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Decision Support System for SmartPhone Selection with AHP-VIKOR Method Recommendations

Akmaludin[1)*], Adhi Dharma Suriyanto[2)], Nandang Iriadi[3)], Budi Santoso[4)], Toni Sukendar [5)]
[1)]Universitas Nusa Mandiri, Jakarta, Indonesia
[2,3,4,5)]Universitas Bina Sarana Informatika, Jakarta, Indonesia
[1)] akmaludin.akm@nusamandiri.ac.id, [2)] adhi.ais@bsi.ac.id, [3)] nandang.ndi@bsi.ac.id
[4)], budi.bis@bsi.ac.id ,[5)] toni.tns@bsi.ac.id

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Abstract: Produce products that have various features and diverse functions, which are able to provide convenience with the reliability of their features and functions. The advantages possessed by SmartPhone become more confident for users to assess the level of product intelligence, the more trustworthy. The purpose of this research is to provide additional knowledge on the selection of SmartPhone to the user in having a product with various benefits. The more criteria that become a barometer, the more difficult it is to choose a product in the form of a SmartPhone. Thus, the right method is needed to perform the selection of the SmartPhone. There are several methods offered to carry out the selection process for SmartPhones, namely the Analytic Hierarchy Process (AHP) method combined with the VIKOR elimination method. Both of these methods are very supportive in the selection process with many types of criteria and their meanings against these criteria. A number of criteria that serve as a barometer for selecting object-based applications are Operating System, Processor, Internal Memory, External Memory, Back Camera, Front Camera, Battery, Cassing Model, Screen Size, Wight and Price. Of the eleven criteria have two different characteristics of understanding. The results of this study can be seen explicitly on the selection of SmartPhones through the acquisition of the smallest Qi index with the three highest ratings, namely the first ranked Samsung Galaxy A3 (0.00) the second is the Xiaomi Mi 4C with an index of 0.19, the third is the Lenovo Vibe K5 Plus with index 0.31. Thus it can be said that the collaboration of the AHP and VIKOR Elimination methods is able to provide optimal decision-making support.

Keywords: AHP, Eliminasi VIKOR, Index rating, Multi-criteria, SmartPhone.

INTRODUCTION

The development of SmartPhone technology is currently advancing rapidly (Sarwar & Soomro, 2013), the products displayed have many specifications that make it increasingly difficult for every user who wants to have it with different display specifications (Sarwar & Soomro, 2013). The pricing of SmartPhone products is the main consideration for having a SmartPhone. The specifications that are in the spotlight on the SmartPhone include the Operating System, Processor, Internal Memory, External Memory, Back Camera, Front Camera, Battery, Model Design, Screen Size, Weight, and Price. Many considerations of the criteria make it very difficult to have a product like this SmartPhone (Destiana, 2019). The purpose of this study is to provide an optimal solution to the process of selecting the right SmartPhone product for each user with multi-criteria conditions. The optimal method that can be suggested is the Multi-criteria Decision Making Analytic Hierarchy Process (MCDM-AHP) which is used to determine the weighting of a number of criteria used (The et al., 1936), (Lipovetsky, 2011), (Saaty, 2010) and the Vlse Kriterijumska Optimizacija Kompromisno Resenje (VIKOR) method (Ishak et al., 2020) is used as a ranking calculation for a number of alternatives to be considered. selected in the selection process.

The initial hypothesis of this research is that the collaboration of the Analytic Hierarchy Process (AHP) method and the VIKOR method can provide optimal decision support for the selection of technology-based products in the form of Smartphones through the stages of obtaining eigenvector values with multi-criteria carried out by a repetition process. The AHP is the basis for determining the weighting which refers to the eigenvector value which is determined as the optimal decision on the criterion value of each alternative (Farkas, 2007). The acquisition value of the eigenvector can be done using algebra matrices calculations and expert choice applications (Ishizaka & Labib, 2009). The difference that can be learned from the two is that the

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calculation of algebra matrices has the advantage of being able to prove the consistency of the acquisition of the eigenvector value which can be seen from the Consistency Ratio (CR), if the CR is less than 10 percent then the temporary decision can be accepted, or otherwise it will be rejected for the resulting process. While the expert choice application for the acquisition of eigenvector values can be measured through the resulting inconsistency value (Dianawati & Rebecca, 2019).

Saaty said that the acceptable eigenvector value is the consistency ratio value must be less than or equal to 0.1 (Saaty, 2010), this greatly affects the interim decision or final decision. From the understanding above, the contribution that can be conveyed in the writing of this article is that the first step in the process carried out on the questionnaire data entry on the respondent's assessment must really pay attention to its accuracy to get the optimal eigevector value which is getting smaller and closer to zero, if it is not successful, the eigevector value is found. will enlarge until it is impossible to find the expected results in the early stages of research. Failure to obtain eigenvector values must at least be repeated for questionnaire entries that are not in accordance with giving the actual comparison value. The second contribution of this research is that the application of a combination of the AHP method and the VIKOR method can provide optimal decision support results for the selection of technology products in the form of Smartphones, so that the collaboration of these two methods can be used as a reference to be used as a test of the selection and evaluation process in other studies. AHP is used as a multi-criteria weighting method and the VIKOR method can be used as a selection for Smartphone products or other technology products that will be proven in the ranking results.

LITERATURE REVIEW

Analytic Hierarchy Process (AHP)

The Analytic Hierarchy Process, which can be said to be the parent of the priority scale determination, is implemented based on expert input through instrumentation media in the form of a questionnaire (Safrizal, 2015), where the decision to be used is based on a joint decision by a number of experts. The method of filling out the questionnaire should be done through snowball sampling or convinient sampling (Adams & Rokou, 2016). This is so that the results obtained provide decisions that have a high level of accuracy sourced from these experts, especially in terms of setting priorities from criteria and sub-criteria.

The application used for determining the criteria and sub-criteria uses the mathematical algebra matrices method, (Farkas, 2007) in which the element matrices are arranged based on the row and column layout. The arrangement of matrices used can be seen in equation 1. The processing method uses the concept of multiplying matrices mathematically (Jones, 2018). (i,j) provides an overview of the location of an element matrix in certain rows and certain columns.

The calculation process using the Multi-criteria Decision Making (MCDM) method provides a high level of accuracy and can be applied using an expert choice application (Ishizaka & Labib, 2009) with an optimal success rate for the final score determination results for both criteria and sub-criteria. To prove the optimal level by doing a consistency test on the consistency ratio (CR) value, this consistency test has structured stages starting from the consistency vector (CV), consistency index (CI) and consistency ratio (CR). Consistency test results like this can only be done for the MCDM method (Gumay et al., 2020) by providing evidence of accuracy in the results that can be compared with mathematical algebra matrices and expert choice applications.

$$M_{(i,j)} = \begin{bmatrix} a_{(1,1)} & a_{(1,2)} & a_{(1,3)} & \cdots & a_{(1,j)} \\ a_{(2,1)} & a_{(2,2)} & a_{(2,3)} & \cdots & a_{(2,j)} \\ a_{(3.1)} & a_{(3,2)} & a_{(2,4)} & \cdots & a_{(3,j)} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ a_{(i,1)} & a_{(i,2)} & a_{(i,3)} & \cdots & a_{(i,j)} \end{bmatrix} \quad (1)$$

To find out how many comparisons to look for against comparisons of criteria and sub-criteria and alternatives (Wibawa et al., 2019), you can use equation 2 which describes the comparison number of the elements to be compared. Consistency testing such as consistency index (CI) by first finding the longest vector length from that of each multiplication of the initial matrices with the eigenvector matrices, with the help of max which gives an overview as the longest vector matrices which will be averaged as consistency indext and the number Element matrices can be measured by how many data elements are owned by the matrices in question and usually the number of the same order is represented by the dimension n. Calculation of consistency index (CI) can use equation 3. While the consistency ratio (CR) provides an explicit description that the temporary decision can be accepted or not (Abastante et al., 2012), this is a measure that can be continued or repeated which can be seen in equation 4.

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$$CN = \frac{n*(n-1)}{2} \quad (2)$$

$$CI = \frac{(\lambda \max - n)}{(n-1)} \quad (3)$$

$$CR = \frac{CI}{RI} \quad (4)$$

The calculation of the CR value is very strong supported by a random index (RI) compiled in a table listed in Table 1 as the value of the determination made by the expert as a standard that can be used to prove the feasibility of a provisional decision, for a comprehensive decision can be made through stages. synthesize. This synthesize stage is the final decision that is obtained based on the accumulation of all levels of a hierarchy model that is made.

Table 1. Random Index

Ordo	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RI	0	0	0.6	0.9	1.12	1.24	1.32	1.41	1.45	1.48	1.51	1.48	1.56	1.57	1.58

Vlse Kriterijuska Optimizacijal Komoromisno Resenje (VIKOR)

One method that can be used as a rating measurement is the VIKOR method (Wang, 2019), where this method performs the ranking process through the normalization stage which is calculated based on the data element, the largest value is the best or the smallest value is the best (Haji et al., 2019). To determine this, use equation 5 as the best largest value and equation 6 to determine the smallest value is the best value. For the weighting determined using the AHP method from the normalization process of each data element for each criterion (Ishak et al., 2020), it must be multiplied by the respective weights of each criterion, pay attention to equation 7.

$$B_{(i,j)} = \frac{(X_{(i,j)} - X'_j)}{X^*_j - X'_j} \quad (5)$$

$$L_{(i,j)} = \frac{(X_{(i,j)} - X^*_j)}{X'_j - X^*_j} \quad (6)$$

$$V_{(i,j)} = x_{(i,j)} w_{(j)} \quad (7)$$

The operation process carried out using the VIKOR method begins by knowing the smallest value of each criterion with dimensions S' and the largest value with dimensions S* from each alternative row and knowing the smallest value of each criterion with dimensions R' and the largest value of each criterion with dimensions R*. The calculation process begins by calculating the total value of each criterion in one alternative using equation 8, while calculating the highest value of each alternative for all existing criteria using equation 9. By knowing the number of rows of each alternative and the maximum value of each alternative (Haji et al., 2019), (Rawashdeh et al., 2017), (Siregar et al., 2018).

$$S_i = \sum_{j=1}^{n} W_j \, R_{(i,j)}, \;\; where \;\; w_j = \text{Criterian} \quad (8)$$

$$R_i = Max_j\left[W_j \; x \; R_{(i,j)}\right], \;\; where\ The\ bigest\ value\ from\ \left[W_j \, xR_{(i,j)}\right] \quad (9)$$

By knowing the number of each alternative and the maximum number of each alternative, it is possible to calculate the index value as the final value of the ranking process from a number of alternatives using equation 10. alternatively, the resulting index provides an overview of decision-making support from the collaboration (Perdana & Budiman, 2021) of the Analytic Hierarchy Process (AHP) method with the VIKOR method which produces optimal decision priorities as the final process of a long mathematical calculation (Waas et al., 2022). Determination of the magnitude of the priority index with the Qi dimension using a balanced presentation by assigning a value of the v dimension with fifty percentage points each (Haji et al., 2019), (Mardani et al., 2016). So the results obtained have the equivalent results. For a more in-depth understanding of this research in a structured manner, the stages of the calculation process are listed in the algorithm listed in Fig. 1.

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$$Q_i = \left[\frac{S_i - S'}{S^* - S'}\right] x\ V + \left[\frac{R_i - R'}{R^* - R'}\right]\ x\ (1\text{-}v) \qquad (10)$$

Using the v dimension listed in equation 10, the balance value is taken to determine the value of Q_i by giving it a fifty-fifty value, with the aim of eliminating the tendency to produce an imbalance towards Q_i, thus the results obtained provide a consistent decision on the priority index. Thus, decision making can be measured based on the value of the smallest index which is the priority and the largest index provides an overview of the decline in priority acquisition and the results of the index can be used as a measure in decision making.

METHOD

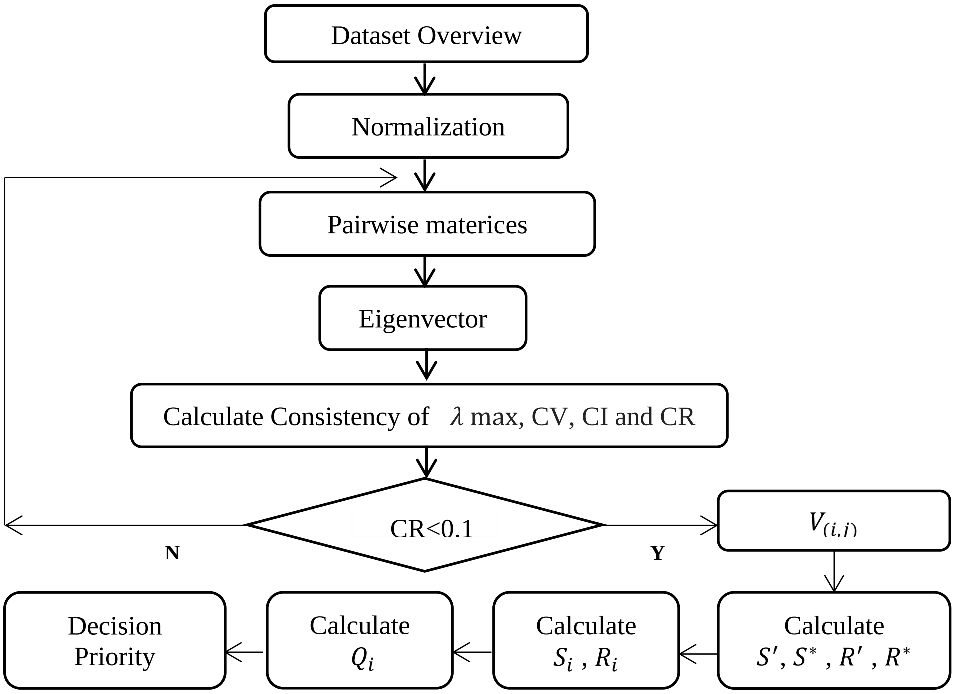

Fig. 1. AHP-VIKOR Algoritm

RESULT

The collection of datasets collected from GSM Arena provides a lot of information about a number of SmartPhones that are the object of this research, which are outlined in a number of categories and specifications as shown in Table 2 and summarized into a dataset as shown in Table 3 which is ready to be processed as calculations using the Analytic method. Hierarchy Process (AHP) combined with VIKOR method to be processed into a form of decision support output. The acquisition value of the SmartPhone in this study is expected to be how to get optimal results, not seen from the most expensive price or others. Decision making to get the optimal SmartPhone value by taking into account the value of the benefits obtained and at an affordable cost, so that in order to be an optimal decision it must be supported by the acquisition of eigenvectors with the MCDM-AHP method.

The AHP method is superior in determining priorities using the comparison method, multi-criteria application materials provide results that are able to provide decision support with the iteration concept to be able to provide optimal results as the benchmark is the eigenvector value which is the main benchmark. To obtain the optimal eigenvector value, it can be seen from the difference that is generated based on the reduction of the last eigevector value with the previous eigenvector value which gives a zero difference result. This means that the acquisition of the eigenvector value has reached the optimal point.

Table 2. Specification of SmartPhone

SmartPhone (Name & Type	Operating System	Processor	RAM (Gyga Byte)	ROM (Gyga Byte)	Back Camera (Mega Pixcel)	Front Camera (Mega Pixcel)	Baterray	Cassing Model	Screen Size	Weight (gram)	Price (thousand)
Samsung Galaxy A3	V5.1.1 (Lollipop)	Quad-core 1.5 GHz Cotex-A53	1.5	16	13	5	2300	256	4.7	132	2.699

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Samsung Galaxy J7 Prime	V6.0.1 (Marshmallow)	Octo-core 1.6 GHz Cotex-A53	3	32	13	8	3300	256	5.5	167	3.329
Xiaomi Mi 4C	V5.1.1 (Lollipop)	Hexa-core 4x1.4 GHz Cortex-A53 2x1.8 GHz Cortex-A72	2	16	13	5	3080	0	5	132	1.439
Xiaomi Mi Max	V6.0 (Marshmallow)	Hexa-core Ax1.4 GHz Cortex-A53 2x1.8 GHz Cortex-A72	3	32	16	5	4850	256	6.44	203	2.557
Asus Zenfone Max ZC550KL	V5.0.1 (Lollipop)	Quad-Core 1.2 GHz Cortex-A53	2	32	13	5	5000	64	5.5	202	1.999
Asus Zenfone 2 ZE551ML	V5.0 (Lollipop)	Quad-Core 2.3 GHz	4	32	13	5	3000	256	5.5	170	3.399
Lenovo Vibe K5 Plus	V5.0.1 (Lollipop)	Octa-core 4x1.5 GHz Cortex-A53 4x1.2 GHz Cortex-A53	2	16	13	5	2750	32	5	5	2.299
Lenovo Vibe Shot	V5.0.2 (Lollipop)	Octa-core 4x1.7 GHz Cortex-A53 4x1 GHz Cortex-A53	3	32	16	8	3000	256	5	5	3.28

Source: GSM Arena (2022)

From the results of the specifications listed in Table 2, it is simplified so that it can be processed into more useful information, converted in the form of research datasets as shown in Table 3 and ready for processing with the collaboration of the two methods.

Table 3. Dataset

Nama SmartPhone	Operating System (HB)	Processor (HB)	RAM (Gyga Byte) (HB)	ROM (Gyga Byte) (HB)	Back Camera (Mega Pixcel) (HB)	Front Camera (Mega Pixcel) (HB)	Baterray (HB)	Cassing Model (HB)	Screen Size (Inci) (HB)	Weight (gram) (LB)	Price (Thousand) (LB)
Samsung Galaxy A3	5.11	6.00	1.50	16	13	5	2300	256	4.70	132	2.699
Samsung Galaxy J7 Prime	6.01	12.80	3.00	32	13	8	3300	256	5.50	167	3.329
Xiaomi Mi 4C	5.11	9.20	2.00	16	13	5	3080	0	5.00	132	1.439
Xiaomi Mi Max	6.00	9.20	3.00	32	16	5	4850	256	6.44	203	2.557
Asus Zenfone Max ZC550KL	5.01	4.80	2.00	32	13	5	5000	64	5.50	202	1.999
Asus Zenfone 2 ZE551ML	5.00	9.20	4.00	32	13	5	3000	256	5.50	170	3.399
Lenovo Vibe K5 Plus	5.01	10.80	2.00	16	13	5	2750	32	5.00	5	2.299
Lenovo Vibe Shot	5.02	10.80	3.00	32	16	8	3000	256	5.00	5	3.28

From each dataset listed in Table 3 to be processed using a method, it must be normalized first so that it can be followed up into the mathematical algebra matrices process shown in Table 5. This dataset has a different understanding of the determination of the criteria used for each alternative, some have The biggest understanding of data is that there is the best (HB) and the second understanding is that the smallest data is the best data (LB). The normalization process that will be carried out on the dataset will of course use two opposite understandings, because this dataset has two different types of understanding. For data types that are categorized as HB, of course, use equation 5 and for data types that have category LB will use equation 6. The results of using this equation will give birth to a new table called normalization.

Table 5. Normalization

SmartPhone (Name & Type)	Operating System (HB)	Processor (HB)	RAM (Gyga Byte) (HB)	ROM (Gyga Byte) (HB)	Back Camera (Mega Pixcel) (HB)	Front Camera (Mega Pixcel) (HB)	Baterray (HB)	Cassing Model (HB)	Screen Size (Inci) (HB)	Weight (gram) (LB)	Price (Thousand) (LB)
Samsung Galaxy A3	0.109	0.150	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.359	0.357
Samsung Galaxy J7 Prime	1.000	1.000	0.600	1.000	0.000	1.000	0.370	1.000	0.460	0.182	0.036
Xiaomi Mi 4C	0.109	0.550	0.200	0.000	0.000	0.000	0.289	0.000	0.172	0.359	1.000

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Xiaomi Mi Max	0.990	0.550	0.600	1.000	1.000	0.000	0.944	1.000	1.000	0.000	0.430
Asus Zenfone Max ZC550KL	0.010	0.000	0.200	1.000	0.000	0.000	1.000	0.250	0.460	0.005	0.714
Asus Zenfone 2 ZE551ML	0.000	0.550	1.000	1.000	0.000	0.000	0.259	1.000	0.460	0.167	0.000
Lenovo Vibe K5 Plus	0.010	0.750	0.200	0.000	0.000	0.000	0.167	0.125	0.172	1.000	0.561
Lenovo Vibe Shot	0.020	0.750	0.600	1.000	1.000	1.000	0.259	1.000	0.172	1.000	0.061

The normalization process listed in Table 5 uses formula 5 and formula 6 which pays attention to the types of variables that are included in the Hight is the Best and Lowest is the Best categories, this means that those who have the meaning of benefit are included in the Hight is the Best variable category. a variable that has a cost meaning is included in the Low is the Best category. With conditions like this, it is necessary to normalize the data so that they have similarities in calculations using the VIKOR method.

To determine the magnitude of each criterion weight, of course, one must use the Analytic Hierarchy Process (AHP) method to obtain the eigenvector of the eleven criteria used. The formation of pairwise matrices for a number of criteria was built with matrices of order 11, where the results obtained from these alternative matrices can be seen in Table 6 below.

Table 6. Pairwise matrices of criteria using algebra matrices

Criteria	OS	PC	IM	EM	BC	FC	BT	CM	SS	WE	PR	Eigenvector
Operating System (OS)	1.000	2.125	2.352	2.735	2.372	3.223	3.121	4.105	3.034	2.422	2.371	0.193
Processor (PC)	0.471	1.000	2.063	2.362	2.436	2.347	3.034	3.142	3.268	2.046	2.042	0.153
Internal Memory (IM)	0.425	0.485	1.000	2.042	2.302	2.435	2.554	2.563	2.945	3.032	2.047	0.128
External Memory (EM)	0.366	0.423	0.490	1.000	2.034	2.153	2.237	2.225	3.035	3.023	3.214	0.109
Back Camera (BC)	0.422	0.411	0.434	0.492	1.000	2.342	2.326	2.043	3.055	3.026	2.425	0.095
Front Camera (FC)	0.310	0.426	0.411	0.464	0.427	1.000	2.045	2.138	3.042	2.162	2.133	0.075
Baterray (BT)	0.320	0.330	0.392	0.447	0.430	0.489	1.000	3.033	2.136	2.034	3.201	0.067
Chassing Model (CM)	0.244	0.318	0.390	0.449	0.489	0.468	0.330	1.000	2.302	2.022	2.043	0.051
Screen Size (SS)	0.330	0.306	0.340	0.329	0.327	0.329	0.468	0.434	1.000	3.163	3.115	0.049
Weight (WG)	0.413	0.489	0.330	0.331	0.330	0.463	0.492	0.495	0.316	1.000	3.052	0.043
Price (PR)	0.422	0.490	0.489	0.311	0.412	0.469	0.312	0.489	0.321	0.328	1.000	0.036
The Result of λ Max=	12.162	; CI=	0.116	;CR=	0.077							

By paying attention to Table 6, it can be seen that there are eigenvector values that provide an overview of each weight possessed by a number of alternatives that are used to determine the multiplication between the results of the normalization process and the eigenvectors so that the index determination of each alternative can be processed. To prove the correctness of the results obtained against the eigenvector values with the algebra matrices method, this can be measured using an expert choice application, where the input value of pairwise matrices uses an expert choice application, pay attention to Table 7 which provides an overview of the input criteria using expert choice, where the data The inputs are the same as those listed in Table 6 by using mathematical algebra matrices to test the correctness of the results, while Fig. 2 is the result of the synthesis process which explains the acquisition of the eigenvector values of each criterion used.

Table 7. Pairwise matrices of criteria using expert choice apps.

	Operating System	Processor	Internal Memory	External Memory	Back Camera	Front Camera	Baterray	Chassing Model	Screen Size	Weight	Price
Operating System (OS)		2.125	2.352	2.735	2.372	3.223	3.121	4.105	3.034	2.422	2.371
Processor (PC)			2.063	2.362	2.436	2.347	3.034	3.142	3.268	2.046	2.042
Internal Memory (IM)				2.042	2.302	2.435	2.554	2.563	2.945	3.032	2.047
External Memory (EM)					2.034	2.153	2.237	2.225	3.035	3.023	3.214
Back Camera (BC)						2.342	2.326	2.043	3.055	3.026	2.425
Front Camera (FC)							2.045	2.138	3.042	2.162	2.133
Baterray (BT)								3.033	2.136	2.034	3.201
Chassing Model (CM)									2.302	2.022	2.043
Screen Size (SS)										3.163	3.115
Weight (WG)											3.001
Price (PR)	Incon: 0.08										

Based on the results of the eigenvector calculation using the expert choice application, the inconsistency value is 8 percent, as well as the results of the synthesis with expert choice having the same value for inconsistency, this means that the use of pairwise matrices data can be continued and accepted.

*name of corresponding author

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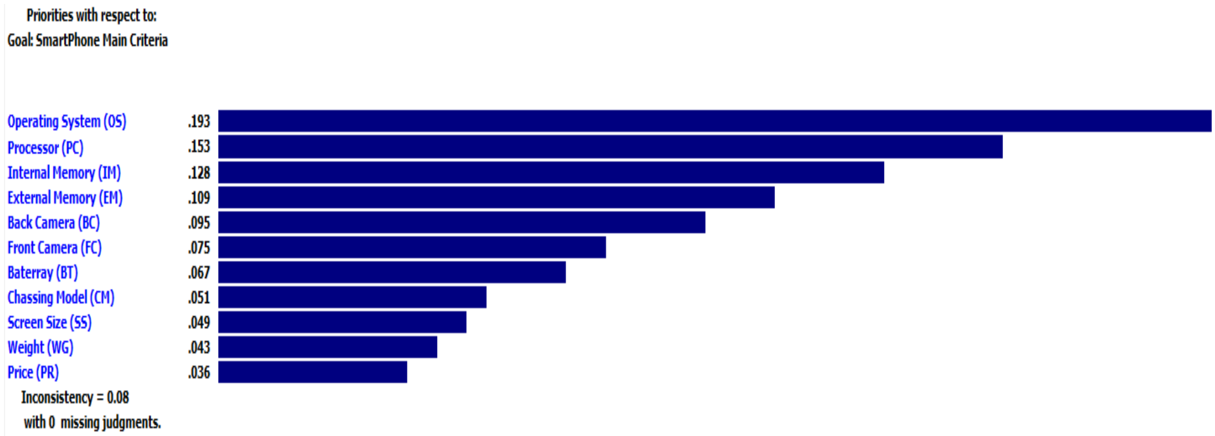

Fig. 2. Synthesis of eigenvector using expert choice apps.

By knowing the eigenvector quantities as the weights of each criterion, it can be attempted to find out the multiplication between the weights and the alternative result quantities as normalized weights as shown in Fig. 2, as a reference for calculating the VIKOR index.

Table 8. Weight Normalization

SmartPhone (Name & Type)	Operating System	Processor	RAM (Gb)	ROM (Gb)	Back Camera (MPixcel)	Front Camera (MPixcel)	Baterray	Cassing Model	Screen Size (Inch)	Weight (Gram)	Price (Thousand)
/ EV	0.193	0.153	0.128	0.109	0.095	0.075	0.067	0.051	0.049	0.043	0.036
Samsung Galaxy A3	0.021	0.023	0.000	0.000	0.000	0.000	0.000	0.051	0.000	0.016	0.013
Samsung Galaxy J7 Prime	0.193	0.153	0.077	0.109	0.000	0.075	0.025	0.051	0.023	0.008	0.001
Xiaomi Mi 4C	0.021	0.084	0.026	0.000	0.000	0.000	0.019	0.000	0.008	0.016	0.036
Xiaomi Mi Max	0.191	0.084	0.077	0.109	0.095	0.000	0.064	0.051	0.049	0.000	0.016
Asus Zenfone Max ZC550KL	0.002	0.000	0.026	0.109	0.000	0.000	0.067	0.013	0.023	0.000	0.026
Asus Zenfone 2 ZE551ML	0.000	0.084	0.128	0.109	0.000	0.000	0.017	0.051	0.023	0.007	0.000
Lenovo Vibe K5 Plus	0.002	0.115	0.026	0.000	0.000	0.000	0.011	0.006	0.008	0.043	0.020
Lenovo Vibe Shot	0.004	0.115	0.077	0.109	0.095	0.075	0.017	0.051	0.008	0.043	0.002

Several stages are important concerns in the process of calculating the VIKOR index, before having to know the smallest magnitude S' and largest S* owned from a number of alternatives from each of the criteria it has, then the next step is knowing the smallest magnitude R' and largest R* of each alternative that has it. Notice in Table 9 that the dimensions Si and Ri are processed data from the derivatives that were previously the reference for the acquisition of the value of the two dimensions. The results obtained for the Qi index are sourced from these two dimensions which can be seen in Table 9 which has been sorted by priority and can be used as a priority determination of a number of alternatives in determining the ranking.

Table 9. Qi, index, and priority

Alternative	Si	Ri	Qi	Index	Priority
Samsung Galaxy A3	0.12	0.05	0.00	0	1
Samsung Galaxy J7 Prime	0.71	0.19	0.98	6	7
Xiaomi Mi 4C	0.21	0.08	0.19	1	2
Xiaomi Mi Max	0.74	0.19	0.99	7	8
Asus Zenfone Max ZC550KL	0.27	0.11	0.32	3	4
Asus Zenfone 2 ZE551ML	0.42	0.13	0.51	4	5
Lenovo Vibe K5 Plus	0.23	0.11	0.31	2	3
Lenovo Vibe Shot	0.60	0.11	0.61	5	6

DISCUSSIONS

This study provides an overview of the understanding of the use of the selection process for SmartPhone products that have priority power on product acquisition based on optimal ways to obtain them, not based on the amount of costs incurred in the acquisition process. The most important concern in the collaboration of the Analytic Hierarchy Process (AHP) and VIKOR method will be to provide optimal results, of course, by paying attention to how to fill in the instrument that is carried out to be very concerned, because it comes from experts who know the product. This should indeed be a concern so that there is no deviation in the values obtained to get the eigenvector values that are optimum. The result of this value will be used as a weighting against the criteria determined by commit so that it can be continued with the calculation of the VIKOR method. For further research, as a comparison of other methods, the ELECTRE or PROMETHEE methods can be used which have similarities in the Multi-criteria Decisio Making (MDCM) group. It is hoped that in addition to the VIKOR method, it can provide further comparisons to the selection and evaluation process of technology-based products.

CONCLUSION

The final process of calculating mathematical algebra matrices and proving with expert choice applications provides similarities, especially in terms of determining the eigenvector value as a weighting value against the criteria which will be continued in a different ranking method, namely the AHP-VIKOR method. The results of rating the SmartPhone product against the priority obtained are based on the index value as a rating measure. The first rank as the owner of the smallest index of SmartPhone products was given to the Samsung Galaxy A3 with an index of 0, followed by the second and third products with the index respectively being Xiaumi Mi 4C and Lenovo Vibe K5 Plus. With the collaboration of the AHP-VIKOR method, it has proven the process of selecting SmartPhone products to be an optimal rating system based on product acquisition in accordance with the criteria possessed by each product, not based on the price owned by a product.

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*name of corresponding author

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