The Analysis of Factors Affecting the Buying Interest in Poultry Frozen Food Processed Product

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Abstract

The purpose of this research is to determine the indicators of the factor affecting consumer buying interest on frozen chicken processed products and consumer cluster analysis. The data obtained through questionnaires distributed to 200 respondents. Seven factors are affecting the buying interest, product, price, promotion, distribution, individual characteristics, social life, and psychological aspect. All factors consist of some indicators. The results showed that 22 indicators that have been determined reduced to 16 indicators based on the results of factor analysis, and grouped in 6 factors. The cluster analysis results from this study formed 2 clusters that the factors of buy interest and characteristics of respondents vary in each cluster. The first cluster consists of 138 samples and the second cluster consists of 58 samples the first cluster dominates by the female private employee group and second cluster dominate by wife household group. All factors hypothesized affecting the customer buying interest are proven for the first cluster. While for the second cluster the factors that affect the buying interest are product attributes, price, and distribution.

Keywords
Cluster Analysis, Factor Analysis.

1. Introduction
The Indonesian poultry industry is a key sector for the national economy, supplying 65% of all animal protein and employing 10% of the national labour force (Ferlito and Respatiadi 2019). Food processing industries grow rapidly by the emergence of frozen food which is often found in modern markets, hotels, restaurants, and supermarkets, and increasing the competition level. Modern public awareness of healthy fast food increases by the emergence of processed products of frozen chicken. Business actors must be able to understand the demand and consumer needs that change from time to time. Semarang is one of the potential markets for the frozen chicken processed product. Currently, various types of frozen food are emerging with a variety of interesting processing and serving creativity, one of which is processed chicken products such as frozen nuggets, meatballs, sausages, and so on.

Companies that already have a place in the hearts of the consumer with various superior products such as PT. So Good Food, PT Charoen Pokphand, PT Belfoods Indonesia, and some micro businesses compete to sell their product. Also, the government encourages the growth of slaughter, storage, and meat processing manufacture, then the poultry product no longer sold as fresh food but frozen food. Figure 1 shows us the projected compound growth for the Annual Growth Rate of several types of food and beverages in Indonesia from the period 2013 to 2017. The projected growth for frozen processed food almost reaches 20 %. The rapid growth of the food and beverage industry has made business people understand the demands and needs of consumers as a top priority. The growth of the food and beverage industry is influenced by rapid changes in customer preferences (Nisar 2014). In more mature households, the tendency to buy canned and preserved food decreases. The tendency to consume something instant like fast food occurs in young couples. This is quite a serious concern for processing industries that the enthusiasts of frozen food consumers still fluctuate. Therefore, it is necessary to identify the factor of consumer buying interest on the frozen processed product which is ideal for all people, especially frozen chicken processed products. There were more than 30 registered micro-businesses at Semarang in 2017 that operate their business on frozen processed food. This shows that the business is a potential sector and has a huge market share of food products in Semarang. Based on a survey conducted by Mars

Indonesia in 2015, Semarang is the highest nugget market share in Indonesia. This research aims to identify the factor affecting consumer buy interest to find out the important attribute product and did a cluster analysis to group the customer to find out the existing market segmentation.
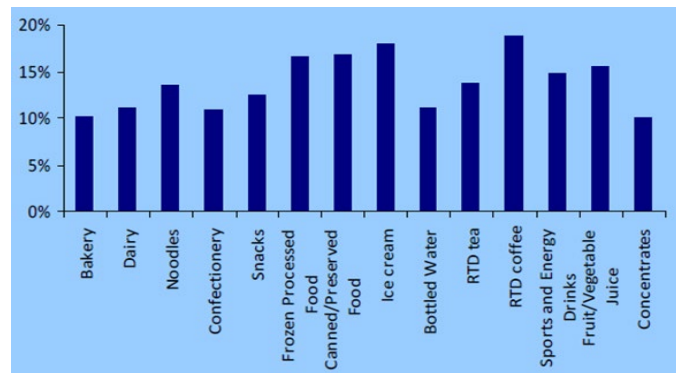

Figure 1: Projected compound growth for annual growth rate of several types of food and beverages in Indonesia 2013-2017.

2. Literature Review

Poultry per-capita consumption was estimated to growth 27 % from 2014 to 2023. Chicken meat has high nutrition, low calories and can be served easily and quickly. The difference between chicken meat and other livestock meat lies in the composition of the protein and fat content in the meat. In chicken meat, most of the fat is at the bottom of the skin and after the cooking process only contains 1.3% fat. Therefore, chicken meat is often used as food to be processed and developed. Processed chicken products are one of the potentials integrated industries from the farm to food industry entrepreneurs (Ariffin et al. 2012). The processed chicken products include chicken nuggets, shredded chicken, crispy chicken, meatballs, sausages, frozen chicken, gelatin, and others. The marketing of the chicken processed product must consider some aspects such as price, product specification, and built the brand image from consumer trust and loyalty.

Marketing is a social and managerial process where individuals and groups get their needs and want by creating, offering, and exchanging products that are of value to each other. The size of a market depends on the number of buyers in the market. Potential buyers have three main characteristics, namely having interest, income, and access. Gain the potential buyer will increase the market share and increase the selling product. To gain a new customer and maintain the existing customer, the marketer needs information about consumer behaviour. Marketers must understand how consumers transform marketing stimuli into buyers' responses. A person's buying behaviour is a complex matter involves many factors such as cultural, social, personal, and psychological factors (Hervé and Mullet 2009). Many of these factors are uncontrolled by marketers. Consumer desires something that meets their needs. This desire is influenced by the cultural background and individual characteristics of a person.

Purchase intention can be a predictive way to incorporate the factors that are most relevant for that person purchase decision (Morwitz 2014). The buying interest can also be interpreted as consumer attitudes towards products that consist of consumer trust in the brand and brand evaluation. Consumers may also form an interest in buying the most preferred product. Kotler suggests that buying interest happens after the consumer evaluates alternatives before making a purchasing decision. There are five indicators of buying interest: consumer aware of the need of the product, being interested in finding information about products, study and evaluate product alternatives, decision to buy, and behaviour after purchase (Chaston 2015).

3. Research Method

3.1 Data Collecting

The data collected through questionnaires formed based on predetermined indicators and then distributed to 200 respondents. Table 1 describe the research factors and indicators used to identify factors of buying interest. Seven

factors are affecting consumer buying interest consist of four factors from product marketing mix (price, product, promotion, and distribution), and others factors are individual factor, psychological factor, and social factors.

Table 1. Factors and indicators of buying interest.

Factors	Indicators	Code
Product	Taste	A1
	Flavour	A2
	Packaging	A3
	Nutritional value	A4
	Halal label	A5
	Brand of product	A6
Price	Customer perception of product prices	B1
	Consider the product price	B2
Promotion	Advertisement	C1
	Promotion	C2
	Direct marketing	C3
Distribution	Ease in obtaining	D1
	Service to consumers	D2
	Far near the location where you buy	D3
Individual factor	Consumer lifestyle	E1
Social Factors	Family as a reference	F1
	Colleagues as a reference	F2
	Partner community as a reference	F3
Psychological factors	Self-confidence	G1
	Self	G2
	Perception	G3
	Self-experience	G4

3.2 Data Processing

3.2.1 Factor Analysis
Factor analysis is a statistical method used to describe variability among observed, correlated variables in terms of a potentially lower number of unobserved variables called factors (Penfold et al. 1966). The factor analysis process tries to find relationships and interrelationship between numbers of variables that are mutually independent of one another so that one or several sets of variables can be made. Steps to interpret the factor matrix:
- Check the biggest loading factor for each variable.
- Identify the biggest loading factor for each variable.
- Combining variables into factors, if the variable with the largest loading factor occurs in factor 1, then the variable is combined into factor 1.
- Removing variables when factors loading is significant variables on several factors and variable communal values smaller than 0.5.
- Give names or labels to formed factors that reflect the combined meaning of the constituent variables.

3.2.2 Cluster Analysis
Clustering is the process of grouping data sets into several groups so that objects in the same group have many similarities to group members and have many differences with objects in other groups (Miller and Han 2009). The differences and similarities are usually based on attributes value of the object and also be a calculation of cluster distance. Clustering also called Unsupervised Classification. The grouping methods in cluster analysis:
- Hierarchical Method; start grouping with two or more objects that have the closest similarity. Then forwarded to other objects and so on until the cluster will form a kind of 'tree' where there is a clear level (hierarchy)

between objects, from the most similar to the least similar. Tools that help to clarify this hierarchical process are called "dendrograms".
- Non-Hierarchical Method; starting with determining in advance the desired number of clusters (two, three, or the other). After the number of clusters is determined, the clustering process is carried out without following the hierarchy process. This method is commonly called "K-Means Cluster"

4. Results and Discussion

4.1 Data Testing
Before data processed on factor analysis and cluster analysis, some tests must be done, the first is the Multicollinearity test. Multicollinearity is a correlation between variables that tends to be avoided in multiple linear regression. Contrary, multi-collinearity is desirable to occur in factor analysis. Factor analysis cannot be done in variables that have no multicollinearity. The results of calculations for all indicators find out a significant correlation ($p <0.05$) with a determinant value of 0.0000373 which is close to zero.

After multicollinearity, the data test continues by KMO test, Bartlett test, and MSA test. The KMO test results KMO values 0.639, which means that feasible factor analysis is carried out insufficient categories. The results of the anti-image correlation result on the anti-image correlation coefficient greater than 0.500, means that the factor analysis is feasible to be done. Bartlett Test is a statistical test to know whether the variables involved are correlated correctly. The null hypothesis (H_0) is no correlation between variables, while the alternative hypothesis (Ha) is a correlation between variables. The Bartlett Test value is approached by the chi-square value. Based on the results of the second calculation, the value of Chi-Square is equal to 1.69 and the significance value is 0.000 means 100% indicators correlate. Then the visible value shows the number 0,000, concluded that factor analysis can be continued. MSA (Measure of Sampling Adequacy) use to measure sampling adequacy for each variable. MSA value 1.0 means that the variable can be predicted with less error by other variables, if the MSA value is > 0.5 then the variable can be predicted and analysed. MSA value < 0.5 means that the variable cannot be predicted and cannot be analysed further. The results of testing MSA (Measure of Sampling Adequacy) in Table 1 shows that 16 variables proposed in the study have an MSA value > 0.5 so that all variables can still be predicted and continue further analysed.

4.2 Factor Analysis Result
The result of the factor analysis shows the value of commonalities and the eigenvalue. The value of commonalities must be greater than 0.5 or more than 50% of data explain this factor. The magnitude of the variance (eigenvalue) described the ability of each factor to represents the variables. Based on the calculation results shown in Table 2 and Table 3, the 16 indicators have communalities greater than 0.5.

Table 2. Result of the MSA test.

Indicators	MSA Value	Indicators	MSA Value	Indicators	MSA Value	Indicators	MSA Value
A4	0.571	C1	0.773	D2	0.600	G1	0.686
A5	0.589	C2	0.620	D3	0.708	G2	0.684
B1	0.587	C3	0.654	F2	0.538	G3	0.708
B2	0.585	D1	0.652	F3	0.546	G4	0.765

Table 3. Result of *communalities* test

Indicator	Initial	Extraction	Indicator	Initial	Extraction	Indicator	Initial	Extraction
A4	1	0.71	C3	1	0.839	G1	1	0.721
A5	1	0.598	D1	1	0.713	G2	1	0.765
B1	1	0.846	D2	1	0.741	G3	1	0.712
B2	1	0.853	D3	1	0.532	G4	1	0.714
C1	1	0.780	F2	1	0.941			
C2	1	0.882	F3	1	0.951			

After all, indicators validated, followed by the extraction factor calculation as Total Variance Explained value. The calculation result is the number of factors formed. This calculation uses an eigenvalue of 1 and resulted in 6 factors that explain the whole indicator. Assumptions are fulfilled the next result that needs to be considered is the component matrix. The Rotated Component Matrix explains each indicator that has been rotated so that it can more clearly enter into the factors that have been formed. At this stage, the amount of loading factor that is formed is worth a minimum of 0.4 due to the provisions which have been determined based on the number of samples used in the calculation of 200 samples. Factor analysis reduced the indicators from 21 become 16. The indicators grouped into 5 factors. The group of indicators given in Figure 2. Seven factors become only six factors. The individual factors were deleted due to the eigenvalue of factor analysis results.

4.3 Cluster Analysis Result

There are two steps in cluster analysis, the initial clustering, and the interpretation cluster. The initial clustering did after descriptive analysis done by obtaining the variable z score with the standardization process. The interpretation process of clustering displays the results of the calculation of cluster interpretations that have been carried out as the output of the final cluster centers. All the indicators measured by the value of their final cluster center, which will be known how many clusters formed. This research results in 3 clusters shown in Table 4. The first cluster consists of 138 samples and the second cluster consists of 58 samples; the third cluster only has 4 members.

The 3rd cluster has only 4 members and should be ignored. Then, cluster analysis only forms 2 clusters or group. All factors hypothesized affecting the customer buying interest are proven for the first cluster. While for the second cluster the factors that affect the buying interest are product attributes, price, and distribution. The main difference between cluster 1 and cluster 2 is occupation and salary. Social Factors and Psychological Factors are not an important factor for cluster 2.
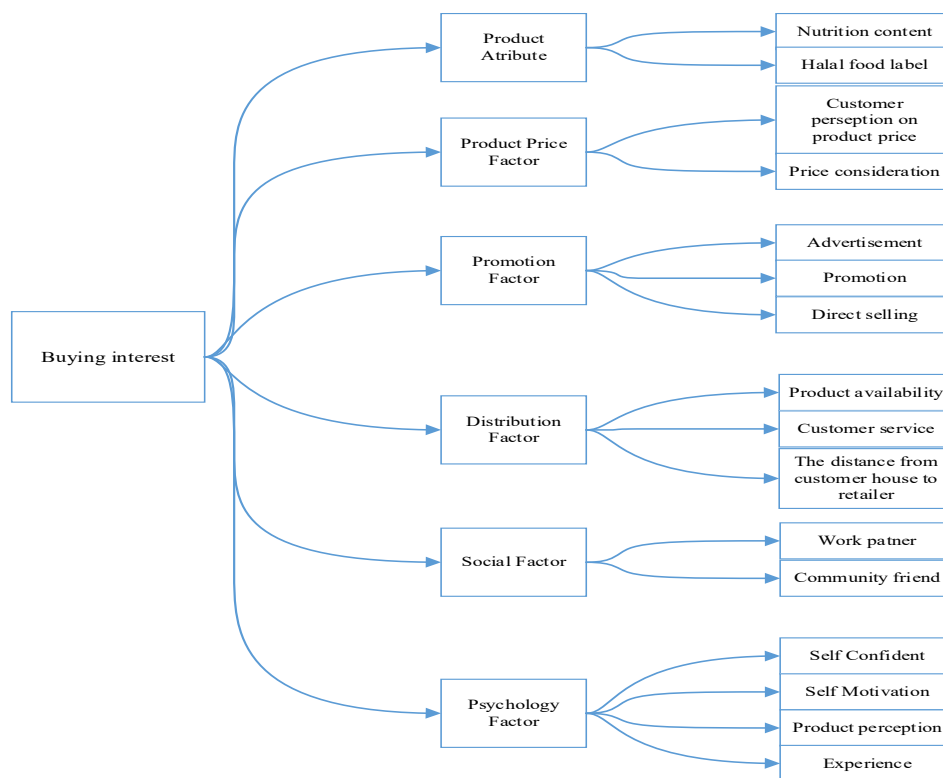

Figure 2. Interpretation of factor analysis, the group of indicators.

Table 4. Interpretation of cluster analysis result.

Cluster	Cluster Characteristic	Factors affecting buying interest
1	Female Age 17-38 Private employee Salary up to 3 million per month	Product Price Promotion Distribution Social Factors Psychological Factors
2	Female Age 17-27 Wife household Income 2 million up to 3 million per month	Price Promotion Distribution
3	Only 4 respondents in this cluster and has no similarity	Product

The specific factor in frozen food distribution is cold chain system which requires quite expensive infrastructure especially in a large capacity. Cold chain must also be carried out during the transportation process. Optimal storage temperature of deep-frozen food products ranges from -18 to -25 and for frozen food is – 20 (Mercier et al. 2017). The existence of this cold chain has a big influence on product quality, prices and product availability. A firm in the frozen food industry is focusing limited resources on developing core competencies by enhancing R&D and introducing new products, and have spent resources on developing the transportation system, distribution system and the capacity of the retailers. The future shows much potential as third-party companies to develop cold chain warehousing and distribution (Kitinoja 2014). This condition also occurs in Indonesia. Purwaningsih (2019) found that the performance of every company in the chicken supply chain was quite efficient, but the long supply chain created high prices at the end consumer level. This is compounded by fluctuations in selling prices because coordination for population control is still weak (Purwaningsih et al. 2018). For frozen food, the material is taken directly from the company farm so that the price of raw materials is cheaper, but the cost for cold chain in transportation and product distribution makes the price at retailers expensive. Also, the highest price margin increases in the supply chain of poultry products occurred at the retail level due to the small sales volume (Betrand et al. 2018).

5. Conclusion

Based on the results of factor analysis there are 6 factors of buying interest formed from 16 indicators and 5 indicators proven has no significant correlation to all factors. The factors are the marketing mix of the product (product attributes, price, promotion, and distribution), psychological factor, and the social factor. Indicators that have a strong correlation to the factors from factor analysis means that these indicators affecting the buying interest.

The indicators which have a significant correlation to product attributes are nutrition content and halal food label. All indicators in price factor, promotion factor, and distribution factor have a significant correlation to their factor. All psychological indicators have significant correlation informed the factors. Social factors show that the product information from work partners and friends affecting the buying interest. Lifestyle has no significant effect on buying interest. The product attribute brand, taste, packaging, and flavor have no significant correlation to product factors.

Cluster analysis formed two groups of customers. The first group are female, age between 17-38 years old, occasion as a private employee and have a salary of up to 3 million per month. All factors in this research are affecting the buying interest for the first cluster. The second cluster is female, age between 17-27 years old, occupation as wife household and have income between 2 up to 3 million per month. The factors affecting their buying interest are price, promotion, and distribution.

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