Assessment The Method of Fuzzy Logic to Determine The Quality of Service Expedition in Jabodetabek Area

Agus Pamuji

Informatic Engineering Department, FTMIPA, University Of Indraprasta PGRI
Email: agus.pamuji@gmail.com

Abstract

Search application services that was designed, could be the based on the difficulty to find out, and to select expedition services which have provided. In these case, when someone who wants to send the packages to a particular destination. Each shipper will see the name of courier services, the god arrive of speed at the destination, prices, and customer services. This application is designed with fuzzy logic method that can be based on the selection of criteria, and specific category. The use of fuzzy logic method can to help and ensure the selection of expedition service that based in variable or criteria are price, speed, location, and services. The result of this research will to display of application that was supported with database systems such as expedition services information and location, and then table of price is available.

Keyword : fuzzy method, expedition, service, apploication, criteria.

1. INTRODUCTION

The development of technology is currently growing rapidly, especially information technology. Development of information technology is characterized by the presence of online selling sites activity to the information supply chain of goods. That is Be caused each the seller who is selling goods through online sites want to view and monitor the status of shipments and in order to ensure the goods have been received by the customer or buyer. Currently, many companies are providing and offering freight forwarding services from one city to another city, even to the inter-provincial cross-country. Every provider of goods forwarding services will provide service rates, type of service, delivery time and so on. Everyone who wants to send the goods (package) in this case can be referred to as the sender, are given free to choose services expeditions. However, in his election often encounter obstacles, such as service charges, as well as delivery time and location of the agent who sometimes travel long distances. Sender also consider services when they want to send goods (package). Based on these cases, in this paper will examine the theory of fuzzy logic method in determining the quality of service courier delivery of goods from various companies.

2. METHOD

2.1. Fuzzy Logic

Fuzzy logic was first discovered by Professor Lotfi A. Zadeh, from the University of California, in June 1965. Fuzzy logic is a generalization of the classical logic which only has two membership values, 0 and 1. In fuzzy logic, the truth value of a statement ranged from entirely true, up to a completely wrong [7-9]. With fuzzy set theory, an object can be a member of many subsets with different degree of membership in each set. This concept differs from the classic sets (crisp). Classical set theory depends on the logic of the two values (two-valued logic) to determine whether an object is a member of the set or not [12].

2.2. The Difference with the Association Definitely Fuzzy Logic Association (Crisp)

In the decisive set (crisp), the value of membership of an item x in a set A, which is often written with µA[x], has two possible [12], which are [1], [3-4]:

1) One (1), which means that an item be a member in a set, or
2) Zero (0), which means that an item is not a member in a set.
   For Example : age variable is divided into three categories, namely:

MUDA   umur < 35 tahun

PAROBAYA $35 \leq$ umur ≤ 55 tahun

TUA   umur ≥ 55 tahun

Membership value graphically, set young, middle-aged, and old are shown in the following the picture:
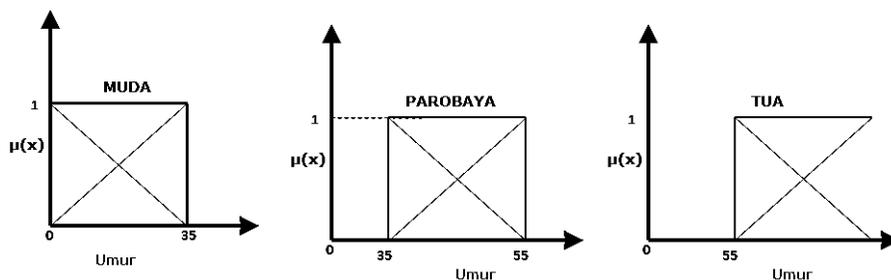

Figure1. Membership value

In the picture above, it can be explained that:

    a.   a. If a person aged 33 years, it said MUDA (μMUDA[33] = 1);

    b.   b. If a person is 35 years old, it said TIDAK MUDA (μMUDA[35] = 0);

If a person aged 35 years less one day, it said TIDAK PAROBAYA (μPAROBAYA[35th – 1 hari] = 0);

2.3. Research Methodology

In this reasearch study to determine the quality of service expedition, researchers will collect data by means of 13]:

1. Interview

   The author did a question and answer to related parties directly to obtain concrete data and complete analysis that will be used as the peneitian.

2. Observation

   In this method, the authors conducted a direct observation of everyday activities both care providers and shippers who want to send packages of some shipping agents [12].

3. Questionaire

   We are to consider in the questionnaires using a questionnaire form, a questionnaires are created structured form of multiple choice questions. This method is used to obtain data on the type of service, rates, speed of delivery and so on.

In this research, the authors used a sample of data. The data used to analyze is with 10 to which service provider expedition. Of the 10 samples of the company that operates around Jakarta, Bogor, Depok, Tangerang, and Bekasi.

3. RESULT AND ANALYSIS

3.1 Fuzzy Association For the Selection of Freight Forwarding Services

In this study,in order to determine the quality of shipping services, the data values that were the result of the formula calculation membership degree function [8], [10]. Value - The value is the result of fuzzification, which has a function as an input value for defuzzification process [8-9]. The data is started from a variable price, speed, location agents, as well as service [12], [14].

3.2 Variable of Price

One of thing in determining the quality is the price. The price will be categorized into sets: murah, sedang, mahal.
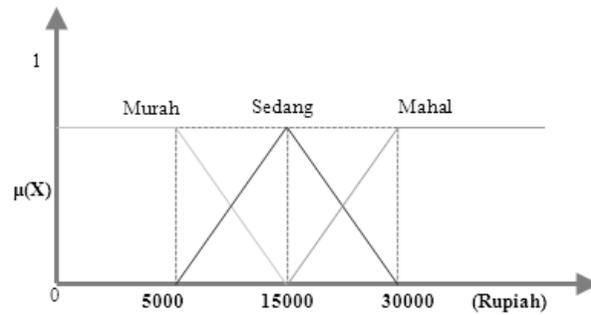
Figure 2. Price variables membership functions

The following based on the picture above, it can be made a function of membership as follows:

$$\mu\text{Murah}[x] \begin{cases} 1; & x \leq 5000 \\ \dfrac{15000\text{-}x}{10000}; & 5000 \leq x \leq 15000 \\ 0; & x \geq 15000 \end{cases}$$

$$\mu\text{sedang}[x] \begin{cases} 0; & x \leq 5000 \text{ atau} \geq 30000 \\ \dfrac{x - 5000}{10000}; & 5000 \leq x \leq 15000 \\ 1; & \dfrac{30000 - x}{15000}; 15000 \leq x \leq 30000 \end{cases}$$

$$\mu\text{mahal}[x] \begin{cases} 0; & x \leq 30000 \\ \dfrac{x - 15000}{15000}; & 15000 \leq x \leq 30000 \\ 1; & x \geq 30000 \end{cases}$$

There are the following table presents the quality of service based on the variable price.

Table 1. The quality of the price variable

ID	Expedition Name	Value	Muah	Sedang	Mahal
D001	Pos Indonesia	8500	0,65	0,35	0
D002	Tiki	7500	0,75	0,25	0
D003	JNE	9000	0,6	0,4	0
D004	Wahana	5000	1	0	0
D005	Pandu Logistic	10000	0,5	0,5	0
D006	Indah Cargo	14000	0,1	0,9	0
D007	TAM	35000	0	0	1
D008	Satuan Prima Antaran	23000			
	SAP		0	1	0

3.3 Varible of Speed

The second variable is a variable speed. Variable speed of the set we will categorized into rendah, sedang, tinggi.
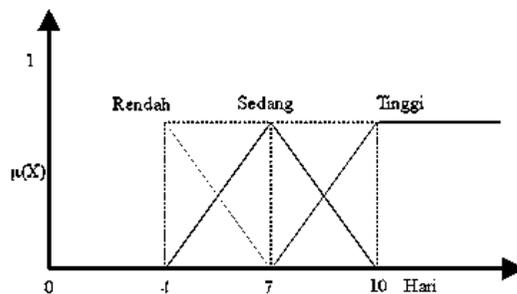

Figure 3. Membership function variable speed

The following based on the picture above, it can be made a function of membership as follows:

$$\mu\text{rendah}[x] \begin{cases} 1; & x \le 4 \\ \dfrac{7 - x}{3}; & 4 \le x \le 7 \\ 0; & x \ge 7 \end{cases}$$

$$\mu\text{sedang}[x] \begin{cases} 0; & x \le 4 \text{ atau} \ge 10 \\ \dfrac{x - 4}{3}; & 4 \le x \le 7 \\ 1; & \dfrac{10 - x}{3}; 7 \le x \le 10 \end{cases}$$

$$\mu tinggi[x] \begin{cases} 0; & x \leq 10 \\ \dfrac{x - 7}{3}; & 7 \leq x \leq 10 \\ 1; & x \geq 10 \end{cases}$$

There are the following table presents the quality of service based on the variable speed

Table 2. The quality of variable speed

ID	Expedition Name	Value	Tinggi	Sedang	Rendah
D001	Pos Indonesia	3	1	0	0
D002	Tiki	4	1	0	0
D003	JNE	2	1	0	0
D004	Wahana	5	0,67	0,33	0
D005	Pandu Logistic	5	0,67	0,33	0
D006	Indah Cargo	6	0,33	0,67	0
D007	TAM	5	0,67	0,33	0
D008	Satuan Prima Antaran SAP	5	0,67	0,33	0

3.4 Variable of Agent Area

The Variable agent locations will describe the its distance traveled by each sender when is trying to send a package to the destination city. The Variables agent locations will be categorized into a set of dekat, sedang, jauh.
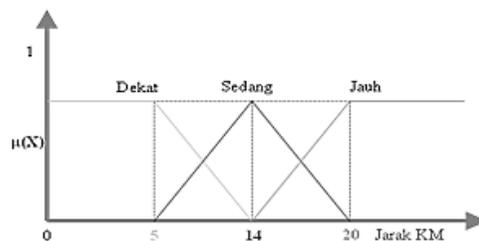

Figure 4. Membership function variables agent locations

The following based on the picture above, it can be made a function of membership as follows:

$$\mu dekat[x] \begin{cases} 1; & x \le 5 \\ \dfrac{14 - x}{9}; & 5 \le x \le 14 \\ 0; & x \ge 14 \end{cases}$$

$$\mu sedang[x] \begin{cases} 0; & x \le 5 \text{ atau} \ge 20 \\ \dfrac{x - 5}{9}; & 5 \le x \le 14 \\ 1; & \dfrac{20 - x}{6}; 14 \le x \le 20 \end{cases}$$

$$\mu jauh[x] \begin{cases} 0; & x \le 14 \\ \dfrac{x - 14}{6}; & 14 \le x \le 20 \\ 1; & x \ge 20 \end{cases}$$

There are the following table presents the quality of service based on the variable of agent area

Table 3. The quality of the variables agent locations

ID	Expediton Namr	Value	Dekat	Sedang	Jauh
D001	Pos Indonesia	13	0,11	0,89	0
D002	Tiki	16	0	1	0,33
D003	JNE	4	1	0	0
D004	Wahana	18	0	1	0,67
D005	Pandu Logistic	23	0	0	1
D006	Indah Cargo	21	0	0	1
D007	TAM	24	0	0	1
D008	Satuan Prima Antaran SAP	22	0	0	1

3.5 Variable of Service

Variable of service will describe the services in serving the sender, especially if there are problems in delivery. Variable service will be categorized into a set of kurang, memuaskan, sangat memuaskan.
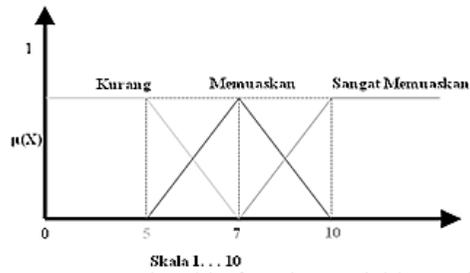
Figure 5. Membership function variable service

The following based on the picture above, it can be made a function of membership as follows:

$$\mu kurang[x] \begin{cases} 1; & x \le 5 \\ \dfrac{7 - x}{2}; & 5 \le x \le 7 \\ 0; & x \ge 7 \end{cases}$$

$$\mu memuaskan[x] \begin{cases} 0; & x \le 5 \text{ atau} \ge 10 \\ \dfrac{x - 5}{2}; & 5 \le x \le 7 \\ 1; & \dfrac{10 - x}{3}; 7 \le x \le 10 \end{cases}$$

$$\mu sanatmemuaskan[x] \begin{cases} 0; & x \le 7 \\ \dfrac{x - 7}{3}; & 7 \le x \le 10 \\ 1; & x \ge 10 \end{cases}$$

There are the following table presents the quality of service based on the variable of service

Table 4. The quality of service variables

ID	Expedition Name	Value	Kurang	Memuaskan	Sangat memuaskan
D001	Pos Indonesia	7	0	1	0
D002	Tiki	9	0	1	0,67
D003	JNE	8	0	1	0,33
D004	Wahana	6	0,5	0,5	0
D005	Pandu Logistic	10	0	0	1
D006	Indah Cargo	4	1	0	0
D007	TAM	5	1	0	0
D008	Satuan Prima Antaran SAP	7	0	1	0

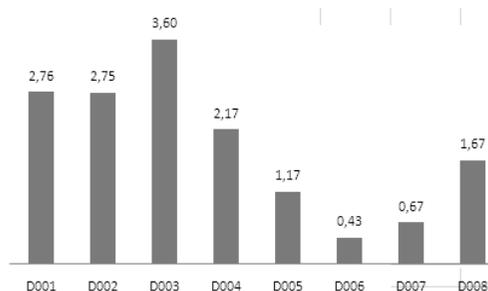The following image is of a quality comparison 8 service providers expedition.

Figure 6. The comparison of quality

4. CONCLUSION

The best quality is made of the price factor, which at this price would have a strong relationship with quality goods speeds when to place the goal. Then, after the tariff is the distance factor agents, easily accessible by the sender wants to send packets to destination .it caused, the sender is easier to know the company name.

5. REFERENCES

[1]   Nelly I.W. 2012. Model Perilaku Berjalan Agen-agen Menggunakan Fuzzy Logic. *Jurnal Komputer dan Informatika (Komputa)* Vol. 1 :A-48 – A-55.
[2]   Rizky A. 2013. Implementasi Metode Fuzzy Tsukamoto Pada Penentuan Harga Jual Barang Dalam Konsep Fuzzy Logic. *Pelita Informatika Budi Darma*. Vol 5(2) : 104-109.
[3]   Sri Yulianto J.P., Indrastanti R.W., Martha O. 2008. Aplikasi Pendukung Keputusan Dengan Menggunakan Logika Fuzzy (Studi Kasus : Penentuan Spesifikasi Komputer Untuk Suatu Paket Komputer Lengkap). *Jurnal Informatika* , Vol 4(2) : 159-173.
[4]   Willis K., Agus S. A., Cahyo B. W. 2014. Implementasi Fuzzy Inference System Metode Tsukamoto Pada Pengambilan Keputusan Pemberian Kredit Pemilikan Rumah. *Telematika*. Vol 10(2) : 137-146.
[5]   Abraham K., Gideon L. 1993. *Fuzzy Control Systems*. CRC Press : Boca Raton, Florida
[6]   Apostolos S., . 2014. *Theory of Fuzzy Computation*. Springer Science + Business Media : New York
[7]   Chin-Teng L., C. S. George L. 1996 . *Neural Fuzzy Systems*. Prentice Hall : New Jersey
[8]   Didier D., Henri P. 2000 . *Fundamentals of Fuzzy Sets*. Springer Science + Business Media : New York
[9]   F. Martin M., Ellen T. 1994 . *Fuzzy Logic A Practical Approach*. AP Professional:Boston

[10] George J. K., Bo Yuan . 1995. *Fuzzy Sets and Fuzzy Logic*. Prentice Hall:New Jersey

[11] Kusrini. 2007. *Konsep Dan Aplikasi Sistem Pendukung Keputusan*. Andi Offset : Yogyakarta

[12] Sri K., H. Purnomo, 2004. *Aplikasi Logika Fuzzy Untuk Pendukung Keputusan*. Graha Ilmu : Yogyakarta

[13] Reni W. A., Hambali F., Musyaddik. 2014. *Implementasi Model Fuzzy Tahani Berbasis Web Untuk Pemilihan Lokasi Wisata Kuliner Dikota Jambi*. BSI Kalimalang, Jakarta Timur, May 24, 2014

[14] Kasih P., Sukemi K. S. 2015. *Dukungan Manajemen Puncak, Partisipasi Pengguna Sistem Program Pelatihan Terhadap Pengembangan SIA Di CV Megah Perkasa Utama Semarang*. Hotel Pandanaran, Oct 10, 2015