

Strategy Development of Revolving Fund for Small Business Grocery Store Using Information System

Arasy Alimudin¹, Agus Sukoco¹, Achmad Zakki Falani².

Department of Management, Narotama University, Indonesia¹

Departement of Information Technology, Narotama University, Indonesia²

arasy.alimudin@narotama.ac.id, agus.sukoco@narotama.ac.id, achmad.zakki@narotama.ac.id

ABSTRACT

Purpose: This study aims at analyzing the factors influencing the ability to return capital of MSMEs in Indonesia (case study of grocery store in Surabaya).

Design/methodology/approach: The sample in this study is 171 pioneering grocery stores of cooperative. Crosstabulation analysis was implemented to seek the relationship between factors of store internal resources and indicators of quality cooperatives on the ability to pay MSMEs. After that, a system architecture was designed which is then formulated in fuzzy logic to create decision-making system using MySQL database. To compare the decision result using fuzzy logic, the data obtained were analyzed using logistic regression.

Findings: This study was found the results of manual calculations using logistic regression and calculation results using fuzzy logic-based information system application at www.simtokop.net, it is obtained the same recommendation on six stores that have output: "Growing" (eligible getting the revolving fund).

Paper type: Research paper

Keyword: Decision-Making Determination, Grocery Store, Information-System, Revolving Fund.

Received : November 22th

Revised : November 23th

Published : November 30th

I. INTRODUCTION

Economic growth in Indonesia is strongly determined by cooperative and SMEs, as of many policies and assistance are given to cooperatives and MSMEs. Most of MSMEs sector is trading, more, center of MSMEs growth is in urban areas. Surabaya is the the second largerst city in Indonesia that is highly possible its development of MSMEs trading sector is imitated by other cities. So far, revolving fund has been given to cooperatives and MSMEs, yet the impact and sustainability of revolving fund is considered less effective and efficient. For the time being, evaluation and decision-making process are based on people and less-transparent data, more, it takes long time to carry out. This study attempts to perceive technology existence as a tool to assist government and third party who giving the revolving fund to make right, snap and transparent decision in order to determine the eligibility of beneficiaries. It is noticeable that MSMEs' development among ASEAN countries get high priority, in which, it is integrated in economic unification among ASEAN countries. It is noted in the cooperation of ASEAN countries in preparing ASEAN Policy Blueprint for SME Development 2004–2014 and ASEAN Strategic Action Plan for SME Development 2010–2015 which is a cooperation framework and action plan to develop a competitive, dynamic and innovative ASEAN SME. Generally, MSME participation in Global Value Chain (GVC) is still low. This low participation is caused by the limitation of resurces, such as, financial, information, management and technology capacity, and access to market information (Wignaraja, G., Jinjarak, 2015).

Similarly (Harvie, C., Narjoko, D., dan Oum, 2010) stated that some factors that are able to increase this participation are, business scale, business maturity, foreign linkage, productivity and access to finance. Those factors make the easiness in running business in Indonesia is in 91st rank, below other ASEAN countries (Singapore ranked 2nd, Malaysia ranked 23rd, Thailand ranked 46th Brunei Darussalam ranked 72nd and Vietnam ranked 82nd WorldBank, 2017). To overcome this, Indonesian government has taken a policy to increase economic development. On April 28, 2016, the Government issued the 12th economic policy package (DISKOP UKM JATIM, 2017). This package focuses on improving the ease of doing business for small and medium enterprises. But the paradigm of government policy related to MSME mostly use social welfare approach rather than business approach. It can be seen from that many government policies related to MSME, which is only give, this is detrimental to the ability of MSMEs to face global competition. This phenomenon does not only occur at the National level but also occurs at the local level.

The regulation of the State Minister of Cooperatives and Small and Medium Enterprises of the Republic of Indonesia Number: 30/ Per/M.KUKM/VIII/2007 Concerning Technical Guidelines for Strengthening Capital of Cooperatives, Small and Medium Enterprises and Financial Institutions by Provision of Initial Capital and Funding through Venture Capital Institutions regulates the provision of long-term capital investment stimulation for CSME (Cooperative, Small and Medium Enterprises) through the provision of matching funds whereby the KUKM-CPPU (Cooperatives and MSMEs - Company Candidate of Business Partner) which can receive MAP funds (Initial Capital & Matching Fund) are business feasibility in accordance with the results of the assessment that has been set, has its own capital to match at least 20% of the total funding needs, prioritized to KUKM-CPPU which has a competitive advantage (export-oriented or import substitution), able to absorb and increase labor productivity or move in production field, product innovation and can create employment, as well as using local resources. In parallel with that regulation, of Cooperative, Small and Medium Enterprises Office in East Java launched a program, named Senkuko (Sentra Perkulakan Koperasi) or wholesaler center for cooperation. The purpose of Senkuko program is to enable cooperatives in East Java carrying out retail activity and wholesaler scale in meeting daily consumers' needs. Senkuko runs a modern retail concept located in each cooperative as a store. Senkuko management is held by the third party based on a mutual agreement. This collaboration is expected to help Senkuko becomes a successful retailer and have a good performance, more, having knowledge and technology transfer. This what happens in Surabaya, in which cooperatives business in retail sector is little bit slowly, whereas retail business development is rapidly growing fast. Cooperatives, generally, insert retail business as a side business to simple meet the needs of its members. Besides that, the workshop space provided is relatively small without warehousing facilities, and the goods provided is very limited both its type and quantity. As a logical consequence, retail business done by cooperatives shop is less competitive in the market (Dinas Koperasi dan UKM Provinsi Jawa Timur, 2018). Responding to this issue, Government of Surabaya has implemented Senkuko program as a form to develop retail business in cooperatives environment. This program is a platform or system of purchasing and selling certain material/goods that provide the greatest benefits in gaining the purchase and selling price for the cooperative as the wholesaler center, for cooperative shops, for grocery store as outlets. Conceptually, Senkuko is equal to wholesale trading. Cooperatives that act as Senkuko have the main task of looking for cheap and good quality goods in upstream sectors (manufacturers, farmers, craftsmen, etc.) which will be distributed to all outlets (stores) that have been consolidated in a solid and efficient distribution network. The amount of granting revolving working capital for business players of Senkuko set through Mayor Regulation of Surabaya number 54 in 2006 is Rp. 250,000,000,- (two hundred and fifty million rupiah) charged to the Regional Government Budget of Surabaya.

Based on the observation result, it is known that, so far, the implementation of revolving fund assistance program is charged to its working group who all of them are city officials of Surabaya, cooperatives offices, and related unit that has already burdened with many duties and responsibilities. Besides of that, in running revolving fund assistance program shows that the service of this program for Senkuko business player through Cooperatives Office of Surabaya City is considered less objective. For example, there are some basic parameters having ambiguous variable score such as financial health condition of cooperatives enterprises agency. Thereby, it becomes less effective and efficient in giving and monitoring the revolving funds since the administrators, who act as the management, are paid by Office while the members who have helped only get dividend. This notion is in the same vein with the result of study conducted by Harwiki et.al state that Senkuko business in East Java encountered technical and managerial problems. If it is not immediately solved, whatever done for fixing and improvement in each Senkuko will not bring significant result (Harwiki, Wiwiek, Nur Sayidah, 2015). Meanwhile, the study by Noviana and Kirwani (2014) on Senkuko in Surabaya depicted that Senkuko also has the following problems: (1) the amount of members shopped in Senkuko is not as expectation, (2) the chief comes from top-down management who does not know the members.

It makes him having less sense of belonging and responsibility both from the chief or the members, (3) procurement of goods, for the time being, is from government, therefore the managers is less successful in establishing cooperation with the suppliers, meaning that Senkuko still depends on the assistance of government capital (Noviana, 2014). Kristanto's research results state If government does not give capital assistance, Senkuko cannot meet all of its costumers and members needs. In order to optimize the revolving fund distributions, the socialition stating that revolving funds status is not from government assistant and transparency of management need to be done (Kristanto, 2013). Thereby, to solve this issue, right method in supporting the decision related to determine and to give the revolving fund for Senkuko businessmen is highly needed.

II. LITERATURE REVIEW

According to the Major Regulation of Surabaya Number 54 in 2006, it is needed to create Guidelines for Strengthening Cooperatives Capital by Providing Revolving Fund of Developing Distribution Network through Wholesaler Center for Cooperatives or Sentra Kulakan Koperasi (Senkuko). All stipulations including objectives, targets, and criteria on giving the revolving fund for business actors of Senkuko have been inserted as well. The Regulation mentioned the goals of optimizing the empowerment of people's economy through Sensuko business are:

- 1) Developing capital of business unit for Cooperatives store as its adequate financing has not been available from the existing financial institutions.
- 2) Developing network of goods distribution between Senkuko and retails units in cooperatives movement circle and among cooperatives movement.
- 3) While the targets of Senkuko business program are:
- 4) The formation of Sentra Kulakan Koperasi (Senkuko)
- 5) The increase of distribution network of goods between Senkuko and retails business unit in cooperative movement circle and among cooperative movements using the patern of retail business network in internal cooperative of the program executor who its member has already had retail business and considered feasible to become an outlet by the related cooperative. It also can be done among retail business network between Senkuko and retail business units in cooperative movement in Surabaya.

Fuzzy logic system approach is used to solve various problems, especially as a decision support system due to, in fuzzy set theory, the role of membership degree as the determinant of the elements in a set is very important. The membership value or membership degree or membership function has become the main characteristic of logic with that fuzzy logic (Sri Kusuma Dewi and Hari Purnomo, 2010).



Figure 1 Output Mapping– Output in Fuzzy Logic

Source:(Sri Kusuma Dewi and Hari Purnomo, 2010)

Noting Figure 1, it can be explained how the general work of fuzzy logic which includes input, process and output. Between input and output, there is a black box that has function to map the input into compatible output. Fuzzy logic is a logical set theory that was developed to solve value concept between the truth and false. The value produced using fuzzy logic is not only yes (1) or no (0), but also whole possibilities between 0 and 1. There are several things in fuzzy system, that is (Sri Kusuma Dewi and Hari Purnomo, 2010).

Fuzzy Set is a group that represents a particular condition or circumstance in a fuzzy variable. The membership function is a curve showing the mapping of data input points into their membership values (also often called membership degrees) which have interval between 0 and 1. One of the ways that can be used to get

membership values is through the approach of trapezoidal-shaped curve function representation. This study categorizes performance value of cooperative-based grocery stores into the set: DECREASE, STEADY, INCREASE.

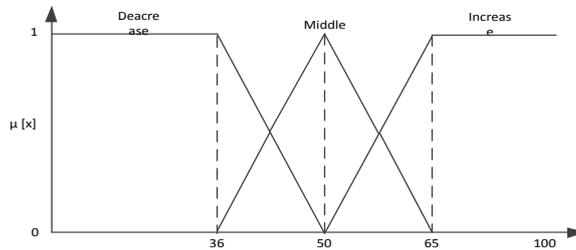


Figure 2 Fuzzy Set in Performance Variable of Grocery Stores

Source:(Sri Kusuma Dewi and Hari Purnomo, 2010)

A Universe of Discourse. All possible values operated in fuzzy variables. A universe of discourse is a set of real numbers that always rise (increase) monotonically from left to right. Those values can be positive or negative number. Sometimes the upper limit of a universe of discourse value is not limited.

Domain. All total values allowed in the universe of discourse and operated in a set of fuzzy. As a universe of discourse, domain is also a set of real numbers which constantly raise (increase) monotonically from left to right. It can be positive or negative number.

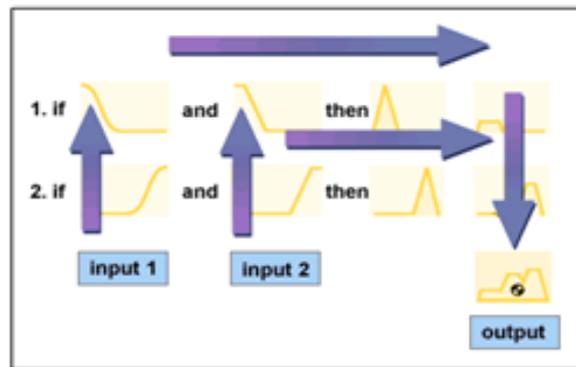


Figure 3 Fuzzy Inference Diagram

Source:(Naba, 2010)

Experts usually have knowledge of the system that can be expressed in a set of IF – THEN rule. By using fuzzy inference, that expert’s knowledge can be transferred into the software, in which then, it maps an input to output based on the given IF – THEN rule. The result is named Fuzzy Inference System (FIS). FIS has been successfully applied in various fields, one of which is an expert system (Alimudin et al., 2018; Naba, 2010).

III. METHODOLOGY

This study is an applied research, as it offers a practical solution (Baguley, 2004). The object of this study is the business actors of cooperative grocery store that are involved in the study by exploring their perception through interviews. The research stages are designed as follows (Tobi & Kampen, 2018). Need Assessment To understand the problems of the system that will be built, the first stage is interview, observation, and literature

study, System Design; Performing the process of sytem design, which consists of determination of data input and design database specification, Implementation; the implementation process which is divided into 3 (three) stages, that is, the process of making the system through coding, then followed by testing the system to the datasheet that has been migrated into database. The last stage is system evaluation, if there are still some deficiencies. The methodology used in this study is the software development life cycle. This method offers structured and formal steps (Turban, E., McLean, E., & Wetherbe, 2008). However, to adapt to grocery stores conditions and the need for information and technology, which demands flexibility and responsiveness, the software development lifecycle will be combined with a causality research approach. The data collected are primary and secondary data. Secondary data is a type of data obtained indirectly from related institutions in the form of financial statements and some other data reports related to the criteria of the revolving fund for each of the cooperative, which its data will be managed further. While the primary data is the direct data obtained from domain expert.

The data was collected by interview and observation using questionnaire. The population of this study is 300 pioneering grocery stores of cooperative in Surabaya City. The sample was determined using Slovin formula, that is, $n = \frac{N}{N(d)2 + 1}$, so the sample in this study is 171 pioneering grocery stores of cooperative (Sugiyono, 2018). Techniques of data analysis used Crosstab through Chi-Square test to know whether or not the relationship between researchs' constructs and characteristics of each respondents (Yankees, 2011).

Logistic regression was used to create predictive models as linear regression or likely named Ordinary Least Squares: (OLS) regression. The difference of logistic regression is that the researchers predict dichotomous-scale dependent variable. The dichotomy scale means the nominal data scale with two categories, such as: Yes and No, Good and Bad, or High and Low (Hosmer, D. W., & Lemeshow, 2005).

IV. RESULTS AND DISCUSSION

Referring to literature review and field survey, it shows that the growth of pioneering grocery stores of cooperatives is influenced by initial capital owned, cost, servie, number of members/customers, whosale prive, number of vendors. This condition is parallel with the study conducted by Ward et.all, stating that competitiveness dimension of a company is consists of cost, quality, delivery, and flexibility (Ward, P. T., Leong, G. K., & Boyer, 1994). Ferdinand (2006) also asserted that low prices or affordable price are an impetus to improve marketing performance. Similarly, the study of Wijayanti and Wiratno (2011) postulated that the component of capital has a significant effect on profitability. Other conclusion made by Rahmasuciana, Mulyo, and Masy (2015) indicating that if the quantity of purchases increases, the acquisition cost (wholesale products) will decrease (Augusty, 2006; Rahmasuciana, D. Y., Mulyo, D. H., & Masyhuri, 2015; Wijayanti et al., 2011)

Stressing the results of those mentioned studies, the indicators are formulated as follows:

- 1) Analysis of internal resources stores using the indicators: selling price, the number of customers, the amount of initial capital, the amount of sales turnover and operational costs, the number of procurement or vendors, wholesale prices.
- 2) Analysis of qualified cooperatives using the indicators: business entities, business performance, risk sharing, customer service. Those are independent variable that does not affect each other, and included in non Fuzzy input.
- 3) Analysis of paying ability using indicators: cash payment method for vendor, credit payment method for vendor, and consignment payment method for vendor.

Table 1. The Relationship between construct variable stores internal resources and qualified cooperative indicators with the dependent variable ability to pay

<i>Construct</i>	<i>Variable</i>	<i>Significance</i>	<i>Description</i>
<i>Store Internal resources</i>	<i>Product Selling price</i>	<i>0.00</i>	<i>Significant</i>
	<i>Number of Customer</i>	<i>0.00</i>	<i>Significant</i>
	<i>Total Initial Capital</i>	<i>0.00</i>	<i>Significant</i>

	<i>Total Sales Omzet</i>	<i>0.00</i>	<i>Significant</i>
	<i>Operational Cost</i>	<i>0.00</i>	<i>Significant</i>
	<i>Total Procurement or Vendor</i>	<i>0.00</i>	<i>Significant</i>
	<i>Product Whole sale Price</i>	<i>0.018</i>	<i>Significant</i>
<i>Qualified Cooperatives Indicator</i>	<i>Business entity</i>	<i>0.001</i>	<i>Significant</i>
	<i>Business performance</i>	<i>0.002</i>	<i>Significant</i>
	<i>Risk sharing,</i>	<i>0.001</i>	<i>Significant</i>
	<i>Service for member</i>	<i>0.018</i>	<i>Significant</i>

Source: processed researchers (2019)

Questionnaires using the 1-4 Likert scale were distributed to the grocery stores in Surabaya, as the respondents. To ensure that the questionnaire is accurate, a pretest was undergone to all questions used as a measurement instrument, that is, validity test and reliability test towards 100 respondents. The result of validity and reliability test on all question items measuring internal environment indicator, external environment and business growth shows that the value of r count and Corrected Item-Total Correlation is greater than r table (0.195) and value: $r\text{-Alpha} \geq 0.6$. It indicates that question items used in this study are valid and reliable. To see the relationship between stores resources and qualified cooperatives with ability to pay, the data collected was tested using crosstabulation analysis. The result of the analysis can be seen in Table 1. According to Table 1, the crosstab analysis of internal and external environment indicator constructs with capital growth seen from payment method for vendor depicts that all internal and external environment indicator construct have significance value below 0.05 which means that all construct have a close relationship with the construct of grocery store's ability to pay.

Table 2 Simple Logistic Regression Analysis Results of Ability to Pay

<i>Sub Variable</i>	<i>p -value</i>	<i>Remarks</i>
<i>Product Selling price</i>	<i>0,001</i>	<i>Continue to multivariate test</i>
<i>Number of Customer</i>	<i>0,000</i>	<i>Continue to multivariate test</i>
<i>Total Initial Capital</i>	<i>0,840</i>	<i>Not Continue to multivariate test</i>
<i>Total Sales Omzet</i>	<i>0,001</i>	<i>Continue to multivariate test</i>
<i>Operational Cost</i>	<i>0,328</i>	<i>Not Continue to multivariate test</i>
<i>Total Procurement or Vendor</i>	<i>0,003</i>	<i>Continue to multivariate test</i>
<i>Product Whole sale Price</i>	<i>0,369</i>	<i>Not Continue to multivariate test</i>

<i>Business entity</i>	<i>0,079</i>	<i>Continue to multivariate test</i>
<i>Business performance</i>	<i>0,049</i>	<i>Continue to multivariate test</i>
<i>Risk sharing,</i>	<i>0,065</i>	<i>Continue to multivariate test</i>
<i>Service for member</i>	<i>0,037</i>	<i>Continue to multivariate test</i>

Source: processed researchers (2019)

In Table 2, it can be seen that the result of logistic regression analysis, in which this step will select which independent variables are eligible to undergo the multivariate test model. The eligible ones have a significance level (sig.) or p value < 0.25 with the "Enter" method in simple logistic regression. That is by doing one by one simple regression between each independent variable (internal environment) to the dependent variable (differentiation competitiveness). The results show that only 8 are included in the multivariate model and 3 should be removed from the multivariate model. Then the 8 variables are applied in multiple logistic regressions. Based on the result of multiple logistic regression analysis, it can be concluded that from all independent variables assumed to affect the ability to pay, there is one subvariabel (the number of customers) that most influence to the cash payment method for vendor with p value 0.000 < 0.05. The largest OR value obtained is 39.623, it means the number of customers perceived respondents have a 39,623 times causing the cash payment method.

Based on multiple logistic regression analysis, it is found that a grocery store that has a larger number of customers will be easier for them to have the ability to pay and return of capital. To maximize the company's performance over the long term, the company must continue to build and maintain profitable cooperative relationships with its customers (Slater, S. F., & Narver, 1995; Turban et al., 2007). Setting the superior value for customers is the company's main capital to gain competitive advantage and the provision of capital must be planned properly through the selection to the grocery store that has a large number of customers and sustainable (Holle, F. R., & Dewi, 2014; Hooley et al., 1998).

The Role of Information Technology in the Decision of Revolving Fund Provision for Pioneering Grocery Stores of Sentra Kulakan Koperasi (Senkuko); Speaking the design to the formulation that can be read by the computer, Fuzzy logic approach is used in this study, that is, a multivalued logic that allows "intermediate condition" can be formulated or defined. Hence, the condition of "somewhat" high "very" quickly can be formulated and calculated. Fuzzy logic is useful for making computers work more humane (Alimudin et al., 2019; Falani et al., 2019; Hellmann, 2001).

Based on the construct variables of internal resources store and quality cooperative indicators with the dependent variable (ability to pay), then the determination of the revolving fund for the pioneering grocery store of Senkuko using Fuzzy logic is stipulated based on input needs, which are divided into:

- 1) Fuzzy Input: (a) the selling price, the numbers of customers, the amount of initial capital, the amount of sales turnover and operational cost; (b) the number of vendors, the purchase/wholesale price.
- 2) Non Fuzzy Input: (a) qualified cooperative criteria, including business entity, business performance, risk sharing, customer service; (b) ability to pay in terms of vendor payment.

Meanwhile, the output of Fuzzy in the form of recommendation of supporting decision for providing the revolving fund using growth analysis of pioneering grocery store of Senkuko concludes that whether the grocery store is in growing business condition, stable or being down.

From our research on the system of providing capital assistance to cooperative-based grocery stores has resulted in a system architecture as in Figure 4, which there are two types of input variables i.e. fuzzy input and non fuzzy input. Fuzzy input consists of seven types of variables, namely the selling price, the number of customers, the amount of capital, sale turnover, operational costs, the number of vendors and the purchase price. As for non-fuzzy input, it consists of an active business entity, business performance, risk sharing, customer services, and payment method.

The result of fuzzyfication process in fuzzy input variable will be counted in weight by expert domain, which then each weight is given summation and resulting $\sum b$ (sigma 'b') value. While for non fuzzy input variable, that is, active business entity, business performance, risk sharing and customer service has 25% for each. The result of summation of those variable is called $\sum nf$ (sigma 'nf') variable, then, it is divided with 50%, so it has $\sum a1$ (sigma 'a1') value. The 50% division is based on the influence pf variable factor towards the

determination of revolving fund provision for cooperative-based grocery stores. In addition, the variable of payment method consists of 20% of cash, 35% of credit and 45% consignment. The result of the variable summation is named $\sum nfa$ (sigma 'nfa') variable and it is divided with 20%, so it results $\sum a2$ (sigma 'a2') value. The 20% division is based on the influence of variable factor on towards the determination of revolving fund provision for cooperative-based grocery stores. Then, the result of $\sum a1$ (sigma 'a1') will be given summation resulting $\sum a2$ (sigma 'a2'), and the results is categorized in $\sum a$ (sigma 'a') variable. Whereas for output process, the result of $\sum a$ will be compared using 'IF THEN ELSE' towards $\sum b$ value. It yields this rule, if the value of $\sum a > \sum b$, the decision recommendation of growing and eligible getting capital assistance is released. While the value of $\sum a = \sum b$, it creates the decision recommendation output of stable and need assistance. Lastly, if the value of $\sum a < \sum b$, the decision recommendation output is down and need assistance. For in-depth discussion, each sub chapter of each process will be explained below. More, it is also noticed that the system testing was done in cooperative-based grocery stores in Surabaya City, that is, from 171 data of questionnaire documented, 100 data was tested in this system.

Fuzzy Input; Based on Figure 4 about system architecture, there are two input categories, namely fuzzy input and non fuzzy input. The next step is the membership function for the price value with the value curve of the new curve. For the category or criteria of the fuzzification process on the data of the selling price based on the data collected, starting from the data store that has the lowest product selling price data, in which will be the lower limit, and the data with the highest selling price data, in which will be the upper limit, it is found that there are 3 (three) parts of the set. They are the set of cheap, fairly and expensive. To facilitate the calculation of fuzzification, 1-2 digits is used in the selling price. After fuzzification process on the selling price, the next step is the fuzzification process on the number of customers data based on the data that has been collected from store data. The lowest number of customers will be the lower limit and the data with the highest number of customer is as the upper limit. For fuzzy set, it is divided into less, moderate and many.

The fuzzification process on the data on the amount of capital is selected based on the lowest capital data, which will be as the lower limit and the data with the highest amount of capital, which will be as the upper limit. With reference to the existing data, then for the fuzzy set, it will be divided into three categories, i.e. low, medium and high. To facilitate the calculation of fuzzification, 1-3 digits is used in the amount of capital.

The fuzzification process on sale turnover data is selected based on the lowest turnover, which will be as the lower limit and the highest product turnover data as the upper limit. To facilitate the calculation of fuzzification, 1-3 digits is used as the sale turnover.

The fuzzification process on operational cost data starts from the lowest operational cost data, which will be the lower limit and the highest operational cost data as the upper limit. For the fuzzy set, it will be divided into low, medium and high category. To facilitate the calculation of fuzzification, 1-2 digits is used as the operational costs.

The fuzzification process on the number of vendor in fuzzy set, it is be divided into low, moderate and high category. The number of vendors from each store has been selected based on the lowest data, which will be the lower limit and the highest number of vendors as the upper limit. While the lowest value of sufficient set is added with the highest value, then the result is divided by 2 (two).

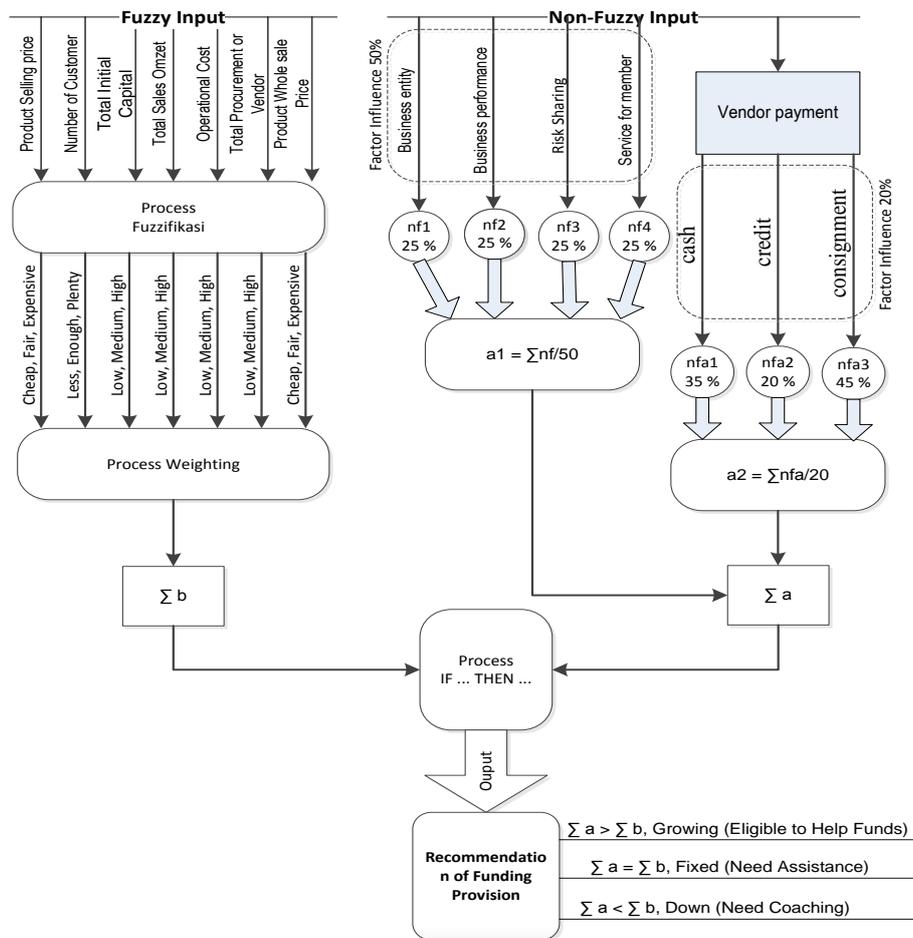


Figure 4 Architecture system

Source: processed researchers (2019)

The fuzzification process on the purchase price data is based on the product purchase price data from each store that have been selected based on the lowest data, as the lower limit, and the highest purchase price, as the upper limit. Referring to the data, the fuzzy set is divided into cheap, fair and high category. To facilitate the calculation of fuzzification, 1-2 digits format is used in the purchase price data.

After the fuzzification process for the product selling price variables, the number of customers, the amount of capital, sale turnover, operational costs, the number of vendors and the purchase price have been done, then the next step is weighting the results of decisions obtained in accordance with the fuzzy set or each variable category. Here is the weight table of each category of fuzzy set that is used as a reference by the domain expert in performing the value assignment, for the cheap, less, and low category, the value is 1-4. For the category of fair or moderate category, the value is 5-7. While for expensive, many or high category, the value is 8-10.

After weighting process from fuzzification result has been completed, the next step is to find the $\sum b$ (sigma 'b') value. 'b' value is a variable that has connotation as the result of fuzzy input. Therefore, $\sum b$ (sigma 'b') is the result of weight summation for fuzzy variable.

Non-Fuzzy Input; After fuzzy input process has been done, and has $\sum x$ (sigma 'x') value, the next step is a calculation of value conversion from non fuzzy input. Non fuzzy input consists of business entity, business performance, risk sharing, customers' service and payment method. While for the payment method, it consists of 3 (three) types, i.e. cash, credit and consignment. More, for each of those variables has the same percentage, except the payment method variable.

The amount of percentage given for each variable can be flexible considering that the system established is dynamic. It means that the expert domain enables to change the percentage based on policy changing in

providing capital assistance towards cooperative-based grocery stores. The calculation of value conversion for each non fuzzy input is explained as follows:

Business Entity. The variable input of business entity is 25%, it means that if the stores has active business entity aspect. It is shown by the complete data of annual meeting report, audit, planning process, organization, implementation and evaluation, business activities, and compliance with applicable laws and regulations. If the documents and the reports is complete, the grocery stores have 1 point, that is, 25%.

Business Performance. Similar with the business entity variables, the variable input of business performance also has 25%. It means that a health business performance aspect is shown by the improvement of capital structure, capital provision condition, asset addition, the increase of business volume, the increase of production capacity, and the increase of profit. If the documents and the reports is complete, the grocery stores have 1 point, that is, 25%.

Risk Sharing. The variable input of risk sharing also has 25% portion which is indicated by member attachment to other member or to organization, in the sense of responsibility or willingness to various risk (risk sharing), level of cooperative service utilization, and other quantitative measures, such as increasing ratio of total members, attendance percentage in meetings, percentage of mandatory repayment, and the percentage of voluntary savings. If the documents and the reports is complete, the grocery stores have 1 point, that is, 25%.

Customers' Service. The variable inout of customers' service also has a percentage of 25% which is indicated by several things, such as the attachment between the business cooperative with business members, the activities of lighting and counseling related to member business, education and training activities for members and the amount of business transactions conducted between cooperatives with its members. If the documents and the reports is complete, the grocery stores have 1 point, that is, 25%.

The Calculation of a_1 ; After the non fuzzy input weighting process, which consists of business entity, business performance, risk sharing and member service, has been completed. Then, the next step is to do the calculation to get the value of a_1 . To get the value of a_1 , it uses this formula, $a_1 = \sum nf / 0.5$. For $\sum nf$ ('sigma nf') is derived from the sum of all the conversion of the calculated values of the business entity variables, business performance, risk sharing and customers' services, while the 50% is derived from the percentage of certainly factors, the influence of $\sum nf$ ('sigma nf') to the system of capital grant to the grocery store based on the cooperative, that is, to 50%.

The Payment Method; For non-fuzzy input variables, the payment of method consisting of cash, credit and consignment. Each of these payment types has different percentage weights. The cash payment method has a weight of 45%, the consignment payment method has a weight of 35% while the credit payment method has a weight of 20%. Each payment method has a different percentage of weight, this is because the stipulated percentage of certainly factors by the expert domain. Of course, the payment method has different influence factors on the system of providing capital to a cooperative-based grocery store. The conversion result of payment method will be saved in variable a_2 .

The Calculation of $\sum a$ & Output; After the calculation process of the values a_1 and a_2 have been completed, the next step is to sum the value of both to produce the value $\sum a$ (sigma 'a'). The value of $\sum a$ (sigma 'a') is derived from summing the value of a_1 , which is derived from the conversion of business entity value, business performance, risk sharing and customers' services, while for a_2 is derived from the conversion of the value of payment of commerce sector (groceries). After $\sum a$ and $\sum b$ have been determined, the last step is to compare the two values using the "IF THEN ELSE" rule to produce a decision recommendation. If the value of $\sum a$ (sigma 'a') is greater than $\sum b$ (sigma 'b') then the system produces a decision recommendation that the grocery store is eligible for capital assistance, and if the opposite, the value $\sum a$ (sigma 'a') is smaller rather than $\sum b$ (sigma 'b') then the grocery store is caategorized as decrease and needs to get coaching. Whereas if the value of $\sum a$ (sigma 'a') is equal to the value of $\sum b$ (sigma 'b') then the system produces the grocery store need to get assistance. Further detail of the transformation result of fuzzy logic formula into information system application can be seen in Figure 5. In Figure 5, it can be seen from 100 grocery stores in Surabaya, Indonesia, which is tested using fuzzy logic-based information system application on www.simtokop.net. it is known that know there are six stores that have Output: "Grow" (worth getting the revolving fund assistance) and have number of customers and vendors with the category "Many" i.e.:

1. Podomoro Store Jl. Tembok Dukuh 105
2. Rejeki Store Jl. Kalibutih 63
3. Dewa Store Jl. Gading 57
4. Omega Dua Store Jl. Menur Pumpungan 19
5. Revil Rusunawa Wonorejo Store
6. Asri Store Jl. Wonorejo 4 / 20

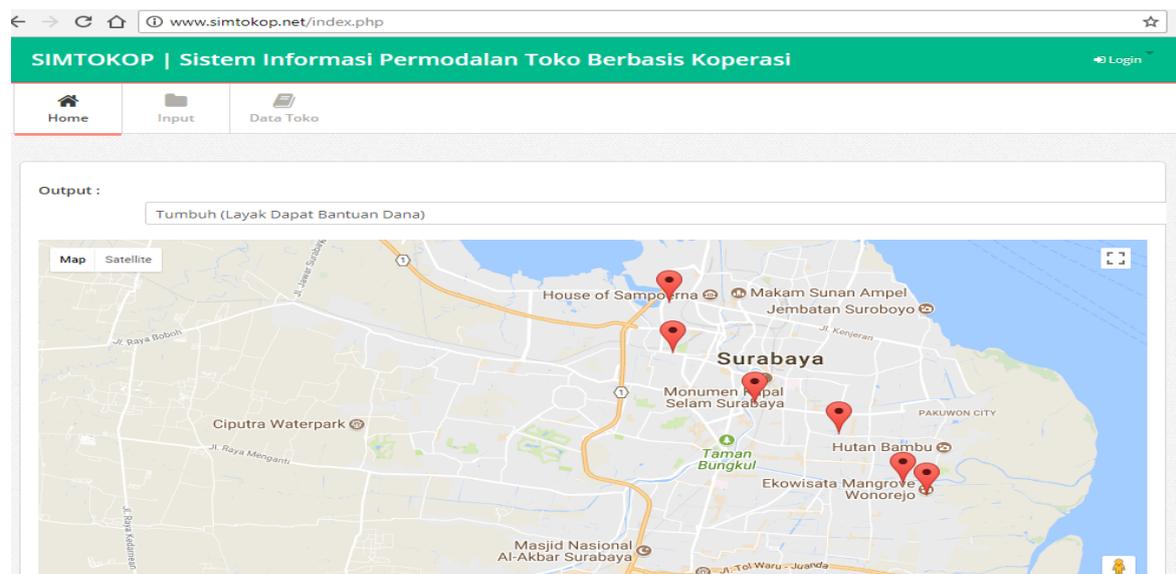


Figure 5. Display Output of Fuzzy Logic calculation on sistem informasi toko koperasi

Based on the result of logistic regression analysis, it can be deferred that from all influencing independent variables which is suspected influencing differentiation competitiveness of the grocery stores, there is one most influencing subvariable (the number of customers) towards the cash payment method of vendor with p value is $0.000 < 0.05$. The biggest OR value is 39,623, which means that there are 39,623 chances from total number of customers perceived by the respondents causing cash payment method. Considering that logistic regression analysis, it is concluded that the grocery stores which have greater customers will be easier for them to have the ability to pay and returning the capital.

V. CONCLUSIONS AND RECOMENDATION

Decision making of providing the revolving fund for business players of Sentra Kulakan Koperasi (Senkuko) needs to be done quickly, accurately and transparently so that the revolving fund can be given to the right party. Based on the results of manual calculations using logistic regression and calculation results using fuzzy logic-based information system application at www.simtokop.net, it is obtained the same recommendation on six stores that have output: "Growing" (eligible getting the revolving fund). Thereby, Cooperative and MSMEs Office of Surabaya or other region in Indonesia can implement the model in this study as a basis to make the decision of providing the revolving funds to the pioneering grocery stores of Senkuko.

VI. ACKNOWLEDGEMENT

The researchers special thank to Dinas Koperasi dan UMKM Distrik Jawa Timur, and Dinas Koperasi dan UMKM Surabaya City, Narotama University research institute and everyone who participated in this study. They all have helped a lot in providing data and information in developing strategies for determining the revolving fund of small grocery stores and Koperasi.

REFERENCES

- Alimudin, A., Falani, A. Z., Mudjanarko, S. W., & Limantara, A. D. (2019). Analisis Pengaruh Penerapan Perspektif Balanced Scorecard Terhadap Peningkatan Kinerja UMKM. *Ekonika : Jurnal Ekonomi Universitas Kadiri*, 4(1). <https://doi.org/10.30737/ekonika.v4i1.337>
- Alimudin, A., Soebandi, Falani, A. Z., Setiawan, E., & Arifin, B. (2018). The Use of Fuzzy Logic in Developing Competitiveness Strategy Toward Small and Medium Enterprises (Grocery). *Advanced Science Letters*. <https://doi.org/10.1166/asl.2017.10534>

- Augusty, F. (2006). *Metode Penelitian Manajemen*. Badan Penerbit Universitas Diponegoro.
- Dinas Koperasi dan UKM Provinsi Jawa Timur. (2018). Data UMKM. In 2018.
- DISKOP UKM JATIM. (2017). *Jumlah Umkm Di Provinsi Jawa Timur Menurut Sektor Dan Kabupaten/Kota*.
- Falani, A. Z., Alimudin, A., Damayanti, E., & Bon, A. T. (2019). Strategy for developing MSMEs performance using balanced scorecard model measurement based on information technology. *Proceedings of the International Conference on Industrial Engineering and Operations Management, 2019(MAR)*, 2284–2285.
- Harvie, C., Narjoko, D., dan Oum, S. (2010). *Firm Characteristic Determinants of SME participation in production Networks* (No. 11; ERIA Discussion Paper).
- Harwiki, Wiwiek, Nur Sayidah, and A. M. (2015). Kajian Dan Evaluasi Bisnis Senkuko Di Jawa Timur. *Jurnal Manajemen Dan Keuangan*, 5(1), 86–101.
- Hellmann, M. (2001). *Fuzzy Logic Introduction*.
- Holle, F. R., & Dewi, R. M. (2014). Pengembangan Industri Kecil Tahu pada Sentral Industri Tahu dan Tempe Desa Sepande Kecamatan Candi Kabupaten Sidoarjo. *Jurnal Pendidikan Ekonomi (JUPE)*, 2(3), 1–15.
- Hooley, G. J., Broderick, a. J., & Möller, K. (1998). Competitive positioning and the resource based view of the firm. *Journal of Strategic Marketing*, 6(2), 97–115. <https://doi.org/10.1080/09652549800000003>
- Hosmer, D. W., & Lemeshow, S. (2005). *Logistic Regression for Matched Case-Control Studies*. *Applied Logistic Regression* (Second Edi).
- Kristanto, J. (2013). Efektivitas Program Dana Bergulir Bagi Ukm Dalam Pemberdayaan Ekonomi. *Publika*, 1(2).
- Naba, A. (2010). *Fuzzy Logic Application to Support Decision Making “Aplikasi Logika Fuzzy untuk Pendukung Keputusan*No Title. Graha Ilmu.
- NOVIANA, N. E. (2014). Perkembangan Modal Dan Usaha Dalam Rangka Meningkatkan Sisa Hasil Usaha (Shu) Kpri” Bahagia Jaya” Kecamatan Gubeng Kota Surabaya. *Jurnal Pendidikan Ekonomi (JUPE)*, 2(3).
- Rahmasuciana, D. Y., Mulyo, D. H., & Masyhuri, M. A. S. Y. (2015). Pengaruh Pengadaan Beras Dan Operasi Pasar Terhadap Harga Beras Dalam Negeri. *Agro Ekonomi*, 26(2), 129–138. <https://doi.org/https://doi.org/10.22146/agroekonomi.17266>
- Slater, S. F., & Narver, J. C. (1995). Market orientation and the learning organization. *The Journal of Marketing*, 59(3), 63-74. <https://doi.org/doi:10.2307/1252120>
- Sri Kusuma Dewi and Hari Purnomo, F. L. A. for S. D. (2010). *Aplikasi Logika Fuzzy untuk Pendukung Keputusan*. Graha Ilmu.
- Sugiyono. (2018). Metode Penelitian Kombinasi (mixed Methods). In *International Journal of Physiology* (Vol. 6, Issue 1).
- Tobi, H., & Kampen, J. K. (2018). Research design: the methodology for interdisciplinary research framework. *Quality and Quantity*. <https://doi.org/10.1007/s11135-017-0513-8>
- Turban, E., McLean, E., & Wetherbe, J. (2008). *Information Technology for Management: Transforming Business in the Digital Economy* (6th ed.). John Wiley & Sons.
- Turban, E., E. Aronson, J., & Liang, T.-P. (2007). Decision Support Systems and Business Intelligence. *Decision Support and Business Intelligence Systems*, 7/E, 1–35. <https://doi.org/10.1017/CBO9781107415324.004>
- Ward, P. T., Leong, G. K., & Boyer, K. K. (1994). Manufacturing Proactive and Performance. *Decision Science*, 25(3), 337–358. <https://doi.org/10.1111/j.1540-5915.1994.tb00808.x>
- Wignaraja, G., Jinjark, Y. (2015). *Why do SMEs not borrow more from banks? Evidence from the People’s Republic of China and Southeast Asia*. <https://doi.org/http://dx.doi.org/10.2139/ssrn.2548916>
- Wijayanti, Pardiana, & Wiratno. (2011). *Analisis Pengaruh Perubahan Keuntungan Usaha Warung tradisional Dengan Munculnya Minimarket (Studi Kasus Di Kecamatan Pedurungan Kota Semarang)*. 71–85.
- Yankees, R. S. (2011). Cross Tabulation Analysis. *Qualtrics, Ico*.