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## Analysis of Factors Affecting The Quality of Shrimp Paste In Bangkalan District

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### **ABSTRACT**

*This study was conducted to determine the factors considered and the dominant factors considered to affect the quality of shrimp paste. The population of this research is shrimp paste producers in Bangkalan regency with a sample of 96 respondents. Sources of research data using primary data collected through the distribution of questionnaires. The sampling technique used is non-probability sampling with the technique of determining the sample by accidental sampling. The research instrument test uses a validity test, reliability test, and factor analysis as research analysis methods. The results showed that the factors considered affecting the quality of shrimp paste in Kab. Bangkalan, namely production facilities, raw materials, equipment, production processes, maintenance, and the environment.*

**Keywords:** *quality, quality factor, factor analysis*

### **Abstrak**

Penelitian ini dilakukan untuk mengetahui faktor-faktor yang dipertimbangkan dan faktor-faktor dominan yang dianggap mempengaruhi kualitas terasi. Populasi dalam penelitian ini adalah produsen terasi di Kabupaten Bangkalan dengan sampel sebanyak 96 responden. Sumber data penelitian menggunakan data primer yang dikumpulkan melalui penyebaran kuesioner. Teknik pengambilan sampel yang digunakan adalah non probability sampling dengan teknik penentuan sampel secara accidental sampling. Uji instrumen penelitian menggunakan uji validitas, uji reliabilitas, dan analisis faktor sebagai metode analisis penelitian. Hasil penelitian menunjukkan bahwa faktor-faktor yang dianggap mempengaruhi kualitas terasi di Kab. Bangkalan, yaitu fasilitas produksi, bahan baku, peralatan, proses produksi, pemeliharaan, dan lingkungan.

**Kata kunci:** *kualitas, faktor kualitas, analisis faktor*

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## INTRODUCTION

The manufacturing industry is currently developing very quickly and rapidly. This development can be caused by competition and innovation that continues to occur following the changing times. The variety of manufacturing industries is very diverse, one of which is the food industry. Regency. Bangkalan had a fishery production of 29,064 tons in 2018 and 31,772 tons in 2019 (Central Bureau of Statistics, 2019). This means that the shrimp paste product in Kab. Bangkalan with abundant raw materials has the potential to continue to be developed and improved, especially in the quality aspect because one of the strengths in the food industry that can be considered for business actors to be able to compete with competitors and survive in the market competition is quality products.

Product quality means that the product sold must be the product that the customer needs (Heizer & Render, 2014). Therefore, producers must be able to produce quality products by providing good production performance and paying attention to things that can affect product quality directly or indirectly to produce good quality products and are needed by customers. In addition, quality is important because it can enhance a company's reputation, a product liability, and global implications (Heizer & Render, 2014). The shrimp paste products in the market have various qualities. Not all shrimp paste products have good quality and not all shrimp paste products with good quality are needed by customers. The diversity of products in quality can be used as an attraction in reaching the market. Basically a product of good quality will be able to reach a wide market. Quality can be influenced by several things, such as how manufacturers process products, which in the process can be done in various ways depending on the processor, and others.

Things that need to be considered to produce quality products refer to previous research, including the capital, labor, and raw materials (Andriani, 2017), raw materials, production processes, and equipment maintenance (Nuha & Zunaida, 2020), work environment (Sayuti & Susanto, 2017), labor, raw materials and machinery (Ngadiman & Abdul Hamid, 2017) which also has an attachment relationship with quality indicated by the statement that training procedures, maintenance, and checking of incoming raw materials are the main factors to overcome the problems that occur. In general, manufacturers in an effort to maintain and improve the quality of their products can pay attention to and consider the following factors: raw materials, machinery, labor, production processes, work environment, capital and maintenance. Then a factor analysis will be carried out to gain deeper knowledge about the factors considered and the dominant factors considered to affect the quality of shrimp paste, especially in Bangkalan.

## LITERATURE REVIEW

Quality is the characteristics and all the features of a product or service related to the ability of the manufacturer to meet market demands for the desired function (Besterfield, 2009). According to Assauri (2016) Quality is emphasized on all the main characteristics of a product that bring and support improvements in the fulfillment of customer desires. Another definition, quality is defined as the ability of a product and service to meet customer needs (Heizer & Render, 2014). Quality can be interpreted in various ways and seen from different perspectives. The definition of quality in terms of manufacturing based means that product quality is goods that meet standards and are made right the first time. Quality is important for every manufacturing company so that the products produced can satisfy customers.

One of the things that are directly related to the formation of product quality is how the treatment is given during production activities. These factors have a strong relationship with whether the production of goods and services achieves its goals. There are several factors that affect the quality of a product or service according to Besterfield<sup>2</sup> (2009) namely raw materials, machinery, labor,

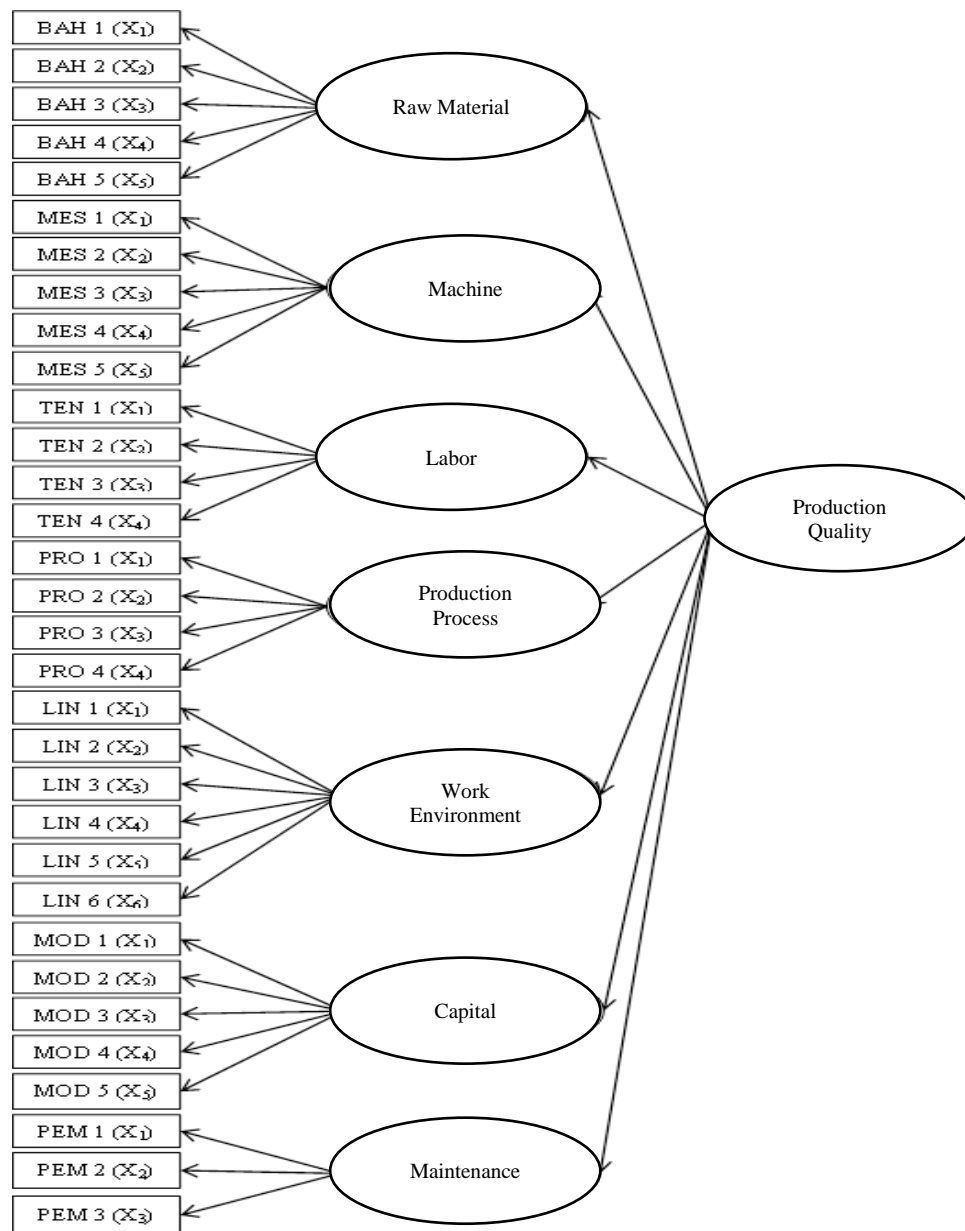
production processes and work environment. The meaning of these variables is according to Kholmi (2013), raw material is something that makes up the bulk of the final product. Assauri (2016) defines a machine as a tool that is driven by a force or power that is used to assist production in working on certain products or product parts. Labor (HR) according to Sedarmayanti (2011) related to the quality of the workforce regarding the ability, both in the form of physical ability, knowledge, and mental. According to Heizer & Render (2014) The process is defined as the method, method or technique used when the production takes place. Therefore, the production process is defined as an activity to add benefits or value to goods and services using owned factors of production. According to Sedarmayanti (2011) The work environment consists of the tools and materials encountered. The work environment includes the surroundings where a person works, the work process, and work arrangements both individually and in groups.

Capital is the most important element in the continuity of a business that is used to carry out operational activities so as to produce valuable products. Every business that is started always requires working capital to finance daily operational activities which are expected to return and rotate through sales proceeds. Capital is also all costs that must be incurred to process inputs into outputs that are ready to be sold, including production costs and quality costs. Working capital requires good handling so that business operations can run according to plan without any capital constraints (Kasmir, 2010). While the general definition of maintenance is a series of activities needed to maintain and keep a system or product in an economical, safe, efficient, and optimal operating condition. Referring to previous research, according to Nuha *et al.* (2020); Satar & Israndi, (2019); Noerpratomo (2018); Endri & Emalia (2017); Andriani (2017); Herawati & Mulyani (2016); Sayuti & Susanto (2017); and Ngadiman *et al.* (2017) shows that product quality can be influenced by factors of raw materials, machinery, labor, production processes, work environment, capital and maintenance. While the most influencing factors according to Herawati & Mulyani (2016) namely the production process and according to Andriani (2017) namely raw materials. Therefore, the factors of the production process and raw materials are the factors that are considered dominant in influencing the quality of the product. In this study, the hypotheses built are as follows:

**H1:** Factors considered to affect product quality include raw materials, machinery, labor, production processes, work environment, capital and maintenance.

**H2:** The dominant factors affecting product quality are raw materials and production processes.

The framework for formulating this research hypothesis is as follows:



**Figure 1.** Research Framework

## RESEARCH METHODS

The population in this study were all shrimp paste producers in Bangkalan. Determination of the number of samples using the Lemeshow formula and obtained or 96 the number of samples as a data source that will represent the shrimp paste population in Bangkalan. Researchers used non-probability sampling technique to determine the sample of this study and accidental sampling as the method. Measurement of data obtained by using a likert scale. The type of data used in this research is quantitative data that comes from primary data sources. How to get it by distributing questionnaires to respondents. Completion of this research using factor analysis technique using SPSS 16.0 program for research data processing.

## RESULTS AND DISCUSSION

The description of the average characteristics of respondents based on the results of the distribution of questionnaires to 96 respondents, it is known that as many as 62 respondents (64.6%) are female. A total of 38 (39.6%) respondents aged 41 - 50 years. A total of 38 (39.6%) respondents had the latest education in junior high school. A total of 30 (31.3%) respondents have been running a business for 11 - 15 years. A total of 85 (88.5%) respondents were assisted by 1 - 5 people in the production process. Validity testing was carried out using the SPSS 16.0 program on 96 respondents. The decision is based on the value of  $r_{count} > r_{table}$  of 0.200 for  $df = 96 - 2 = 94$  and  $\alpha = 0.05$  then the item is valid or vice versa. The instruments tested were 32 and one question with results below the standard provisions. Then drop items so that there are 31 remaining items that are suitable to be used as a measuring tool for variable representation raw materials, machinery, labor, production processes, work environment, capital, and maintenance due to all of the questions tested have a value of  $r_{count} > r_{table}$  or  $> 0.200$  and are declared valid.

Reliability testing carried out using Cronbach's Alpha method. Decision based on limit value 0.600. If the Cronbach Alpha value is  $> 0.600$ , then it is declared reliable. On the other hand, if the Cronbach Alpha value is  $< 0.600$ , it is declared unreliable. The test results of all the question instruments from each tested variable were declared reliable as seen from the Cronbach Alpha value  $> 0.600$ . Furthermore, the items in each variable concept of raw materials, machinery, labor, production processes, work environment, capital, and maintenance are appropriate to be used as measuring tools and can be continued to perform factor analysis. The data testing phase with factor analysis was carried out on 7 variables and 31 research instruments that had passed the validity and reliability testing. KMO MSA test results (Kaiser-Meyer-Olkin Measure of Sampling Adequacy) and Bartlett's Test of Sphericity are presented as follows:

**Table 1.** KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.625
Bartlett's Test of Sphericity	Approx. Chi-Square	813,793
	df	210
	Sig.	.000

Based on the output table above, it is known that the KMO MSA value is 0.625 and the value of Bartlett's Test of Sphericity (Sig.) 0.00 which means that both of them are eligible because KMO MSA  $> 0.5$  and Sig.  $< 0.05$ . So, the variables tested can be said to be feasible and Factor analysis in this study can be continued because it has met the first requirement. Next is the Measure of Sampling Adequacy (MSA) test. The data from the Measures of Sampling Adequacy (MSA) test describes the relationship between the independent variables indicated by the letter code (a) in the SPSS output results of the Anti Image Correlation table or the sampling adequacy value with the condition that the value is  $> 0.5$ . The indicators with MSA test results that do not meet the requirements can be dropped (dropped) and retested after the drop.

The first MSA test has been carried out and found several indicators that do not meet the requirements. The first MSA test was 31 indicators with 10 indicators dropped (dropped) because they had a value below  $> 0.5$ . The omitted indicators include: raw material specifications 0.432, composition 0.462, reliability 0.400, capacity 0.464, education 0.359, gender 0.362, air temperature 0.482, hygiene handler 0.454, equipment purchase 0.440, and raw material cost 0.452. So, a second MSA test was carried out with 21 indicators that met the requirements. It is known that of the 21 indicators that were retested, all indicators met the requirements with a value of  $> 0.5$ . This means that all of the indicators tested in the MSA test are feasible to be used for factor analysis. Thus all indicators have met the requirements *Bartlett's Test of Sphericity*, *Coefficient-Meyer-Olkin* (KMO) and Measures Sampling

Adequacy (MSA). The extraction stage is carried out on the tested variables so that a group of factors is formed. The number of variants of a variable that can be explained by existing factors is called communalities. The greater the value of communalities, the greater the correlation with the formed factors. The communalities output data are presented as follows:

**Table 2.** Results of Communalities

No	Indicator	<i>Initial</i>	<i>Extraction</i>
1	BAH_2	1,000	0.642
2	BAH_3	1,000	0.771
3	BAH_4	1,000	0.613
4	MES_1	1,000	0.559
5	MES_2	1,000	0.587
6	MES_5	1,000	0.613
7	TEN_2	1,000	0.599
8	TEN_3	1,000	0.468
9	PRO_1	1,000	0.559
10	PRO_2	1,000	0.678
11	PRO_3	1,000	0.690
12	PRO_4	1,000	0.628
13	LIN_1	1,000	0.803
14	LIN_3	1,000	0.648
15	LIN_4	1,000	0.779
16	MOD_3	1,000	0.758
17	MOD_4	1,000	0.695
18	MOD_5	1,000	0.763
19	PEM_1	1,000	0.576
20	PEM_2	1,000	0.606
21	PEM_3	1,000	0.545

Based on the output table above, it is known the extraction value for all indicators is  $> 0.50$  which means that all indicators used already have a strong relationship and are able to explain the factors formed. Therefore, it can be seen that all variables can be used to explain factors. The next factor extraction stage is the total variance explained which describes the number of factors formed as seen from the eigenvalues which indicate the relative importance of each factor in calculating the variance of the existing components. The ordering of the eigenvalues is ordered from the largest to the smallest. The value of the variance that is owned  $> 1$ . The total variance explained is presented as follows:

**Table 3.** Total Variance Explained

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	4,502	21,437	21,437
2	2,491	11,863	33,300
3	2.168	10.323	43,623
4	1,810	8,619	52,242
5	1.381	6.575	58,817
6	1,228	5.849	64,666

Source: SPSS Processed Data for 2022

Based on the output table *initial eigenvalues* above it is known that there are 6 variants or factors that can be formed from the 21 components analyzed. To be a factor, the value of *eigenvalues* must  $> 1$ .

Score eigenvalues component 1 is 4,502 and able to explain 21.437% variation. Score eigenvalues component 2 is 2,491 and able to explain 11.863% of variation. Score eigenvalues component 3 is 2.168 and able to explain 10.323% variation. Score eigenvalues component 4 is 1,810

and able to explain 8,619% variation. Score eigenvalues component 5 is 1.381 and able to explain 6.575% variation. Score eigenvalues component 6 is 1,228 and able to explain 5,849% variation. Whole Score eigenvalues component  $> 1$  then it can be used as factor 1, factor 2, factor 3, factor 4, factor 5, and factor 6. If all factors are added up, it can explain 64.666% variation. Factor rotation is used with the varimax method to simplify the factor matrix columns, which are known from the highest coefficient values. We can find factor rotation in the output of the rotated component matrix test results after the component matrix for better interpretation of the output results. The component matrix is to determine the number of factors formed from factor analysis and show the correlation value of each indicator with the formed factors. The output of the component matrix test results is presented as follows:

**Table 4.** Component Matrix

	Component Matrix					
	1	2	3	4	5	6
BAH_2	.253	.638	.220	-.259	-.117	-.204
BAH_3	.355	.579	.255	-.462	-.100	-.144
BAH_4	.259	.176	.265	-.404	-.524	.083
MES_1	.194	.472	.134	.172	.344	-.364
MES_2	.462	.002	.370	.240	-.412	-.093
MES_5	.406	-.048	.233	.470	-.386	-.144
TEN_2	.458	-.112	.059	.546	-.064	-.266
TEN_3	.572	-.120	-.287	.142	-.096	-.122
PRO_1	.371	-.284	.567	.034	-.061	-.120
PRO_2	.150	.088	.658	.147	.427	.103
PRO_3	-.287	-.253	.702	-.027	.165	-.151
PRO_4	-.003	-.163	.547	.013	.291	.466
LIN_1	.825	-.170	-.179	.116	.023	.220
LIN_3	.530	.172	-.212	.324	.346	-.260
LIN_4	.792	-.036	-.155	-.195	.271	.122
MOD_3	.618	.311	-.100	-.444	.259	-.080
MOD_4	.693	-.341	.065	-.220	.084	.198
MOD_5	.773	-.273	-.105	-.071	-.072	.264
PEM_1	.012	.537	.070	.202	-.226	.437
PEM_2	.002	.515	.016	.408	.004	.418
PEM_3	-.034	.623	-.106	.318	.100	.185

Source: SPSS Processed Data for 2022

Based on the output table above, it can be seen in the indicatorsbah\_2that the correlation value ingredients source with factor 1 of 0.253, the value of correlation with factor 2 of 0.638, the value of correlation with factor 3 of 0.220, the value of correlation with factor 4 of -0.259, the value of correlation with factor 5 of -0.117, and the value of correlation with factor 6 of -0.204. Likewise with the other 20 indicators mentioned in table 4.12 data. The next step is factor rotation analysis (rotated component matrix) which is needed to determine the distribution of indicators that have been rotated into factors. Rotated component matrix is a matrix of rotated components which is the main output of the basic component analysis. The output contains the estimated correlation between each factor and the estimated components. The output of the rotated component matrix test results is presented as follows:

**Table 5.** Rotated Component Matrix

	Rotated Component Matrix					
	Component					
	1	2	3	4	5	6
BAH_2	-.037	<b>.757</b>	.072	-.018	.173	.178
BAH_3	.107	<b>.863</b>	-.008	.042	.078	.082
BAH_4	.111	<b>.597</b>	.214	-.016	.005	-.445
MES_1	-.069	.295	.071	.098	.129	<b>.660</b>
MES_2	.156	.219	<b>.704</b>	.107	.045	-.071
MES_5	.106	.001	<b>.769</b>	.000	.091	.042
TEN_2	.210	-.162	<b>.635</b>	-.028	-.003	.353
TEN_3	<b>.500</b>	-.030	.310	-.296	-.069	.169
PRO_1	.176	.128	<b>.471</b>	.454	-.286	-.038
PRO_2	.030	.096	.099	<b>.761</b>	.105	.260
PRO_3	-.383	-.008	.100	<b>.650</b>	-.330	-.040
PRO_4	.109	-.111	-.069	<b>.744</b>	-.121	-.174
LIN_1	.842	-.043	.281	-.046	.076	.075
LIN_3	.382	-.011	.178	-.115	.083	<b>.671</b>
LIN_4	<b>.834</b>	.188	-.026	.030	-.048	.211
MOD_3	.560	<b>.562</b>	-.199	-.040	-.052	.292
MOD_4	<b>.761</b>	.077	.120	.195	-.217	-.104
MOD_5	<b>.830</b>	.021	.235	-.003	-.045	-.130
PEM_1	-.043	.185	.078	.014	<b>.716</b>	-.143
PEM_2	-.031	-.014	.053	.072	<b>.768</b>	.086
PEM_3	-.107	.089	-.058	-.071	<b>.661</b>	.283

Based on the output table above, it is known that 6 new factors are formed. The first group of factors is TEN\_3, LIN\_1, LIN\_4, MOD\_4, and MOD\_5. Factor group the second is BAH\_2, BAH\_3, BAH\_4, and MOD\_3. The third group of factors, namely MES\_2, MES\_5, TEN\_2, and PRO\_1. The fourth group of factors, namely PRO\_2, PRO\_3, and PRO\_4. The fifth group of factors, namely PEM\_1, PEM\_2, and PEM\_3. The sixth group of factors, namely MES\_1 and LIN\_3. The last step of factor analysis is to interpret the factors that have been formed in order to describe the components that are members of the factor group. The most indicators exist in these variables in the following table:

**Table 6.** Distribution of Formed Indicators

No	Factor Name	Forming Components	Score
1	Production facilities	Work experience (TEN_3) Plight (LIN_1) Air circulation (LIN_4) Equipment maintenance costs (MOD_4) Cost of quality (MOD_5)	4,502
2	Raw material	Source of raw material (BAH_2) Price of raw materials (BAH_3) Material is easy to get (BAH_4) Labor cost (MOD_3)	2,491
3	Equipment	Equipment (MES_2) Durability (MES_5) Useless (TEN_2) planning (PRO_1)	2.168
4	Production process	Execution (PRO_2) Surveillance (PRO_3) Evaluation (PRO_4)	1,810
5	Maintenance	Preventive maintenance (PEM_1) Damage maintenance (PEM_2) Emergency maintenance (PEM_3)	1.381
6	Environment	Technology (MES_1) Air smell (LIN_3)	1,228



Based on the output table above, it can be seen that the correlation between the factors formed and their constituent components is seen from the total value. This value shows the relative importance of each factor in calculating the variance of the components formed, which are ordered from the highest to the lowest value. The production facility factor has the highest value, namely 4,502, raw material factor of 2,491, equipment factor of 2,168, production process factor of 1,810, maintenance factor of 1,381, and environmental factor of 1,228. Then, the factors considered affect the quality of shrimp paste in Kab. Bangkalan, namely production facilities, raw materials, equipment, production processes, maintenance, and the environment.

Based on the first hypothesis of the study, it is suspected that the which is considered to affect the quality of petis products in Bangkalan include raw materials, machinery, labor, production processes, working environment, capital and maintenance. This research refers to research conducted by Nuha *et al* (2020); Satar & Israndi (2019); Noerpratomo (2018); Endri & Emalia (2017); Andriani (2017); Herawati & Mulyani (2016); and Sayuti & Susanto (2017) shows that product quality can be influenced by factors of raw materials, machinery, labor, production processes, work environment, capital and maintenance. Then these factors are considered affect the quality of the petis product. Based on the eigenvalues from the results of the analysis output that has been carried out in this study, the production facility factor has a value of the highest eigenvalues then followed by the raw material factor. These two factors have the highest eigenvalues among another group of factors. Referring to the results of previous research, this study has results are not the same but not much different. Research conducted by Herawati & Mulyani (2016) stated that the most an important role that affects product quality is the process production. Meanwhile, according to Andriani (2017) in his research that the most influencing product of production are raw materials. Research result in this case, the factors of production facilities and raw materials are factors with highest / dominant value. The difference is in the facility factor production and production process factors. The difference is due to because the variables and indicators tested in factor analysis have variety, number, and different respondents with previous research.

## CONCLUSIONS

Based on the results of research and data analysis conducted on the factors that affect the quality of shrimp paste in Bangkalan obtained conclusions from research results that answer the formulation of the research problem. The factors considered affect the quality of shrimp paste in Bangkalan, namely production facilities, raw materials, equipment, production processes, maintenance, and the environment. These six factors need to be considered in order to maintain and improve the quality of shrimp paste products produced by shrimp paste business actors, especially in Kab. Bangkalan. While know the dominant factor that is considered to have an effect on the quality of the shrimp paste, namely the factor of production facilities. This indicates that the factor of production facilities has an important role in the production of quality shrimp paste products because of the large relationship between the two based on the output of the research that has been done. Therefore, to produce shrimp paste products with good quality, it is necessary to consider and pay attention to the factors of production facilities.

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