

Rating of Bottled Drinking Water (AMDK) Sellers in Local and National in Madura Using Fuzzy TOPSIS

Tony Yulianto¹, M. Rofiqi Mudassir², Faisal³

{toniyulianto65@gmail.com¹, rofiqimudassir@gmail.com², faisol.monif@gmail.com³}

^{1,2,3}Mathematics Department, Faculty of Mathematics and Natural Sciences, Islamic University of Madura, Madura, Indonesia

Abstract. Bottled drinking water (AMDK) is raw water that has been through a sterilization, packaged and safe process to drink including mineral water and demineralized water. In recent years the sales of bottled drinking water (AMDK) in Indonesia have grown so rapidly that it needs a ranking. Sales is one of the most important indicators in a company, if the level of sales generated by the company is large, then the profits generated by the company will be large so that the company can survive in business competition and it built by seller. The method that can be used in ranking seller of local and national bottled drinking water is fuzzy TOPSIS method. Result of simulation, we get for AMDK local the sellers who is getting first rank are seller 11 and 12 and total of rank from the rating of seller is any 35 rank. Whereas AMDK national the sellers who is getting first rank are seller 13 and total of rank from the rating of seller is any 37 rank. Because the rank of AMDK national seller is more than AMDK local seller, so people still like AMDK national product than AMDK local product.

Keywords: AMDK, fuzzy TOPSIS, seller

1. Introduction

Drinking water is an important substance in life. About three-quarters of the human body consists of water and no one can survive more than 4-5 days without drinking water. Water is also used for industrial, agricultural, fire fighting, recreation, transportation and others. Water is needed by body organs to help with metabolism, assimilation systems, fluid balance, digestion, dissolution and toxin removal from the kidneys, so that the kidneys work lightly. Based on RI Minister of Health Regulation No. 416 / MENKES / PER / IX / 1990 concerning water quality supervision requirements, drinking water is water whose quality meets the requirements and can be drunk directly. Drinking water that is consumed by humans must have quality or content that can meet the body's needs. The large number of human needs for drinking water makes some people take the initiative to produce water into bottled drinking water [1].

Bottled drinking water (AMDK) is raw water that has been through a sterilization, packaged and safe process to drink including mineral water and demineralized water. In recent years the sales of bottled drinking water (AMDK) in Indonesia have grown so rapidly that it needs a ranking. The Ministry of Industry explained that the bottled water industry (AMDK) in 2013 had a production of 20.48 billion liters. Meanwhile, in 2014 there were 23.1 billion liters and in 2015 the total production was 24.7 billion liters. The more conscious people are to live healthy and want practical things, this has encouraged many bottled water companies (AMDK) to emerge, Chairperson of the Association of Indonesian Bottled Water Companies (Aspadin), said that currently the number of domestic bottled water industries reaches 700

units with 2,000 brands, bottled water companies compete to create a product that has the power to offer quality that laboratory tests have done [2].

The most important factor in providing quality in accordance with the standards is not only oriented to raw materials such as water quality, but many indicators that influence the success of product quality. Many products when in the process are not in accordance with the standards set. The occurrence of failure in a product is certainly not expected by the manager, when there is a failure in a product causing consumer loyalty to the product to decrease, so as to satisfy consumers one of them is to maintain product quality in accordance with standards to support competitiveness of increasing sales of bottled drinking water [3].

2. Bottled Water and Development

Bottled drinking water is raw, processed, and safe drinking water including mineral water and demineralized water. Bottled drinking water is processed in several stages using either the water purification process (reverse osmosis / without minerals) or the usual process of Water treatment processing (Mineral), where the source of water used for mineral bottled water comes from mountain springs, for bottled drinking water Non minerals can usually also be used with ground water sources / mountain springs. Mountain water is the best source of water for drinking water, because in addition to the location of the source that is far below the surface of the land, it is located above the height of the mountain which is still maintained naturalness. During the drainage of water in the soil, in a daily period of up to millions of years, physical and chemical processes occur. The hydrogeochemical process is strongly influenced by the mineral composition factors of aquifers (water-bearing rock layers), the processes and patterns of groundwater movement and the residence time of groundwater within the aquifer [2].

Based on Indonesian Minister of Industry Regulation Number 96 / M-IDN / PER / 12/2011, bottled water is processed water, without other food ingredients and food additives, packaged, and safe to drink. There is plenty of bottled drinking water (AMDK) circulating in Indonesia include [4]:

- a. Mineral water
Mineral water is drinking water that contains minerals in a certain amount without the addition of any minerals
- b. Demineralized water
Demineral water is bottled drinking water obtained through a process of purification by distillation, deionization, reverse, osmosis
- c. Natural mineral water
Natural mineral water is drinking water obtained directly from natural water sources or drilled from deep wells with a controlled process that avoids pollution or external influences on the chemical, physical and microbiological properties of natural mineral water
- d. Drinking water dew
Dew water namely water obtained from the process of condensing water vapor from moist air into droplets of dew water which is processed into packaged dew water. The bottled water business has continued to develop in fact, with the growing number of brands of bottled water products that continue to emerge, both large, medium and small. According to Asosiasi for Indonesian Bottled Drinking Water Production (ASPADIN), there are currently 480 bottled water companies, but only 350 with 165 of them are

incorporated in ASPADIN. Now there are approximately 600 brands of bottled water which are active including Aqua, Vit, Club, Flow, Hk, Gh, Adeni, and so on.

2.1 Factors Affecting the Sale of Bottled Drinking Water

The purpose of marketing activities is to influence sellers to be willing to sell company goods and services when they need them. Factors that influence the seller's decision are different for each seller in addition to the products sold. The factors that influence the seller include Branding, Packaging, Sales, Promotion, Competition, Brands, Product Quality are:

- a. Branding
According to Kotler and Keller [5] Branding is the giving of names, terms, signs, symbols, designs or combinations of all of them, which are made with the aim of identifying goods or suits or groups of sellers and to distinguish from goods or services from competitors.
- b. Packaging
Packaging is one of the fields in communication design that has special demands because its function directly dealing with consumers is a challenge because in addition to being required to get an aesthetic packaging design, manufacturers are also required to maximize packaging appeal to win in fight against competing products. Another challenge is that clients not only expect an increase in sales but also for consumers to remain faithful in using their products [4].
- c. Quality
Quality and quality of goods is one of the factors that affect sales volume. With good quality, consumers will remain loyal to the company's products, and vice versa. Conversely, if the quality of the product offered is not good, consumers will turn to other products [6].
- d. Sales
Sales is an activity that results in the flow of goods out of the company so that the company receives money from customers. Sales for service companies are services sold by the company. A trading company is an item sold by the company. While manufacturing companies are goods produced and sold by the company. So the definition of seller is an activity carried out by sellers in selling goods or services in the hope that they will earn a profit from the existence of these transactions [6].
- e. Promotion
Promotion is the main strategy for introducing bottled water to consumers. Promotion strategy is used as one way to increase demand or sales of bottled water, besides that promotion is an activity that is used as a way to communicate directly with consumers and prospective consumers [7].
- f. Competition
According to the large Indonesian dictionary competition is a competition carried out by a certain person or group of people, in order to obtain competitiveness or results [8].
- g. Brand
A brand is a product in the form of a name, trademark, logo or other symbol. Brands can be a tool to identify sellers or brand makers. In addition, the brand is actually a promise of sellers to consistently provide a description, benefits and certain services to buyers. The best brands provide quality assurance as well as brands more than just symbols [9].
- h. Price
Price is an attribute among several other attributes in consumer decision making. This will lead to price competition from various brands available in the market, so consumers

who are sensitive to price changes tend to switch to other cheaper brands. But consumers who are loyal to the brand they like may not switch to another brand [4].

i. **Product Quality**

Product quality is an understanding that the products offered by sellers have more selling values that are not owned by competing products. Therefore a company seeks to focus on product quality and compare it to products offered by competing companies. Quality must be measured through the consumer's perspective on the quality of the product itself, so that the tastes of consumers here are very influential. So in managing the quality of a product must be in accordance with the intended use by consumers. In this case the important thing is to maintain the consistency of product output at the level of quality desired and expected by consumers [4].

2.2 Sales

Sales is a transaction carried out by two or more parties using a legal payment instrument, with sales also being a source of income for a person or company that conducts buy and sell transactions, in a company if the greater the sale, the greater the income obtained [10].

The main purpose of sales is to get profits or profits from products or goods produced by the producers with good management. In its implementation, the sale itself cannot be carried out without the actors working in it such as agents, traders and marketing personnel [11].

2.3 Fuzzy

Fuzzy logic was first developed by Lotfi A. Zadeh through his writings in 1965 on fuzzy set theory [12]. Fuzzy logic is a method that is basically from an Artificial Intelligence system can mimic the ability of humans in thinking in the form of algorithms which are then run by machines. This algorithm is used in various data processing applications that cannot be represented in binary form. Fuzzy logic interprets vague statements into a logical understanding [13]. The term fuzzy means vague or unclear, but Fuzzy systems that are built to model the forecasting still have a clear way of working and description based on the theory of fuzzy logic [14].

2.5 Fuzzy Method TOPSIS Algorithm

Fuzzy TOPSIS method algorithm, namely [15]:

1. Fuzzy merging of each decision maker, $D_k: (k = 1, 2, 3, \dots, K)$ can be represented as a fuzzy triangle number $\tilde{R}_k: (k = 1, 2, 3, \dots, K)$ with the membership function $\mu_{\tilde{R}}(x)$.
2. Determine evaluation criteria
3. Next, adjust linguistic variables to evaluate criteria and alternatives.
4. After the criteria weights are met. Fuzzy ranking can be searched by the formula:

$$\tilde{R}_k = (a, b, c), k = 1, 2, 3, \dots, K \tag{1}$$

with,

$$a = \min\{a_k\}, b = \frac{1}{K} \sum_{k=1}^K b_k, c = \max\{c_k\}$$

5. Form a decision matrix D refers to an alternative from equation (1) that will be evaluated based on n criteria defined as follows

$$\bar{D} = \begin{bmatrix} \bar{x}_{11} & \bar{x}_{12} & \cdots & \bar{x}_{1n} \\ \bar{x}_{21} & \bar{x}_{22} & \cdots & \bar{x}_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ \bar{x}_{m1} & \bar{x}_{m2} & \cdots & \bar{x}_{mn} \end{bmatrix} \quad (2)$$

with \bar{x}_{ij} declare performance from calculations for the i alternative to the j attribute
Preference weight values indicate the relative importance of each criterion or subcriteria.
Weight values can be calculated using the formula:

$$W = \{w_1, w_2, w_3, \dots, w_n\} \quad (3)$$

with, \tilde{x}_{ij} and \tilde{w}_j^k is a linguistic variable which can be indicated by a fuzzy triangle value
 $\tilde{x}_{ij} = (a_{ij}, b_{ij}, c_{ij})$ and $\tilde{w}_j = (w_{j1}, w_{j2}, w_{j3})$

6. Determine normalized decision matrices. The normalized matrix from equation (2) is formed from the formula:

$$\tilde{R} = [\tilde{r}_{ij}]_{m \times n} \quad (4)$$

With B and C is the set of attributes benefit and cost, with

$$\tilde{r}_{ij} = \left(\frac{a_{ij}}{c_j^+}, \frac{b_{ij}}{c_j^+}, \frac{c_{ij}}{c_j^+} \right), j \in B \quad (5)$$

$$\tilde{r}_{ij} = \left(\frac{a_j^-}{c_{ij}}, \frac{a_j^-}{b_{ij}}, \frac{a_j^-}{a_{ij}} \right), j \in C \quad (6)$$

$$c_j^+ = \max_i c_{ij}, j \in B \text{ and } a_j^- = \min_i a_{ij}, j \in C$$

7. Calculate weighted normalized decision matrices. Calculating weighted atomized matrices is calculated using the equation (4) and (3) follows the formula:

$$\tilde{V} = [\tilde{v}_{ij}]_{m \times n}, i = 1, 2, 3, \dots, m; j = 1, 2, 3, \dots, n \quad \text{with,} \quad (7)$$

$$\tilde{v}_{ij} = \tilde{w}_i(\cdot) \tilde{r}_{ij}.$$

8. Calculating the matrix of positive ideal solutions A^+ and the matrix of negative ideal solutions A^- from equation (7) follows the formula:

$$A^+ = (\tilde{v}_1^+, \tilde{v}_2^+, \tilde{v}_3^+, \dots, \tilde{v}_n^+) \quad (8)$$

$$A^- = (\tilde{v}_1^-, \tilde{v}_2^-, \tilde{v}_3^-, \dots, \tilde{v}_n^-) \quad (9)$$

9. Calculate the distance between the values of each alternative with the matrix of the ideal positive solution and the negative ideal solution matrix of the equation (8) and (9). Alternative distance (d_i^+) with positive ideal solutions from equation (7) and (8) are formulated as follows:

$$d_i^+ = \sum_{j=1}^n (\tilde{v}_{ij}, \tilde{v}_j^+); i = 1, 2, 3, \dots, m. \quad (10)$$

Alternative distance (d_i^-) with negative ideal solutions from equation (7) and (9) are formulated as follows:

$$d_i^- = \sum_{j=1}^n (\tilde{v}_{ij}, \tilde{v}_j^-); i = 1, 2, 3, \dots, m. \quad (11)$$

10. Calculates the preference value for each alternative from the equation (10) and (11).

Preference value (CC_i) for each alternative formulated as follows:

$$CC_i = \frac{d_i^-}{d_i^+ + d_i^-}; i = 1, 2, 3, \dots, m \text{ with } 0 < CC_i < 1. \quad (12)$$

3. Results And Discussion

3.1 Fuzzy Topsis Process in Local bottled water sales ranking data

From the results of the data obtained from the results of the questionnaire to sellers in Madura with the products are Sae from Bangkalan, Aiman from Sampang, HK from Pamekasan, and Bariklana from Sumenep that have been changed into the form of numbers can be seen in Table 1.

Table 1. Local Products of Water

No.	Name of Sellers	Local Products			
		Sae	Aiman	HK	Bariklana
1	Istifa	1	2	1	1
2	Robiatul adabawiyah	4	5	5	4
3	Mulkan Abdullah	2	4	2	2
		⋮			
48	Samhadi	4	3	5	3
49	Zaykiya	3	4	5	4
50	M. Rofiq	4	5	3	5

3.2 Change data to fuzzy form of Local Water

To change data from Table 1 to the fuzzy form using equation (1) can be seen in the Table 2.

Table 1. Form of Matrix on Local bottled water products

No.	Name of Sellers	Local Products			
		Sae	Aiman	HK	Bariklana
1	Istifa	(1,1,3)	(1,3,5)	(1,1,3)	(1,1,3)
2	Robiatul adabawiyah	(5,7,9)	(7,9,9)	(7,9,9)	(5,7,9)
3	Mulkan Abdullah	(1,3,5)	(5,7,9)	(1,3,5)	(1,3,5)
		⋮			
48	Samhadi	(5,7,9)	(3,5,7)	(7,9,9)	(3,5,7)
49	Zaykiya	(3,5,7)	(5,7,9)	(7,9,9)	(5,7,9)
50	M. Rofiq	(5,7,9)	(7,9,9)	(3,5,7)	(7,9,9)

3.3 Search the value of Normalization Matrix (\widetilde{R}) of Local Water

Search the value of Normalization Matrix (\widetilde{R}) from the fuzzy form of data in Table 2 using equation (4) can be seen in Table 3.

Table 2. Normalization Matrix Results (\widetilde{R}) On Local bottled water products

No	Name of Sellers	Local Products			
		Sae	Aiman	HK	Bariklana
1	Istifa	$\left(\frac{3}{1}, \frac{3}{1}, \frac{3}{3}\right)$	$\left(\frac{1}{9}, \frac{3}{9}, \frac{5}{9}\right)$	$\left(\frac{1}{9}, \frac{1}{9}, \frac{3}{9}\right)$	$\left(\frac{1}{9}, \frac{1}{9}, \frac{3}{9}\right)$
2	Robiatul adabawiyah	$\left(\frac{3}{5}, \frac{3}{7}, \frac{3}{9}\right)$	$\left(\frac{7}{9}, \frac{9}{9}, \frac{9}{9}\right)$	$\left(\frac{7}{9}, \frac{9}{9}, \frac{9}{9}\right)$	$\left(\frac{5}{9}, \frac{7}{9}, \frac{9}{9}\right)$
3	Mulkan Abdullah	$\left(\frac{3}{1}, \frac{3}{3}, \frac{3}{5}\right)$	$\left(\frac{5}{9}, \frac{7}{9}, \frac{9}{9}\right)$	$\left(\frac{1}{9}, \frac{3}{9}, \frac{5}{9}\right)$	$\left(\frac{1}{9}, \frac{3}{9}, \frac{5}{9}\right)$
		⋮			

48	Samhadi	$\left(\frac{3}{5}, \frac{3}{7}, \frac{3}{9}\right)$	$\left(\frac{3}{9}, \frac{5}{9}, \frac{7}{9}\right)$	$\left(\frac{7}{9}, \frac{9}{9}, \frac{9}{9}\right)$	$\left(\frac{3}{9}, \frac{5}{9}, \frac{7}{9}\right)$
49	Zaykiya	$\left(\frac{3}{3}, \frac{3}{5}, \frac{3}{7}\right)$	$\left(\frac{5}{9}, \frac{7}{9}, \frac{9}{9}\right)$	$\left(\frac{7}{9}, \frac{9}{9}, \frac{9}{9}\right)$	$\left(\frac{5}{9}, \frac{7}{9}, \frac{9}{9}\right)$
50	M. Rofiq	$\left(\frac{3}{5}, \frac{3}{7}, \frac{3}{9}\right)$	$\left(\frac{7}{9}, \frac{9}{9}, \frac{9}{9}\right)$	$\left(\frac{3}{9}, \frac{5}{9}, \frac{7}{9}\right)$	$\left(\frac{7}{9}, \frac{9}{9}, \frac{9}{9}\right)$

3.4 Search the value of weighted normalization matrix (\widetilde{V}) of Local Water

The steps to search normalized matrix values from Table 3 using equation (7) can be seen in the Table 4.

Table 3. The results of the normalized matrix values are weighted (\widetilde{V})

No	Name of Sellers	Local Products			
		Sae	Aiman	HK	Bariklana
1	Istifa	$\left(\frac{67}{42}, \frac{603}{280}, \frac{6}{5}\right)$	$\left(\frac{67}{882}, \frac{603}{1960}, \frac{6}{7}\right)$	$\left(\frac{67}{882}, \frac{201}{1960}, \frac{18}{35}\right)$	$\left(\frac{67}{882}, \frac{201}{1960}, \frac{18}{38}\right)$
2	Robiatul adabawiyah	$\left(\frac{67}{210}, \frac{603}{1960}, \frac{2}{5}\right)$	$\left(\frac{67}{126}, \frac{1809}{1960}, \frac{54}{35}\right)$	$\left(\frac{67}{201}, \frac{1809}{1960}, \frac{54}{35}\right)$	$\left(\frac{335}{882}, \frac{201}{280,5}, \frac{4}{35}\right)$
3	Mulkan Abdullah	$\left(\frac{67}{42}, \frac{201}{280}, \frac{18}{25}\right)$	$\left(\frac{335}{882}, \frac{201}{280}, \frac{45}{35}\right)$	$\left(\frac{67}{882}, \frac{603}{1960}, \frac{6}{7}\right)$	$\left(\frac{67}{882}, \frac{603}{1960}, \frac{5}{7}\right)$
			⋮		
48	Samhadi	$\left(\frac{67}{210}, \frac{603}{1960}, \frac{2}{5}\right)$	$\left(\frac{67}{294}, \frac{201}{392}, \frac{6}{5}\right)$	$\left(\frac{67}{126}, \frac{1809}{1960}, \frac{54}{35}\right)$	$\left(\frac{67}{294}, \frac{201}{392}, \frac{6}{5}\right)$
49	Zaykiya	$\left(\frac{67}{126}, \frac{603}{1400}, \frac{18}{35}\right)$	$\left(\frac{335}{882}, \frac{201}{280}, \frac{54}{35}\right)$	$\left(\frac{67}{126}, \frac{1809}{1960}, \frac{54}{35}\right)$	$\left(\frac{335}{882}, \frac{201}{280}, \frac{54}{35}\right)$
50	M. Rofiq	$\left(\frac{67}{210}, \frac{603}{1960}, \frac{2}{5}\right)$	$\left(\frac{67}{126}, \frac{1809}{1960}, \frac{54}{35}\right)$	$\left(\frac{67}{294}, \frac{201}{392}, \frac{6}{5}\right)$	$\left(\frac{67}{126}, \frac{1809}{1960}, \frac{54}{35}\right)$

3.5 Search the value of an ideal solution of max (A^+) and min (A^-) of Local Water

To find the ideal value of the solution max (A^+) from Table 4 using equation (8) can be seen in the Table 5.

Tabel 4. The results of the editorial solution max A^+

Sae	Aiman	HK	Bariklana
$\left(\frac{6}{5}, \frac{6}{5}, \frac{6}{5}\right)$	$\left(\frac{54}{35}, \frac{54}{35}, \frac{54}{35}\right)$	$\left(\frac{54}{35}, \frac{54}{35}, \frac{54}{35}\right)$	$\left(\frac{54}{35}, \frac{54}{35}, \frac{54}{35}\right)$

Whereas to find the ideal value solution, min (A^-) from Table 4 using equation (9) can be seen in the Table 6.

Table 5. The ideal solution value results min A^-

Sae	Aiman	HK	Bariklana
$\left(\frac{67}{294}, \frac{67}{294}, \frac{67}{294}\right)$	$\left(\frac{67}{882}, \frac{67}{882}, \frac{67}{882}\right)$	$\left(\frac{67}{882}, \frac{67}{882}, \frac{67}{882}\right)$	$\left(\frac{67}{882}, \frac{67}{882}, \frac{67}{882}\right)$

3.6 Searching for the maximal solution distance max (d_i^+) and min (d_i^-) of Local Water

Searching for the maximal solution distance max (d_i^+) from Table 4 and 5 using equation (10) can be seen in the Table 7.

Table 6. The ideal solution max (d_i^+) on ranking local bottled water

No.	Name of Sellers	The ideal distance solution max (d_i^+)
1	Istifa	4,4261
2	Robiatul adabawiyah	3,0515
3	Mulkan Abdullah	3,6292
⋮		
48	Samhadi	3,5125
49	Zaykiya	3,0404
50	M. Rofiq	3,2128

To find the maximal solution distance max (d_i^-) from Table 4 and 6 using equation (11) can be seen in the Table 8.

Table 7. The ideal distance solution min (d_i^-) on ranking local bottled water

No.	Name of Sellers	Ideal distance solution min (d_i^-)
1	Istifa	2,4520
2	Robiatul adabawiyah	3,0879
3	Mulkan Abdullah	2,7672
⋮		
48	Samhadi	2,5377
49	Zaykiya	3,1626
50	M. Rofiq	2,8487

3.7 Preference Value (cc) and Rank of Local Water

Preference value from Table 7 and 8 using equation (12) can be seen in the Table 9.

Table 9. Preference Value (cc)

No.	Name of Sellers	Value of Local Preference	Rank
1	Istifa	0,3565	31
2	Robiatul adabawiyah	0,5030	3
3	Mulkan Abdullah	0,4326	18
⋮			
48	Samhadi	0,4194	21
49	Zaykiya	0,5099	2
50	M. Rofiq	0,4700	6

From the Table 9 so we can conclude that the sellers who is getting first rank are seller 11 and 12. Then, total of rank from the rating of seller is any 35 rank.

3.8 Fuzzy Topsis Process in National bottled water sales ranking data

From the results of the national water of data obtained from the results of the questionnaire to sellers in Madura that have been changed into the form of numbers can be seen in Table 10.

Tabel 8. Form of Matrix on Nasional bottled water products

No	Name of Sellers	National Products			
		Aqua	Flow	Club	Cleo
1	Istifa	1	2	1	2
2	Robiatul adabawiyah	4	3	5	3
3	Mulkan Abdullah	4	1	2	5
		:			
48	Samhadi	5	4	5	4
49	Zaykiya	5	4	5	3
50	M. Rofiq	4	5	4	5

For the next step follows the steps like calculating in local water. Then for the last step of national water can be seen in the Table 11.

3.9 Preference Value (cc) and Rank of National Water

The final result of national water calculation from preference value like the step before in local water using equation (12) can be seen in the Table 11.

Tabel 9. Preference Value National

No.	Name of Sellers	Value of National Preference	Rank
1	Istifa	0,3844	26
2	Robiatul adabawiyah	0,4194	20
3	Mulkan Abdullah	0,3147	36
		:	
48	Samhadi	0,4799	6
49	Zaykiya	0,4471	12
50	M. Rofiq	0,5030	2

From the Table 11 so we can conclude that the sellers who is getting first rank are seller 13. Then, total of rank from the rating of seller is any 37 rank.

6. Conclusion

The conclusions from this study are:

1. For the bottled drinking water local so we can conclude that the sellers who is getting first rank are seller 11 and 12. Then, total of rank from the rating of seller is any 35 rank.
2. For the bottled drinking water national so we can conclude that the sellers who is getting first rank are seller 13. Then, total of rank from the rating of seller is any 37 rank.
3. Because the rank of AMDK national seller is more than AMDK local seller, so people still like AMDK national product than AMDK local product.

Acknowledgements

The author thanks to Ristekdikti who have provided funding assistance related to PKPT research. Dean, Chair of the UIM MIPA Study Program and partner lecturer who have helped in the completion of PKPT research. K-Consulting CV has been helped in simulation on this research.

References

- [1] M. Badriyah, "Memprediksikan persediaan AMDK 'LABINI' di sumenep menggunakan metode sphaley value," Universitas Islam Madura, 2017.
- [2] M. Deril and H. Novirina, "Uji Parameter Air Minum Dalam Kemasan (AMDK) Di Kota Surabaya," *J. Ilm. Tek. Lingkung.*, vol. 6, no. 1, pp. 56–57, 2014.
- [3] O. D. Cahyanti, "Tata Kelola Produk AMDK Airku Di PDAM Tirta Binangon Dalam Upaya Memperluas Akses Air Minum Pada Masyarakat Kulon," *Jurnal*, pp. 3–5, 2016.
- [4] D. Arumsari, "Analisis Pengaruh Kualitas Produk, Harga dan Promosi Terhadap Keputusan Pembelian Air Minum Dalam Kemasan (AMDK) Merek Aqua," Universitas Diponegoro, 2012.
- [5] P. Kotler and K. L. Keller, *Manajemen Pemasaran*. Jakarta: Erlangga, 2009.
- [6] D. Yulitasari, "Pengaruh Biaya Promosi Terhadap Volume Penjualan pada Yamaha Sudirman Motor Temanggung," Universitas Negri Yogyakarta, 2014.
- [7] R. Alfianyah, "Pengaruh Dimensi Green Advertisin Terhadap Niat Beli Air Minum Dalam Kemasan (AMDK) Merek Ades Di Bandar Lampung," Universitas Lampung, 2017.
- [8] Departemen Pendidikan Indonesia, *Kamus Bahasa Indonesia*. Jakarta: Balai Pustaka, 2008.
- [9] I. P. Lestari, "Analisis Strategi Bisnis Air Minum Dalam Kemasan (PT Dharma Guna Citra Bandar Lampung)," Universitas Lampung, 2017.
- [10] F. Rusdi, "Sistem Informasi Penjualan," Universitas Komputer Indonesia, 2015.
- [11] M. Munir, "Peramalan Penjualan Genting Dengan Menggunakan Metode Fuzzy Time Series Markov Chain," Universitas Islam Madura, 2017.
- [12] T. Yulianto, S. Komariyah, and N. Ulfaniyah, "Application of fuzzy inference system by Sugeno method on estimating of salt production," in *AIP Conference Proceedings*, 2017, pp. 020039–1.
- [13] A. B. Elfajar, B. D. Setiawan, and C. Dewi, "Peramalan Jumlah Kunjungan Wisatawan Kota Batu Menggunakan Metode Time Invariant Fuzzy Time Series," *J. Pengemb. Teknol. Inf. Dan Ilmu Komput.*, p. 86, 2017.
- [14] M. N. Sumartini, Hayati and S. Wahyuningsih, "Peramalan Menggunakan Metode," *J. EKSPONENSIAL*, vol. 8, p. 51.
- [15] M. Ningrum, Sutarman, and R. Sitepu, "Aplikasi Metode TOPSIS Fuzzy Dalam Menentukan Prioritas Kawasan Perumahan Di Kecamatan Percut Sei tuan," *Saintia Mat.*, 2013.