



Take It or Leave It? Understanding Whether Defective Fruit Still Has Economic Value to Consumers

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Abstract. Post-harvest fruit quality depends on size, color, shape and the presence of defects. Defects in fruit tend to reduce consumers' positive views of the fruit and end in economic losses. This research aims to determine consumers' willingness to pay for defective fruit. In addition, consumer perceptions of the quality of defective fruit in this study were examined. Data from 124 participants was obtained through an online survey and analyzed descriptively. The findings show that 49.19% of consumers are willing to pay for defective fruit. The respondents had a good level of perception regarding the nutrition in defective fruit which was the same as the original product. This research provides practical implications regarding marketing opportunities for defective fruit.

Keywords: willingness to pay, perceived quality, fruit defects, consumer behavior

1 Introduction

Consumer purchasing and consumption decisions regarding food are greatly influenced by perceived quality and availability of alternative choices. Along with human consumption behavior, food loss often occurs. Food loss often occurs from crop production to the final stages of the supply chain. Hanssen [1] states that most of the wasted food comes from plants. It is estimated that 40-50% of fruit and vegetable production is wasted throughout the supply chain [2]. Food ingredients, especially fruit and vegetables, that are not purchased or consumed result in an increase in food waste. For fresh products, sensory appearance in the form of visual quality is often the main determinant of consumer choice. In fresh food stores, losses often occur because the product decreases in quality or becomes no longer attractive to consumers [3].

In particular, the long fruit marketing chain makes physical damage during harvesting, packaging and distribution the main cause of quality reduction because the fruit becomes susceptible to various defects (Opara 2014). Defects in fruit are defined as imperfections or abnormalities that cause the fruit to decrease in quality and become less valuable [4]. Defects in fruit can include physiological abnormalities, bruising, rot, and fruit metabolic dysfunction such as the appearance of discoloration, necrotic tissue spots, and the appearance of cavities in the flesh of the fruit. Despite not being able to evaluate the nutritional and nutritional qualities of deformed fruit, consumers often associate small changes in external appearance as a reduction in quality in their perception [5]. Previous research has shown that defects in fruit greatly impact consumer purchasing decisions [6].

From a marketer's point of view, quality is usually measured in terms of appearance, taste and food safety [7]. Changes in the shape or color of fruit that is not fresh are believed to affect food safety and nutritional content [8]. Consumer perceptions of food safety are said to influence consumer purchasing decisions. Fruit with a less than optimal appearance has been proven to trigger negative evaluations from consumers who consider it to be fruit that does not

meet standards, so it is less nutritious, less fresh, less delicious and unsafe to consume [10] . Meanwhile, fruit that is starting to change its appearance and is on the verge of rotting causes economic losses.

This study seeks to identify market opportunities for consumers to purchase defective fruit. Traders tend to sell defective fruit at a lower price than healthy and fresh fruit in general. Therefore, estimates of consumers' willingness to pay for defective fruit need to be identified to determine the appropriate price match for marketers and consumers. Willingness to pay is defined as the maximum amount of money a customer is willing to pay for a particular product or service [11] . The satisfaction that consumers will get is related to the price which can be measured by WTP. Therefore, this research aims to identify WTP for defective fruit and its relationship to consumer perceptions of the quality of defective fruit.

2 Methods

This research uses a quantitative approach with a basic analytical descriptive method. The study was conducted using a survey method of respondents with a minimum age of 17 years. Data was taken online and obtained a total of 124 respondents. Data collection was carried out in June-July 2023. The sampling method used was the snowball technique. The data were analyzed using descriptive statistics to answer the objectives of this study. The descriptive method in this study is used to identify consumers' perceived quality and willingness to pay for defective fruit. Descriptive analysis is known to be able to stand alone in analyzing patterns of phenomena that have not been known before and helps in explaining a case [12] . Based on the principle of maximizing respondents' utility, the contingent valuation method (CVM) is used to measure consumers' WTP value [13] . Consumers will be faced with various alternative price reduction percentages for defective fruit and the consumer's response to the price they are willing to pay is essentially maximum utility [14] . Furthermore, the association between perceived quality and consumers' willingness to pay on defective fruit was analyzed using Spearman Rank analysis.

3 Results and Discussion

3.1 Socio-Demographic characteristics of respondents (N=124)

Table 1 displays the sample characteristic profile. 124 respondents were obtained from an online survey distributed throughout Indonesia. In particular, in terms of age, the majority are young adults, namely 58% between 28-38 years old. Gender in this study revealed that 79% of respondents were women. Women are often associated as those who prefer to consume fruit and vegetables. Young adult women also ate more fruit than young adult men [15] . In this study 52% of respondents were married while the rest were single. The majority of respondents (66.94%) have medium-sized families (2-4 people). The majority of respondents have an average monthly income of between IDR 2,000,000-IDR 4,000,000 (48%) and 23% of respondents have an income of above IDR 6,000,000 per month.

Table 1. Socio-demographic characteristics

Categories	Number (person)	Percentage (%)
Age		
17-27	46	37.10
28-38	72	58.06
> 38	6	4.84
Gender		
Man	26	20.97
Woman	98	79.03
Marital Status		
Married	64	51.61
Not married	60	48.39
Amount Member Family		
1	19	15.32
2-4	83	66.94
>4	22	17.74
Income/month (IDR)		
<2,000,000	14	11.29
2,000,000-4,000,000	59	47.58
4,000,001-6,000,000	22	17.74
> 6,000,000	29	23.39

3.2 Willingness to pay for defective fruit

Knowledge about consumers' willingness to pay for a product plays an important role in marketing, such as in decisions regarding pricing and product development. Willingness to pay is an amount of money that represents the difference in consumer surplus before and after an increase in a product [16]. In this case, WTP is usually used to measure consumers' willingness to pay for products with additional attributes, such as organic, local, fair trade food, certified pesticide free, natural food, etc. This research attempts to measure consumers' WTP for defective fruit, which has not yet been explored much. Rather than measuring additional utility from attribute values, this study attempts to measure whether consumers are still willing to buy fruit that is no longer in line with fresh fruit in general.

The study in this research was carried out by providing a description of examples of fruit that have defects in appearance (mango, apple, guava and orange) to measure participants' WTP. In this study, participants were asked to indicate their WTP through the questions presented. WTP for defective fruit is measured by the percentage reduction in price that is willing to be paid. Alternatives to paying the same as the normal price and not being prepared to pay are also provided. The research results are shown in Table 2.

Table 2 Consumers' willingness to pay for defective fruit

Willingness to pay	Amount (People)	Percentage (%)
Unwilling	63	50.81
Willing	61	49.19

Normal price	8	6.45
Lower < 10%	13	10.48
Lower 11-20%	19	15.32
Lower 21-30%	10	8.06
Lower 31-40%	7	5.65
Lower > 40%	4	3.23

In this study it was discovered that there were 49.19% of participants who were willing to pay for defective fruit. These results have the implication that basically fruit that has defects still has economic value even though consumers have varying variations in their WTP. It is known that the majority of consumers (15.32% of participants) are willing to pay for defective fruit with a price reduction of 11-20% from the price of normal fruit. Only 6.45% of respondents were willing to pay the normal price. Meanwhile, 10.48% of respondents were willing to pay a price reduction of <10%. Hartmann [17] suggests that consumers have proven unwilling to pay the same amount for food that they consider to be of lower than standard quality.

Several other studies refer to food conditions with an abnormal appearance in terms of weight, size or shape, safety in terms of consumption as part of suboptimal food [13, 18] . Acceptance of suboptimal food from consumers varies at the time of purchase or consumption. Hooge [19] stated that consumers who have suboptimal food (e.g. spotted apples) at home will be more willing to consume rather than waste it than when in the supermarket (purchase phase). Consumer acceptance of suboptimal food is closely related to perceived quality [20] . Consumer perceptions of quality are formed based on sensory attributes, appearance, taste, texture, freshness and safety.

3.3 Consumers quality perception of defective fruit

Consumer purchasing decisions and perceived product value are the result of the interaction of the consumer's perceived satisfaction (in terms of economic, functional and psychological benefits) with the resources needed to obtain it (in this case in the form of money, time and energy) [21] . This study provides an overview of consumer perceptions of defective fruit. Quality in this study is described in terms of taste, appearance, freshness, nutrition and food safety. The results of the study regarding consumer perceptions of defective fruit are presented in Table 3.

Table 3. Consumers' quality perception of defective fruit

Indicators	Disagreement (%)	Agree (%)
Has the same great taste	60.16	39.84
Still have good quality	69.11	30.89
The appearance is not bad	75.61	24.39
Still has a fresh scent	67.48	32.52
Still has the same good nutrition	49.59	50.41
Still safe to consume	16.26	83.74
Does not cause dangerous diseases	32.52	67.48

In Table 3 it is known that the majority of consumers (84%) have a good perception of the safety of defective fruit for consumption. This result is in line with the majority of consumers (67%) who said that defective fruit does not cause dangerous diseases. Apart from that, most consumers also have the perception that defective fruit still has the same nutrition as standard fruit. On the other hand, the majority of consumers (76%) have the perception that the appearance of defective fruit is bad. Consumers also negatively evaluate defective fruit in terms of taste and aroma. In general, the majority of consumers (69%) do not agree that defective fruit still has good quality.

The findings show that consumers basically have a good assessment of the nutrition and food safety of defective fruit. However, simultaneously a negative assessment appears about the sensory display. Therefore, it is important to build a campaign strategy to provide a positive knowledge stimulus for defective products. The strategy that can be implemented is to campaign for the same safety and nutritional quality as standard fruit which is expected to reduce the negative impact of other stimuli. Apart from that, positioning the product as an ethical product can be a positive campaign in itself. Findings suggest that consumers who are aware of the issue of food waste and have a pro-environmental attitude, tend to be more willing to purchase suboptimal food [22]. This is aimed at growing consumer acceptance of defective fruit. Furthermore, it has an effect on consumer WTP. Previous researchers have stated that perceptions of quality are related to WTP for defective fruit [18]. In line with this, Table 4 shows this relationship.

Table 4. correlation between quality perception and WTP

Correlations			Quality Perception	WTP
Spearman's rho	Quality Perception	Correlation Coefficient	1,000	,455**
		Sig. (2-tailed)	.	<.001
		N	124	124
WTP	WTP	Correlation Coefficient	,455**	1,000
		Sig. (2-tailed)	<.001	.
		N	124	124

** . Correlation is significant at the 0.01 level (2-tailed).

In Table 4 it is shown that there is a significant relationship between consumer perceptions of defective fruit and consumer WTP. Previous researchers [21] stated that when consumers feel

that the quality of the fruit has decreased, as perceived by the appearance showing damage, their willingness to pay decreases. Vice versa, price reductions are also known to cause consumers to assume that quality has decreased. The existence of this negative conclusion can have an impact on perceptions and buying intentions in the future. Thus, pricing strategy is an important concern for marketers. As for prices, campaigns to avoid waste can be carried out.

4 Conclusion

There is an opportunity for consumers to be willing to pay for defective fruit even if the price decreases. The willingness to pay for defective products in this study is known to be related to consumer perceptions of quality. Consumers are known to have a good perception of the safety and nutrition of defective fruit, while consumer perceptions are negative regarding the appearance of defective fruit. These findings provide practical implications for marketers, policy makers and NGOs to provide positive campaigns to build positive consumer perceptions of defective fruit. The strategy of positioning products as ethical products as a form of waste reduction can be an alternative in increasing consumer WTP.

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