Fuzzy Tsukamoto for Determinen Linen Priority

Adan Hermawan, Indra Ranggadara, Aries Suharso, Ifan Prihandi, Suhendra

Abstract*: With problems at the hospital Dr. Cipto Mangunkusumo, namely borrowing linen when nurses make loans to the logistics division, so that the logistics division has difficulty in determining which linen is used more frequently or lent by nurses, because the type of linen that is very much causes difficulties in the division in determining which linen is obliged to return it quickly to the logistics division. In order for linen to be available again in the logistics division, in addition to a very large loan every month, the logistics division had difficulty determining the average loss of linen in one year. That way the problem that occurs to solve this problem is to use a method namely Fuzzy Tsukamoto to determine the average amount of loss of linen and to determine priority linen that will be replaced earlier when the linen change schedule is in progress or the linen return is speeded up by returning the type of linen that is very often used for. After calculating using the Fuzzy Tsukamoto method, priority linen can be produced, including a Bolster, Blanket, Mattress Pad, and Bed Cover. Based on the calculation of Fuzzy Tsukamoto by doing several stages, namely Fuzzyfication, Fuzzy Rule, Fuzzy Inference System, and Defuzzyfication resulting in an average amount of linen loss in one year is 222.

***Keywords* : Borrowing, Fuzzy, Linen, Hospital, Priority, Tsukamoto Method**

I. INTRODUCTION

THe Hospital DR. Cipto Mangunkusumo (abbreviated as Dr. Cipto Mangunkusumo Hospital or RSCM) is an Indonesian government hospital institution located in central Jakarta. Besides being a government hospital Dr. hospital Cipto Mangunkusumo (RSCM) also functions as a teaching hospital, which is medical education from the University of Indonesia. Besides the name of this hospital is taken from the name of Dr. Tjipto Mangunkoesoemo, a prominent figure in the Indonesian struggle during the colonial period. Hospitals are integral institutions of health organizations and social organizations, whose function is to provide health services for hospital patients who are very complete. The hospital is also a training center for health professionals and as a research center for health research [1].

To get the best service for Dr.Cipto Mangunkusumo hospital for patients in providing quality and clean linen

services for Dr. hospital patients. Cipto Mangunkusumo and Palayanan Hospital According to Tjiptono define service quality is defined as the expected level of excellence and control over the level of excellence to meet customer desires.

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Quality of service is not seen only from the perspective of the provider or service provider, but is based on the perception of the public (customer) service recipients. Customer Customers who consume and feel the services provided, so they should assess and determine the quality of service [2]. According to Kotler in service service is as every action or deeds that can offer by one party to another party which is basically intangible and cannot be seen ownership of something. Services have a pretty basic difference when compared to physical manufacturing products. The quality of a service is more difficult to evaluate by consumers compared to the quality of a physical product. Services are defined as actions or activities that can be offered to one party to another party which is basically invisible or intangible and does not result in any ownership [1].

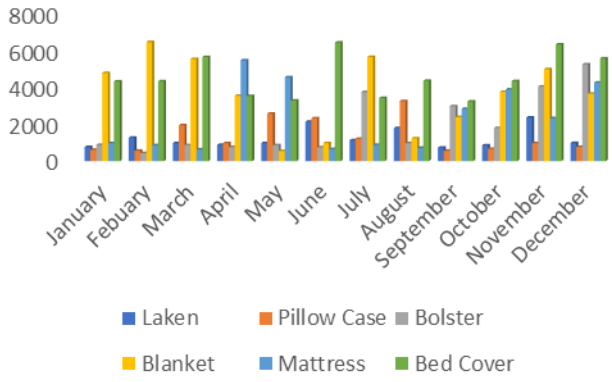


Fig.1. Linen Loan Data for 2018

Based on the data above the problems that occurred at Dr. Hospital Cipto Mangunkusumo (RSCM) is a matter of linen borrowing when nurses borrow linen to the logistic division for hospital patients and confuses the change of linen that is often used by patients or borrowed by nurses and the lack of timely return of linen which causes an out of stock linen in the ogistic division . Frequent out of stock of some of the most frequent linen borrowed by nurses, and nurses do not make timely repayments. So causing some linens borrowed by nurses to run out of stock in the division logistic. By doing so to provide solutions to the problems that occur from the logistic division and the medical division in linen lending, namely by determining linen priorities and determining the average loss of each linen borrowed by nurses. For this reason, take some linen that is often heavily borrowed by nurses, to become research material. To not run out of stock in the ogistic division, priority linen is needed or accelerate the change or return of linen so that it can be reused or borrowed again by another nurse.

So that there is no prioritization of linen at the time of the change of schedule for the linens to be replaced first or the linen that is often used by the nurse to borrow. That way the ogistic staff in checking and calculating the stock is available in the logistics division and can be borrowed again by other nurses. Changing linen will be very helpful when determining the priority of linen changes that will be used by patients and nurses and also to determine the average value of loss of linen. Linen is a term to refer to all textile products in the hospital which include linen in the treatment room or clothing surgery in the operating room (OK), while nurses' suits, doctor's suits and work clothes are usually not grouped in the linen category, but categorized as uniform (uniform) [2].

With the problems at Dr.Cipto Mangunkusumo Hospital, the solution is to obtain linen to be prioritized and determine the average value of linen loss. For this reason, determining the priority of linen and determining the average loss of linen will use an algorithmic method, namely using the Fuzzy Tsukamoto method. Thus in the health sector there is not much research on linen in prioritizing linen that will be prioritized using the tsukamoto fuzzy method and there are no priorities in the form of goods using the Fuzzy Tsukamoto method.

The Tsukamoto method is that each rule is represented using fuzzy sets, in the Tsukamoto method every consequence of an IF-Then form must be presented with a fuzzy set to determine the output value (Crips) of a firm result. The final result is obtained using a weighted average [3].

The purpose of this study is to help overcome the problems that occur in the hospital Dr.Cipto Mangunkusumo (RSCM) to determine the average amount of linen loss that is often used by patients and determine which linen will be a priority in assisting a decision support during linen replacement schedule .

II. STUDY LITERATURE AND PREVIOUS RESEARCH

A. Hospital

Hospitals are logistics whose main function is to provide health services to the community [4]. The hospital is one of the health facilities, health efforts are every activity to maintain and improve health, which aims to realize the optimal level of health for the community.

According to Azwar, hospitals are an integral institution of health organizations and social organizations, whose function is to provide complete health services. The hospital is also a training center for health logistics and as a research center for health research [5].

Decree of the Minister of Health of the Republic of Indonesia Number 1204 / MENKES / SK / X / 2004 that a hospital is a health service facility, a gathering place for the sick and healthy people. This large group of people will allow the hospital to be a place for transmission of disease, health problems, and environmental pollution. To avoid the occurrence of risks and health problems, it is necessary to do the environmental health of the hospital (Ministry of Health, 2004) [6].

The hospital is an organized organization of medical personnel and permanent medical facilities in providing medical services, continuous nursing care, diagnosis, and treatment of illnesses suffered by patients [7].

B. Linen

Linen is a term to refer to all textile products in the hospital which include linen in the treatment room and surgical surgical clothing (OK), while nurses' suits, doctor's suits and work clothes are usually not classified in the linen category, but are categorized as uniform [2].

Linen can also be interpreted as materials from fabrics used in health care facilities by household staff (bedclothes and towels), cleaning staff (cleaning cloths, gowns and hoods), surgical personnel (hoods, masks, washing clothes, surgical gowns, drapes and wrappers), and staff in special units such as the ICU and other units that carry out invasive medic procedures (such as anesthesiology, radiology, or cardiology) [8].

There are various types of linen used in hospitals. The types of linen referred to include [6]: Bed linen / laken, steek laken, perlak / zeil, pillowcases, bolsters, blankets, boven lakes, logical pads, bed covers, curtains / drapes, curtains, vitage, insulation / scherm, mosquito nets, tablecloths, schort barracks (health workers and visitors), aprons, hats, rags, patient clothes, surgical gowns, cloth coverings (gas savings, trolleys and other medical devices), various docks, baby diapers, baby clothes, swaddling clothes, baby octopus, baby steak laken, baby mosquito net, baby laken, baby blanket, mask, octopus, cloth hat, wash cloth, towel, operating linen (clothes, pants, suit, various kinds of laken, hat, mask, doek, glove , mayo table cover, logistic table mat, mitela, schort barracks).

C. Decision Support System

Based on experts, among others, Moore and Chang's definition of the decision support system (SPK) is a system that can be developed capable of supporting data analysis and decision modeling, oriented to future planning, and cannot be planned intervals (periods) of time of use [9].

Basically SPK is a further development of a computerized Management Information System that can solve problems in a structured or unstructured. Interactive with the aim to facilitate various components in the decision making process such as procedures, policies, analysis, experience and manager's insight to make decisions that solve the time [10].

DSS is a system built to solve various managerial problems or corporate organizations that are designed to develop the effectiveness and productivity of managers to solve problems with the help of technology [11].

D. Previous Research

In previous studies by determining the amount of production at PT. Asia Pacific Fibers makes it difficult to determine the amount to be produced, therefore a decision support system is needed to overcome the problem in determining the appropriate amount of production for the company. To overcome the problem a method is needed, which will be used in decision making to determine the amount of production is the Tsukamoto fuzzy method. This method was chosen because the concept of fuzzy logic is easy to understand, because it uses the basic set theory, the mathematical concepts that underlie fuzzy reasoning are quite easy to understand [12].

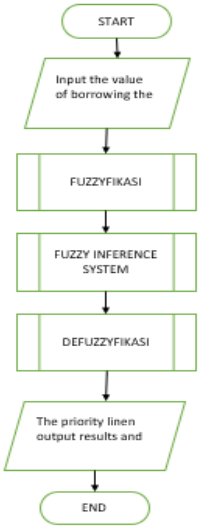
The results of previous studies are that there are no cases discussing hospital linen, with previous studies similar to the case of monitoring linen with fuzzy tsukamoto which is about determining the linen that is widely used by patients, determining priority linen when there is a schedule for changing linen using the Fuzzy Tsukamoto method .

Designing a Monitoring System for Decision Making of Fuel Use on Fuzzy Logic Based Vessels. So that management and crew can access the use of fuel on the ship directly. In this monitoring system there is a decision making unit that shows the amount of fuel consumption based on fuzzy logic [13].

III. METHOD

A. Collection Data Technique

Data collection methods used in this study, namely by conducting a literature study to relate to research to prove the theoretical foundation and also research concepts that support this research then conduct direct interviews with Hospital Staff from logistic officers and medical staff and make observations in the field or direct observation and involve directly with the object being translated, making it easier for writers to analyze the processes that are currently running.



B. The Reasearch Flow Diagram

Fig.2. Flow Diagram Fuzzy Tsukamoto

In Figure 2, it explains the steps or process of the Tsukamoto fuzzy algorithm method which starts from the input of the borrowed linen type which is widely used, after that the first process of calculating the fuzzfication to show large, medium, and low curves. Next do the fuzzy rules and look for the min value of the fuzzyfication result, after that do defuzzyfication which results in the value of the average linen loss.

C. *Fuzzy Logic*

Fuzzy logic is created because boolean logic does not have high accuracy, it only has 0 and 1 logic numbers. So to make a system with high accuracy, it cannot be done with Boolean logic used in fuzzy as follows: [14]

a. Degree of membership The function is to give weight to an input that has been given, so that the input can be expressed as a value.
b. Fuzzy Variable Is a variable that is to be discussed in a fuzzy system.
c. Scope / Domain Is the limit of a certain set of inputs.
d. Labels Are words to provide a description of the scope.
e. Membership Function A form of representation that represents a boundary of scope. Some functions to declare membership functions:

1. Linear Representation: mapping the input to the degree of membership is depicted as a straight line.
2. Triangle Curve Representation: is a combination of 2 lines (linear).
3. Representation of the Trapezoid Curve: like a triangle, only there are some points that have a membership value of 1.

4. Representation of the S-curve: almost the same as a linear curve but the uncertain values are ascending or descending but researchers flexible.

f. Crisp Input Analog input value is given to find the degree of membership.

Universe of Discourse Limit input that has been given in designing a fuzzy system.

In this study discussing the modified Parametric Sample Selection Model (PSSM) for non-participants by applying the fuzzy concept. Fuzzy modeling is based on the concept of fuzzy sets. There are three phases to discuss FPSSM, namely parameter fuzzification, fuzzy environment and defuzzification[15].

Fuzzy logic, before paying attention to the concept of fuzzy set. Fuzzy set has 2 attributes, they are :

1. Linguistics, namely the name of a group that represents a fairness by using natural language such as COLD, COOL, and HEAT represents the variable temperature. Other examples such as YOUNG, PAROBAYA, TUA represent the age variable.
2. Numerical, which shows the size of a variable such as 10, 35, 40 and so on.

D. *Tsukamoto* Method

According to Sri Kusumadewi and Sri Hartati, the fuzzy inference system is a calculation framework based on the concept of fuzzy set theory, fuzzy form rules IF THEN, and fuzzy reasoning. Broadly speaking, the block diagram of the fuzzy inference process is shown in Figure 3[16].

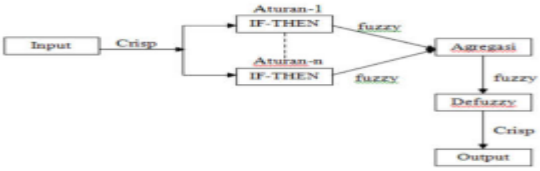


Fig.3. Diagram Block System Inferensi Fuzzy[16]

Sri Kusumadewi and Hari Purnomo Fuzzy logic is one of the forming components. Fuzzy logic was first introduced by prof. Lotfi A. Zedeh in 1965. The basis of fuzzy logic is the theory of the formation of fuzzy sets. In the theory of the formation of fuzzy sets, the role of membership values as defining the existence of a set is very important.

Membership value (membership function) characterizes the reasoning of the fuzzy logic set [16].

The tsukamoto method in Sri Kusumadewi and Purnomo is that each rule is represented using fuzzy sets, in the Tsukamoto method each consequent to the rules in the form of IF-Then must be presented with a fuzzy set to determine the output value (Crips) firm results. As a result, the output of the inference results from each rule is given explicitly (crisp) based on the predicate (fire strength). the end result will get a weighted average value. In its inference, the Tsukamoto method uses stages: [16]

1. Fuzzyfication, which is a fuzzy set by determining membership functions.
2. The formation of a Fuzzy knowledge base (Rule in the form of IF .... THEN).
3. Fuzzy Inference System Use the MIN implication function to get the a-predicate value for each rule.
4. Defuzzyfication, i.e. changing fuzzy quantities from inference systems to firm quantities. The defuzzyfication process uses the weighted average method with the following formula:Many ways to do defuzzyfication, including the following methods.
    1. *Average* Method

$$z^* = \frac{\sum \mu_i z_1}{\sum \mu_i z_1} \quad (1)$$

    2. *Center Of Area* Method [3] (2)

$$z^* = \frac{\int \mu(z) z dz}{\int \mu(z) dz}$$

IV. RESULT AND DISCUSSION

A. Fuzzyfikasi

Using linen lending data in 2018, shows linen lending data with different types of linen with the total lending in a year and the total repayment in a year and with the amount of stock available in 2018. Then the calculation to determine the average linen loss borrowed by nurses and linen will be the priority of linen using the Fuzzy Tsukamoto method. In the 2018 loan data to be a fuzzy set.

Table- I: Linen Data for 2018

Month	Type of Linen					
	Laken	Pillow Case	Bolster	Blanket	Mattress	Bed Cover
January	763	615	879	4777	978	4322
Febuary	1270	564	435	6452	863	4325
March	976	1945	865	5533	636	5642
April	876	974	763	3542	5466	3532
May	978	2574	863	546	4542	3284
June	2142	2324	753	977	654	6432
July	1132	1212	3743	5645	876	3422
August	1793	3252	974	1238	723	4353
September	736	564	2977	2389	2837	3233
October	854	667	1795	3756	3884	4335
November	2364	976	4045	4986	2329	6322
December	983	765	5247	3656	4256	5568

B. Laken Loan Variable (Bed Sheet)

Based on 2018 data, lending linen (bed linen) is a variable with various types of linen. The variable laken (bed linen) into three fuzzy sets, namely: Low (L), Medium (M), and High (H). Low and high sets use down and high linen curves using upward curves, while medium sets use triangular shapes.

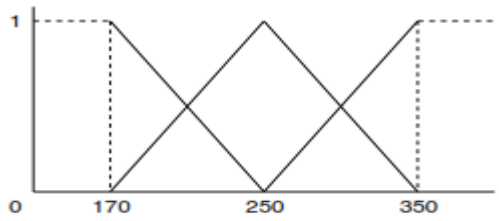


Fig.4. Variable Curve Type for Linen Loan

a. Borrow Low Laken

$$\mu[x] = Low\ Borrow \begin{cases} 1 & : jika \ldots x \leq 170 \\ \frac{x-170}{350-250} & : 170 < jika \ldots x < 350 \\ 0 & : jika \ldots x \geq 350 \end{cases} \quad (3)$$

b. Borrow Medium laken

$$\mu[x] = Medium\ Borrow \begin{cases} 0 & : jika \ldots x \geq 250 \quad (4) \\ (x-170)/(350-250) & : jika\ 170 < x < 250 \\ (350-x)/(350-250) & : jika\ 250 < x < 350 \end{cases}$$

c. Borrow Laken High

$$\mu[x] = High\ Borrowing \begin{cases} 1 & : jika \ldots x \leq 170 \\ \frac{350-x}{350-170} & : jika 170 < x < 350 \\ 0 & : jika \ldots x \geq 350 \end{cases} \quad (5)$$

C. Variable Improvement of Pillowcases

Based on 2018 data, borrowing linen pillowcases are variable with various types of linen. The variable of pillowcase into three sets of fuzzy set, namely: Low (L), Medium (M), and High (H). Low and high sets use down and high linen curves using upward curves, while medium sets use triangular shapes.

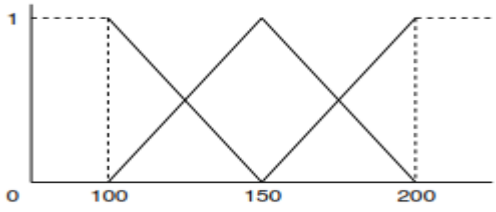


Fig.5. Variable Curve Type for Linen Loan

a. Borrow a Low Pillowcase

$$\mu[x] = Low\ Borrow \begin{cases} 1 & : jika \ldots x \leq 100 \\ \frac{x-100}{200-150} & : 100 < jika \ldots x < 200 \\ 0 & : jika \ldots x \geq 200 \end{cases} \quad (6)$$

b. Borrow a Medium Pillow Case

$$\mu[x] = Medium\ Borrow \begin{cases} 0 & : jika \ldots x \geq 150 \quad (7) \\ (x-100)/(200-150) & : jika\ 100 < x < 150 \\ (200-x)/(200-150) & : jika\ 150 < x < 100 \end{cases}$$

c. Borrow a High Pillowcase

$$\mu[x] = High\ Borrowing \begin{cases} 1 & : jika \ldots x \leq 100 \\ \frac{200-x}{200-100} & : jika 100 < x < 200 \\ 0 & : jika \ldots x \geq 200 \end{cases} \quad (8)$$

D. Variable Borrow Loan Loan

Based on 2018 data, borrowed linen bolsters are variable with various types of linen. The variables of bolster glove are into three fuzzy sets, namely Low (L), Medium (M), and High (H). Low and high sets use down and high linen curves using upward curves, while medium sets use triangular shapes.

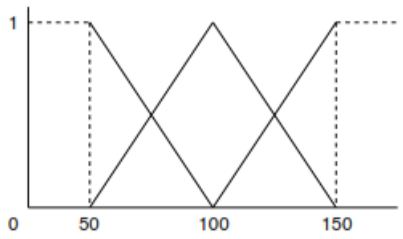


Fig.6. Variable Curve Type for Linen Loan

a. Borrow Low Rolling Gloves

$$\mu[x] = Low\ Borrow \begin{cases} 1 & : jika \ldots x \leq 50 \\ \frac{x-50}{150-100} & : 50 < jika \ldots x < 150 \\ 0 & : jika \ldots x \geq 150 \end{cases} \quad (9)$$

b. Borrow a Moderate Bolster

$$\mu[x] = Medium\ Borrow \begin{cases} 0 & : jika \ldots x \geq 100 \\ (x-50)/(150-100) & : jika\ 50 < x < 100 \\ (150-x)/(150-100) & : jika\ 100 < x < 50 \end{cases} \quad (10)$$

c. Borrow a High Bolster

$$\mu[x] = High\ Borrowing \begin{cases} 1 & : jika \ldots x \leq 50 \\ \frac{150-x}{150-500} & : jika\ 50 < x < 150 \\ 0 & : jika \ldots x \geq 150 \end{cases} \quad (11)$$

E. Blanket Sharpening Variable

Based on 2018 data, borrowing linen covers is variable with various types of linen. The blanket loan variable into three fuzzy sets, namely: Low (L), Medium (M), and High (H). Low and high sets use down and high linen curves using upward curves, while medium sets use triangular shapes.

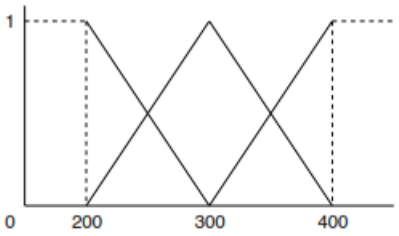


Fig.7. Variable Curve Type for Linen Loan

a. Borrow a Low Blanket

$$\mu[x] = Low\ Borrow \begin{cases} 1 & : jika \ldots x \leq 200 \\ \frac{x-200}{400-300} & : 200 < jika \ldots x < 400 \\ 0 & : jika \ldots x \geq 400 \end{cases} \quad (12)$$

b. Borrow a Medium Blanket

$$\mu[x] = Medium\ Borrow \begin{cases} 0 & : jika \ldots x \geq 300 \\ (x-200)/(400-300) & : jika\ 200 < x < 300 \\ (400-x)/(400-300) & : jika\ 300 < x < 200 \end{cases} \quad (13)$$

c. Borrow a High Blanket

$$\mu[x] = High\ Borrowing \begin{cases} 1 & : jika \ldots x \leq 200 \\ \frac{400-x}{400-200} & : jika 200 < x < 400 \\ 0 & : jika \ldots x \geq 400 \end{cases} \quad (14)$$

F. Variable Sharpening of Mattresses

Based on 2018 data, borrowing of bed linen linens is variable with various types of linen. Mattress base bed variable into three fuzzy sets, which are Low (L), Medium (M), and High (H). Low and high sets use down and high linen curves using upward curves, while medium sets use triangular shapes.

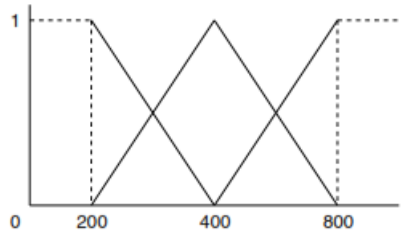


Fig.8. Variable Curve Type for Linen Loan

a. Borrow a Low Mattress

$$\mu[x] = Low\ Borrow \begin{cases} 1 & : jika \ldots x \leq 200 \\ \frac{x-200}{800-400} & : 200 < jika \ldots x < 800 \\ 0 & : jika \ldots x \geq 800 \end{cases} \quad (15)$$

b. Borrow a Medium Mattress

$$\mu[x] = Medium\ Borrow \begin{cases} 0 & : jika \ldots x \geq 400 \\ (x-200)/(800-400) & : jika\ 200 < x < 400 \\ (800-x)/(800-400) & : jika\ 400 < x < 200 \end{cases} \quad (16)$$

c. Borrow a High Bed Mat

$$\mu[x] = High\ Borrowing \begin{cases} 1 & : jika \ldots x \leq 200 \\ \frac{800-x}{800-200} & : jika 200 < x < 800 \\ 0 & : jika \ldots x \geq 800 \end{cases} \quad (17)$$

G. Bed Cover Loan Variable

Based on 2018 data, borrowing bed linen cover is variable with various types of linen. The variable bed cover into three fuzzy sets, namely Low (L), Medium (M), and High (H). Low and high sets use down and high linen curves using upward curves, while medium sets use triangular shapes.

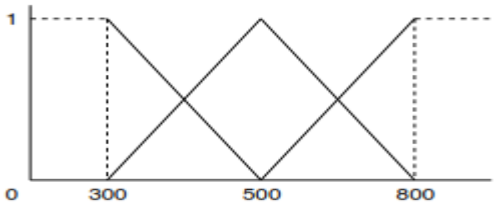


Fig.9. Variable Curve Type for Linen Loan

a. Borrow Low Bed Cover

$$\mu[x] = Low\ Borrow \begin{cases} 1 & : jika \ldots x \leq 300 \\ \frac{x-300}{800-500} & : 300 < jika \ldots x < 800 \\ 0 & : jika \ldots x \geq 800 \end{cases} \quad (18)$$

b. Borrow a Medium Bed Cover

$$\mu[x] = Medium\ Borrow \begin{cases} 0 & : jika \ldots x \geq 500 \\ (x-300)/(800-500) & : jika\ 300 < x < 500 \\ (800-x)/(800-500) & : jika\ 500 < x < 300 \end{cases} \quad (19)$$

c. Borrow a High Bed Cover

$$\mu[x] = High\ Borrowing \begin{cases} 1 & : jika \ldots x \leq 300 \\ \frac{800-x}{800-300} & : jika\ 300 < x < 800 \\ 0 & : jika \ldots x \geq 800 \end{cases} \quad (20)$$

H. Linen Loss Variable

Based on data from 2018, borrowing types of linen is a variable loss of linen. Linen loss variables into three fuzzy sets, namely: Low (L), Medium (M), and High (H). Low and high sets use down and high linen curves using upward curves, while medium sets use triangular shapes.

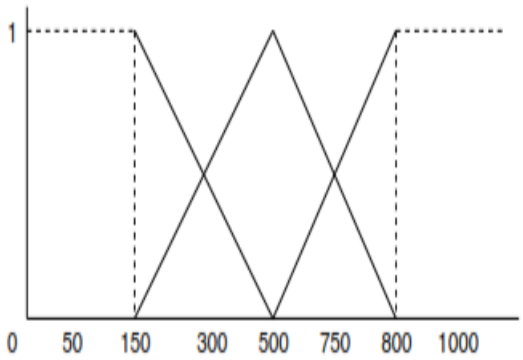


Fig.10. Linen Loss Curve

a. Lost Low

$$\mu[x] = Lost\ Low \begin{cases} 1 & : jika \ldots x \leq 50 \\ \frac{300-x}{300-50} & : 50 < jika \ldots x < 300 \\ 0 & : jika \ldots x \geq 300 \end{cases} \quad (21)$$

b. Missing Medium

$$\mu[x] = Missing\ Medium \begin{cases} 0 & : jika \ldots x \geq 500 \quad (22) \\ (x-150)/(800-150) & : jika\ 150 < x < 500 \\ (800-x)/(800-150) & : jika\ 500 < x < 800 \end{cases}$$

c. Lost Height

$$\mu[x] = Lost\ Height \begin{cases} 1 & : jika \ldots x \leq 750 \\ \frac{x-750}{1000-750} & : jika 750 < x < 1000 \\ 0 & : jika \ldots x \geq 1000 \end{cases} \quad (23)$$

I. Rule *Fuzzy*

After doing fuzzyfication then input fuzzy rule base variables depend on input variables, the three input variables combined will form 216 rules. The fuzzy rule base is performed IF and THEN input variables generated with the following table form:

Tabel- II: Rules *Fuzzy*

NO		Laken	PillowCase	Bolster	Blanket	Mattress	Bed Cover		Result
1		High	High	High	High	Low	Medium		Medium
2		Low	Low	Low	Medium	Medium	High		Low
3		High	High	High	High	High	High		High
4		Low	Low	High	High	High	High		High
5	IF	Medium	High	Medium	Medium	Low	Low	THEN	Medium
_>									
212		Low	Low	Low	Low	Low	Low		Low
213		Medium	High	High	Low	High	Medium		Low
214		High	High	High	High	Medium	Medium		High
215		Medium	Medium	Medium	Medium	Medium	Medium		Medium
216		Rendah	Medium	Medium	Medium	High	High		Medium

Based on the input variable by doing IF AND THEN to find the implication or predicate value using fuzzy rules. Then the results obtained in prioritizing the types of linen that are more often borrowed or used by patients and nurses can be seen with the following table form:

Table- III: *Fuzzy* Rules Results

NO		Laken	PillowCase	Bolster	Blanket	Mattress	Bed Cover		Result
1		High	High	High	High	Low	Medium		Medium
2		Low	Low	Low	Medium	Medium	High		Low
3		High	High	High	High	High	High		High
4		Low	Low	High	High	High	High		High
5	IF	Medium	High	Medium	Medium	Low	Low	THEN	Medium
_>									
212		Low	Low	Low	Low	Low	Low		Low
213		Medium	High	High	Low	High	Medium		Low
214		High	High	High	High	Medium	Medium		High
215		Medium	Medium	Medium	Medium	Medium	Medium		Medium
216		Rendah	Medium	Medium	Medium	High	High		Medium

J. *Defuzzyfikasi*

Thus to determine the average value of linen loss or determine the value of Z using the Tsukamoto method as follows:

$$Z = \frac{\alpha 1 * z1 + \alpha 2 * z2 + \alpha 3 * z3 + \cdots + \alpha 8 * z8 + \alpha 9 * z9 + \alpha 10 * z10}{\alpha 1 + \alpha 2 + \alpha 3 + \alpha 4 + \alpha 5 + \alpha 6 + \alpha 7 + \alpha 8 + \alpha 9 + \alpha 10}$$

$$Z = \frac{0.15 * 280 + 0.16 * 260 + 0.65 * 212.5 + \cdots + 0.35 * 137.5 + 0.35 * 256.25 + 0.14 * 282.5}{0.15 + 0.16 + 0.65 + 0.16 + 0.15 + 0.14 + 0.15 + 0.35 + 0.35 + 0.14}$$

$$Z = \frac{533,15}{2,4}$$

Z=221,729

= (222)

V. CONCLUSION

Based on research conducted at Dr. Cipto Mangunkusumo and explained through this scientific work, the authors make the following conclusions:

1. Generating priority linen based on Fuzzy Tsukamoto calculations, With the many types of linen in determining priority linen, there are two stages: fuzzyfication (Membership Function) and Fuzzy Tsukamoto Rules. By producing several types of linen that will be a priority, namely bolsters, blankets, mattress mattresses and bed covers with a high predicate in the type of linen loan.
2. With research on the lending process that often results in loss of linen for it to be able to produce in determining the average amount of linen loss, which very often loses linen within one year using Fuzzy Tsukamoto's method calculation through several stages namely, fuzzfication, rule fuzzy, fuzzy inference system and defuzzyfiask (AVERAGE) can produce an average amount of linen loss that is 221,729 rounded up to 222.

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