The Indonesian Journal of Computer Science
www.ijcs.net
Volume 13, Issue 4, August 2024
https://doi.org/10.33022/ijcs.v13i4.4101

SMART Method to Choose The Best Smartphone

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Article Information

Received : 7 Jun 2024
Reviesed : 16 Aug 2024
Accepted : 20 Aug 2024

Keywords

Smartphone, Decision Support System, SMART

Abstract

Smartphones are important devices for many people and are considered a necessity in today's industrial age 4.0. This is the beginning of the advancement of digital technology and the internet, where information can be easily accessed in various places. Therefore, people started buying smartphones. With this, people can utilise the Decision Support System. used to determine the data criteria needed to select a smartphone. With these criteria, users can accurately and quickly determine their choice. Where in the research in choosing a smartphone according to the needs of the community using 9 criteria that are often taken into consideration including Brand, Price, Processor Specifications, RAM Specifications, Model, Battery Capacity, Camera Resolution, Internal Capacity, Screen size which will be processed using the SMART method. Where the weight for each criterion has a value range of 0-100 depending on the priority given to each criterion. Based on calculations using the SMART method, the Iphone 11 Pro smartphone ranks highest with a final score of 8.3.

A. Introduction

Smartphones are smart phones that have computer-like capabilities, usability, and functions with specific operating systems such as Symbian OS, Android, iOS, Windows Mobile, BlackBerry, and others. Smartphones provide various advanced features, such as QWERTY keyboard, touch screen, email access, reading e-books, interacting with others on the internet, watching videos, and other advanced features. Smartphones are also convenient to carry around.

A decision support system is part of an information system that can solve problems to support the decision-making process. This system is used as a consideration in making decisions or policies in an organisation or company (R. Sari, A. P. Windarto, D. Hartama, and S. Solikhun, 2018). Decisions are made by evaluating several options and choosing the best alternative. This decision is taken after considering several different calculations and options. The process of making a decision starts with recognising the problem, preparing several options, and then choosing the best decision (R. Giofani, M. Sihombing, and I. Ambarita 2022).

SMART (Simple Multi Attribute Rating Technique) is a method to evaluate elements both quantitatively and qualitatively. With this method, users can input smartphone specifications into the calculation, so that the SMART method can determine which smartphone is suitable for users. The way to solve the problem is to build a system that helps users or the public find purchasing decisions that are in accordance with their interests, abilities, and purchasing power (Raynor, 2022).

The SMART method is more commonly used because of its accuracy in responding to decision-makers' needs and the way they analyse responses. The analysis is transparent, so the method provides a deep understanding of the problem and is acceptable to decision makers. Therefore, SMART (Simple Multi Attribute Rating Technique) is an appropriate method to use in solving decision-making problems (A. F. Boy and D. Setiawan, 2019).

This research aims to assist users and the public in choosing smartphones according to individual needs, considering prices and brands, as well as providing spare parts, repair, and service services and choosing the smartphone that suits them.

B. Research Method

The SMART method is an approach to decision-making that involves multiple attributes or criteria used to help users choose the best outcome among several available options. This method usually provides an explanation that each alternative outcome consists of several attributes or criteria that have certain values, and each attribute or criterion is given a weight (with a scale between 0 and 1) as the main difference between one attribute or criterion and another. Weights play an important role in assessing each alternative outcome in order to get the best result (Sibyan, 2020)

SMART Method Stages :

a) Select the options and standards that will be used to solve the decision-making problem.
b) Provide a score for each criterion using a scale range of 1 to 100 according to its highest level of importance.

c) After giving weights, normalise the criteria weights of each criterion by dividing the score on the criteria weight by the total criteria weight according to the equation. (1) below:

$$Normalisation = \frac{Wj}{\sum Wj} \dots\dots\dots (1)$$

d) Determine the criteria score for each alternative choice. This criterion score can consist of qualitative or quantitative data (in the form of numbers). If the data is still in qualitative form, the data will be converted into quantitative data first by giving parameter values to the criteria.

e) Calculate the utility value by converting the criterion score for each criterion into the criterion's standardised data score. In the benefit category, the criteria are calculated using equation. (2) as follows.

$$ui\ (ai) = \frac{C_{Outi} - C_{min}}{C_{max} - C_{min}} \dots\dots\dots\dots\dots (2)$$

Meanwhile, criteria with the cost category are calculated with equation (3) as follows.

$$ui\ (ai) = \frac{C_{max} - C_{outi}}{C_{max} - C_{min}} \dots\dots\dots\dots\dots (3)$$

f) Calculating the final score by adding the total multiplication result of the normalised criterion weight with the normalised standard data criterion score, as contained in equation. (4) below.

$$(a_i) = \sum wj * (a_i)\ m\ j{=}1 \ \dots\dots\dots\dots\dots (4)$$

C. Result and Discussion

Before calculating the value in choosing a smartphone by applying the SMART method, there are several steps that need to be taken, one of which is:

1. Criteria Identification

   In the system assessment, there are 9 criteria obtained through interviews, namely brand, price, processor specifications, RAM specifications, model, battery capacity, camera resolution, internal capacity, and screen size.

2. Determine the Weight of Criteria

   Give a value to each criterion with a range of 0-100 according to the priority of each criterion.

Table 1. Criteria Weight

No	Criteria	Weight
1	Brand	10
2	Price	20
3	Processor Specifications	10
4	RAM Specifications	10
5	Model	10
6	Battery Capacity	10
7	Camera Resolution	10
8	Internal Capacity	10

9	Screen Size	10
Total		100

3. Normalisation of Criteria Weights
   Provide percentage weighting of criteria.

Table 2. Normalisation of Criteria Weights

No	Criteria	Bobot	Normalisasi
1	Brand	10/100	0,1
2	Price	20/100	0,2
3	Processor Specifications	10/100	0,1
4	RAM Specifications	10/100	0,1
5	Model	10/100	0,1
6	Battery Capacity	10/100	0,1
7	Camera Resolution	10/100	0,1
8	Internal Capacity	10/100	0,1
9	Screen Size	10/100	0,1

4. Assign a criterion value to each option.
   The determination of these criteria comes from data on frequent smartphone purchases.

Table 3. Awarding Criteria

No	Criteria	Iphone 11 Pro	Samsung A13	Poco M4 Pro	Oppo A58	Infinix GT 10 Pro
1	Brand	9	7	8	8	7
2	Price	9	9	6	7	6
3	Processor Specifications	8	7	8	8	5
4	RAM Specifications	8	7	6	8	5
5	Model	6	8	5	7	5
6	Battery Capacity	9	9	7	7	6
7	Camera Resolution	9	8	6	5	7
8	Internal Capacity	8	6	6	7	8
9	Screen Size	7	6	6	5	7

5. Determine the Utility Value
   The criteria are then converted into standardised data criteria values to determine the utility values obtained from the equation. See table 4.

   Maks (Brand) = maks{9,7,8,8,7} = 9
   Min (Brand) = min {{9,7,8,8,7} = 7

$$\text{Iphone 11 Pro (Brand)} = \frac{9-7}{9-7} * 100\% = 1$$

$$\text{Samsung A13 (Brand)} = \frac{7-7}{9-7} * 100\% = 0$$

$$\text{Poco M4 Pro (Brand)} = \frac{8-7}{9-7} * 100\% = 0.5$$

$$\text{Oppo A58 (Brand)} = \frac{8-7}{9-7} * 100\% = 0.5$$

$$\text{Infinix GT 10 Pro (Brand)} = \frac{7-7}{9-7} * 100\% = 0$$

Maks (Price) = maks{9,9,6,7,6} = 9
Min (Price) = min {9,9,6,7,6} = 6

$$\text{Iphone 11 Pro (Price)} = \frac{9-6}{9-6} * 100\% = 1$$

$$\text{Samsung A13 (Price)} = \frac{9-6}{9-6} * 100\% = 1$$

$$\text{Poco M4 Pro (Price)} = \frac{6-6}{9-6} * 100\% = 0$$

$$\text{Oppo A58 (Price)} = \frac{7-6}{9-6} * 100\% = 0.333$$

$$\text{Infinix GT 10 Pro (Price)} = \frac{6-6}{9-6} * 100\% = 0$$

Maks (Processor Specifications)= maks{8,7,8,8,5} = 8
Min (Processor Specifications) = min {8,7,8,8,5} = 5

$$\text{Iphone 11 Pro (Processor Specifications)} = \frac{8-5}{8-5} * 100\% = 1$$

$$\text{Samsung A13 (Processor Specifications)} = \frac{7-5}{8-5} * 100\% = 0.666$$

$$\text{Poco M4 Pro (Processor Specifications)} = \frac{8-5}{8-5} * 100\% = 1$$

$$\text{Oppo A58 (Processor Specifications)} = \frac{8-5}{8-5} * 100\% = 1$$

$$\text{Infinix GT 10 Pro (Processor Specifications)} = \frac{5-5}{8-5} * 100\% = 0$$

Maks (RAM) = maks{8,7,6,8,5} = 9
Min (RAM) = min {8,7,6,8,5} = 5

$$\text{Iphone 11 Pro (RAM)} = \frac{8-5}{8-5} * 100\% = 1$$

$$\text{Samsung A13 (RAM)} = \frac{7-5}{8-5} * 100\% = 0.666$$

$$\text{Poco M4 Pro (RAM)} = \frac{6-5}{8-5} * 100\% = 0.333$$

$$\text{Oppo A58 (RAM)} = \frac{8-5}{8-5} * 100\% = 1$$

$$\text{Infinix GT 10 Pro (RAM)} = \frac{5-5}{8-5} * 100\% = 0$$

Maks (Model) = maks{6,8,5,7,5} = 8
Min (Model) = min {6,7,5,7,5} = 5

$$\text{Iphone 11 Pro (Model)} = \frac{6-5}{8-5} * 100\% = 0.333$$

$$\text{Samsung A13 (Model)} = \frac{8-5}{8-5} * 100\% = 1$$

$$\text{Poco M4 Pro (Model)} = \frac{5-5}{8-5} * 100\% = 0$$

$$\text{Oppo A58 (Model)} = \frac{7-5}{8-5} * 100\% = 0.666$$

$$\text{Infinix GT 10 Pro (Model)} = \frac{5-5}{8-5} * 100\% = 0$$

Maks (Battery Capacity) = maks{9,9,7,7,6} = 9
Min (Battery Capacity) = min {9,9,7,7,6}= 6

$$\text{Iphone 11 Pro (Battery Capacity)} = \frac{9-6}{9-6} * 100\% = 1$$

$$\text{Samsung A13 (Battery Capacity)} = \frac{9-6}{9-6} * 100\% = 1$$

$$\text{Poco M4 Pro (Battery Capacity)} = \frac{7-6}{9-6} * 100\% = 0.333$$

$$\text{Oppo A58 (Battery Capacity)} = \frac{7-6}{9-6} * 100\% = 0.333$$

$$\text{Infinix GT 10 Pro (Battery Capacity)} = \frac{6-6}{9-6} * 100\% = 0$$

Maks (Camera Resolution) = maks{9,8,6,5,7} = 9
Min (Camera Resolution)= min {9,8,6,5,7} = 5

$$\text{Iphone 11 Pro (Camera Resolution)} = \frac{9-5}{9-5} * 100\% = 1$$

$$\text{Samsung A13 (Camera Resolution)} = \frac{8-5}{9-5} * 100\% = 0.75$$

$$\text{Poco M4 Pro (Camera Resolution)} = \frac{6-5}{9-5} * 100\% = 0.25$$

$$\text{Oppo A58 (Camera Resolution)} = \frac{5-5}{9-5} * 100\% = 0$$

$$\text{Infinix GT 10 Pro (Camera Resolution)} = \frac{7-5}{9-5} * 100\% = 0.5$$

Maks (Internal Capacity) = maks{8,6,6,7,8} = 8
Min (Internal Capacity) = min {8,6,6,7,8} = 6

$$\text{Iphone 11 Pro (Internal Capacity)} = \frac{8-6}{8-6} * 100\% = 1$$

$$\text{Samsung A13 (Internal Capacity)} = \frac{6-6}{8-6} * 100\% = 0$$

$$\text{Poco M4 Pro (Internal Capacity)} = \frac{6-6}{8-6} * 100\% = 0$$

$$\text{Oppo A58 (Internal Capacity)} = \frac{7-6}{8-6} * 100\% = 0.5$$

$$\text{Infinix GT 10 Pro (Internal Capacity)} = \frac{8-6}{8-6} * 100\% = 1$$

Maks (Screen Size) = maks{7,6,6,5,7} = 7
Min (Screen Size) = min {7,6,6,5,7} = 5

$$\text{Iphone 11 Pro (Screen Size)} = \frac{7-5}{7-5} * 100\% = 1$$

$$\text{Samsung A13 (Screen Size)} = \frac{6-5}{7-5} * 100\% = 0.5$$

$$\text{Poco M4 Pro (Screen Size)} = \frac{6-5}{7-5} * 100\% = 0.5$$

$$\text{Oppo A58 (Screen Size)} = \frac{5-5}{8-6} * 100\% = 0$$

$$\text{Infinix GT 10 Pro (Screen Size)} = \frac{7-5}{7-5} * 100\% = 1$$

Table 4. Alternative Utility Value Calculation Matrix

No	Criteria	Iphone 11 Pro	Samsung A13	Poco M4 Pro	oppo A58	Infinix GT 10 Pro
1	Brand	1	0	0.5	0.5	0
2	Price	1	1	0	0.33333	0
3	Processor Specifications	1	0.66666	1	1	0
4	RAM Specifications	1	0.66666	0.33333	1	0
5	Model	0.33333	1	0	0.66666	0
6	Battery Capacity	1	1	0.33333	0.33333	0
7	Camera Resolution	1	0.75	0.25	0	0.5
8	Internal Capacity	1	0	0	0.5	1
9	Screen Size	1	0.5	0.5	0	1

6. Determine the Final Grade

Assigning alternative values using the equation formula by adjusting the utility value with the normalised criteria weight value to obtain the final result. The calculation is like this:

Table 5. Determining the Final Score Using Equation

No	Criteria	Iphone 11 Pro	Samsung A13	Poco M4 Pro	oppo A58	Infinix GT 10 Pro
1	Brand	1	0	0.5	0.5	0
2	Price	1	1	0	0.33333	0
3	Processor Specifications	1	0.66666	1	1	0
4	RAM Specifications	1	0.66666	0.33333	1	0
5	Model	0.33333	1	0	0.66666	0
6	Battery Capacity	1	1	0.33333	0.33333	0
7	Camera Resolution	1	0.75	0.25	0	0.5
8	Internal Capacity	1	0	0	0.5	1
9	Screen Size	1	0.5	0.5	0	1
10	**Nilai Akhir**	**8.33333**	**5.58332**	**2.91666**	**4.33332**	**2.5**

From the calculation above, the best choice is the one that outperforms other choices. From the calculation using the SMART method, the Iphone 11 Pro gets the highest rank with a final score of 8.3.

D. Conclusion

The SMART method can be used to determine alternative solutions that suit user needs, by considering several criteria: Brand, Price, Processor Specifications, RAM Specifications, Model, Battery Capacity, Camera Resolution, Internal Capacity, Screen Size. In this study, the highest rank was obtained, namely Iphone 11 Pro with a final value of 8.33333.

E. References

[1] A. F. Boy and D. Setiawan, "Penerapan Metode SMART (Simple Multi Attribute Rating Technique) dalam Pengambilan Keputusan Calon Pendonor Darah pada Palang Merah Indonesia (PMI) Kecamatan Tanjung Morawa,"J. SAINTIKOM (Jurnal Sains Manaj. Inform. dan Komputer), vol. 18, no. 2, p. 202, 2019. https://doi: 10.53513/jis.v18i2.160.

[2] Fauzan, Y. Indrasary, and N. Muthia, "Sistem Pendukung Keputusan Penerimaan Beasiswa Bidik Misi di POLIBAN dengan Metode SAW Berbasis Web," J. Online Inform., vol. 2, no. 2, p. 79, 2018. https://doi: 10.15575/join.v2i2.101.

[3] Ilham Dwi Putranto and Dina Maulina, "Sistem Pendukung Keputusan Dengan Metode SMART Untuk Menentukan Guru Terbaik". JACIS : Journal Automation Computer Information System Vol.3, No.2, November 2023, pp. 92~102.

[4] Khoirotun Nisak and Iriani Iriani, "alisis Pengukuran Kinerja Perusahaan menggunakan Metode SMART System". Volume 14, Nomor 3, September 2023 P-ISSN 2089-1989 E-ISSN 2614-1523 Terakreditasi (SK No. 225/E/KPT/2022)

[5] Nasution, A. B., Apriani, D., & Simpa, Z. Y. (2022). Sistem Pendukung Keputusan dengan Aplikasi Penentuan Komunitas Literasi Terbaik Dengan Menerapkan Metode SMART Determining the Best Literacy Community By Applying the SMART Method, 1.

[6] Papilo, P. R. (2012). Integrasi metode IPMS dan SMART system dalam pengukuran kinerja perguruan tinggi. Jurnal Teknik Industri, 13(2), 186-193. https://doi.org/10.22219/JTIUMM.

[7] Sibyan, H. (2020). Implementasi Metode SMART pada Sistem Pendukung Keputusan Penerima Beasiswa Sekolah. Jurnal Penelitian Dan Pengabdian Kepada Masyarakat UNSIQ, 7(1), 78–83. https://doi.org/10.32699/ppkm.v7i1.1055.

[8] Rantaka, M. P., Zulfia Zahro, H., & Faisol, A. (2020). Penerapan Metode Simple Multi Attribute Rating Techni1Ue Untuk Menentukan Regu Pramuka Terbaik Berbasis Web Pada Sman 2 Kota Mojokerto. JATI (Jurnal Mahasiswa Teknik Informatika), 4(1), 110–117. https://doi.org/10.36040/jati.v4i1.2371.

[9] R. Sari, A. P. Windarto, D. Hartama, and S. Solikhun, "Decision Support System for Thesis Graduation Recommendation Using AHP-TOPSIS Method," J. Teknol. dan Sist. Komput., vol. 6, no. 1, pp. 1– 6, 2018, doi: 10.14710/jtsiskom.6.1.2018.1-6.

[10] Sukamto, S., Andriyani, Y., & (2022). Penerapan Metode SMART untuk Rekomendasi Pencari Kerja Terbaik. Jurnal Media, 6(April), 1224–1233. https://doi.org/10.30865/mib.v6i2.3988.
[11] Sodikin, I., Wisnubroto, P., & Ayunin, N. M. (2017). Pengukuran kinerja perusahaan menggunakan strategic management analysis and reporting technique (SMART) system di PT. Telkom Witel Magelang. Industrial Engineering Journal of The University of Sarjanawiyata Tamansiswa, 1(1), 9-16. https://doi.org/10.30738/iejst.v1i1.2034.
[12] Giofani, M. Sihombing, and I. Ambarita, "Sistem Pendukung Keputusan Pemilihan Paket Indihome Terbaik Bagi Calon Pelanggan Menggunakan Metode Topsis (Studi Kasus PT . Telkom Indonesia Kandatel Binjai)," vol. 4, pp. 12–30, 2022.
[13] Yazid Azriel and, Galuh Saputri, "Sistem Pengambilan Keputusan Pemilihan Menu Terlaris Menggunakan Metode Smart (Simple Multi Attribute Rating Technique)". Jurnal Informatika MULTI Vol.1 No.5 September 2023 E-ISSN: 2985-8860 Hal 456-463.
[14] Wahyuni, N., Katili, P. B., & Pranata, I. C. (2015). Pengukuran kinerja fakultas teknik UNTIRTA melalui strategic management analysis and reporting technique (SMART). Seminar Nasional IENAC, 2(15), 606-612. https://publikasiilmiah.ums.ac.id/handle/11617/5889.
[15] Wibowo, S. M., & Nurhidayat, A. I. (2020). Rancang Bangun Sistem Pendukung Keputusan Pemilihan Laptop Terbaik Menggunakan Metode Simple Multi Attribute Rating Technique Berbasis Web. Jurnal Manajemen Informatika, 11(1), 1–10.