

# Analysis of factors affecting competition in bottled drinking water sales in Madura

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## Analysis of factors affecting competition in bottled drinking water sales in Madura

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**Abstract.** Bottled Drinking Water is water that is treated using certain technologies, then packaged in various forms. The factors that influence the competition in the sale of bottled water include Branding, Packaging, Quality, Sales, Promotion, Competition, Brand, Price, Product Quality, Marketing. From this, there needs to be an analysis to determine the competition in selling bottled water between local and national products. Therefore, research will be conducted using the factor analysis method, factor analysis aims to identify the relationship between variables so that it can be classified into several sets of variables that are less than the number of initial variables. From the ten variables can be reduced to less after a factor analysis then of the ten variables into two factors, from each factor is given a group or name where the first factor is an influence factor and the second factor is an item factor. From each local product and national product have two factors, but of the two added together to produce diversity values, local products are able to provide a cumulative diversity value of 59.474%. While the National Product is able to provide a cumulative diversity value of 62.059%. This research contributed to the decision making regarding the factors that influence the competition in the sale of bottled water. This study provides recommendations to bottled water companies to give more attention to the factors that influence the success of bottled water sales.

### 1. Introduction

Drinking water is an important substance in life. About three-fourths 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, recreational areas, transportation and others. Water is needed by the body's organs to help the occurrence of metabolism, assimilation system, fluid balance, digestion process, dissolution and removal of toxins from the kidneys, so that the kidneys work light [1,5].

Bottled Drinking Water is water that is treated using certain technologies, then packaged in various forms. AMDK has a very important role in people's lives today. When the need for proper water is increasingly difficult to obtain, various types of bottled drinking water are offered by the drinking water industry both from local products and national products. New competitors can enter the industry with relative easy, as well as suppliers and customers can increase their bargaining power, so that companies compete by tackling environmental forces in the interests of the company [3,8].

When viewed from the effect of sales on increasing bottled drinking water, several factors that influence bottled drinking water sales are Branding, Packaging, Quality, Sales, Promotion, Sales,



Brand, Price, Product Quality, Marketing. In this research an analysis is needed to determine the factors that influence sales between local and national products in Madura. Associated with these problems, so that it is necessary to do one study to solve these problems with the factor analysis method. Factor analysis is one of the multivariate statistical methods used to reduce some of the underlying factors and is also used to explain the relationships or correlations between various independent indicators observed [4,7]. The main objective of Factor Analysis is to reduce data that has many variables into a set of variables that make up a number of factors that are smaller in number. With this method the competition results in the sale of bottled drinking water.

The problem in this study that are: how the characteristics of consumer ratings in Madura on bottled drinking water products in Madura, what factors affect the competition for sales of bottled drinking water, and what is the proportion of the diversity of each factor formed and the proportion of cumulative diversity of all factors consisting of sales competition bottled drinking water in Madura. This study aims to determine the competition in selling bottled drinking water between local and national products.

**2. Literature review**

**2.1. Sales competition**

Sale is an activity that results in the flow of goods out of the company so that the company receives money from customers. Sales for a service company are the services that the company sells. Trading companies are goods that the company sells. Whereas manufacturing companies are goods produced and sold by these companies. Activity that is carried out by the seller in selling goods or services in the hope that they will get profit from the existence of these transactions [6,7].

**2.2. Multivariate analysis**

Multivariate analysis is statistical analysis techniques that treat a group of variables as a system, by calculating the correlation between research variables. If there are as many as  $n$  objects and  $p$  variables. Then the observation of  $i$ th object and  $j$ th variable are notated  $x_{ij}$  with  $i = 1, 2, \dots, n$  and  $j = 1, 2, \dots, p$

The classification of multivariate analysis techniques is divided into two main categories [9,10]:

- Dependence method  
Dependence method is a multivariate technique in which there are variables or sets of dependent variables and other variables as independent variables. The techniques included in the dependence method are multiple regression, discriminant analysis, and canonical correlation analysis.
- Interdependence method  
Interdependence method is a multivariate technique in which there are no variables or a number of variables that predict or explain other variables. In this case there are no dependent and independent variables. The interdependence method is included like factor analysis, cluster analysis, categorical data analysis and multidimensional scaling. Then it can be seen in Table 1.

**Table 1.** Variables and Object Relations

	Var 1	Var 1	...	Var j	...	Var i
Object 1	$x_{11}$	$x_{12}$	...	$x_{1j}$	...	$x_{1i}$
Object 2	$x_{21}$	$x_{22}$	...	$x_{2j}$	...	$x_{2i}$
⋮	⋮	⋮	⋮	⋮	⋮	⋮
Objectn	$x_{n1}$	$x_{n2}$	⋮	$x_{nj}$	⋮	$x_{ni}$

**2.3. Initial data testing**

The initial data testing which is included that are correlation test, data adequacy test, homogeneity test, normality test [2]:

- Correlation test

Some things that must be fulfilled before the factor analysis is a correlation between variables and the adequacy of the sample. Solid testing is carried out with the Sphericity Barlett  $H_0$  is between variables do not correlate with each other  $H_1$  is between interrelated variables

$$x_{count\ it}^2 = -\ln|R|(n-1 - (\frac{2p+5}{6}))$$

$$X_{table}^2 = X_{0,05,\frac{1}{2}10(10-1)}^2 \tag{1}$$

Decline  $H_0$  if  $X_{count\ it}^2 > X_{\frac{1}{2}(p-1)(\alpha)}^2$  or value of  $p - value < \alpha$  then the variables are correlated. This means there is a relationship between variables, so it is worth doing a factor analysis [9].

- Kaiser mayer olkin data adequacy test

The Kaiser Mayer Olkin Test aims to determine whether all data that has been adequately factored, the hypothesis of KMO is as follows [9].

Hypothesis:

$H_0$ : enough data is factored

$H_1$ : insufficient amount of data to factor

$$KMO = \frac{\sum_{i \neq j} r_{ij}^2}{\sum_{i \neq j} r_{ij}^2 + \sum_{i \neq a} a_{ij}^2} \tag{2}$$

- Homogeneity test

Homogeneity Testing is testing covariant variance using the *Box's M* test, hypothesis and *Box's M* test statistics [2].

Hypothesis:

$H_0: \Sigma_1 = \Sigma_2 = \dots = \Sigma_k = \Sigma$

$H_1$ : there is at least one  $\Sigma_i \neq \Sigma_j$  for  $i \neq j$

$$X_{count\ it}^2 = -2(1 - c_1) \left( \frac{1}{2} \sum_{j=1}^c v_j \ln|s_j| - \frac{1}{2} \ln \|s_{pool}\| \sum_{j=1}^c v_j \right)$$

$$s_{pool} = \frac{\sum_{j=1}^c v_j S_j}{\sum_{j=1}^c v_j}$$

$$c_1 = \left( \sum_{j=1}^c \frac{1}{v_j} - \frac{1}{\sum_{j=1}^c v_j} \right) \left( \frac{2p^2 + 3p - 1}{6(p+1)(k-1)} \right) v_i = n_i - 1 \tag{3}$$

- Normality test

Test makes it easier to check whether a multivariate normal data is distributed, so with the help of the R program the following tests are performed [2]:

Hypothesis:

$H_0$ : multivariate normally distributed data

$H_1$ : data not normally distributed multivariate

$$d_i^2 = (x_i - \bar{x})^T s^{-1} (x_i - \bar{x}); = 1, 2, \dots, n \tag{4}$$

- Measure of sampling test (MSA)

Measure of Sampling (MSA) Test is a test used to determine whether a variable is sufficient for a factor analysis. If the MSA value is higher than 0.05, the variable is sufficient for further analysis. If the MSA value is less than 0.05 then the variable cannot be predicted and is not further analyzed and excluded from the variable. The MSA value of each variable can be calculated using the following formula [2]:

$$MSA_i = \frac{\sum_{i \neq k} r_{ik}^2}{\sum_{i \neq k} r_{ik}^2 + \sum_{i \neq k} a_{ik}^2} \tag{5}$$

#### 2.4. Factor analysis

Factor analysis is a technique that aims to define the fundamental structure of a collection of variables. Factor analysis is in principle used to reduce data, namely the process of summarizing a number of variables to be smaller and named as factors [11,12]. For example  $X$  is an observed random vector  $\Sigma$  will be summarized into a number of  $m$  factors, where  $m \leq p$ . The factor model states that  $Xt$  is

linearly dependent on unobserved variables  $F_1, F_2, \dots, F_m$  which are called joint factors and a number of additional  $p$  variance variables  $\varepsilon_1, \varepsilon_2, \dots, \varepsilon_p$  which are called specific factors.

$$X_p - \mu_p = l_{p1}F_1 + l_{p2}F_2 + \dots + l_{pm}F_m + \varepsilon_p \quad (6)$$

Based from equation (6), it can be formed into the matrix:

$$\begin{bmatrix} X_1 \\ X_2 \\ \vdots \\ X_p \end{bmatrix} - \begin{bmatrix} \mu_1 \\ \mu_2 \\ \vdots \\ \mu_p \end{bmatrix} = \begin{bmatrix} l_{11} & l_{21} & \dots & l_{1m} \\ l_{21} & l_{22} & \dots & l_{2m} \\ \vdots & \vdots & \ddots & \vdots \\ l_{p1} & l_{p1} & \dots & l_{pm} \end{bmatrix} \begin{bmatrix} F_1 \\ F_2 \\ \vdots \\ F_m \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_p \end{bmatrix} \quad (7)$$

In equation (7) it can be written as:

$$\mathbf{X}_{(p \times 1)} - \boldsymbol{\mu}_{(p \times 1)} = \mathbf{L}_{(p \times 1)} \mathbf{F}_{(m \times 1)} + \boldsymbol{\varepsilon}_{(p \times 1)} \quad (8)$$

### 2.5. Determination of the number of factors

According to Rolph E Adensor, the determination of the number of factors based on the magnitude of the eigen value is the amount of variance the maximum. The way of getting the amount of variance maximum with doing a factor analysis to find new variables called factors that correlate free each other. Fewer in number than the original variable, but it can absorb some of the information that contained in the original variable. The selected core factors are factors that have an eigen value  $> 1$  [12].

### 2.6. Loading factor estimation

Factor analysis of the  $S$  sample covariance matrix which is in the form of a specification of the eigen-eigen factor and  $(\hat{\lambda}_1, \hat{e}_1), (\hat{\lambda}_2, \hat{e}_2) \dots, (\hat{\lambda}_p, \hat{e}_p)$  where  $\hat{\lambda}_1 \geq \hat{\lambda}_2 \geq \dots \hat{\lambda}_1 \geq 0$  if  $m < pa$  is the number of factors. Estimated Loading factor estimated:  $\{\hat{L}_i\}$  is given by [12]:

$$\text{Is: } \hat{L}_j = \left[ \sqrt{\hat{\lambda}_1} \hat{e}_1 \ ; \ \sqrt{\hat{\lambda}_2} \hat{e}_2 \ \dots \ \sqrt{\hat{\lambda}_p} \hat{e}_p \right] \text{eigen vector}$$

Specific estimation of variance comes from the diagonal element of the matrix  $S - LL'$  so we get:

$$\text{So } \varphi = \begin{bmatrix} \varphi_1 & 0 & \dots & 0 \\ 0 & \varphi_2 & \dots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \dots & \varphi_p \end{bmatrix}$$

### 2.7. The rotation process with varimax

Factor rotation is done to facilitate interpretation in determining which variables are listed in a factor because there are some variables that have a high correlation with more than one factor or a loading factor of a variable value below the smallest predetermined. The main purpose of this method is to get a factor structure so that each variable is loaded only on a factor. So, each variable must have a high load on one factor and on another factor [12].

### 2.8. Scores factor

Factor Scores are used to estimate the value of factors that are not observed randomly on the  $F_j$  factor, where  $j = 1, 2, \dots, n$  of the factors formed can provide an explanation that between variables within a particular factor have a very strong relationship, the goal of the Scores factor is create one or several variables that can represent variables that already exist [9,12].

### 2.9. Determination of dominant factors

A measure of suitability obtain a feasible description of the use of  $k$  factor analysis. It used for interpretation or further analysis is the percentage of diversity that can be explained by  $k$  factor analysis, namely  $\frac{(\lambda_1, \lambda_2, \dots, \lambda_k)}{(\lambda_1, \lambda_2, \dots, \lambda_p)} 100\%$ ; where  $\lambda_1, \lambda_2, \dots, \lambda_k$  are eigen values. The greater the value of the suitability measure, the more feasible the factor analysis is used. There are researchers who use practical guidance in using  $k$  factor analysis if the diversity can be explained is  $\geq 80\%$ . The covariance matrix that used is a correlation matrix, so many researchers in the social field ignore the analysis of factors that correspond to eigen values less than 1 [9,12].

### 3. Research method

The results of the descriptive statistical analysis of each variable for the competition results in sales of bottled drinking water can be seen in Table 2.

**Table 2.** Competition For Sales Of Local Products And National Products

Variabel local AMDK	Mean	Varabel national AMDK	Mean
$X_{1L}$	4	$X_{1N}$	4
$X_{1L}$	4	$X_{2N}$	4
$\vdots$	$\vdots$	$\vdots$	$\vdots$
$X_{10L}$	4	$X_{10}$	4

Assessing feasible variables based on the results of the SPSS with output for the 10 question data is answered by 98 respondents in the questionnaire.

#### 3.1. Correlation test

This stage tests the correlation of variables from equation (1) that have been defined using the Barlett's sphericity test, the Barlett's sphericity test can be seen in Tables 3 and 4 of them as follows:

**Table 3.** Barlett's Sphericity Local Products

Approx Chi-Square		401.399
Df		45
Sig.	.000	

**Table 4.** Barlett's National Product Sphericity

Approx Chi-Square		434.531
Df		45
Sig.	.000	

Between local products and national products have been fulfilled  $X_{count}^2 > X_{tabel}^2$ , so it can be interpreted that the interrelated variables have been met, then the next stage can be continued.

#### 3.2. Adequacy test

Data sufficiency test to know whether all data that has been factored enough, then the data sufficiency test must be carried out. As for the data testing carried out based on Kaiser Mayer Olkin (KMO) from equation (2). Tables 5 and 6 are as follows:

**Table 5.** Mayer-Olkin Kaiser Local Products

Kaiser-Meyer-Olkin Measure Of Sampling Adequacy	0.881
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Then it can be seen in Table 6 the results of the National AMDK

**Table 6.** Mayer-Olkin Kaiser National Products

Kaiser Mayer-Olkin	0.878
Measure Of	
Sampling Adequacy	

Reject  $H_0$  if KMO value  $< 0.5$  therefore KMO value  $> 0.5$  between local products and national products so that  $H_0$  fails to be rejected which means that the data is sufficient to be factored. Then the variables and samples are worthy of further analysis.

### 3.3. Homogeneity test

Homogeneity Testing from equation (3) is testing the variance of covariance using the Box's M test, the hypothesis and the Box's M test statistics. The result, we can take a look from Tables 7 and 8.

**Table 7.** Test Box's M Local Products

Box's M	18.1960
Chi-quer	18.0334
Df	12
P	0.1147
$X_{tabel}^2$	36.4150

Then it can be seen in Table 8 the results of national bottled drinking water.

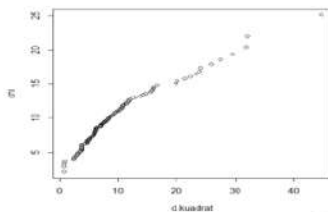
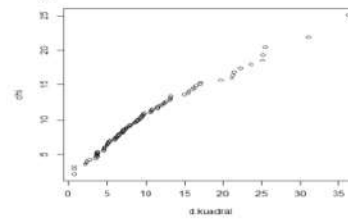
**Table 8.** Test Box's M National Products

Box's M	14.3100
Chi-quer	14.1822
Df	12
P	0.2892
$X_{tabel}^2$	36.4150

Between local products and national products the value of  $u \leq X_{tabel}^2$  fails to reject  $H_0$  which means a homogeneous variance-covariance matrix is homogeneous and we can conclude identical residuals.

### 3.4. Normality test

The next stage in conducting factor analysis is testing whether the data are multivariate in normal distribution. Testing the normality of the data in this study using the help of the R. program. The results of the normality test from equation (4) on the data of local bottled drinking water and drinking water in the National packaging can be seen in Figure 1 and Figure 2.

**Figure 1.** Local Lottery Product Test Plots**Figure 2.** National Product Normality Test Plots

Based on Figure 1 and 2 it can be concluded that the graph spreads to resemble a straight line for both local AMDK and National AMDK so that local AMDK and National AMDK data spread normally multivariate.

### 3.5. Measure of Sampling Adequacy (MSA)

Measure of Sampling (MSA) Test from equation (5) is a test used to determine whether a variable is sufficient for a factor analysis. If the MSA value is higher than 0.05, the variable is sufficient for



further analysis. If the MSA value is less than 0.01 then the variable cannot be predicted and is not further analyzed and excluded from the variable, it can be seen in Table 9.

**Table 9.** Bottled Water Local Products And National Products

Variable drinking water in Local Product packaging	Value	Variable drinking water in National Product packaging	Value
$X_{1L}$	0,945	$X_{1N}$	0,932
$X_{2L}$	0,739	$X_{2N}$	0,915
$\vdots$	$\vdots$	$\vdots$	$\vdots$
$X_{10L}$	0,885	$X_{10N}$	0,929

3.6. Determination of the number of factors

In the table below determination of the number of factors to be determined eigenvalues can be seen in Tables 10 and 11.

**Table 10.** Total Variance Explained Products Local

Component	Initial Eigenvalues			Extraction Sums Of Squared Loading		
	Value	% Variance	Cumulative%	Value	% of Variance	Cumulative %
1	4.721	47.214	47.214	4.721	47.214	47.214
2	1.226	12.261	59.474	1.226	12.261	59.474
3	0.982	9.817	69.291			
$\vdots$	$\vdots$	$\vdots$	$\vdots$			
10	0.267	2.667	100.000			

Based on the results of local product research, it can be seen that of the 10 variables analyzed only 2 components were formed. Variables that can be explained by component 1 are obtained the total variance, so it can be explained are  $4,721 / 10 \times 100\% = 47,214\%$ . Variables that can be explained by component 2 are obtained the total variance, so it can be explained is  $1,226 / 10 \times 100\% = 12,261\%$ . The total variance the cumulative for 2 factors is  $47,214\% + 12,261\% = 59,474\%$ . By extracting the initial variables into 2 factors, a total cumulative variance has been produced, which is quite large, namely 59,474%. It means that the 2 components formed can represent 10 competing variables. In the sale of drinking water in local product packaging, it explains 59.474%, thus from extracting 2 factors that obtained, so it can be stopped and meets these criteria.

**Table 11.** Total Variance Explained Local Products

Component	Initial Eigenvalues			Extraction Sums Of Squared Loading		
	Value	% Variance	Cumulative%	Value	% of Variance	Cumulative %
1	4.721	47.214	47.214	4.721	47.214	47.214
2	1.226	12.261	59.474	1.226	12.261	59.474
3	0.982	9.817	69.291			
$\vdots$	$\vdots$	$\vdots$	$\vdots$			
10	0.267	2.667	100.000			

While the results of the national product research can be seen that of the 10 variables, analyzed only 2 components were formed. Variables that can be explained by component 1 are obtained the total variance that can be explained is  $4.822 / 10 \times 100\% = 48.217\%$ . Variables that can be explained by component 2 are obtained the total variance that can be explained is  $1.384 / 10 \times 100\% = 13.841\%$ . Variance cumulative total for the 2 components is  $48.217\% + 13.841\% = 62.059\%$ . By extracting the initial variables into 2 factors, a significant cumulative total variance of 62.059% has

been produced. It means that the 2 components that formed, so it can represent 10 competing variables. In the sales of bottled drinking water in Madura, It explains 62.059%.

### 3.7. Component matrix

After knowing that 2 factors are the most optimal number, the Component Matrix Table shows the distribution of the ten variables on the two factors formed. While the values in the table are loading factors, which show the correlation between variables with factor 1, the process of determining which variables will go into the factor is done by making a large comparison on each row. For more details, it can be seen in the Table 12 and 13.

**Table 12.** Component Matrix Product Local

	Component	
	1	2
$X_{1L}$	0.640	-0.072
$X_{2L}$	0.300	0.355
$\vdots$	$\vdots$	$\vdots$
$X_{10L}$	0.778	-0.223

Based on the results from Table 12, it explains the variable  $X_1$  (Branding) that the correlation between variables  $X_1$  with a factor of 1 is 0.640 (strong because it is above 0.5) and the correlation between variables  $X_1$  with a factor of 2 is -0.072 (very weak because it is below 0.5). Because the biggest factor loading number is in component 1, so the variable  $X_1$  can be a correlation between variables  $X_2$  (packaging) with a factor of 1 is 0.300 (weak because below 0.5) and the correlation between variables  $X_2$  is 0.355 (weak because it is below 0.5). Because there is variable  $X_2$  (packaging) that is not yet clear will be included in factor 1 and 2, so it is necessary to do the rotation process (rotation) will be increasingly, clear the difference in a variable will be included in factor 1 or 2.

**Table 13.** Component Matrix Products National

	Component	
	1	2
$X_{1N}$	0.722	-0.239
$X_{2N}$	0.752	-0.070
$\vdots$	$\vdots$	$\vdots$
$X_{10N}$	0.778	0.034

Based on the results of Table 13, it explain the variable  $X_1$  (Branding) that the correlation between variables  $X_1$  with a factor of 1 is 0.722 (strong because it is above 0.5) and the correlation of the variable  $X_1$  with a factor of 2 is -0.239 (weak because it is below 0.5). Because the largest loading factor number exist in component 1, so the  $X_1$  variable can be entered as component (factor) 1.

### 3.8. Rotation

The process of rotation in the results of this study aims to get factors with factor loading that is clear enough for interpretation. Rotated component matrix (correlation matrix) which shows the distribution of variables that are clearer and more tangible than the component matrix. Then it can be seen in Tables 14 and 15 of them as follows:

**Table 14.** Rotated Component Matrix Products Local

	Component	
	1	2
$X_{1L}$	0.566	0.306
$X_{2L}$	0.044	0.463
$\vdots$	$\vdots$	$\vdots$
$X_{10L}$	0.766	0.260

Based on the results of the component matrix, the results of the rotation process (Rotated Component Matrix) shows a more clear and tangible distribution of variables. It can be seen that the loading factor which was initially small is getting smaller, and the large loading factor is getting bigger.

**Table 15.** Rotated Component Matrix Products National

	Component	
	1	2
$X_{1N}$	0.748	0.137
$X_{2N}$	0.693	0.299
⋮	⋮	⋮
$X_{10N}$	0.682	0.420

Judging from Table 15, it can be seen that variabel  $X_2$  (Branding) variable is included in factor 1 because factor loading has the biggest factor (0.748), variable  $X_2$  (packaging) this variable goes to factor 1 due to factor loading with factors 1 is the largest (0.693), and so on.

#### 4. Result and discussion

Judging from the results of rotation, competition can be formed between Local Products and National Products, so they can be seen in Table 16 and 17.

**Table 16.** Results Of Grouping Variables In Local Product Factors

Component	Variabel	Eigenvalue	Factor loading		Variance %
			1	2	
$F_1$	$X_1$	4.721	0,566	0,302	47.214
$F_1$	$X_3$	4.721	0,684	0,263	47.214
⋮	⋮	⋮	⋮	⋮	⋮
$F_2$	$X_9$	1.226	0,327	0,766	12.261

Then it can be seen in Table 17 the results of National bottled drinking water

**Table 17.** Results Of Grouping Variables In National Product Factors

Component	Variabel	Eigenvalue	Factor loading		Variance %
			1	2	
$F_1$	$X_{1N}$	4.822	0,748	0,137	48.217
$F_1$	$X_{2N}$	4.822	0,693	0,299	48.217
⋮	⋮	⋮	⋮	⋮	⋮
$F_2$	$X_{9N}$	1.384	0,225	0,812	13.841

Based on Tables 16 and 17, it can be distinguished from those included in factor 1 of Table 16 (Branding, Quality, Sales, Promotion, Competition, Marketing) while those included in factor 2 include (Brand, Price, Product Quality). Based on Table 17, it can be distinguished from those included in factor 1 (Branding, Packaging, Quality, Sales, Promotion, Competition, Competition) while another included in factor 2 among them (Brand, Price, Product Quality). Thus it can be seen the results of competition between local products and national products, National Products are higher than local products because national product variables are included in all factors compared to local products. The local product is one of the variables that is not included in the factor because the factor is less than 0.55, so the factor is not significant.

**Table 18.** Results of Factor 1

Factor 1	
bottled water for local products	bottled water for national products
1. Branding	1. Branding
2. Quality	2. Packaging
3. Sales	3. Quality
4. Promotion	4. Sales
5. Competition	5. Promotion
6. Marketing	6. Competition
	7. Marketing
total diversity : 47.214%	total diversity : 48.217%.

**Table 19.** Results of Factor 2

Factor 2	
bottled water for local products	bottled water for national products
1. Brand	1. Brand
2. Price	2. Price
3. Product Quality	3. Product Quality
total diversity: 12.261%.	total diversity: 13.841%.

Cumulative Diversity Value of Local Products between Factor 1 and Factor 2: 47,214% + 12,261% = 59,474%  
 Cumulative Diversity Value of National Products between Factor 1 and Factor 2: 48,217% + 13,841% = 62,059%

After forming the factors of all the variables studied, the naming of factors based on the characteristics is in accordance with the members of the Local Products AMDK and the National Products AMDK

AMDK Local Products Factor 1: consists of variable (Branding, Quality, Sales, Promotion, Competition, Marketing) and the factor is called the Influence Factor. Factor 2: consists of variables (Brand, Price, Product Quality) and the factor is called the Item Factor. AMDK National Product Factor 1: consists of variable (Branding, Packaging, Quality, Sales, Promotion, Competition, Marketing) and the factor is called the Influence Factor. Factor 2: consists of variables (Brand, Price, Product Quality) and the factor is called the Item Factor.

Of the ten variables studied, after analyzing the factors using the appropriate method, obtained 2 factors, namely: the first factor ( $F_1$ ) is an influence factor capable of explaining the total diversity value of 47,214%. The second factor ( $F_2$ ) Item Factor is able to explain the value of diversity a total of 12,261%. These two factors provide a cumulative diversity of 59,474% meaning that the two factors said in this study can affect the competition in the sale of bottled drinking water in Madura 59,474%.

Of the ten variables studied, after a factor analysis using the appropriate method, 2 factors were obtained: the first factor ( $F_1$ ) was the Influence Factor explaining the total diversity value of 48,217%. The second factor ( $F_2$ ) item factor is able to explain the total diversity value of 13,841%. These two factors are able to provide a cumulative diversity value of 62.059% which means that the two factors said in this study can affect the competition in the sale of bottled drinking water in Madura 62.059%.

#### 4 Conclusion

Based on the simulation results using the Predator Factor Analysis method, it can be concluded that the competition between Local Products and National Products has clearly seen. National Products has the cumulative value of 62.059%. It is better than compared to the value of cumulative diversity of Local Products of 59.474%.

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1

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#### References

- [1] M. Badriyah, "Memprediksikan Persediaan AMDK "LABINI" di Sumenep Menggunakan Metode Shapley Value," in skripsi, pakong, universitas islam madura, 2017, p. 5.
- [2] M. Deril and H. Novirina, "Uji Parameter Air Minum Dalam Kemasan (AMDK) Di Kota Surabaya," *Jurnal Ilmiah Teknik Lingkungan* Vol. 6 No. 1, pp. 56-57, 2014.
- [3] W. Kuntjoroadi and N. Safitri, "Analisis Strategi Bersaing dalam Persaingan," *Bisnis & Birokrasi, Jurnal Ilmu Administrasi dan Organisasi*, Jan—Apr 2009, pp. 45-52, 2014.
- [4] M. Konitin, *Kajian Tentang Analisis Faktor Menggunakan Metode Principal Component Analysis*, Yogyakarta: Universitas Negeri Sunan Kalijaga Yogyakarta, 2010.
- [5] A. Florence, "Industri Air Minum Dalam Kemasan (AMDK)," *Journal article*, 2015.
- [6] D. Yulitasari, "Pengaruh Biaya Promosi Terhadap Volume Penjualan pada Yamaha Sudirman Motor Temanggung," in *Skripsi*, Yongyakarta, Universitas Negeri Yongyakarta, 2014, p. 10.
- [7] D. Arumsari, "Analisis Pengaruh Kualitas Produk, Harga dan Promosi Terhadap Keputusan Pembelian Air Minum Dalam Kemasan (AMDK) Merek Aqua," in *Skripsi*, semarang, Universitas Diponegoro, 2012, pp. 24-25.
- [8] I. P. Lestari, "Analisis Strategi Bisnis Air Minum Dalam Kemasan (PT Dharma Guna Citra Bandar Lampung)," in *skripsi*, Bandar Lampung, Universitas Lampung, 2017, p. 8.
- [9] H. Zahroh, "Analisis Faktor Dalam Menentukan Komoditas Dominan dari Hasil Pertanian dan Perkebunan di Pulau Jawa," in *skripsi*, pamekasan, Uuniversitas Islam Madura, 2016, pp. 6-21.
- [10] A. R. Rencher, *Methods of Multivariate Analysis*, New York: John Wiley Son Inc, 2002.
- [11] Santoso, *Riset Pemasaran Konsep dan Aplikasi dengan SPSS*, Jakarta: PT. Elek Media Komputindo Kelompok Gramedia, 2001.
- [12] F. Elvira, "Penerapan Analisis Faktor untuk Menentukan Faktor-faktor yang Mempengaruhi Mahasiswa dalam Memilih Jurusan Matematika Fakultas Sains dan Teknologi Universitas Islam Negeri Alauddin Makassar," in *skripsi*, makassar, Universitas Islam Negeri Alauddin, 2014, p. 5.

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