

## APPLICATION OF ANALYTICAL HIERARCHY PROCESS TO CHOOSE CRITERIA FOR MOBILE PHONES

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### ABSTRACT

*This research on the criteria of choosing mobile phones consumers. Various brands and mobile phone specifications will affect consumers to choose their mobile phone. One method to choose mobile phone brand and criteria is using "Analytical Hierarchy Process". Data for this research is obtained from questionnaires we sent to respondents. The spread is divided into three stages as follow the first one is open questionnaire, that we sent to 50 respondents, to know what people need when choosing mobile phone, the second spread into 90 respondents. Its function is to identify consumer's need and satisfaction toward existing mobile phone, and to separate their answers into 5 quality dimension that we put in open questionnaire. the third one is AHP questionnaire, spread into 10 respondents. This questionnaire is combination between the first and the second questionnaire, because the result that has negative value or "gap" will be analyzed deeper to identify several criteria that people need in their mobile phone. The first criteria is design (61,8%), the second is brand (26,3%), and the third is after sales service (11,75%).*

*Key words: Mobile Phone, gap, Analytical Hierarchy Process*

### 1. INTRODUCTION

Nowadays, mobile phone is not only used by certain segment. Consumers' need has significant effect in their decision to buy cellphone, but lifestyle doesn't affect their decision significantly (1). Various income levels, from upper class until lower class, even children, use cellphone. So, businessmen who sell cellphone in their store, must be able to find products that fit the condition in Silaut area, based on available cellular operator. One factor that affect consumer's buying decision is quality. Each consumer has different need and criteria. Analytical hierarchy process (AHP) was used to assist in building the model and help draw decisions (2) and AHP also can be used in generating weights for evaluation of products of notebook computers (10). The analytical hierarchy process (AHP) method is applied to determine priority in selection suppliers with multiple criteria that related with the key factors like quality, cost and delivery (3). The success of retailer is determined not only by its ability to define the need of consumers, but also backed up by its own strategy. According the Pearson correlation results, price is the dominant

factor affecting the decision to buy mobile phone. Secondly, the features incorporated in a mobile hand set are the most important factor which is considered by the consumers while purchasing the mobile phone. However, all features of mobile phones are not equally important. The other factors equally correlated and have moderate relationships with the decision to buy are brand name and durability of mobile phones. Both the factors are highly associated with the quality of mobile phone devices. The least correlated factors are after sales service and social influences (7). Not necessarily all the variables influence a person in the same way and same extent (11). In this research focused on the selection criteria that have gap or negative value.

### 2. THEORETICAL BACKGROUND

#### 2.1 INTRODUCTION OF QUALITY

The method to measure service quality is a function between consumer expectation and their perception toward actual service, provided by a company. Consumer's expectation is affected by several factors such as : word of mouth, personal needs, and past experience in Nusya'bani purnama

(2005). This expectation must become reference for service provider to design, produce, and deliver their service to consumers. While consumer's perception is their appraisal to the service they receive. Service quality is comparison or the difference between service they get, and ideal service they want. The difference between perception and expectation is called GAP :

Perception – Expectation = GAP

- If GAP is positive, it means perception is big, and service expectation is classified as surprise and satisfying.
- If GAP is negative, it means perception is small, and service expectation is not satisfying, and no quality.
- If GAP is zero, it means perception is equal with expectation. It is classified as satisfying and no quality.

Service quality as a whole is consumer's average assessment score toward each dimension. The instrument we use to measure service quality is questionnaire or list of written questions and statements we spread to consumers using likert scale.

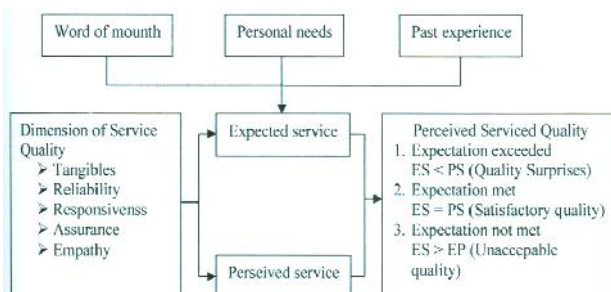


Figure 1. *Perceived Service Quality*

**2.2. ANALYTICAL HIERARCHY PROCESS**

AHP is a model to support decision, developed by Thomas L. Saaty. This decision support model will elaborate multy factor problems or multy complex criteria to become a hierarchy. According to Saaty (1993), hierarchy is defined as representation of complex problems in multy level structures where the first level is goal, followed by factor, criteria, sub-criteria, and so on until last alternative level. AHP has been used in various settings to make decisions.

AHP is often used as a method to solve problems, more often than other methods, because of these following reasons :

- 1 Hierarchical structure, as consequence the criteria they chose, until the deepest sub criteria.
- 2 To consider validity until the limit of various criteria and alternatives, chosen by decision maker.

To consider endurance of sensitivity analysis output in decision making

**3. RESEARCH METHOD**

1. Make questionnaire
2. Spread questionnaire to measure consumers' need and satisfaction toward cellphone
3. Validity and reliability test
4. Measurement of consumers' need and satisfaction level
5. Measurement of GAP level
6. Matrix of cartesius diagram
7. Making hierarchical structure of AHP
8. Spread AHP questionnaire
9. Matrix of criteria weighting factor.

**4. RESULT AND DISCUSSION**

**4.1. Level of customer needs**

Score = Likert scale x the number of respondents who chose the level of need

$$\text{Scores needs var 1} = (1 \times 0) + (2 \times 1) + (3 \times 3) + (4 \times 14) + (5 \times 12) = 396$$

$$\text{Level requirement} = \text{score} / \text{number of respondents} = 396/90 = 4.4$$

**4.2. Level of cutomer satisfaction**

Measurement of Customer Satisfaction

Score = Likert scale x the number of respondents who chose the level of satisfaction

$$\text{Var satisfaction scores 1} = (1 \times 0) + (2 \times 0) + (3 \times 1) + (4 \times 12) + (5 \times 17) = 408$$

$$\text{Satisfaction} = \text{Score/number of respondent} = 408/90 = 4.53$$

### 4.3. Level Measurement and Compliance Gaps

Having obtained the value of each level needs and satisfaction levels, calculating the level of the gap (gap) to know how big the gap between the needs and the level of customer satisfaction. The formula used is:  
 Gaps = Satisfaction - Level requirement  
 = 4.53 - 4.4  
 = 0.13

The level of conformity is the comparison of the level of need and the level of satisfaction. To calculate the degree of correspondence between the need to use the formula of satisfaction:

$$\begin{aligned} \text{Level Compliance} &= \text{Satisfaction level/the} \\ &\text{level of need} \times 100\% \\ &= (4,4/4.53) \times 100\% \\ &= 97.13 \end{aligned}$$

**Table 1. Mobile Phone Characteristics**

No	Criteria in choosing Mobile Phone	Defenition of each criteria
1	Harga	The amount of money paid for mobile phone transaction
2	Dimension	Length, width, and thickness of mobile phone
3	Features	Full facility of mobile phone, such as browser/google, game, etc
4	Design	Physical appearance of mobile phone
5	Performance	Quality and ability of mobile phone
6	Brand	The name of given to mobile phone by the company that produce it
7	After sales servis	Service level given by the company after transaction
8	Weight	Heavingness of mobile phone
9	Accessories	Additional facility of

		mobile phone, such as handsfree
10	Endurance	Product's excellence, such as durable battery
11	Memori internal	Memory that can be accessed directly by mobile phone
12	Dual simcard	Mobile phone with two simcard
13	Internet	Mobile phone with internet browsing
14	Battery	Battery durability
15	Camera	Mobile phone with camera
16	Network	Edge atau H+
17	Service	Pelayanan

### 4.5. Pengolahan AHP

Hierarchy is formed from variable or criteria that has negative value (has GAP). From 17 criteria, there are 3 criteria that inappropriate (has negative value) with the need of consumer, as follows :

1. Design
2. Brand
3. After sales service
4. Criteria weighting factor matrix
5. Matrix factors weighting criteria:
6. Table 2. Matrix Weighting factors Totally Selection Mobile Phone
- 7.

RESPONDENT											
CRIT ERIA	1	2	3	4	5	6	7	8	9	10	CRIT ERIA
DESI GN	2	4	3	5	2	6	5	8	1	3	BRAN D
DESI GN											AFTE R SALE S SERV ICES
	3	6	4	3	5	6	7	2	3	4	AFTE R SALE S SERV ICES
BRAN D	4	2	3	3	6	2	1	4	5	5	AFTE R SALE S SERV ICES

Table 3. Matrik Pair Wise

Matrik Pair Wise			
CRITERIA	DESIGN	BRAND	AFTER SALES SERVICES
DESIGN	1	3.340061	4,015027
BRAND	0.299396	1	3,116387
AFTER SALES SERVICES	0,249064	0,320884	1
TOTAL	1,54846	4,660945	8,131414

$$CI = \frac{n(\lambda_{max} - n)}{(n-1)} = \frac{3,102938 - 3}{3-1} = 0,051469$$

$$CR = \frac{CI}{RI} = \frac{0,051469}{0,58} = 0,08874$$

Because CR < 0.100, means that the respondent is inconsistent.

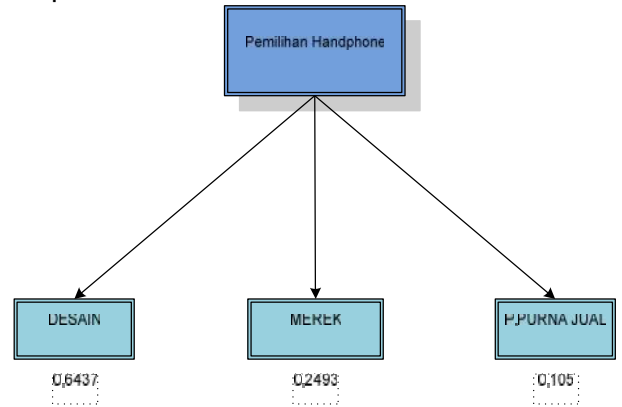


Figure 3: Structure Hierarchy

Table 4: Addition priority

CRITERIA	DESIGN	BRAND	AFTER SALES SERVICES	Vector Eigen
DESIGN	0,645803	0,716606	0,493767	0,618725
BRAND	0,193351	0,214549	0,383253	0,263717
AFTER SALES SERVICES	0,160846	0,068845	0,12298	0,117557

Table 5 : Addition Entry

CRITERIA	DESIGN	BRAND	AFTER SALES SERVICES	TOTALLY
DESIGN	0,618725	0,880832	0,471995	1,971553
BRAND	0,185244	0,263717	0,366354	0,815315
AFTER SALES SERVICES	0,154102	0,084623	0,117557	0,356282

Table 6 : Maximum Eigen Value

CRITERIA	Summation entry	Summation priority entry	Entry/Priority	CRITERIA
DESIGN	1,971553	0,618725	3,186475	DESIGN
BRAND	0,815315	0,263717	3,091624	BRAND
AFTER SALES SERVICES	0,356282	0,117557	3,030715	AFTER SALES SERVICES
<b>Total</b>			9,308814	<b>Total</b>

Of the 17 variables or criteria obtained three variables is negative and consistency index values obtained are:

For n = 3, RI = 0,58 (Table saaty) then :

### 5. CONCLUSION

In this research, there are 3 criteria to choose mobile phone : design, brand, and after sales service. Based on the table above, we can see that design has the highest score (61,8%). It shows that design is criteria is the most important criteria for consumer

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