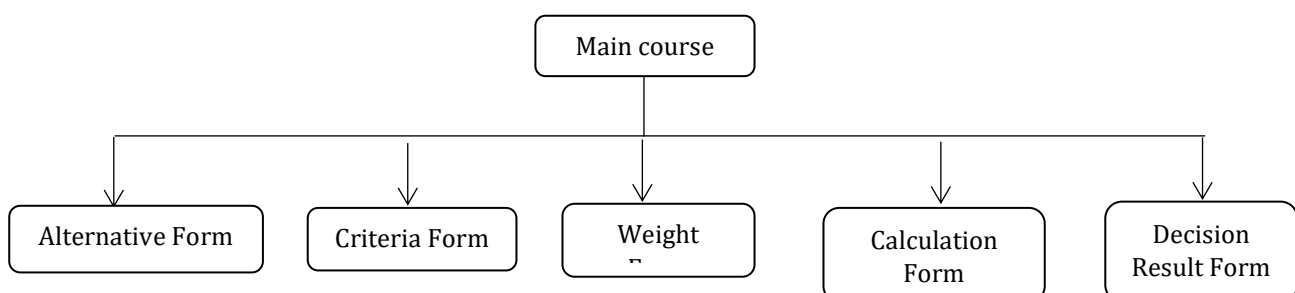


Figure 3. Interface Structure**Table 12**
Description of the Interface Structure

Interface Name	Description
Main course	System menu display
Alternative Form	Form that contains the type of phone type
Criteria Form	Form that contains the criteria for a handphone
Weight Form	Form that contains the weight in each criterion.
Calculation Form	Calculations using the weighted product method
Decision Result Form	The results of the decisions that will become recommendations

c. Database Design

Class diagram describes the static structure of the classes in your system and describes the attributes, operations and relationships between classes. Class diagrams help in visualizing the class structure of a system and are the most widely used type of diagram[10]. The following is the class diagram in this study:

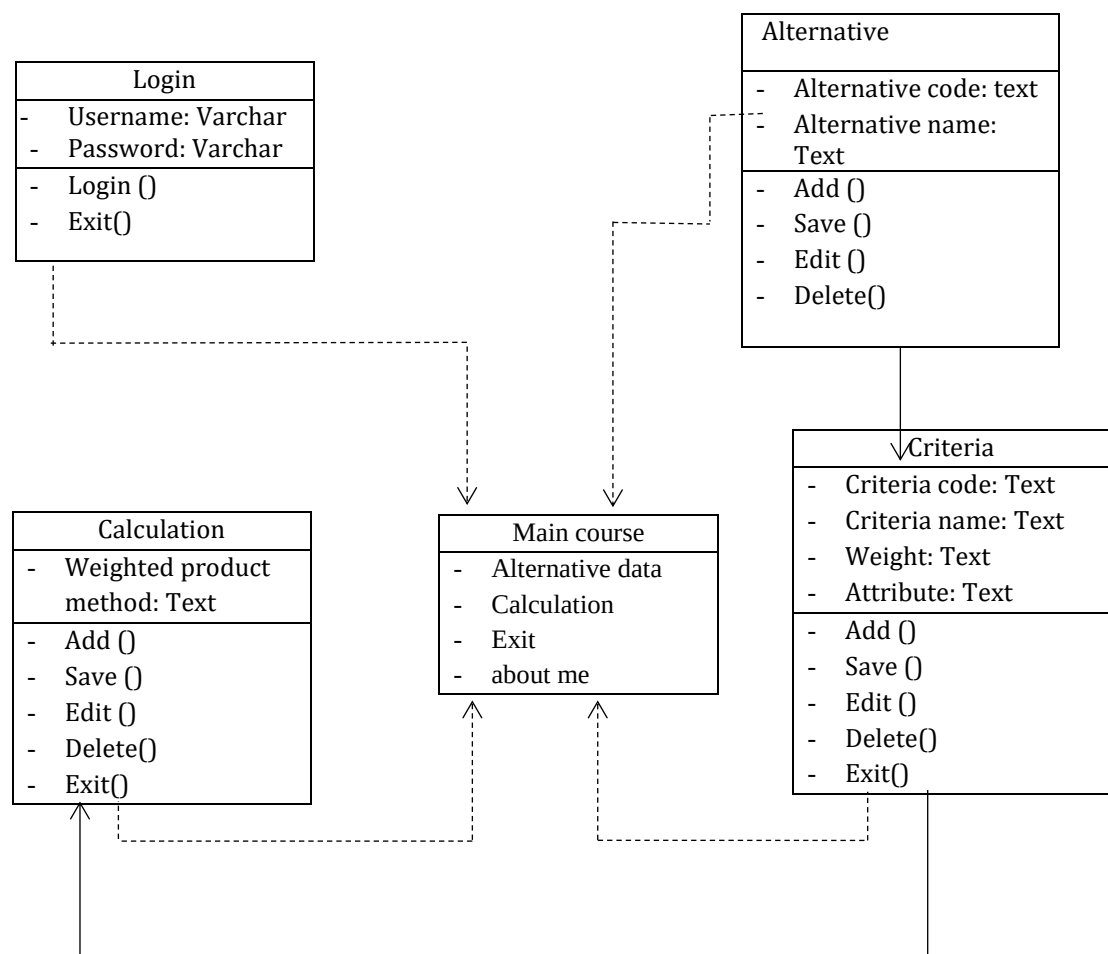


Figure 4. Database Design**d. Result Display (Output)**

The following is a display of the results of the system that has been built:

PERANGKINAN

Proses Pengambilan Keputusan
Trend Penjualan Handphone Tahun 2020

Hasil Keputusan :

No	Kode	Nama Alternatif	Kamera(1)	RAM(0.5)	ROM(1)	Harga(0.25)	Berat(1)	Baterai(0.75)	Hasil S	Hasil V	Hasil
1	A5	Galaxy A50s	0.5	0.5	1	0.5	0.5	0.75	0.678	0.3388	33.88
2	A7	Vivo Y12	0.25	0.25	0	0.75	1	1	0	0	0
3	A8	Vivo Y15	0.25	0.5	0.5	0.5	1	1	0.6113	0.3055	30.55
4	A9	Vivo Y17	0.25	0.5	1	0.5	1	1	0.712	0.3558	35.58
5	A6	Vivo y91c	0.25	0	0	1	0.25	0.75	0	0	0
6	A2	Galaxy A10s	0.25	0	0	0.75	0.5	0.75	0	0	0

Periksa Simpan/Urutkan Keluar

Bobot	Perbaikan Bobot
C1	0.22
C2	0.11
C3	0.22
C4	0.06
C5	0.22
C6	0.17

Figure 3.Confidence Results**4. Conclusion**

Based on the research results, it can be concluded that the weighted product method in predicting mobile phone sales trends in 2020 is as follows:

- Designing a Decision Support System using the Weighted Product method is very effective in helping decision making in choosing a cellphone according to consumer needs.
- The application of the Weighted Product method uses criteria, namely camera, ram, rom, price, weight, and battery. Testing the Weighted Product method shows that the highest ranking of vector values is the alternative. The preference weights used in this study are camera, price, and weight.
- Implementation of the Decision Support System using the Weighted Product method at cellphone intersections using the Microsoft Visual Basic 2010 application and the Microsoft Access 2010 database. The results of this study indicate that the recommended alternative is A3, namely OPPO type OPPO A9 2020 with a V value of 0.093.

5. Reference

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