

Selection of the Best Expedition Services in Nganjuk Regency using the Analytical Hierarchy Process (AHP)

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Abstract:

Delivery services or expedition services are now increasingly in demand by Indonesian people, especially in this sophisticated era. The advent of technology in the globalization era does tend to leave people like everything easy and practical. For some people who often make online buying and selling transactions, the selection of expedition services is a usual common activity. The expedition services selection is considered necessary to determine the speed and suitable price for consumers. The method used in this research is the Analytical Hierarchy Process (AHP) using Expert Choice 11 software. This study aims to determine the best expedition service in Nganjuk Regency with the criteria of shipping costs, speed of delivery, availability of outlets in various locations, and service quality. Then, the alternatives are J&T Express, JNE, and SiCepat. From this research, it is found that the best expedition service in Nganjuk Regency is J&T Express with a weight of 0.353 or equivalent to 35.3%.

Keywords —Expedition Services, Analytical Hierarchy Process, Decision Support System Nganjuk Regency.

I. INTRODUCTION

The advent of technology in the globalization era does tend to leave people like everything easy and practical, especially in terms of sending goods related to regional affordability [1]. Expedition services will be a solution for those who like convenience and practicality in sending

some things, besides that expedition services are also considered very effective and efficient. There are many people use expedition services to send their goods. The gap between the sender and the recipient is increasingly limitless and it can be mediated by the expedition service [2].

The increasing growth of internet users in Indonesia is correlated with changes in people's lifestyles, especially buying and selling goods or shopping. The function of the internet in shopping activities has received an excellent response from the public. Based on observations in the community, the method used in shopping has experienced a shift from shopping activities through available retailers to shopping through the internet or social media facilities. The online shopping process is searching for information, comparing alternatives that have been found, and making decisions [3]. People can do online shopping activities through various applications and social media platforms that are often used. With this convenience, all people in the community can make buying and selling transactions anytime and anywhere just by having an adequate internet connection.

The participation of expedition services in online buying and selling transactions is significant as an intermediary, so both parties (buyer and seller) do not need face-to-face contact because of the availability of expedition services to deliver goods from the seller's area to the buyer's address safely. The increasing public interest in online transactions has made many expedition services expand their business. It happens because the need for delivery is increasing. So, the expedition services providers are in contention to be in great demand by consumers. There are many ways that expedition service providers do to market and also retain their company name. Those ways are starting from choosing a location to opening a strategic branch and offering a variety of services by showing the uniqueness and advantages of each expedition.

The Covid-19 pandemic situation in the world influenced the increase in the goods delivery service sector. It happens because social restrictions encouraged people to use the expedition services or delivery of goods. The quick survey conducted by MarkPlus, Inc. noted that using of courier services to deliver goods increased during the COVID-19 pandemic. In detail, 39% of respondents admit that the frequency of using courier services has increased significantly during the pandemic. 39% of respondents stated that the use of courier services

increased slightly. Then, 13% of respondents said the frequency of using couriers during the pandemic did not change compared to the previous. 4% of respondents admitted that the use of courier services decreased slightly during the pandemic. Meanwhile, 5% of respondents stated that the use of courier services has significantly decreased at this time. MarkPlus, Inc's rapid survey was conducted on 122 respondents across Indonesia. In detail, 59.8% of respondents came from Jabodetabek and 41.2% from non-Jabodetabek [6].

The objectives of this research are:

- a. To determine the criteria used in selecting the best expedition service when shopping online.
- b. To apply the Analytical Hierarchy Process (AHP) and Expert Choice software in selecting the expedition service.
- c. To determine the final value of the Analytical Hierarchy Process (AHP) method and Expert Choice software in selecting the best expedition service when shopping online.

The limitation of the problem in this research is using the Analytical Hierarchy Process (AHP) and Expert Choice software; the criteria are delivery costs, speed of delivery, availability of outlets (service areas) in various locations, and quality of service. Expedition services that are an alternative are J&T Express, JNE Express, and SiCepat. The respondents of this study are the people of Nganjuk Regency who have used these expedition services.

The population of Nganjuk people who use the three expedition services is unknown. The sample determination used the Lemeshow formula [7]. Besides, the minimum number of respondents is 96 people.

$$= \frac{Z^2_{1-\frac{\alpha}{2}} \cdot P(1-P)}{d^2} \tag{Eq 1}$$

with:

n is the number of samples.

$Z^2_{1-\frac{\alpha}{2}}$ is a Z table with α value of 5% and 95% level of trust.

p is the maximum estimation (0.5).
 d is the level of precision used by 10% or 0.1.

II. LITERATURE REVIEW

There is some research that used AHP method and Expert Choice software to solve the others problem, i.e, researcher Yogi Prihatono and Hilyah Magdalena on 2012 entitle “Implementation of Analytical Hierarchy Process (AHP) Method as a Support Decision to Determine Best Internet Service Provider in Pangkalpinang” using AHP method and Expert Choice software to help user especially postpayagency counter for easier and also as an alternative to decide which package internet should be chosen [4]. The other researched by Elizabeth Apriyanti on 2016 entitle “The Used of Analytical Hierarchy Process Method as A Decision Support Model on Assessment of Employee Performance (Case Study: Himalaya Agung Glass Jakarta)” aims to build a decision support system which has analysis capability choosing employee performance by using collecting data observation, interviewing and giving the questionnaire to all Himalaya Agung Glass employee Jakarta [8]. Those collected data using analysis data process using Analytical Hierarchy Process (AHP) and using decision support system expert choice, so that is easier to take the decision to choose the good performance employee, so that will get a proper reward for the proper employee. There is also research by AisyahKartiniPutriTanjungKuning and Nessa Ananda on 2020 entitle “The Choosing of Expedition Services in Pharmacy Company Using Analytical Hierarchy Process (AHP)”.

The benefit of solving the problem using Analytical Hierarchy Process (AHP) method is can be conceived graphically, so all team included on decision maker can be understanding easier and help the decision maker until final as good as well [5]. The steps are doing on AHP method mentioned as below:

1. Decomposition problem or arrange hierarchy structure

Decomposition problem is a step where the goal that has been set further explained systematically into structure that arranged the system until the goal is achieved rationally. So that, it shows hierarchy AHP structure as below:

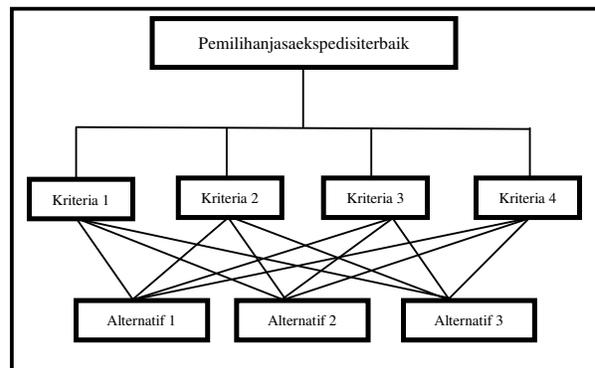


Fig. 1 The structure of Analytical Hierarchy Process (AHP) Method

2. Assessment/integrity to compare each element

Paired comparison assessment (weighting/integrity) on each hierarchy based on relative interest. The result of each element comparison is number 1 until 9 which shows comparison interest level each element. The procedure of paired comparison assessment in AHP refers to the assessment score developed by Saaty (2016) [9]:

Tabel 1. Assessment Analytical Hierarchy Process (AHP) Scores

Score	Remarks
1	Both elements are important
3	One element is a quite important than others
5	One element is more important than others
7	One element is very important than others
9	One element is absolutely important than others
2, 4, 6, 8	Middle value is on two comparison similar, this value is given with comparison needed

III. METHODOLOGY

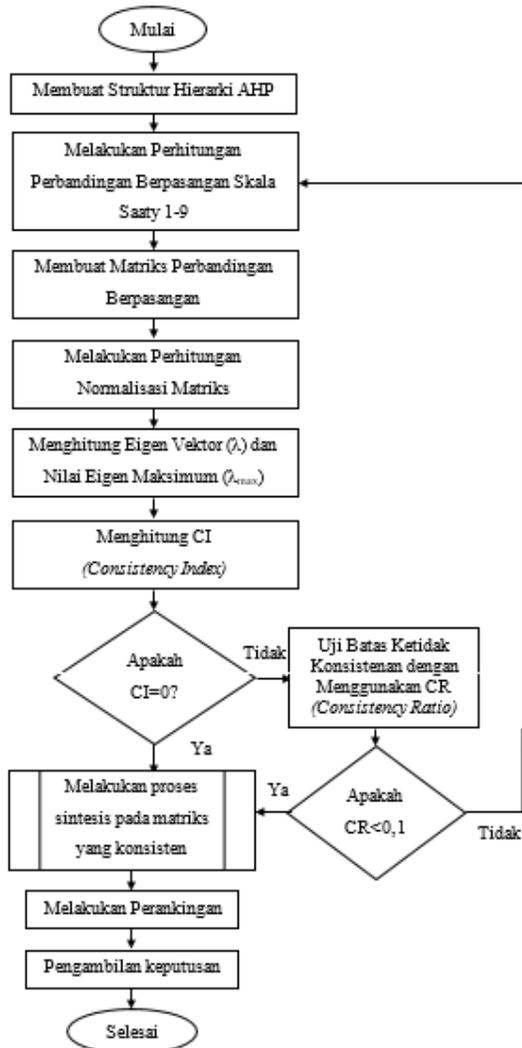


Fig. 2 Flow Chart Analytical Hierarchy Process (AHP) Method

IV. RESULTS

The data has been obtained in the analysis using Expert Choice software 11 and the results are:



Fig. 3 Synthesis result between criteria

Above picture conclude that costing sending criteria is the most influenced and the most considered on choosing expedition services due to have the highest value as much as 0.307 or 30.7%, second one is the speed of expedition criteria as much as 0.247 or 24.7%, third is availability shop criteria as much as 0.234 or 23.4%, and the lowest criteria is service quality as much as 0.212 21.2%.



Fig. 4 Result of synthesis sending costing criteria

Above picture is the result of the synthesis of sending costing. It can be concluded that JNE expedition is the most consider of choosing expedition services based on costing with the highest value as much as 0.339 or 33.9%, second one is SiCepat expedition as much as 0.338 or 33.8%, third one is J&T Express expedition with the lowest value as much as 0.322 or 32.2%. This conclusion says that J&T Express expedition gives the highest number of costing than the other expedition.

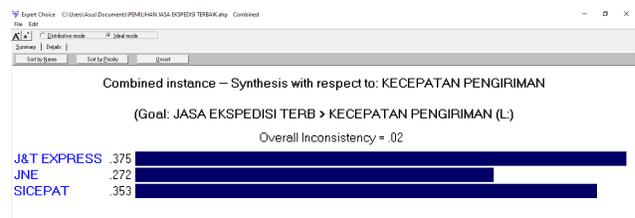


Fig. 5 Result of synthesis speed of delivery criteria

Above is the results of synthesis speed of delivery criteria. It concludes that J&T Express expedition is the most consider on choosing delivery expedition based on speed of delivery due to the highest

number of values, as much as 0.375 or 37.5%, second is SiCepat expedition as much as 0.353 or 35.3%, third one is JNE expedition with the lowest value as much as 0.272 or 27.2%.

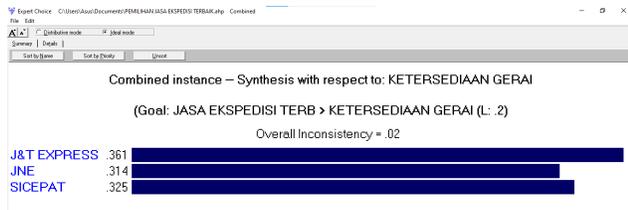


Fig. 6 Result of synthesis availability shop criteria

Next one is the synthesis of availability shop criteria. It can be concluded that J&T Express expedition is having the highest value, as much as 0.361 or 36.1%, second is SiCepat expedition as much as 0.325 or 32.5%, third one is JNE expedition with the lowest number of value as much as 0.314 or 31.4%. From this synthesis criteria can be seen that J&T Express is having more shop abroad in some location

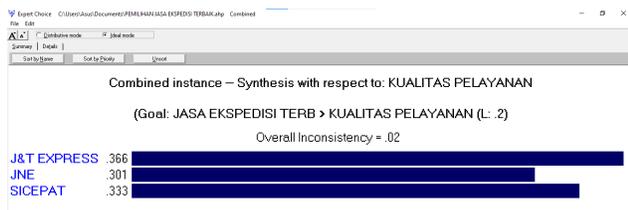


Fig. 7 The results of synthesis services quality criteria

The last result is synthesis of service quality expedition. It can be concluded that J&T Express expedition has the highest number as much as 0.366 or 36.6%, second one expedition is SiCepat as much as 0.333 or 33.3%, third one is JNE expedition with the lowest number of value as much as 0.301 or 30.1%.

After calculating based on all of criteria, concludes alternative value final as graphic below:



Fig. 8 Final result of choosing expedition services

Based on processing the data all respondent can be concluded that main priority or the highest alternative of choosing expedition services in Nganjuk Region is J&T Express expedition with the number of value as much as 0.353 or equal to 35.3% of the total alternative has been set. And then the second priority expedition is SiCepat (value 33.8%), and the lowest number of expedition priorities is JNE (value 31.0%).

Inconsistency ratio data respondent is a parameter which is used to check whether paired comparison is consequent or not. Inconsistency ratio data becomes good if the CR number is ≤ 0.1 [10]. In this research, all paired comparison is having value $CR \leq 10\%$ so that the calculation geometry paired data respondent is consequent enough.

V. CONCLUSION

Based on the results analysis by implementing software Expert Choice 11 can be concluded the most criteria in choosing expedition services is costing delivery as much as 0.307 or equal to 30.7%. After analysis to all the criteria can be concluded the best alternative expedition is J&T Express with total value 0.353 or equal to 35.3%. This Software Expert Choice 11 is only a tool to help proceed making decision to be easier. While the final result depends on each personality decision maker.

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