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Application of AHP (Analytic Hierarchy Process) Method in Selecting 6 GB Ram Class Smartphone

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ABSTRACT

This research aims to find out the selection of Smartphones on the Samsung, Oppo, Redmi and Realme brands in the best 6 GB RAM class. This study uses the AHP (Analythical Hierarchy Process) method. The sample uses five participants, namely 5 respondents. The model begins by identifying the main criteria, namely Price, Design, Battery Power and Engine Power using the main criteria ranking based on expert opinions to be interpreted in AHP. The second stage in the methodology is to identify sub-criteria by determining the Smartphone brands to be ranked, namely Samsung, Oppo, Redmi and Realme. Primary data was collected by interviewing and observing participants who use 6Gb RAM smartphones for more than a year. The results of the study showed that Realme smartphone got the first rank with a value of 0.283 while Redmi got the second priority with a value of 0.275 and Oppo got the third priority with a value of 0.265 and Samsung got the fourth priority with a value of 0.18, these are the results of this research analysis.

Keywords: *AHP, Smartphone and 6 GB RAM.*

1. INTRODUCTION

Smartphones are now no longer considered a luxury item but are considered a necessity. Manto get information everyday. This can be caused by a shift in human life needs on smartphones. If we look at the pattern of human life and the way of thinking in choosing goods is also increasingly selective. Not only primary needs, the need for luxury goods is also increasing. Such as the need for Smartphones and electronic equipment. These products are offered with their respective advantages. The goal to be achieved in this study is to determine the weight of consumer assessment criteria in choosing this Smartphone with the alternative criteria owned are the cheapest price, good design, long-lasting battery and the machine is not easily damaged according to consumer criteria.

Smartphones have become an important tool for people who travel long distances, not only to get the latest information, the latest news but also to open application programs and e-books [1]. Nowadays, many people do distance learning without having to use a computer, but simply by using a smartphone connected to the internet and then studying in a virtual classroom [2]. The difference between a regular cellphone and a smartphone is that regular cellphone generally have limited features such as SMS, telephone, watching videos, playing songs and the internet.

For general typing media, regular phones still use a keypad whose letters are combined with numbers. While the internet feature is quite difficult because it has to do a rather complicated setting and in terms of power for regular phones it is more efficient because it is not used to run many processes. While if the smartphone has much more diverse features and is used to run many processes [3]. Smartphones a mobile phone or smart mobile phone equipped with advanced and high-performance features like a computer. Smartphone can also be interpreted as a mobile phone that works by using operating system (OS) software that provides standard and basic connections for application developers [4].

While the term Smartphone is more appropriate when referring to mobile devices that are equipped with all kinds of additional features that are absent on mobile phones. These features include internet access, the ability to download various applications, to sophisticated camera features. The keyboard on a smartphone is also usually present in virtual form, aka touch screen [5]. The Analytical Hierarchy Process (AHP) method can be used as a method for making scientific and rational decisions to provide the best solution to fairly complex criteria problems from various alternatives [6].

This study uses the AHP (Analytical Hierarchy Process) method in sorting priority scales and weighting scales with various criteria and several alternative choices to determine the most important thing in choosing a 6 GB RAM class smartphone [7]. AHP is a decision support model developed by Thomas L. Saaty. This decision support model will describe complex multi-factor or multi-criteria problems into a hierarchy, according to Saaty (1993), hierarchy is defined as a representation of a complex problem in a multi-level structure where the first level is the goal, followed by the level of factors, criteria, sub-criteria, and so on down to the last level of alternatives. With a hierarchy, a complex problem can be described into its groups which are then arranged into a hierarchical form so that the problem will appear more structured and systematic [8].

Decision-making steps in facing difficult situations with several criteria and alternative choices through a weighting hierarchy can be carried out using various methodologies [9]. Decision making is a complex thing that must be done when we are faced with situations and problems that must be overcome and need to be solved, including in management [10]. AHP Procedure There are three main principles in problem solving in AHP according to Saaty, namely: Decomposition, Comparative Judgement, and Logical Consistency. In general, the AHP procedure includes the following stages [11]. By using the AHP method, strategic planning can be used widely in various fields, including selecting smartphones with RAM ranging from low to high capacity.

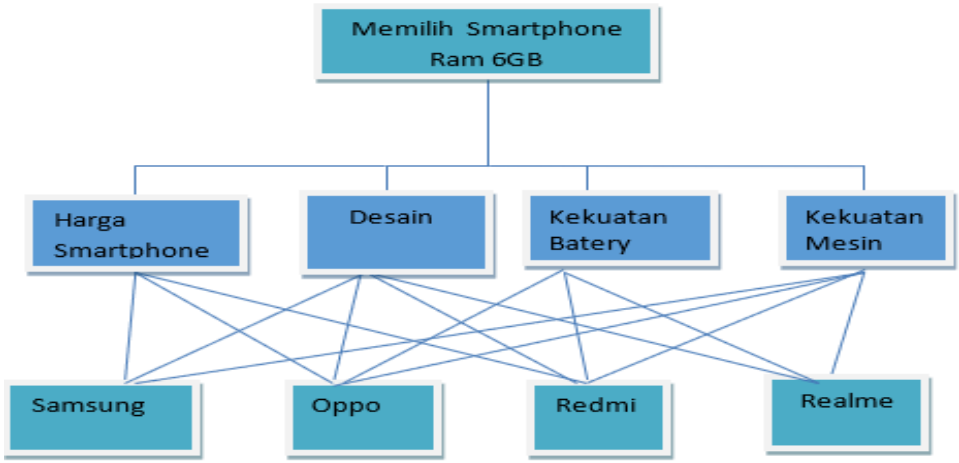
The main tool of AHP is a form of functional hierarchy with the most important input of human perception. The existence of a hierarchical form allows a complex or unstructured problem to be solved in sub-problems, then arranged into a hierarchical form [12]. By first conducting research on several decision-making. Decision-making research is a way of collecting information from data about a product against other products in the same class. This consumer research will be conducted to find out which smartphone is the best from several brands against the criteria that are the main priority in decision-making using the AHP method.

Research conducted by Sidik Pratomo and Jasmir (2023) Using the AHP method, a system that has been designed based on needs analysis is needed to help select quality used cars when purchasing a car with several consideration criteria on several alternatives faced. The decision support system is designed only to help in selecting several alternatives to get the right car. Research conducted by [13] who conducted research on "Housing selection decision support systems using the AHP method". The AHP method can help determine the selection of a house with several criteria and several alternatives to get the right house. Research conducted by [14] who conducted research on "Decision Support Design Techniques with the Analytical Hierarchy Process (AHP) Method to Determine Social Assistance for the Community Impacted by Covid 19" With the AHP method, it can help determine the selection of people with several criteria and alternatives so as to choose the right people to receive social assistance.

In conducting variable assessments, it is necessary to pay attention to the principle of consistency in assessing through the specified criteria and alternatives. This consistency has two meanings, the first is that similar objects are grouped homogenously. For example, when you want to compare smartphones in the 6 GB RAM class from various brands and have the cheapest price, it is impossible to compare them with smartphones with 12 GB RAM with a more expensive price.

2. METHODS

The location of the research was in the APP Jakarta Polytechnic Campus environment. The research will be conducted from March 2024 to October 2024. Data collection through observation, namely observation and recording of data in the campus environment of the APP Jakarta Polytechnic related to the object of research. Observations are made directly. Questionnaire filling is done by interviewing respondents who have used a 6 GB RAM Smartphone for at least 1 year by giving a questionnaire to respondents. Respondents are people who understand and know the following criteria, namely Price, Design, Battery Life and Engine Power For this research used a questionnaire of 5 respondents. From these criteria and alternatives, a smartphone selection hierarchy model can be created as follows:



Struktur Hirarki AHP

Hierarchy is the result of unstructured solutions and grouped into certain groups and then the group is arranged and arranged into a hierarchical arrangement from level 0 containing the problem objectives then level 1 is defined factor criteria of the problem and after that at level 2 the alternative solution options are selected. In this hierarchy process, a hierarchy tree is created as a solution to the existing problem into a hierarchy that shows from the general objectives to the criteria and alternative options given to achieve the problem objectives.

The assessment or weighting in the 2nd Hierarchy is intended to compare the values of each criterion in order to achieve the goal. So that later the weighting of the level of importance of each criterion will be obtained to achieve the goals that have been set. The paired comparison assessment procedure in AHP refers to the assessment score that has been developed by Thomas L Saaty, Table 1 as follows:

Table 1. Assessment or weighting in Hierarchy 2

Tingkat	Definisi	Keterangan
1	Sama penting	Kedua elemen sama penting
3	Sedikit lebih penting	Elemen yang satu lebih penting dibandingkan dengan elemen lainnya
5	Satu lebih penting	Satu elemen sangat disukai dan secara praktis dominasinya sangat nyata, dibandingkan dengan elemen pasangannya.
7	Satu sangat lebih penting	Satu elemen terbukti sangat disukai dan secara praktis dominasinya sangat, dibandingkan dengan elemen pasangannya.
9	Satu ekstrim lebih penting	Satu elemen mutlak lebih disukai dibandingkan dengan pasangannya, pada tingkat keyakinan tertinggi.
2,4,6,8	Nilai tengah diantara dua pendapat	Nilai – nilai ini diperlukan suatu kompromi.

Sumber : Saaty T. Lorie 1993

3. RESULTS AND DISCUSSION

The hierarchy process of the AHP method analysis proposed in this study aims to provide an assessment of the criteria that influence the decision to choose alternative smartphone choices by looking at Samsung, Oppo, Redmi and Realme smartphone users. The selection of the methodology is based on the characteristics of the problem and consideration of the advantages and disadvantages of the effectiveness and efficiency of a smartphone. Characteristics with criteria Price, Design, Battery Power and Engine Power.

Each criterion is assessed by the weight of the importance of the pair of criteria such as engine power, smartphone price, battery power and design which are compared in terms of criteria. The final result of AHP is a ranking or priority weighting of each alternative choice.

3.1 Main Criteria Weighting Results Table

The weighting data was obtained from sample data from 5 respondents, namely the Facilitator and 4 participants who are people who understand how to use types of smartphones. The following data is a combination of data from five respondents, table 2 as follows:

Table 2. Main Criteria Weighting Results

Pembobotan Kriteri Utama

	Harga	Desain	Kekuatan Batery	Kekuatan Mesin
Harga	1	0.83	1.25	0.5
Desain	1.2	1	2	0.71
Kekuatan Batery	0.8	0,5	1	0.4
Kekuatan Mesin	2	1.4	2.5	1

Normalisasi Kriteria Utama

Dengan membagi pembobotan dengan jumlah total tiap kolom

	Harga	Desain	Kekuatan Batery	Kekuatan Mesin	P Vektor	Bobot
Harga	0.2	0.22	0.185	0.192	0.799	0.199
Desain	0.24	0.268	0.296	0.272	1.0764	0.269
Kekuatan Batery	0.16	0.135	0.148	0.153	0.595	0.148
Kekuatan Mesin	0.4	0.375	0.370	0.383	1.528	0.382
Total	5	3.23	6.75	2.61		

Normalisasi Kriteria Kekuatan Batery

	Samsung	Oppo	Redmi	Realme	P.vektor	Bobot
Samsung	1	4	3	2	0.486	2.08
Oppo	0.25	1	1.4	0.83	0.164	6.9
Redmi	0.33	0.7	1	1	0.156	6.4
Realme	0.5	1.2	1	1	0.1944	4.83
Total	2.08	6.9	6.4	4.83		

Determine the Consistency Index (CI) and Consistency Ratio (CR) values

1. Add the above quotient with the number of elements present, the result is called λ max. Eigen Value = 0.995 + 1.0071 + 1.0125 + 0.9918 = 4.0064
2. Calculate the Consistency Index (CI).
   CI = (4.0064 - 4) / (4-1) = 0.0064 /3 = 0.0021
3. Calculate the Consistency Ratio (CR), for n=4 then RI=0.9(Random Consistency table, Saaty) CR = CI / RI = 0.0064 /0.9 = 0.0071 Because CR <0.1 means the respondent's preferences are consistent. Table 4.

Ordo Matrik	1	2	3	4	5	6	7	8
Random Index	0,00	0,00	0,58	0,90	1,12	1,24	1,32	1,41

Pairwise comparison matrix Table 5.

Normalisasi Kriteri Harga

	Samsung	Oppo	Redmi	Realme	P Vektor	Bobot
Samsung	1	0.66	0.5	0.33	0.536076	0.134019
Oppo	1.5	1	0.66	0,5	0.779338	0.194834
Redmi	2	1.5	1	1	1.227177	0.306794
Realme	3	2	1	1	1.457409	0.364352
Total	7.5	5.16	3.16	2.83		

Normalisasi Kriteri Desain

	Samsung	Oppo	Redmi	Realme	P Vektor	Bobot
Samsung	1	1	0.5	0.66	0.734	0.1834
Oppo	1	1	0.55	0.833	0.7974	0.1993
Redmi	2	1.8	1	1.25	1.4085	0.352
Realme	1.5	1.2	0.8	1	1.0606	0.2652
Total	5.5	5	2.85	3.743		

Menentukan Eigen Value

Menentukan Eigen value dengan perkalian antara Bobot yang didapat dari normalisasi dengan total matrik pertama.

0.1834	5.5	1.0087
0.1993	5	0.9965
0.352	2.85	1.0032
0.2652	3.743	0.99264
Nilai eigen Value		4.001044

Sehingga didapat nilai

Eigen value = 1.0087 + 0.9965 + 1.0032 + 0.99264 = 4.00104

Menentukan nilai Consistency Index (CI) dan Consistency Ratio (CR)

Normalize Data With elements on Each column is divided by the total number in the relevant column, the Priority vector will be obtained, then divided by the order matrix 4, then the normalized relative weight will be produced.

The eigenvalue is generated from multiplying the relative weight value by the total value of the first matrix for each row. The results can be seen in the following table 5: The following is the calculation of the normalized relative weight.

	Harga	Desain	Kekuatan Batery	Kekuatan Mesin
Samsung	0.134019	0.183396	0.485827	0.076995
Oppo	0.194834	0.199337	0.163928	0.385603
Redmi	0.306794	0.352118	0.155848	0.24947
Realme	0.364352	0.265149	0.194397	0.287931
Bobot	0.199819	0.269106	0.148863	0.382212

Score
0.177883
0.264359
0.274611
0.283147

	Harga	Desain	Kekuatan Batery	Kekuatan Mesin
Samsung	0.026	0.049	0.072	0.029
Oppo	0.038	0.053	0.024	0.147
Redmi	0.061	0.095	0.023	0.095
Realme	0.072	0.071	0.028	0.11
Bobot	0.199819	0.269106	0.148863	0.382212

Score
0.177883
0.264359
0.274611
0.283147

Based on the results above, it shows that the results obtained from the scores are as shown in the score table. From Table 6 above, it shows that overall the best Smartphone that will be selected with the criteria of Price, Design, Battery life and Engine life to be selected as the Smartphone with the best quality because overall it has a score based on the calculation of this weighting has the highest value compared to the three other smartphone brands. User testing is carried out by digging deeper into the 6 GB RAM Smartphone to respondents, respondents then create a weighting table

and rank the final results of the overall Weight value then the value is obtained, namely the Realme Smartphone has the highest value of 0.283 so that it becomes the selected alternative.

CONCLUSION

From the results of the research data processing, the following conclusions were obtained: The results of the study show that the alternative choice of Realme Smartphones gets the highest priority, namely getting the highest value with a value of 0.283, then Redmi gets the second priority with a value of 0.275. Then Oppo with a value of 0.265 gets the third priority. Then Samsung with a value of 0.18 gets the fourth priority.

get the fourth priority if seen Smartphone literacy has not been able to mediate the influence of Samsung smartphones so that it only gets the fourth rank. This needs to be explored further with further research. Then Samsung smartphones can adjust the risk attitude towards the sustainability of smartphone marketing related to technology from the criteria of Price, Design, Battery power and Engine power.

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