Factors Affecting Consumers’ Perception and Willingness To Pay Toward Yogyakarta Local Black Rice

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Abstract. This study aims to determine the factors that influence consumer perceptions of local black rice in Special Region of Yogyakarta (Yogyakarta) and consumer willingness to pay (WTP). Consumer perceptions and WTP need to be known in order to expand marketing and preserve the sustainability of local black rice in Yogyakarta, and can be input for producers in developing marketing strategies. Data collection used purposive and snowball sampling techniques with questionnaires and interviews with black rice consumers in Yogyakarta, namely Sleman, Bantul, and Gunungkidul Regency. The method used was descriptive analysis, factor analysis, and Contingent Valuation Method (CVM). The results showed that the majority of black rice consumers in this research were women (64%) with ages between 18-27 years. The factors that influenced consumer perceptions of black rice were quality attribute factor with an eigenvalue value of 9.365, purchasing location factor (2.980), socialization of the benefits of black rice to consumers factor (1.885), product superiority compared to white rice factor (1.502), price according to benefits factor (1.103), and packaging factor (1.065). The average price of black rice is 264% of the white rice price.

1. Introduction
Rice is the main food source of carbohydrates consumed by about half of the world's population. Rice is an important food source for most developing countries, including Indonesia [1]. As a staple food, the average production of rice, especially white rice in Indonesia is relatively increased, as presented on the data of national rice production in the last five years in Table 1.

| Year | Production (Tons) |
|------|-------------------|
| 2011 | 65.756,904        |
| 2012 | 69.056,126        |
| 2013 | 71.279,709        |
| 2014 | 70.846,465        |
| 2015 | 75.397,841        |

Source: Central Statistics Agency (2017)

Indonesia also has other rice varieties besides white rice, and black rice is among them which has begun to be popular [2]. Black rice is a good source of fiber, minerals and phytochemicals in addition
to basic nutrients[3]. Black rice may be consumed as a staple food substitute for white rice. The increasing popularity of black rice is due to its phytochemical composition, especially flavonoids and anthocyanin, which have proven its beneficial effects to prevent chronic diseases associated with oxidative stress[4]. In addition, black rice extract shows a protective effect on kidney injury in vivo[5]. Black rice extract can also reduce the risk of hepatic steatosis and the diseases associated with it, including hyperlipidemia and hyperglycemia [6].

Increasing welfare of the population encourages changes in consumption patterns that have a negative impact of the increasing variety of degenerative diseases. Awareness of the magnitude of the relationship between food and the possibility of diseases, has changed the view that food must also have benefits for health [7]. With the many benefits of black rice content, it can be said that black rice is very good for maintaining health and has the potential as a functional food, namely food that contains one or more compounds that are considered to have certain functions that are beneficial to health. However, because black rice has not been widely consumed as a staple food, its existence is increasingly scarce and even almost extinct [8]. Black rice is different from black sticky rice, the high amyllose content in black rice causes its texture to be dry and pera (not sticky), whereas in black sticky rice contains low amyllose but high amyllopectin so the texture is sticky and fluffy. Black rice can be a mixture or substitute for white rice as a staple food. One of the producing regions that having local black rice varieties is Special Region of Yogyakarta (Yogyakarta).

Yogyakarta has local black rice varieties spread in three regencies, namely Sleman, Bantul, and Gunungkidul Regency. The local black rice in Yogyakarta has been around for a long time, there are still many people who do not know about it. Recently, many black rice products that come from outside Yogyakarta region are on Yogyakarta market. Some local black rice farmers complain that they are facing difficulties to market their harvests. Currently, consumers of black rice are still limited and from certain segments, therefore farmers as producers hope for more black rice socialization to the public in order to inform about local black rice and its benefits.

Consumer acceptance is a key factor in the concept of functional food to be succeeded in market as product development tailored to the desires of consumers. Knowledge and awareness of consumers' health from newly developed functional food is still limited, so communication efforts are needed for consumers regarding this matter. Submitting information about the health benefits of a product must be done through credible media so that it can be easily accessed by consumers [9].

Factors that influence consumer perceptions of black rice are very important so that producers and stakeholders can find out what consumers expect. In addition, an analysis of the willingness to pay for black rice is done to help determine the price of local black rice in Yogyakarta. In the marketing mix, pricing is one of the most important elements [10]. Price is the only element that can generate income. Determining the right price for a product or service is a major problem for many business people [11].

By acknowledging the factors that influence the perception and WTP of local black rice consumers in Yogyakarta, producers are expected to be able to develop the potential of local black rice optimally to maintain sustainability and increase sales.

2. Methodology

This research was conducted in Special Region of Yogyakarta (Yogyakarta) Indonesia, namely Sleman, Bantul, and Gunungkidul Regency. The selection of the three regencies was because the area was close to the location of local black rice planting in Yogyakarta. Sampling method used non-probability sampling data collection, namely purposive sampling, with the criteria of consumers who have consumed black rice at least once, and snowball sampling because the number of black rice consumers was still very limited and not yet recorded. The number of respondents in this study were 100 consumers of black rice, in accordance with maximum likelihood estimation, the sample size must be five times the number of free parameters in the model, including error [12].

The data used were primary and secondary data. Primary data includes the profile of the respondents as well as the results of interviews and questionnaires on consumer perceptions and willingness to pay.
The secondary data used was national rice production data from the Central Statistics Agency. Data was taken in May-November 2018.

Data analysis used was descriptive analysis to explain the characteristics of the respondents and factors that influence the consumer perceptions of local black rice in Yogyakarta. The 4P marketing mix, namely product, price, distribution or place, and promotion was used as the variables studied as factors that influence the perception. Marketing mix was used to form independent variables because it can be a controlled variable marketing tool to produce the desired response in the target market [13]. From marketing mix, we developed 26 six independent variables, also with literature review and consideration of researches. Factor analysis was used to process the data that will identify the structure of relationships and explain the relationship among variables or respondents. In addition, factor analysis can reduce uncorrelated variables, so that factors will form the main explanations for a population [14].

The basic factor analysis model is shown below [15].

\[ X_i = \sum_{j=1}^{n} a_{ij} f_j + e_i \]  

where:
- \( X_i \) = value of an observed explanatory variable
- \( f_j \) = common factors
- \( a_{ij} \) = factor loadings, indicates the correlation between \( X_i \) and \( f_j \)
- \( e_i \) = an error term

Statistical Package for the Social Sciences (SPSS) version 24 was used to carry out factor analysis.

The Contingent Valuation Method (CVM) was used to analyse the willingness to pay (WTP) of black rice consumers. WTP is the maximum price that someone wants to pay for something [16]. The CVM method was chosen because of the ease of access to respondents, the information obtained was relatively accurate because it directly asked for the value of WTP, and applicable for developing countries [17]. WTP is defined as follows [16].

\[ WTP = \int_{P_0}^{P} X^h(P, u) dP \]

\[ = M (\bar{P}, u) - M (P_0, u) \]  

Where \( M (\bar{P}, u) \) is the income after a change with constant utility, and \( M (P_0, u) \) is the initial income.

The stage of the CVM approach consists of making a market hypothesis by providing information about local black rice [16], then obtaining bids value by single bid questions with dichotomous answer choices, yes or no [18], and calculating the average value of WTP, in addition the standard deviation was calculated to determine the price range.

### 3. Result and Discussion

The result of data collection in the form of black rice consumer respondent characteristics is presented in Table 2. From Table 2, the majority of black rice consumers in this research are women (64%), with a relatively young age between 18 to 27 years, followed by elder people. This shows that young people are aware of their health so they try and choose to eat foods that are good for health. Black rice consumers also have monthly income of Rp. 3.000.001-6.000.000 (29%) that is relatively high compared to the minimum wage of Rp. 1.676.280 in Yogyakarta. According to Keynes Theory, a person's income is often associated with his consumption pattern, the higher the income the higher the consumption [19]. Income also has a significant effect on the level of consumption of people in Indonesia [20].

| No. | Respondent Characteristics | Percentage (%) |
|-----|----------------------------|----------------|
| 1   | Sex                        |                |
|     | a. Male                    | 36             |

Table 2. Respondent Characteristics
|       |       |   |
|-------|-------|---|
| 2     | Age (years) |   |
|       | a. 18 – 27 | 54 |
|       | b. 28 – 37 | 17 |
|       | c. 38 – 47 | 8  |
|       | d. 48 – 57 | 19 |
|       | e. 58 – 67 | 2  |
| 3     | Number of family members (person) |   |
|       | a. 2      | 13 |
|       | b. 3      | 21 |
|       | c. 4      | 26 |
|       | d. 5      | 26 |
|       | e. 6      | 13 |
|       | f. 7      |  1 |
| 4     | Monthly income (Rupiahs) |   |
|       | a. <1.000.000 | 16 |
|       | b. 1.000.001 – 1.500.000 | 11 |
|       | c. 1.500.001 – 3.000.000 | 24 |
|       | d. 3.000.001 – 6.000.000 | 29 |
|       | e. >6.000.000 | 20 |
| 5     | Education |   |
|       | a. Elementary school | 1  |
|       | b. Senior high school | 15 |
|       | c. Diploma |  4 |
|       | d. Undergraduate | 61 |
|       | e. Graduate | 13 |
|       | f. Post Graduate |  6 |
| 6     | Occupation |   |
|       | a. Private employee | 28 |
|       | b. BUMN employee |  4 |
|       | c. Civil servant | 22 |
|       | d. Entrepreneur | 12 |
|       | e. Student | 20 |
|       | f. Housewife |  7 |
|       | g. Others |  7 |
| 7     | Black rice consumption reasons |   |
|       | a. Health | 39 |
|       | b. Trying | 47 |
|       | c. Black rice physical properties | 5  |
|       | d. Diet program |  8 |
|       | e. Others |  1 |
| 8     | Place to buy black rice |   |
|       | a. Farmer | 13 |
|       | b. Traditional market | 18 |
|       | c. Modern market | 38 |
|       | d. Community market |  7 |
|       | e. Grocery store |  6 |
|       | f. Others | 18 |

Six factors formed from 26 independent factors that influence the perception of black rice consumers. The result of factor analysis is presented in Table 3. Table 3 shows that the six factors have eigenvalue...
values greater than 1, eigenvalue is the amount of variance in numbers in the variables related factors, the greater the eigenvalue, the more representative the variable represents a factor. These six factors have a cumulative variance value of 68.841%, which means that the six factors have the ability to explain cumulative total diversity of 68.841% as a factor that influences consumer perceptions of black rice. The magnitude of the variance that can be explained by the new factor formed is 68.841%, while the remaining 31.159% is explained by other factors not examined in this study.

In Table 3, the results presented as variables that have the highest loading factor values are grouped into a factor. The value of loading factor indicates a simple correlation between variables and their factors. The higher the value of the loading factor, the higher the relationship between the variables and the factors. Six factors are formed from 26 independent variables.

The factor that most influence consumers’ perceptions of black rice is quality attribute factor, includes the shape, color, aroma, taste and texture of the product. Product is the strongest factors that correlated with consumer perceptions of black rice. Product is offered to consumers to get their attention, be bought, used or consumed so that it can fulfill someone’s desires or needs [21]. Product that provides benefits and the needs of consumers can have a great opportunity to be accepted by the market. Consumers also consider the sales location to buy black rice, mostly in the modern market (38%) because of its relatively strategic location and easy access. The socialization factor is one of the factors that influence consumer perceptions, because from the process of socialization, the delivery of a product is done by various media. Consumers strongly consider product excellence, black rice is known to have a better content for health than white rice. This can be considered as the strengths and advantages of black rice. Consumers are willing to pay more if a product has benefits in accordance with its claims. The price factor according to benefits is one of the factors that influence consumer perceptions of black rice. The last factor is the packaging factor, packaging size is one thing that can affect consumer perceptions. Consumers can have an option that suits their needs if there are variations in the packaging size.

The black rice consumer willingness to pay (WTP) analysis using the Contingent Valuation Method (CVM) approach resulted in the lowest WTP is Rp. 9.000 per kilogram, while the highest value is Rp. 45.000 per kilogram. Most consumers are willing to pay more for black rice than white rice above Rp. 20.000, because they have already known that black rice has better content and benefits than white rice. This is accordance with the opinion of Wuryandani et al [22] that consumer will buy pigmented rice even though it has price higher than white rice, because of the health benefit of pigmented rice. The distribution of WTP values is presented in Figure 1.

| Factors                      | Eigenvalue | % of Variance | % Cumulative |
|------------------------------|------------|---------------|--------------|
| 1 (Quality attributes)       | 9,365      | 36,018        | 36,018       |
| 2 (Purchase location)        | 2,980      | 11,461        | 47,478       |
| 3 (Socialization)            | 1,885      | 7,248         | 54,727       |
| 4 (Product superiority)      | 1,502      | 5,776         | 60,502       |
| 5 (Price according to benefits) | 1,103    | 4,242         | 64,745       |
| 6 (Packaging)                | 1,065      | 4,096         | 68,841       |
Fig 1. The distribution of WTP black rice consumers

From Figure 1, 70% of consumers are willing to buy black rice at price of Rp. 29.000 – 38.000. The average price of pigmented rice, including black rice, is Rp. 30.000, while white rice is Rp. 11.000 per kilogram in the market [22], the price is higher than white rice. The average value of black rice consumer WTP is Rp. 29.000 per kilogram with a standard deviation of Rp. 7.050, the range of WTP local black rice consumers is Rp. 21.950 – 36.050 per kilogram, or equal to 264% of the white rice price. The consumers are willing to pay more for benefits of black rice. The average value of this WTP is not much different from the price of black rice which is currently on the market.

4. Conclusion
The majority of Yogyakarta local black rice consumers in this research were women (64%) with a relatively young age, between 18 to 27 years. Factors that most influence consumer perceptions of black rice is product quality attribute, such as shape, color, aroma, taste, and texture of the product. The average price of black rice is 264% of the white rice price in the market.

Acknowledgment
This research was supported by the RTA Program under The Directorate of Research UGM to DI and YRP.

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