

Application of Analytical Hierarchy Process Method in Laptop Selection

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Abstract: The process of selecting a laptop must be based on the capabilities and needs of the buyer. Buyers are faced with a large selection of laptop brands with various specifications, based on that we can make a decision support system aimed to help buyers select a laptop that fits the criteria of Style, Reability and Price, and takes alternatives Samsung, HP and Lenovo. This study used Analytical Hierarchy Process (AHP) method. Obtained results from Samsung, HP (Hewlett-Packard) and Lenovo.

Index Terms: Laptop, Decision Support System, Analytical Hierarchy Process

I. INTRODUCTION

A. Background

A laptop is one type of computer that can be carried everywhere, the weight of a laptop depends on its size, the material, and the specifications of the laptop. The components in the laptop are the same as the components on the personal computer (PC) the difference is that the components on the laptop are reduced in size, made lighter, and save power. And as technology advances many laptop brands have sprung up and from every single one launches laptop with their various advantages. Of the various types of laptops, specifications, and functions often cannot be used by consumers who do not meet their needs. Because of this, a laptop selecting system is needed.

The determination process takes account of prices, brands, and laptop specifications such as processor, ram, and memory. In connection with that information relating to the final assignment with the title "Application of Analytical Hierarchy Process Method in Laptop Selection".

B. Formulation of the problem

Based on the problems found in the background, a problem occur that can be discussed in this final project, namely:

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1. How to design a system that supports the decisions of laptop choosing in order to facilitate consumers in choosing a laptop that suits their needs.

C. Scope of problem

In order to avoid a discussion outside the problem, then the provisions needed to be able to provide inspiration that is more directed at the problem. The limits of problems are:

1. Creating a laptop selection decision support system.
2. Using the Analytical Hierarchy Process (AHP) method in making this decision support system.
3. Creating this decision support system using the PHP programming language.

D. Research objective

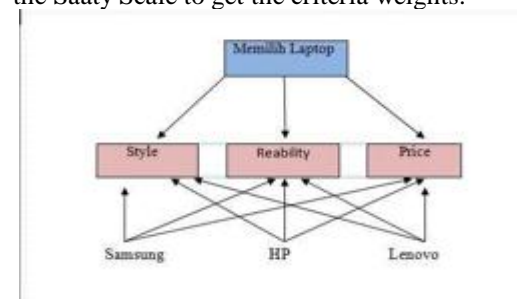
From the description of the problem above, the objective of this final project was to create a laptop selecting using decision support system that will help to provide solutions for consumers in choosing a laptop that suits their needs.

E. Benefits of research

- A. Providing the right alternative for choosing a laptop that suits your needs.
- b. Extending knowledge about the decision support system with analytical hierarchy method.

II. METHODOLOGY OF RESEARCH

Someone will buy a laptop, the alternative laptop that will be chosen is Acer, Toshiba, Apple. While the criteria chosen are Style, Reability, Price. Next do a pairwise comparison with the Saaty Scale to get the criteria weights:



a. Paired comparison with saaty scale

	Style	Reability	Price
Style	1	3	5
Reability	1/3	1	2
Price	1/5	1/2	1

b. Calculate the weight of the criteria (priority vector) by:

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1) Make the value of the paired comparison be a decimal value and add up each column.

	Style	Reability	Price
Style	1.00	3.00	5.00
Reability	0.33	2.00	3.00
Price	0.20	0.50	1.00
Collumn	1.53	4.50	8.00

Column

- 1 : 1.00+0.33+0.20=1.53
- 2: 3.00+2.00+0.50 = 4.50
- 3: 5.00+3.00+1.00 = 8.00

2) normalization of the value of each paired comparison matrix column by dividing each value in the matrix column with the corresponding column sum results.

	Style	Reability	Price
Style	0.65	0.67	0.62
Reability	0.22	0.22	0.25
Price	0.13	0.11	0.13

How to normalize each value: Column 1 row 1 (1.00) divided by the sum of results per column (1.53) the results enter column 1 row 1 0.65 and so on until all values are met.

3) Calculate the average value of the sum of each matrix line

	Style	Reability	Price	Vector Scale
Style	0.65	0.67	0.62	0.65
Reability	0.22	0.22	0.25	0.23
Price	0.13	0.11	0.13	0.12

Obtain vector priority values: Line 1: $0.65 + 0.67 + 0.62 / n = 0.65$ Line 2: $0.22 + 0.22 + 0.25 / n = 0.23$ Line 3: $0.13 + 0.11 + 0.1113 / n = 0.12$

n = Number of criteria used.

c. Calculate CI

	Style	Reability	Price	Scale Vector
Style	1.00	3.00	5.00	0.65
Reability	0.33	1.00	2.00	0.23
Price	0.20	0.50	1.00	0.12
Collumn	1.53	4.50	8.00	

$$] = \lambda_{max} [1.53 \times 0.65] + [4.50 \times 0.23] + [8.00 \times 0.12]$$

$$= 3.03$$

$$CI = (\lambda_{max} - n) / (n - 1)$$

$$= (3.03 - 3) / 2 = 0.02$$

Table IR

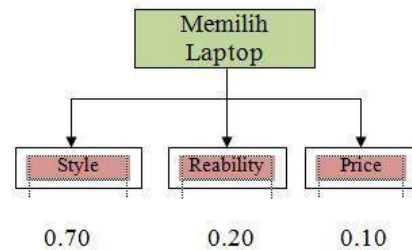
Ordo Matrix	RI	Ordo	RI	Ordo Matrix	RI
1	0	6	1.24	11	1.51
2	0	7	1.32	12	1.48
3	0.58	8	1.41	13	1.56
4	0.9	9	1.45	14	1.57
5	1.12	10	1.49	15	1.59

So: CR = CI / IR

$$= 0.02 / 0.58$$

$$= 0.03$$

d. New hierarchy arrangement (complete with criteria weights)



e. Calculation of alternative weights for Style criteria

a. Pairwise comparison

Style	Samsung	Hp	Lenovo
Samsung	1	3	5
Hp	1/3	1	1/3
Lenovo	1/5	3	1

b. Criteria weight (vector priority)

Decimal value and sum of each column

Style	Samsung	Hp	Lenovo
Samsung	1.00	3.00	5.00
Hp	0.33	1.00	0.33
Lenovo	0.20	3.00	1.00
Collumn	1.53	7.00	6.33

Normalization

Style	Samsung	Hp	Lenovo
Samsung	0.65	0.43	0.79
Hp	0.22	0.14	0.05
Lenovo	0.13	0.43	0.13

Get the priority vector

Style	Samsung	Hp	Lenovo	Priority vector
Samsung	1.00	3.00	5.00	0.62
Hp	0.33	1.00	0.33	0.14
Lenovo	0.20	3.00	1.00	0.24

f. Alternative weight calculations for Reliability criteria

a. Pairwise comparison

Reability	Samsung	Hp	Lenovo
Samsung	1	3	1/5
Hp	1/3	1	1/3
Lenovo	5	3	1

b. Criteria weight (vector priority), Being a decimal and sum up each column

Reability	Samsung	Hp	Lenovo
Samsun g	1	3	0.2
Hp	0.33	1	0.33
Lenovo	5	3	1
Collumn s	6.33	7	1.53

Normalization			
Style	Samsung	Hp	Lenovo
Samsung	0.16	0.43	0.13
Hp	0.05	0.14	0.22
Lenovo	0.79	0.43	0.65

Get the priority vector				
Style	Samsung	HP	Lenovo	Priority Vector
Samsung	0.16	0.43	0.13	0.24
HP	0.05	0.14	0.22	0.14
Lenovo	0.79	0.43	0.65	0.62

g. Calculation of alternative weights for Price criteria

a. Pairwise comparison

Price	Samsung	Hp	Lenovo
Samsung	1	3	2
Hp	1/3	1	3
Lenovo	1/2	1/3	1

b. Criteria weight (vector priority), Being a decimal and sum up each column

Reability	Samsung	Hp	Lenovo
Samsung	1.00	3.00	2.00
Hp	0.33	1.00	3.00
Lenovo	5	0.33	1

Normalization

Price	Samsung	Hp	Lenovo
Samsung	0.55	0.69	0.33
Hp	0.18	0.23	0.5
Lenovo	0.27	0.08	0.17
Collumn	1.83	4.33	6.00

Get the priority vector

Style	Samsung	Hp	Lenovo	Priority vector

Samsung	0.55	0.69	0.33	0.53
Hp	0.18	0.23	0.5	0.30
Lenovo	0.27	0.08	0.17	0.17

h. Alternative ranking (the sum of the multiplication of each alternative weight with the weight of the corresponding criteria)

	Style	Reability	Price		Priority vector
Samsung	0.62	0.24	0.53	x	5.00
Hp	0.14	0.14	0.30		0.33
Lenovo	0.24	0.62	0.10		1.00

	Style	Reability	Price	Priority vector
Samsung	0.43 (0.62 x 0.70)	0.05 (0.24 x 0.20)	0.05 (0.53 x 0.10)	0.53 (0.43+ 0.05+ 0.05)
Hp	0.10 (0.14 x 0.70)	0.03 (0.14 x 0.20)	0.03 (0.30 x 0.10)	0.16 (0.10 +0.03 +0.03)
Lenovo	0.17 (0.24 x 0.70)	0.13 (0.62 x 0.20)	0.02 (0.17 x 0.10)	0.32 (0.17 +0.13+ 0.02)

III. IMPLEMENTATION RESULTS

		SAMSUNG				
No	Type	PROCESSOR	RAM	HDD	VGA	HARGA
1	XE5001C-H0D	Intel Atom Z2760 1.8	2 GB	64GB	1	RP-9.000.000
2	2NP22064V	Intel Celeron J1007U	2 GB	500GB	2	RP-5.000.000
3	NP2708AE-A01D	Intel Core i3 3110m	4GB	500GB	2	RP-6.000.000

		HP				
No	TYPE	PROCESSOR	RAM	HDD	VGA	HARGA
1	K396011-N028TU	N2830 DC 2.16	4GB	500GB	2	RP-4.469.000
2	K396011-N043TU	N2830 DC 2.16	4GB	500GB	2	RP-4.469.000
3	K396011-K027TU	N3050 DC	4GB	500GB	1	RP-4.790.000

		LENOVO				
No	TYPE	PROCESSOR	RAM	HDD	VGA	HARGA
1	IdeaPa d E10-30	N2815	2GB	320GB	2	RP-2.799.000
2	S20-30	N2830-2	2GB	500GB	2	RP-3.075.000
3	IdeaPa d B40730	N2840	2GB	500GB	1	RP-4.250.000

Product	Recommend
FORM REKOMENDASI LAPTOP	
Merk Laptop	Asus
Processor	AMD E1-2500
RAM	2 GB
HDD	1024 GB
VGA	GB
Harga Laptop	< Rp. 2.500.000
Find	

IV. CONCLUSIONS AND SUGGESTIONS

A. Conclusion

Based on the response given by the client, it can be concluded that the decision support system that has been made is enough to help the client in choosing a laptop that suits his



needs. Ranking results are in accordance with the above criteria

It obtained in the order namely: Samsung, HP and Lenovo, which have been inputted by clients such as laptop brands, processors, RAM, HDD, VGA, and prices.

B. Suggestion

1. In the future this DSS can be made online so that all users can use it as a reference for purchasing laptops.
2. Complete the brand and type of laptop and its specifications so that, the selection is not limited to a few brands.
3. Add images of each brand and type so that users can immediately see the picture of the laptop

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