International Journal of Basic and Applied Science 9 (2) (2020) 50-56

Published by:IOCSCIENCE

International Journal of Basic and Applied Science

Journal homepage:www.ijobas.pelnus.ac.id

Determination of the Amount of Instant Noodle Production By Applying the Fuzzy Mamdani Method at PT. Indofood CBP Sukses Makmur Tbk Medan

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Article Info

Article history:

Received Jul 06, 2020
Revised Jul 28, 2020
Accepted Aug 14, 2020

***Keywords*:**

Fuzzy Logic;
Total production;
Mamdani Method.

ABSTRACT

The problem that often occurs in a company is difficult to determine the amount of production that must be produced, this is because the number of requests is not always fixed or there is no certainty. So also at PT Indofood CBP Sukses Makmur Tbk Medan which is engaged in the production of instant noodles. Fuzzy logic is one method for analyzing systems that contain uncertainty. The author uses the method mamdani or often also known method Min - Max, in this study the author uses data on the number of requests and the amount of inventory in PT. Indofood CBP prosperous success in the field from January to March 2018. System design to get output is done in stages (a) formation of fuzzy sets. (b) application of implication functions, (c) forming rules, (d) confirmation (defuzzification). In this study defuzzification is done using the centroid method.

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1. INTRODUCTION

Production is an activity carried out by every entrepreneur who runs a food industry business [1] [2]. Every entrepreneur who will build a business in the industrial sector will think about what type of production will be produced to be marketed, entrepreneurs will also think about how many goods they will produce, how much they save for inventory and how much demand is expected for the goods they produce [3] [4].

PT.Indofood CBP Sukses Makmur Tbk Medan Branch, is a company unit that produces instant noodles located at Jalan Medan T.Morawa KM 18.5 Tanjung Morawa, taken as a case study of planning production quantities to minimize production costs. PT.Indofood CBP Sukses Makmur Tbk Medan Branch has a production capacity of up to 85000 boxes of instant noodles per day then the number of products produced is increasing along with increasing consumer demand. However, the reality shows that consumer demand fluctuates, does not always remain constant every day of production, thus forcing entrepreneurs to plan to improve the quality of production as well as possible. Entrepreneurs must be able to overcome the problem of demand spikes or decreases in

demand so that the production process continues to run smoothly and entrepreneurs do not experience losses [5] [6].

By storing information and an adequate set of reasoning rules, it is possible for the computer to draw conclusions or make decisions that are of the same quality as fuzzy logic [7].

According to the journal Mia Kastina, Marzuki Silalahi, I, 173, 2016. The title is "Fuzzy Logic Mamdani Method in Production Fuzzy Decision System Using Matlab" Explains the Mamdani method often known as the Max - Min method. This method was introduced by Ebrahim Mamdani in 1975 [8].

To get the output of the Fuzzy method, four stages are needed, namely: Formation of the Fuzzy Set, Application of the implication function, Composition of rules, and Defuzzyfication. At the stage of the defuzzification function, a decision on the company's production amount can be determined [9] [10] [11].

Determining the amount of production, becomes a problem that cannot be avoided due to the number of requests that are always changing. With this problem, to determine the amount of production to meet fluctuating consumer demand, an alternative solution to the problem is needed without adding raw materials, namely by applying the Mamdani fuzzy method. The application of the mamdani fuzzy method in planning the amount of production, is expected to be able to cope with fluctuating consumer demand with minimal production costs.

Mamdani fuzzy method is a method that maps an input into an output without ignoring the existing factors. This method is a mathematical framework used to represent several variables such as low production, large production and medium production, so that it is very suitable for the problem of fluctuating demand and uncertain production quantities.

Fuzzy Logic was first introduced by Prof. Lutfi Zadeh in 1965. Fuzzy logic is "a system used to deal with the concept of partial truth, namely the truth that is between completely true and completely false" [12]. Fuzzy logic is different from ordinary digital logic, where digital logic usually only recognizes two states, namely "yes"-"no" or "on"-"off" or "high"-"low" or "1"-"0". Fuzzy logic replaces Boolean logic in the truth level [13] [14] [15].

Fuzzy logic has been widely used in fields such as statistics, control theory, and so on. Fuzzy logic is a method for transferring or imitating human knowledge into machines. Fuzzy logic which has a value of fuzziness between true or false. In fuzzy logic theory, a value can be either true or false at the same time. The value of truth and error depends on the weight of membership or degree of membership (Membership Function) in the range 0 to 1. In contrast to digital logic which only has two values 1 or 0. Fuzzy logic is used to translate a quantity expressed using language (linguistics), for example a measure of the speed of a vehicle which is expressed as slow, moderately fast, fast, and very fast [16] [17] [18].

2. RESEARCH METHODS

In conducting research to obtain complete data and information needed from PT Indofood CBP Sukses prosperous Tbk Medan Branch, the research was carried out using the following methods: data collection methods and system design methods.

2.1 Application of Fuzzy Mamdani

In determining the amount of production using the Mamdani method, criteria and weights are needed to carry out the calculations so that maximum results will be obtained. The steps in the comprehensive solution are as follows:

a. Fuzzy Set Formation

The Mamdani method in the process requires criteria that will be used as material for calculations in the ranking process.

b. Fuzzy Knowledge Base

The knowledge base of a fuzzy inference system consists of a database and a rule base. The database is a set of membership functions from fuzzy sets associated with the linguistic values of the variables involved in the system.

c. Inference Engine Stages
The Min function is performed for each rule in the implication function.
d. Composition Rules
The composition of the rules using max is the overall conclusion by taking the maximum membership level of each consequent application of the implication function and combining all the conclusions of each rule.

2.2 design

a. Use Case Diagrams
b. Activity Diagram
c. Sequence Diagrams

3. RESULTS AND DISCUSSION

3.1 Hardware and Software Requirements

In the implementation of the instant noodle production prediction program, it requires hardware (hardware) and software (software). The hardware and software that will be needed are as follows:

a. Minimum microprocessor Pentium 3
b. The hard disk for where the system operates and as a data storage medium
c. Minimum memory 64 MB
d. Super VGA monitor
e. Keyboard
f. Mouse

3.2 Interface Implementation

a. Login Form

In this section, the program interface will be implemented. The image below shows the display before entering the application where the user must first login. In this login form, you must write down your user name and password, if the username or password is wrong, you will not be able to continue.

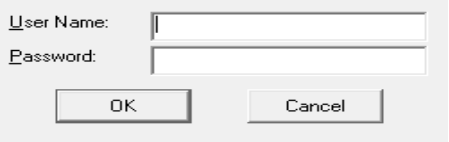

Figure 1. Login Form

b. Main Menu Form

The main menu display after the user logs in. This form is used as a place to accommodate all options such as input forms, and the production plan process contained in the system that is designed as shown in Figure 2.

Figure 2. Main Menu Form

c. Prediction Data Input Display

This form is used to enter the amount of demand data and the amount of inventory data and the amount of production for the last one year into the system, while the image of the implementation of this form can be seen in Figure 3 below:

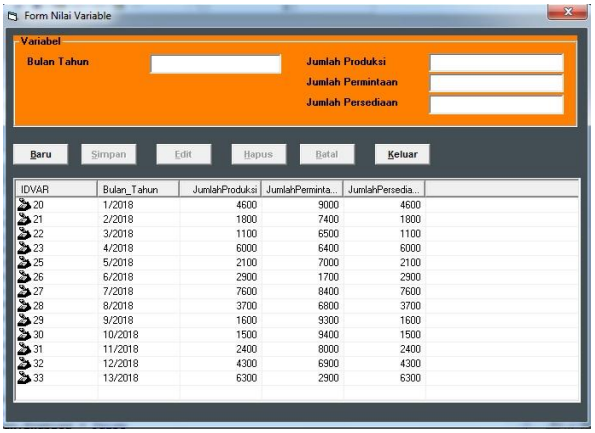

Figure 3. Prediction Data Input Form

d. Prediction Process Form

This form is used to perform the production prediction calculation process. In this form, first select the month and year to display the previous data along with the max and min values from the data for the last year that was previously inputted. Then after the previous data is displayed the production prediction process will be processed after clicking the calculate button. The picture of the implementation of this form can be seen in Figure 4 below:

Figure 4. Instant Noodle Production Calculation Result Form

e. Membership Value Result Form

This form is used to display membership values. The picture of the implementation of this form can be seen in Figure 5 below:

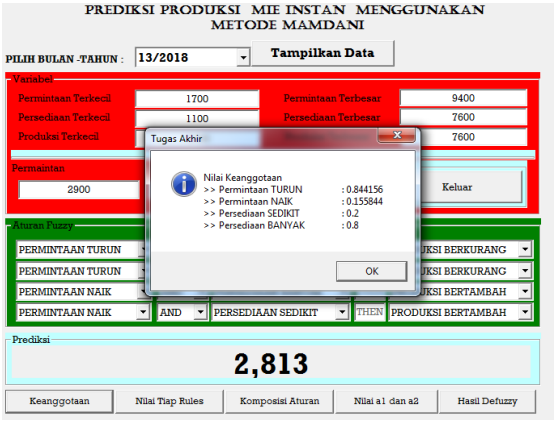

Figure 5. Membership Value Data Form

f. Result Value Form of Each Rule

This form is used to display the value of each rule. In the form, first select the month and year to display the amount of demand data and the amount of inventory based on the selected month then display the max value and min value of the last one year data that has been inputted. Then after the data is displayed, you can click the value button for each rule. This form is used to display the value of each rule, while the image of the implementation of this form can be seen in Figure 6 below:

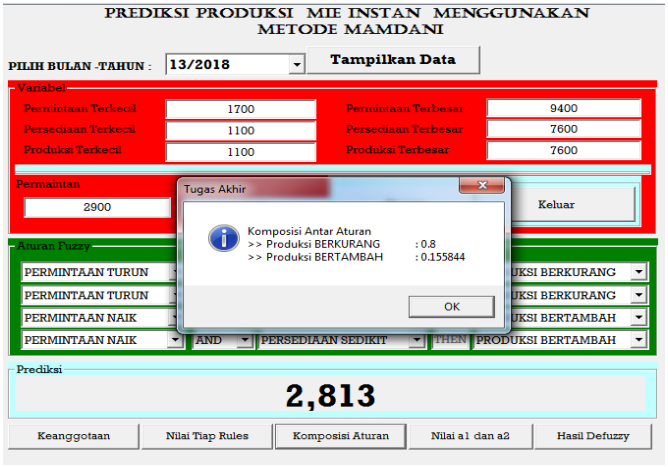

Figure 5. Value Data Form of Each Rule

g. Rule Composition Value Form

This form is used to display the rule composition values. In this form, first select the month and year to display the amount of demand data and the amount of inventory based on the selected month then display the max value and min value of the last one year data that has been input. Then after the data is displayed, you can click the value composition rule button. The picture of the implementation of this form can be seen in Figure 7 below:

Figure 6. Data Form Value Composition Report Rules

4. CONCLUSION

Based on the discussion on the application of the Fuzzy Mamdani method in predicting the amount of instant noodle production based on inventory data and total demand, it is concluded.

The design involves use case diagrams to describe the system to be created, login activity diagrams, main menu activity diagrams, sales data input activity diagrams.

The application of the mamdani fuzzy method in predicting Instant Noodle Production for a certain period of time, by analyzing the needs and analyzing the mamdani fuzzy method. In Mamdani's analysis there are three variables, namely demand, production, and supply.

From the results of the discussion above, the application of Mamdani fuzzy logic is effectively applied in applications to assist the company in predicting the amount of instant noodle production based on inventory data and the number of requests.

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