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Consumer Perception of Sweet Potato-Based Foods Product Innovation in Province of Yogyakarta

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***Abstract*— The purpose of this study was to find the factors that influence consumer perceptions of sweet potato-based foods product innovation in Province of Yogyakarta. The research method used was survey. The method of data analysis used was EFA (Exploratory Factor Analysis). Based on the review of previous literature, it was found five factors that affect consumers in consuming innovative foods, these factors were novelty and change, variety, processing and technology, origin and ethnicity and convenience. Based on these factors, a set of questionnaires was formulated. Using quota sampling, the questionnaire was divided and distributed to respondents in 3 districts, namely Bantul, Sleman, and Yogyakarta's city. The survey was conducted twice, first survey involved 318 respondents with 62 indicator questions. The first survey was rotated 6 times. It formed 12 factors, consist of 30 indicators that considered to affect consumer perceptions of sweet potato-based foods product innovation. The KMO-Bartlett was 0.636 with a significance level 0.000. The second survey involved 155 respondents. It was divided into 3 districts as same as the first survey. After processed by factor analysis, the last rotation (2nd rotation) identified 10 factors and 27 question indicators of consumer perceptions of sweet potato-based foods product innovation. The KMO-Bartlett was 0.605 with a significance level 0.000. Through a face validity, the factor was summarized into four factors namely novelty and change, variety, processing and technology, andn convenience.**

***Keywords*—Exploratory Factor Analysis, Consumer Perception, Sweet Potato-based Food, Product Innovation.[1]**

I. Introduction

Damanpor (2009) states that innovation is often driven by pressures from the external environment, including factors such as competition, deregulation, isomorphism, scarcity of resources, and customer demand, and it is associated with the adaptive behavior of organizational changes in order to maintain or improve its performance. Fagerberg (in Guererro, et al., 2009) explains that the innovation introduces the novelty into the economic sphere. Therefore, innovation is critical to the long-term economic growth. Fagerberg (in Guererro, et al., 2009) also said that innovation is a strong factor behind the differences in performance between companies, regions and countries.

Many businesses are successful because of its ability to transform an idea into a new product innovation. Therefore, innovation is considered to be one important factor in improving the competitiveness of a business. Entrepreneurs who do not have innovation in their products will eventually disappear from the market because it is not able to survive in the competition. Innovation is also one part of the business strategy to counter the presence of competitors or new entrants that present a dangerous signal to the business.

Baregheh, Rowley, Sambrook, and Davies (2012) mentions the food industry has undergone many changes in the social, economic and technology in recent years. In Indonesia, food industry made much progress. The Indonesia's Central Bureau of Statistics said, in large and medium industries of the food and beverage sector, Indonesia has increased the index, ie, 245.01 in 2007; 251.51 in 2008; 276.30 in 2009; 303.91 in 2010 and 318.52 in 2011 (www.bps.go.id). The study supports the statement of the Director General of Agro Industry (Indonesia's Ministry of Industry), Benny Wahyudi, that the growth of food and beverage industry continues to grow and become the leading sectors since it is supported by strong domestic demand caused by the growing middle class consumers in the country (www.suarapembaruan.com).

Indonesia has a rich agricultural products that can be processed into a variety of new food products. Rabobank Group, an international bank based in the Netherlands and focus on the development of agriculture and agribusiness, assesses Indonesia's agricultural sector will continue its expansion with a well in the coming decades (www.swa.co.id).

One of the examples is the sweet potato. M. Suprapti Lies (2003: 7) states that the sweet potato (Ipomea batatas) is an agricultural commodity that has a bright prospect in the future. Based on data from The Indonesia's Central Bureau of Statistics, in 2009 Indonesia produced 2,057,913 tons sweet potatoes. Despite the decline in 2010 is 2,051,046.12 tons, but in the next year is likely to increase the production of 2,196,033 tons in 2011 and 2,483,467 tons in 2012 (www.bps.go.id).

Generally, the development of sweet potato products in Indonesia is still about domestic refined products such as boiled potatoes, fried potatoes, kolak, roasted sweet potatoes, etc. (Juanda and Cahyono, 2000: 13). Sweet potato processing has experienced a shift in line with the development of the food industry. Currently the sweet potatoes are not only treated with boiled or fried only, but later evolved into various types of food. Many creative food industry that makes a wide range of potato-based foods into new food innovation.

This opportunity has been used by bakpia's entrepreneurs in Yogyakarta Special Region. Some manufacturers like Bakpia Bona, Telopia, Bakpia Ayu, Omahe Bakpia, and others find it as a new business opportunity. Traditionally, the bakpia industry uses green beans as its contents, add product variants

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such as coffee, cheese, and others. And that is currently known is bakpia with sweet potatoes as the content.

Indonesia has a wealth of diversity in the field of food, sweet potato's bakpia is one of them. But until now businessmen of sweet potato-based foods do not yet have the sufficient information on consumer perceptions of the food innovation. Classification data provided by statistical central berau is still too wide. Data on food sales alone insufficient to support sellers in answering questions about the consumer perception innovative products.

So that, this research purpose was to find the factors that influence consumer perceptions of sweet potato-based foods product innovation in Province of Yogyakarta.

II. Research Methods

This study is a survey research using questionnaires as a research instrument. Data analysis methods used are Exploratory Factor Analysis (EFA), which is a tool for analyzing the structure of the relationship (correlation) among many variables by defining a set of variables related to becoming a strong, known as factors (Hair et al., 2010: 102).]

This study took place in Province of Yogyakarta. Researchers conducted the study for five months in the beginning of November 2013 until March 2014. The population in this study, as all those who know bakpia products made from sweet potatoes in the Yogyakarta Special Region. The samples used by researchers was the person who knows bakpia sweet potato with locus Omahe Bakpia, Bakpia 555 and Bakpia Agung.

The operational definition of variables in this study are five main concepts (factors) of innovation proposed by Guerrero, et al. (2009). The five factors as below:

A. *Novelty and Change*

Based on literature review, it can be identified several indicators that influence consumer perceptions regarding the novelty and change: something new, modifications in materials, modifications in food preparation, modifications in size, modifications in packaging, prepared differently, when adding unknown/ new ingredients, while adding foreign/ unusual materials, and innovation as tradition. Finally obtained 10 questions as indicators on the factors of novelty and change.

Questionnaires to measure food Neophobia also used in this factor. The questionnaire was based on research Verbeke and Lopez (2005). This study mentioned that consumers have concerns on something foreign and unknown. Neophobia food personality trait is defined and set to measure reluctance to eat and / or avoid new foods. There are 10 questions to measure food items Neophobia. However, researchers removed the two items that do not fit.

B. *Variety*

From the literature review identified several indicators that can influence consumer perceptions regarding the variation: variety in taste, variety of food combinations, variety in shape, variety in size, to appreciate diversity, to appreciate the possibility of choice, boredom and saturation, curiosity, and satisfaction of individual behavior. Finally obtained 9 questions as indicators on the factors of novelty and change.

The new indicators are added in this factor are based on research from Sijitsema, et al (2002) about the variables that affect the perception of food. The study describes some food related models. There is one model that was made by Randall and Sanjur (in Sijitsema et al., 2002) which describes the factors that can affect food preferences according to researchers who can support factor. One of the stated preference is characteristic of the food such as taste, appearance, texture, price, type/ kind of food, methods of preparation, forms, seasoning, and combination foods. Because the taste, preparation methods, and forms already mentioned, so that the word is eliminated.

C. *Processing and Technology*

According to the literature review identified several indicators that can influence consumer perceptions regarding the processing and technology: applying new technology and further processing. There are two questions on the questionnaire as indicators of processing and technology factors.

In this factor, the study uses research from Baregheh, et al (2012) as an additional indicator. This study has several factors including the 'innovation in process'. Innovation in process then becomes an additional indicator of the processing and technological factors. Researchers eliminate one item that is 'to develop and deploy new technologies' because already mentioned earlier.

D. *Origin and Ethnicity*

From the literature review identified several indicators that can influence consumer perceptions regarding the origin and ethnicity: an overview of the product (national or regional) and cultural openness.

E. *Convenience*

The prior research found that the consumer's perception of the convenience related with saving shopping time, saving time in preparing meals, saving time in cooking, saving time in consuming, saving time on activities after dining, kitchen evaders type of consumer, retail formats, branding, cooked food, ready to eat foods, heated food, and new packages. Research conducted by Scholderer and Grunert (2004) about the consumer, foods and conveniences can support this factor.

In the factor analysis research, researchers must involve more than 50 respondents even better if there are 100 or more respondents. The general rule states that a minimum of respondents at least as much as 5 times the estimated parameters, it's better to follow a ratio of 10:1 (Hair et al. 2010: 101). In this study, the number of indicators were 62 that the minimum sample size was 5 times the number of indicators or as many as 5 x 62 = 310. This study used 310

samples were divided into three locus, each of them consisted of 110 respondents. The use of a larger number of respondents was done so that if there is bias or not valid then it does not reduce the number of respondents in the sample below the minimum. This study uses the quota sampling technique as a sampling technique. The sampling technique was conducted on the basis of the amount or the predetermined quota. Researchers chose three stores that is Omahe Bakpia bakpia, located in the city of Yogyakarta, Bakpia 555, located in Bantul, and Bakpia Agung, located in Sleman.

III. Data Collection Techniques

Data was collected by giving a questionnaire containing a set of written questions to the respondents. The questionnaire contains a list of questions about the general idea of the attention and opinions of respondents regarding the object of research.

Data analysis technique was a method used to obtain the relevant information contained in the data, and use the data to solve a problem. Factor analysis is a multivariate technique that aims to find the certain structures among the variables analyzed (Hair et al. 2010: 93). Stages of data analysis as follows:

A. *Interdependency Tests*

It was done to test whether one variable to another variable has associated. If there are certain variables that have the correlation with other variables it will be excluded from the analysis. Testing is done through observation of sampling adequacy measure, the correlation matrix, the value of the determinant, KMO values and Bartlett's test results.

B. *Extraction of factors*

The method was used to obtain the results that can maximize the presentation of variants that can be explained by the model. The results of the extraction was the factors by the number of variables extracted. At this stage a number of factors known to be acceptable or feasible to represent a set of variables. Items used in the study was an item that has a value of loading factor > 0.4. Loading factor was the correlation question items with the construct being measured. According to Hair et al. (2010), loading factor > 0.3 has met the minimum level, but it is strongly recommended > 0.4. When loading of an item question is > 0.5 then the item is very important in interpreting the measured constructs.

C. *Rotation of factors*

The method was done because the initial model obtained from the matrix of factors before rotation can not explain a simple data structure so it is difficult to be interpreted (Hair et al. 2010).

D. *Face Validity*

This method refers to the subjective agreement among professionals that reflect the concept being measured logically. This method describes whether a given test item seems reasonable to define the concept of (Zikmund, et al., 2009: 307).

IV. Results and Discussion

A. *Quantitative Analysis I*

This study requires at least 310 respondents. Terms of respondents was people who know bakpia sweet potato with the research locus Omahe Bakpia store located in Yogyakarta city, Bakpia 5555 store located in Bantul, and Bakpia Agung store located in Sleman. During the process of distributing questionnaires, the researchers obtain 313 respondents who fill in the answers with the complete, the number analyzed.

Based on the review of previous literature, it was found five main factors, namely novelty and change, variety, processing and technology, origin and ethnicity, and convenience. Based on these factors, a set of questionnaire was prepared which consisted of 62 questions.

Respondents' answers were processed using factor analysis. The tools used were SPSS 21.0. Limit loading factor used was 0.5. This means that if an indicator has a value less than 0.5, then the indicator removed. Indicators which are members of the two factors must also be removed.

In the first rotation, formed 20 factors. Under the terms loading factor above there are 17 question items were eliminated that is question item No. 1, 2, 6, 7, 11, 22, 23, 26, 27, 31, 37, 45, 46, 52, 53, 61 and 62. After removing the item questions, conducted the rotation again.

In the second rotation, formed 16 factors. There are 8 items eliminated questions that is question item No. 3, 10, 16, 19, 29, 33, 36, and 49. After removing the item questions, conducted the rotation again.

In the third rotation, formed 14 factors. There are 3 items that abolished question that is no question items 28, 32 and 40. After removing the item questions, conducted the rotation again.

In the fourth rotation, formed 13 factors. There are 2 questions that eliminated items that is question item No. 18 and 21. After removing the item questions, conducted the rotation again.

In the fifth rotation, formed 12 factors. There are 2 questions that eliminated items that is question item No. 59 and 60. After removing the item questions, conducted the rotation again.

In the sixth rotation, formed 12 factors. All indicators meet the criteria of loading factor. KMO- Bartlett value was 0.636 with a significance level of 0.000.

After data processing, then formed 12 factors. Through a face validity, there are 12 factors to be restored to the original factor, namely novelty and change with the question's No. 4, 5, 8, 9, 12, 13, 14, 15 and 17), variety with the question's No. 20, 24, 25, 30 and 41, processing and technology with the question's No. 34, 35, 38 and 39, origin and ethnicity with the question's No. 41, and convenience with the question's No. 42, 43, 44, 47, 48, 50, 51, 54, 55, 56, 57 and 58.

B. Quantitative Analysis II

This study requires at least 150 respondents. During the process of questionnaire distribution, the researchers obtains 155 respondents who fill the answers completely, the number analyzed.

Based on questionnaire data that previously consisting of 62 questions, 30 questions finally obtained. These questions are indicators of the factors that influence innovation potato based foods in Yogyakarta Special Region.

In the first rotation, formed 10 factors. Under the terms loading factor, there are three indicators were eliminated, the question items No. 13, 18 and 30. After remove the item that question, conducted the rotation again.

In the second rotation, formed 10 factors. All indicators meet the criteria of loading factor. KMO-Barlett value is 0.605 with a significance level of 0.000. Having conducted by the data, forming 10 factors. After face validity, 10 factors are summarized into four factors namely:

1) Novelty and Change

Question items that are in the category of *novelty and change* were number 1, 2, 3, 4, 5, 6, 7, 8 and 9. From the indicator questions that exist, it can be analyzed that novelty and change indicates something that is new and/ or modified in size, packaging and materials. Someone has a variety of responses in terms of food innovations such as hesitation, the desire to avoid, fear, or even otherwise the interest and want to try all the food innovation.

2) Variety

Question items that are in the category of *variety* were number 10, 11, 12, and 14. The remaining factors explain that food innovation can increase choices in choosing foods. The options available are based on a variety of diversity in materials or prices. Someone want to try the diversity due to several factors, namely boredom and curiosity.

3) Processing ang Technology

Question items that are in the category of *processing ang technology* were number 15, 16, 17 and 19. The questions that remain imply that that the innovative foods can be created using new technology, new ways and involve significant resources in its production. The use of new techniques in making food innovation is expected to make the food taste better.

4) Convenience

Question items that are in the category of *convenience* were number 20, 21, 22, 23, 24, 25, 26, 27, 28 dan 29. From the indicator questions that exist, it can be analyzed that innovation is expected to make the people can saving time in preparing and cooking food. Innovation foods can also make time for a meal is reduced. On the other hand, innovation of existing food makes people have an interest to find a challenge in the kitchen trying to cook food with innovatively they even feel that cooking innovative food is a necessity and an important part. Parameters of marketing also contributed to increased conveniences. The Convenient getting innovative food and its availability in many stores also impact the increasing of convenience that perceived by consumer, in addition when they can get information on these stores to satisfy his curiosity.

V. Conclusion and Recommendations

A. Conclusion

In perceiving food innovation, consumers consider many factors. Increasing number of factors means the more correlation so that it needs to be reducted. Before conducting the survey, researchers found five factors that affect food innovations from the previous journal. These factors are novelty and change, variety, processing and technology, origin and ethnicity and convenience. After doing a literature review, 62 indicators finally obtained. The process formation of this indicators involved the expert judgment to keep the objectivity for face validity.

Respondents were selected using quota sampling method involving 468 respondents spread in three places namely Bantul, Sleman and Yogyakarta. The survey was conducted two times, with 313 respondents in the first survey and 155 respondents in the second survey. The second survey was conducted to strengthen the validity of the first survey. Data analysis methods used are Exploratory Factor Analysis (EFA) and processed using SPSS. In the first survey, after conducted six times rotation, formed 12 factors and 30 indicators considered affecting consumer perceptions of product innovation potatoes-based foods. The KMO Bartlett value is 0.636 with a significance level of 0.000. After face validity, 12 factors then condensed into five factors that existed before. After the second survey, the data re-processed with SPSS. The last rotation (second rotation) identified 10 factors and 27 indicators of consumer perceptions of innovation potato - based foods. The KMO Bartlett value is 0.605 with a significance level of 0.000. After face validity, factors summarized into four factors that is novelty and change, variety, processing and technology, and convenience with the following explanation :

1) Novelty and change

It indicates something new and/ or modified in size, packaging and materials. Someone has a variety of responses in terms of food innovations such as hesitation, the desire to avoid, fear, or even otherwise the interest and want to try all the food innovation.

2) Variations

Variations in food innovation can increase choices in choosing foods. The options available are based on a variety of diversity in materials or prices. Someone want to try the diversity due to several factors, namely boredom and curiosity.

3) Processing and technology

Processing and technology has an important role in the production of innovative food. The innovative foods can be created using new technology, new ways and involve significant resources in its production. The use of new

techniques in making food innovation is expected to make the food taste better.

4) The conveniences

The conveniences is related to food innovations because Innovation is expected to make the people can saving time in preparing and cooking food. Innovation foods can also make time for a meal is reduced. On the other hand, innovation of existing food makes people have an interest to find a challenge in the kitchen trying to cook food with innovatively they even feel that cooking innovative food is a necessity and an important part. Parameters of marketing also contributed to increased conveniences. The Convenient getting innovative food and its availability in many stores also impact the increasing of convenience that perceived by consumer, in addition when they can get information on these stores to satisfy his curiosity.

B. Recommendations

This study was only done on bakpia products made from sweet potatoes, but still a lot of others innovative food products made from sweet potatoes so that the study can not represent the factors that influence consumers' perception of the overall innovation foods. Continued research on other food innovation is strongly recommended because of consumer perceptions of food innovation may differ according to the type of food. In addition, the study has a limited sample, in limited area so this study can not be considered representative of all consumers in Indonesia. The unavailability of the population framework also makes this study less than perfect. Future studies should extend the area of study. Survey involving respondents were more more and widely expected to further identify the consumer. In addition, the framework of a clear population will be able to represent the diversity of consumers.

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