

Analysis of Customer Satisfaction Level using Customer Satisfaction Index and Determination of Priority Criteria through Analytical Hierarchy Process in the Delivery Service of Pos Indonesia (Persero) Company in Tulungagung Regency

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Abstract:

Pos Indonesia (Persero) in Tulungagung Regency is one of the State-Owned Enterprises (BUMN) of Indonesia engaged in postal and delivery services. People in Tulungagung distribute goods and services through some Pos Indonesia (Persero) companies or Tulungagung Regency Post Office. This study aims to analyze community satisfaction in Tulungagung Regency and analyze the order of priority delivery service indicators that need to be improved by Pos Indonesia Company (Persero) in Tulungagung Regency using Customer Satisfaction Index (CSI) and Analytical Hierarchy Process (AHP). There were 105 samples and the CSI results obtained by 72.57%, the respondents were very satisfied with the delivery service at Pos Indonesia (Persero) company in Tulungagung Regency. According to the AHP results with a sample of 9 respondents, it was found that the order of priority of service indicators was the attribute "responsible for the safety of goods and customer comfort (0.372)" in the assurance dimension, there was the attribute "fast service, customers do not queue (0.126)" in the responsiveness dimension, there was the attribute "information provided by employees is clear and easy to understand (0.069)" in the reliability dimension, and there was the attribute "willingness of a large and safe parking space (0.028)" in the dimension of physical evidence. So, it can be concluded that the guarantee, attribute of "responsible for the safety of goods and customer comfort" occupied the highest priority in improving the quality of delivery services at Pos Indonesia (Persero) company in Tulungagung Regency.

Keywords - Pos Indonesia (Persero) Tulungagung Regency, Delivery Service, Customer Satisfaction Index (CSI), Analytical Hierarchy Process (AHP).

I. INTRODUCTION

Delivery is the activity of distributing goods and services from producers to consumers, or marketing activities to facilitate delivery of goods and services from producers to consumers. Indirect or actual delivery activities have often been encountered in daily life, from most of the producers themselves are not able to handle the problem of delivery without the help of some delivery service providers themselves [1]. Delivery service is one of requirements of a

person who is often done in the current era of globalization. A consumer tends to want a thing that is fast, safe, easy, and practical in terms of goods delivery and making delivery services have increased rapidly. The rapid development of technology makes people prefer to move into technological advances that are more effective and efficient. Good services and in accordance with the requirements are the people expectations as a service user so as to realize public satisfaction as a user. Quality, scalable, easy, fast, and

affordable public services are an important key in constructing the relationship between the company and the community. Customers must be satisfied because if they are not satisfied, they will leave the company and become a competitor customers [2] (Supranto, 2011)

According to Law No. 38 of 2009 on Post, there is a change in the organization of posts in Indonesia, because of the competitive competition among the providers of posting services. Pos Indonesia (Persero) is one of the state-owned enterprises (BUMN) that carry out tasks in the field of postal services and support government program policies in terms of economic development. Pos Indonesia (Persero) or better known as the Post Office provides postal services for all communities in Indonesia and outside of Indonesia area. Pos Indonesia (Persero) experiences competition among other delivery service providers, service conditions of Pos Indonesia (Persero) in the perspective of the general user community can be stated to be lacking, not even fulfilling the public users' expectation of postal delivery services.

Based on several aspects of reliability and physical facilities owned by Pos Indonesia (Persero) company is considered not maximal satisfactory, so there is possibility to be a systematic and sustainable decline. But in the current problems, the extent to which the development of services organized by Pos Indonesia (Persero) company can fulfill customers' needs for delivery services. To know a comprehensive description related to these problems, it is necessary to conduct a research activity. At Pos Indonesia (Persero) company in Tulungagung regency is found several problems that have occurred. In the case of goods delivery at the Post Office Tulungagung often experience delays in delivery time and the arrival of goods to the destination is not in accordance with the schedule that has been delivered by officer to the customer. In addition, the occurrence of damage to the goods from delivery packages or damage to the packaging of goods in transit. It occurs inappropriate data input of goods received in actual with the admin office. There are some

officers who do not apply SOP correctly, lack of supervision from the company that makes officers less than optimal. Related to the computerization, Pos Indonesia (Persero) district companies often experience network errors or server crash. Then, customers who wait too long for receipts out after inputting data.

The Customer Satisfaction Index (CSI) is used to analyze the overall level of customer satisfaction by looking at the level of performance and the importance or expectation of the attributes of a product or service. In daily life, a person is often faced with a selection of various alternatives, which ultimately requires prioritization of existing choices. In determining these priorities, someone will use logical factors by comparing these choices with criteria related to choice. It has described the principle of the Analytical Hierarchy Process (AHP) method.

Analytical Hierarchy Process (AHP) is a method to rank the best satisfaction alternatives, in making decisions have many goals or criteria that must be fulfilled or considered. Some criteria compared with each other (the importance levels) is the main emphasis on the concept of this AHP [3]. The Analytical Hierarchy Process (AHP) is the process of developing a numerical score to rank each decision alternative based on how far each alternative fulfills the decision maker's criteria.

According to the description above, in this study, researchers will conduct a study entitled "The Customer Satisfaction Level using Customer Satisfaction Index and Determination of Priority Criteria through Analytical Hierarchy Process in the Delivery Service of Pos Indonesia (Persero) Company in Tulungagung Regency" with the expectation of analyzing the priority level of criteria that need to be improved for decision-making by Pos Indonesia (Persero) company in Tulungagung regency after known analysis of the community satisfaction level with the delivery service of Pos Indonesia (Persero) company in Tulungagung Regency.

Objective of this study:

- a. Describe the respondents' opinion based on the answers selected related indicators that allegedly affect the delivery service of Pos Indonesia (Persero) company in Tulungagung Regency.
 - b. Analyze and interpret the analysis of customer satisfaction level about the delivery service of Pos Indonesia (Persero) company in Tulungagung regency with Customer Satisfaction Index analysis.
 - c. Analyze the priority indicators of the dimensions that need to be corrected by Pos Indonesia (Persero) company in Tulungagung regency based on Analytical Hierarchy Process Analysis..
- customer and be responsible for the information that has been provided.
 4. Assurance dimension is the ability of employees to have knowledge and good manners. It is intended that customers / consumers have trust in the service quality that has been provided by the company's employees.
 5. Empathy dimension is the attitude of sincere attention to individual customers by always trying to understand the specific needs of customers. The service includes needs and wants.

Tabel 1 Research Variables

II. RESEARCH METHOD

A. Methode and Data Source

The method used in this study was Analytical Hierarchy Process (AHP) method and using primary data obtained by conducting surveys to the people who become customers of Pos Indonesia (Persero) company in Tulungagung Regency. The survey was conducted through the distribution of questionnaires and interview process directly to the respondents, namely customers of Pos Indonesia (Persero) company in Tulungagung Regency.

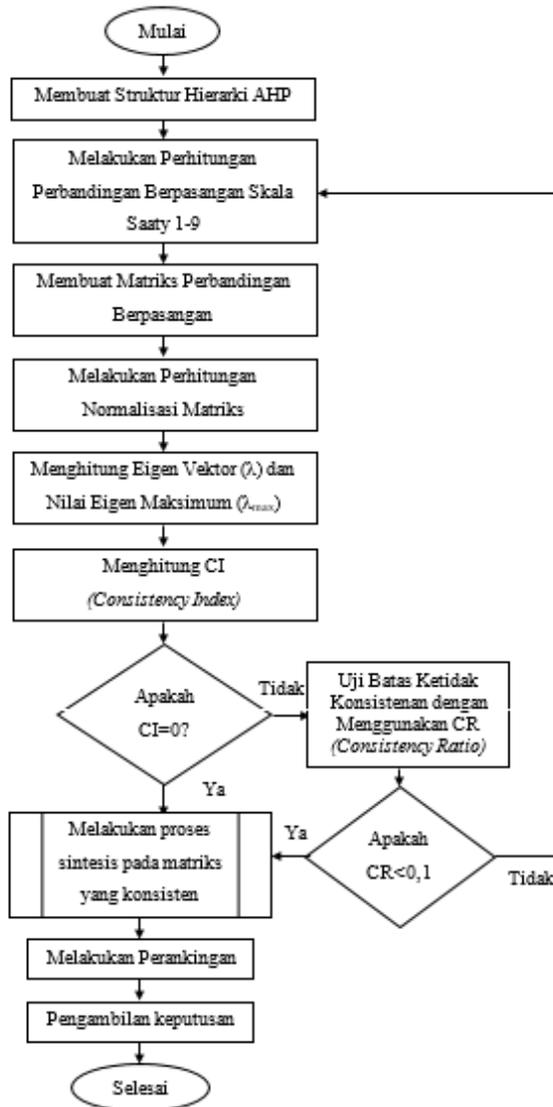
B. Research Variable

As a special measuring tool to measure the quality of a service (service) developed by simplifying ten dimensions into five basic dimensions [4]. Concerning about the service quality which consists of five basic dimensions known as SERQUAL (Service Quality) [5], namely:

1. The tangible dimension is the ability of a company to present physical facilities, products, and the environment that can be perceived by the five human senses.
2. Reliability dimension is the ability to provide fast, accurate, and precise services to the customers for products or services offered.
3. Responsiveness dimension is the ability to provide fast service (responsive) with the easy understood information delivery for the

No	Dimensions	Variable
X ₁	<i>Tangible</i>	Completeness of service room and waiting room facilities (X _{1.1})
		Office equipment used in modern support services (X _{1.2})
		Employees always wear a clear identification of their name and look polite and neat (X _{1.3})
		Cleanliness and neatness both interior and exterior arrangements of the post office (X _{1.4})
		Large and safe parking space availability (X _{1.5})
(X ₂)	<i>Reliability</i>	Services provided to the customers quickly and on time (X _{2.1})
		Information provided by employees is clear and easy to understand (X _{2.2})

C. Step of the Result



III. RESULT AND DISCUSSION

The determination of sample size in this study used the Lemeshow formula [6] as follows:

$$n \geq \frac{Z^2_{1-\frac{\alpha}{2}} P(1-P)}{d^2}$$

For α , the sample size taken is:

$$n \geq \frac{1,96^2_{(0,5)(0,5)}}{0,1^2} \text{ atau } n \geq 96$$

Obtained the results of 96 minimum respondents.

A. Validity Test

Validity test is used to measure the validity or invalidity of the instruments [7]. Validity can be determined from the correlation or the total variable with the forming variable.

Tabel 2 Validitas Test

Dimensions	Variable	p-value	Kesimpulan
Tangible	X _{1.1}	0,000	Valid
	X _{1.2}	0,000	Valid
	X _{1.3}	0,000	Valid
	X _{1.4}	0,000	Valid
	X _{1.5}	0,000	Valid
Reliability	X _{2.1}	0,000	Valid
	X _{2.2}	0,000	Valid
	X _{2.3}	0,000	Valid
	X _{2.4}	0,000	Valid
	X _{2.5}	0,000	Valid
Responsiveness	X _{3.1}	0,000	Valid
	X _{3.2}	0,000	Valid
	X _{3.3}	0,000	Valid
	X _{3.4}	0,000	Valid
	X _{3.5}	0,000	Valid
	X _{3.6}	0,000	Valid
Empathy	X _{4.1}	0,000	Valid
	X _{4.2}	0,000	Valid
	X _{4.3}	0,000	Valid
	X _{4.4}	0,000	Valid
	X _{4.5}	0,000	Valid
	X _{4.6}	0,000	Valid
Assurance	X _{5.1}	0,000	Valid
	X _{5.2}	0,000	Valid
	X _{5.3}	0,000	Valid
	X _{5.4}	0,000	Valid
	X _{5.5}	0,000	Valid

According to the results of the validity test for each variable with the results of calculations using IBM 25 SPSS software, all question variables have a

smaller p-value than the variable value from $\alpha = 0.05$ which means rejected H_0 . So, it can be concluded that all the questions in the questionnaire can measure the same aspect, which means that it is valid.

B. Reliability Test

Reliability tests are performed to measure the extent to which measuring instruments can be trusted or relied upon [8]. The high and low reliability is empirically indicated by a number called the coefficient of reliability.

Tabel 3 Reliabilitas Test

No	Variabel	Cronbach's Alpha	Kesimpulan
1	Tangible	0,986	Very High Reliability
2	Reliability	0,987	Very High Reliability
3	Responsiveness	0,978	Very High Reliability
4	Empathy	0,985	Very High Reliability
5	Assurance	0,986	Very High Reliability

Based on the above results, it can be seen that the analysis results with Cronbach's Alpha value in five dimensions (physical appearance, reliability, responsiveness, assurance, and empathy) have a very high reliability with Cronbach's Alpha value between 0,80 to 1,00.

C. Customer Satisfaction Index

Measurement of Customer Satisfaction Index is used to determine the customer satisfaction level in delivery service of Pos Indonesia (Persero) company in Tulungagung Regency thoroughly with an approach that considers the importance level of

service attributes measured [9]. CSI calculation results as follows:

Tabel 4 Customer Satisfaction Index Result

j	Variable	(MIS _j)	WF	(MSS _j)	WS
1	X _{1.1}	3,833	0,0373	3,565	0,1331
2	X _{1.2}	3,746	0,3650	3,499	0,1277
3	X _{1.3}	3,843	0,0374	3,684	0,1379
4	X _{1.4}	3,795	0,0369	3,595	0,1330
5	X _{1.5}	3,780	0,0368	3,508	0,1292
6	X _{2.1}	3,815	0,0371	3,500	0,1301
7	X _{2.2}	3,809	0,0371	3,587	0,1331
8	X _{2.3}	3,878	0,0378	3,716	0,1404
9	X _{2.4}	3,828	0,0373	3,692	0,1378
10	X _{2.5}	3,939	0,0383	3,885	0,1488
11	X _{3.1}	3,828	0,0373	3,643	0,1359
12	X _{3.2}	3,735	0,0364	3,587	0,1306
13	X _{3.3}	3,765	0,0367	3,590	0,1317
14	X _{3.4}	3,832	0,0373	3,624	0,1353
15	X _{3.5}	3,774	0,0368	3,588	0,1319
16	X _{3.6}	3,848	0,0375	3,556	0,1333
17	X _{4.1}	3,750	0,0365	3,420	0,1249
18	X _{4.2}	3,744	0,0364	3,542	0,1292
19	X _{4.3}	3,746	0,0365	3,592	0,1311
20	X _{4.4}	3,861	0,0376	3,818	0,1436
21	X _{4.5}	3,731	0,364	3,620	0,1316
22	X _{4.6}	3,789	0,0369	3,679	0,1358
23	X _{5.1}	3,780	0,0368	3,700	0,1363
24	X _{5.2}	3,821	0,0372	3,731	0,1389
25	X _{5.3}	3,777	0,0368	3,665	0,1349
26	X _{5.4}	3,856	0,0376	3,803	0,1429
27	X _{5.5}	3,724	0,0363	3,551	0,1289
		CSI = 0,725661			

Based on the results above, it shows the calculation of the CSI value of 72,56%. The value is in the interval value of 66-80 (%) which means the customer is satisfied with the delivery service of Pos Indonesia (Persero) company in Tulungagung Regency. Although it has received a fairly good CSI score, Pos Indonesia (Persero) company in Tulungagung regency needs to improve and maintain the delivery services quality provided to the people of Tulungagung regency.

D. Importance Performance Analysis

IPA analysis is used to compare consumer assessment of the importance of service quality (Importance) with the performance level of Service Quality (Performance) [10]. IPA analysis on all dimensions is used to determine the extent to which the satisfaction of visitors to the attributes related to each dimension, as follows:

Tabel 5 Position of Variables in Each Dimension

Dimensions	Position	Variable
Tangible	Quadrant I	$X_{1.3}$
	Quadrant II	$X_{1.1}$
	Quadrant III	$X_{1.2}$
		$X_{1.5}$
	Quadrant IV	$X_{1.4}$
Reliability	Quadrant I	$X_{2.3}$
		$X_{2.5}$
	Quadrant III	$X_{2.1}$
		$X_{2.2}$
	Quadrant IV	$X_{2.4}$
Responsiveness	Quadrant I	$X_{3.1}$
		$X_{3.4}$
	Quadrant II	$X_{3.6}$
Quadrant III	$X_{3.2}$	

Empathy	Quadrant I	$X_{3.3}$
		$X_{3.5}$
	Quadrant II	$X_{4.4}$
		$X_{4.6}$
	Quadrant III	$X_{4.1}$
$X_{4.2}$		
Quadrant IV	$X_{4.3}$	
Assurance	Quadrant I	$X_{4.5}$
		$X_{5.2}$
	Quadrant III	$X_{5.4}$
		$X_{5.3}$
	Quadrant IV	$X_{5.5}$
		$X_{5.1}$

E. Analytical Hierarchy Process

AHP is used to determine the priority level of policy dimensions to be taken by the management of Pos Indonesia (Persero) company in Tulungagung Regency. This policy dimension that will be taken, this analysis is obtained from the difference between high expectations and reality / above the median. The end result is a ranking or priority weighting dimension [11].AHP The results of matrix formation about comparison between quality dimensions, as follows:

Tabel 6 Comparison Matrix in Each Service Dimensions

Dimensions	X_1	X_2	X_3	X_4	X_5
X_1	1,000	2,904	5,827	7,031	4,334
X_2	0,344	1,000	1,690	5,488	2,192
X_3	0,172	0,592	1,000	5,169	0,611
X_4	0,142	0,182	0,193	1,000	0,642
X_5	0,231	0,456	1,636	1,558	1,000

Before proceeding to the synthesis step of the priority, a consistency test was carried out. For the AHP model, the comparison matrix is acceptable if the consistent ratio value < 0.1 CR value < 0.1 is a value that has a good consistency level and can be accounted for. The consistency test is first done by

compiling the level of relative importance on each criterion or alternative expressed as normalized relative weight.

$$\frac{G_{11}}{\sum_{i=1}^k G_{i1}} = \frac{1,000}{1,000 + 0,344 + \dots + 0,172 + 0,142} = 0,529$$

Table 7 Normalized Relative Weight

Dimensions	X ₁	X ₂	X ₃	X ₄	X ₅
X ₁	0,529	0,566	0,563	0,347	0,494
X ₂	0,182	0,195	0,163	0,271	0,250
X ₃	0,091	0,115	0,097	0,255	0,070
X ₄	0,075	0,035	0,019	0,049	0,073
X ₅	0,122	0,089	0,158	0,077	0,114

Furthermore, the Eigen factor can be calculated by averaging the sum of each row in the normalized relative weight matrix with the number of dimensions.

Eigen factors for the physical evidence dimension, are as follows:

$$\lambda_1 = \frac{\sum_{j=1}^k G_{1j}}{k} = \frac{0,529 + 0,566 + \dots + 0,347 + 0,494}{5} = 0,499$$

Table 8 Eigen Factors of the Normalized Matrix

Criteria / Alternatives	Eigen Factor (λ)
Tangible	$\lambda_1 = \frac{2,499}{5} = 0,499$
Reliability	$\lambda_2 = \frac{1,061}{5} = 0,212$
Responsiveness	$\lambda_3 = \frac{0,628}{5} = 0,126$
Empathy	$\lambda_4 = \frac{0,252}{5} = 0,050$
Assurance	$\lambda_5 = \frac{0,560}{5} = 0,112$

Next, determine the value λ_{max} to determine the value of CI,

$$\lambda_{max} = \left(\sum_{i=1}^k G_{i1} \times \lambda_1 \right) + \dots + \left(\sum_{i=1}^k G_{ij} \times \lambda_n \right)$$

$$= (1,889 \times 0,499) + (5,134 \times 0,212) \dots + (8,779 \times 0,112) = 5,336$$

$$CI = \frac{\lambda_{max} - k}{k - 1}$$

$$= \frac{5,336 - 5}{5 - 1} = 0,084$$

The next test is measured using the Consistency Ratio (CR), which is the index value or the comparison between CI and RI

$$CR = \frac{CI}{RI} = \frac{0,084}{1,12} = 0,075$$

CR value is obtained at 0.075 or $CR < 0.1$ which means the data stated to be consistent.

The final result of data processing synthesis based on the AHP method using the help of expert Choice 11 software is as follows:

Table 9 Priority Weight of Each Dimension

Dimensions	Priority Weight	Order of Priority
Tangible	0,477	1
Reliability	0,195	2
Responsiveness	0,185	3
Empathy	0,101	4
Assurance	0,042	5
Consistency Ratio = 0,075		

Table 10 Attribute Priority Weight

Attributes	Priority Weight	Order of Priority
X _{4.2}	0,327	1
X _{3.6}	0,126	2
X _{2.2}	0,069	3
X _{1.5}	0,028	4

IV. CONCLUSION

A. Conclusion

Based on AHP (Analytical Hierarchy Process) analysis, it is known that the order of priority dimension of guarantee is 0.477 which means that the guarantee dimension is the priority dimension in improving the quality of delivery service of Pos

Indonesia (Persero) company in Tulungagung Regency. The empathy dimension is in the second priority weight of 0,195; the responsiveness dimension has a priority weight of 0,185; the reliability dimension has a priority weight of 0,101; and in the last priority, there is a physical evidence dimension with a priority weight of 0,042. Thus, it can be concluded that the guarantee dimension is the most important guarantee for improving the quality of delivery services of Pos Indonesia (Persero) company in Tulungagung Regency.

Furthermore, based on the AHP (Analytical Hierarchy Process) analysis, is known that the order of priority attributes/indicators of delivery services needs to be improved by Pos Indonesia (Persero) company in Tulungagung Regency, namely in the empathy dimension, there are attributes responsible for the security and comfort of customers. In the responsiveness dimension, there are attributes of fast service, customers do not queue. In the reliability dimension, there are attributes of information provided by employees that are clear and easy to understand. Then, in the dimension of physical evidence, there are attributes of the willingness of a large and safe parking lot.

B. Suggestions

According to the results of the discussion and conclusions obtained, some suggestions can be proposed as follows:

1. From the results of this study suggested to the Pos Indonesia (Persero) company in Tulungagung Regency in order to improve the delivery services quality for the the people satsofaction of Tulungagung Regency is better, especially in the dimension of empathy, which is responsible for the safety of goods and customer comfort.
2. For further studies, they are expected that new researchers can conduct more specific research, and pay attention to the structure of language and clarity of questions so that respondents ' answers are better and more stable.

V. REFERENCES

- [1] Hang, M. (2016). *Sistem Operasional Manajemen Distribusi*. Jakarta: PT. Grasindo.
- [2] Supranto, J. (2011). *Pengukuran Tingkat Kepuasan Pelanggan Untuk Menaikkan Pangsa Pasar*. Jakarta: Penerbit PT Rineka Cipta.
- [3] Utama, D. N. (2017). *Sistem Penunjang Keputusan*. Yogyakarta: Garudhawaca.
- [4] Zeithaml, VA, Parasuraman, AA& Berry, L.L. (1990), *Delivering Service Quality: Balancing Customer Perception and Expectation*, New York: The Free Press.
- [5] Tjiptono, F. (2008). *Strategi Bisnis Pemasaran*. Yogyakarta: Andi Offset.
- [6] Lemeshow, S. &. (1997). *Besar Sampel Dalam Penelitian Kesehatan*. Yogyakarta: Gadjah Mada University Press
- [7] Ghozali, I. (2018). *Aplikasi Analisis Multivariate Dengan Program SPSS*. Jakarta: Universitas Diponegoro.
- [8] Dewi, D. A. (2018). Modul Uji Validitas dan Reliabilitas. *Researchgate*, 1-15.
- [9] Irawan, H. (2003). *Indonesian Customer Satisfaction*. Jakarta: PT. Elex Media Komputindo.
- [10] Purnama, N. (2006). *Manajemen Kualitas: Perspektif Global*. Yogyakarta: Ekonisia.
- [11] Saaty, T. L. (1994). *Fundamentals of Decision Making and Priority Theory with the Analytic Hierarchy Process*. Pittsburgh USA: RWS Publications.

