

Do Not Judge these Potatoes by Its Peel: Urban Consumers' Perceptions of Imperfect Produce

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ABSTRACT

Even though these products have the same nutritional content, imperfect vegetable and fruit products are often ignored and discarded by consumers. This condition has resulted in an increasing problem of food loss and food waste, from the producer to the consumer level. This paper aimed to investigate consumer perceptions of imperfect vegetable products. The research design used two approaches, namely (1) hedonic test experiments and (2) group discussion forums (FGD). The participants were urban people who were living in Jakarta. Participants assessed the level of preference (hedonic) on color, aroma, texture, and taste. Potatoes used in this study were (Sample 1) potatoes grade A and (Sample 2) potatoes grade B. Potatoes sample 1 has a good shape, size, and only a minor blemish level. In contrast, potatoes sample 2 has a smaller size, not good condition, and blemish level. Investigation through the Mann-Whitney test showed that all parameters were not significantly different ($p < 0.05$) for all variables. This indicated that consumers could accept imperfect produce. However, in terms of consumer behavior, cosmetics and appearance products are considered in choosing potatoes.

Keywords: consumer behaviour, food loss and waste, imperfect produce, potatoes

INTRODUCTION

Vegetable marketing is complex because of the perishability aspect and the supply chain's inefficiency (Deogharia, 2017). Garrone *et al.*, (2014) classified fruits and vegetables as a medium recoverability level. It is because customers can directly consume them without prior transformation. However, cereals are less perishable than fruits and vegetables, but they need a more intense shift (Osugiri *et al.*, 2018). So, that they were classified as having a

low recoverability level (Garrone *et al.*, 2014). There is a long supply chain in agriculture marketing in Indonesia consisting of growers, assemblers, commission agents, wholesalers, and retailers. It makes produces generally wasted during the food supply chain (Göbel *et al.*, 2015; Bernstad *et al.*, 2017; Mopera 2016; Alexander *et al.*, 2017).

In the farmer's stage, the unstable produce price sometimes makes many farmers throw away the product as a protest or just left in the

farm, which is potentially wasted. On the other hand, there are strict cosmetic standards on fresh produce size, shape, weight, blemish level, and weight (Gustavsson *et al.*, 2011). The facts that imperfect produce is still good as nutritional and taste (Aschemann-Witzel *et al.*, 2015). Imperfect produce (fruit and vegetables) is generally defined as the produces rejected by retailers because they do not suit the standard (Aschemann-Witzel *et al.*, 2017; Loebnitz and Grunert, 2018; Lombart *et al.*, 2019).

The food loss and waste (FLW) topic must be increased for public awareness about the severe problem behind the food we eat. Moreover, this problem is mainly ignored and underestimated without acknowledging the threatening danger. FLW brings impact to economic loss, environmental, and nutritional loss (Hiç *et al.*, 2016; Visschers *et al.*, 2016; Cronjé *et al.*, 2018; Schanes *et al.*, 2018; Berjan *et al.*, 2019; Chalak *et al.*, 2019; von Massow *et al.*, 2019). In this case, consumers have a critically important role in contributing to a sustainable food system. Promoting and campaigning to embrace imperfect produce is a crucial strategy in FLW reduction. Consumers'

perception has to shift that every food is equal to whatever they look. This paper aimed to examine the consumers' perception of imperfect potatoes.

RESEARCH METHOD

The design research was two scenarios that are (1) hedonic test experiment and (2) forum group discussion (FGD). Sixty-one participants joined in this event. For the social experiment, all participants were asked to do the hedonic test with the criteria of understanding and filling out the questionnaire independently and willing to participate in research. The participants were urban people who were living in Jakarta. Participants assessed the level of preference (hedonic) on color, aroma, texture, and taste using 5 scales, namely 1: dislike very much, 2: dislike, 3: neutral; 4: like, 5: like very much.

Potatoes used in this study were (Sample 1) potatoes grade A and (Sample 2) potatoes grade B. Potatoes sample 1 has a good shape, size, and only a minor blemish level, while potatoes sample 2 has a smaller size, not good shape, and blemish level. To avoid consumers directly judging the potatoes by appearance. The potatoes were peeled and boiled for around five

minutes. After that, it was cut to be dice. Thus, the impression was the same.



Picture 1. (a) Potatoes Sample 1 and (b) Potatoes Sample 2

The hedonic test data were analyzed using the Mann-Whitney test to understand differences in the level of preference between the two grades of potatoes. Data analysis used SPSS Statistics 25 at a significant level of 0.05.

RESULTS AND DISCUSSION

Hedonic Test

Social experiment through the hedonic test of two samples showed that respondents chose to like the potatoes' texture of sample 1 (50%), while for sample 2, they tended to like and very like with same percentage (29%). For potatoes' color, most respondents chose to neutral for both samples 1 and 2 (42%). Respondents also stated that they liked the aroma in samples 1 (38%) and 2 (46%). Even though, for sample 2, there were respondents to choose to

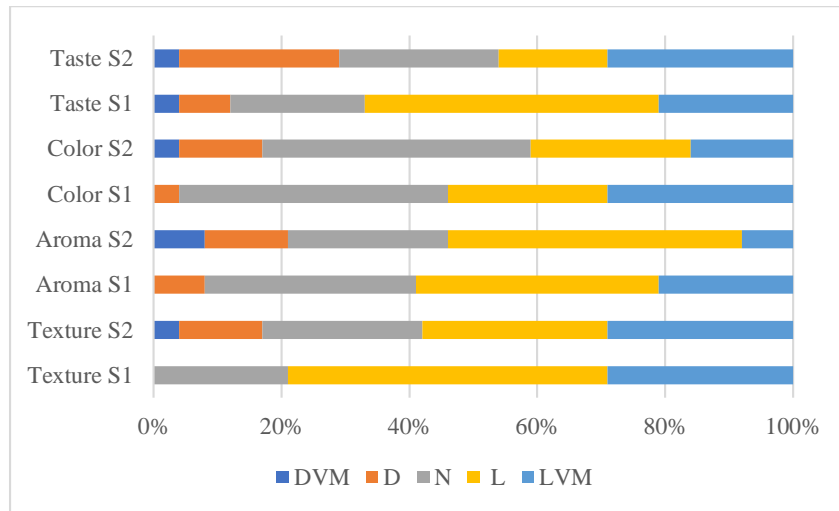
dislike very much (8%) and dislike (13%). Most respondents responded to

like potatoes' taste of sample 1 (46%), while 29% chose to like very much. Figure 1 shows the percentage of the hedonic test. Further investigation through Mann-Whitney Test showed that all parameters were not significantly different ($p < 0.05$) (Table 1). By these results, imperfect produces can be accepted by customers.

People have cosmetically standards that imperfect produce (sample 2) is not good as perfect produce (sample 1). One of the alternative solutions to shift customer preferences in imperfect produce is through transforming them into new processed products. After converting to new process products, imperfect and perfect will look the same as physically. Converting to new processed products (i.e., juice) can increase customers'

acceptance (Barone *et al.*, 2021). Similar to Trudel and Argo (2013), the physical parameters transformation of imperfect produce in processed products will impact consumer recycling behavior. Ikhwan and Sylvia (2021) stated that recycling imperfect foods to be cold-

taste, health, and price, can increase the credibility of costumer and positively impact the retailer's brand image (Louis and Lombart 2018; Legendre *et al.*, 2020). The main content of communication about reducing hunger problems and the negative impact of food waste can be



Picture 2. Percent of Respondents for Cosmetically Imperfect Potatoes

pressed juice can increase income and reduce food waste for small-medium businesses.

According to Olavarria-Key *et al.*, (2021), the customer can be persuaded to accept and participate in food waste reduction efforts by using communication strategies. Customers' motive to buy imperfect produces is influenced by the degree of anthropomorphism and communication message to customers (Shao *et al.*, 2020). A clear communication statement about the imperfect produce, such as food

used to attract the costumer's attention to buy imperfect produces (Yuan *et al.*, 2019).

Customer's acceptance of imperfect produce is influenced by diverse variables based on their knowledge or experience (Aschemann-Witzel *et al.*, 2017). According to (Quested *et al.*, 2013), people over 65 years of age were more accepting of the imperfect produce than other ages. Discounts can also motivate customers to buy imperfect produces (De Hooge *et al.*, 2017; Quested *et al.*, 2013). Even

though, discounts or lower prices can make people more consumptive, it will produce more food waste (Porpino *et al.*, 2015). People who buy in the fresh food market have more positive acceptance than in the supermarkets (Canavari *et al.* 2016).

Indonesia has an index hunger score of 21.9. The position is 70 out of 119 countries behind other Southeast Asia (SE) countries, such as the Philippines, Cambodia, Thailand, Malaysia, and Vietnam. Similarly, World Food Programmes (2017) stated that 19.4 million Indonesian people were

Table 1. Mann-Whitney Test of Respondents for Cosmetically Imperfect Potatoes

Parameters	Sample 1 (Mean ± SD)	Sample 2 (Mean ± SD)	<i>p</i>
Texture	4.08 ± 0.72	3.67 ± 1.17	0.25
Aroma	3.71 ± 0.91	3.33 ± 1.09	0.31
Color	3.79 ± 0.93	3.38 ± 1.06	0.18
Taste	3.71 ± 1.04	3.42 ± 1.28	0.42

Note: Significance = $p < 0.05$

Impact of Food Loss and Waste

FLW leads to several severe social, economic, and environmental problems. (1) Society impact, the Food and Agriculture Organization of the United Nations (FAO) estimates that around 40% of the food produced globally is thrown away to be food waste (Gustavsson *et al.*, 2011). Indonesia was the second-largest country after Saudi Arabia in food waste and food loss aspects in 2017 (The Economist & Intelligence Unit, 2017). Ironically, when these phenomena happen, most people still face limited food supply and food insecurity. According to von Grebmer *et al.*, (2019),

suffering from malnutrition issues. Furthermore, 29% of children under five years old face stunted, and its number of stunting was equal to 63% of total stunted children in Southeast Asia countries (FAO 2018).

(2) Economic Losses, the the estimatimation of the economic losses because of food waste of \$ 940 billion annually. For example, In the United States, 40% of food loss and wastes annually impact \$218 billion or 1.3% GDP (FAO 2019). The business and Sustainable Development Commission (2016) predicts that by 2030 decreasing food waste will show a \$155-405 billion economic opportunity. These estimations of the economic losses

represent the importance of food waste and loss reduction because it is related the inefficiently utilizing scarce resources and preventing financial losses (Ishangulyyev et al. 2019).

(3) The environmental impacts, food loss, and waste produce emissions deriving from the food supply chain system (Scherhauser et al. 2018). The food loss and waste in landfills have a tremendous amount of methane, a more substantial greenhouse gas than CO₂. Excess amounts of greenhouse gases (i.e., methane, CO₂, and chlorofluorocarbons) absorb infrared radiation and heat the earth's atmosphere, causing climate change and global warming. According to Hall *et al.*, (2009), FLW also contributes to excess total freshwater and fossil fuel consumption. In the US, uneaten food will contribute 4% of GHG emissions, 14% of freshwater use, 18% of cropland use, and 24% of landfill inputs (ReFED 2019). In addition, 2% of national emissions from food loss and waste is equivalent to least 113 million metric tonnes of CO₂e annually in the US (Venkat 2011). Feldstein (2017) also stated that food loss and waste also could contribute to biodiversity loss,

and it must be a concern in a conservation strategy.

CONCLUSION

Conslusion

This study examines consumer awareness, perception, and behavior of imperfect produce. Based on the analysis results, it is known that all the parameters studied are not significantly different. From these results, imperfect produce can be accepted by consumers. However, consumer behavior shows that the appearance and cosmetic factors of the product are taken into consideration in choosing a product, even though the imperfect product has the same nutritional content. Therefore, strategies, education, and communication to consumers are needed to change the paradigm regarding imperfect produce. A communication strategy with an approach to the impact of food loss on the environment, economy, and society can be applied. The loss of food for horticultural types in Indonesia, especially vegetables, is tremendous, reaching 62.8% of the entire domestic supply of vegetables in Indonesia (Bappenas, 2021). The problem of displaying imperfect produce caused by

differences in crop yields should not trigger food waste and food unsustainability problems. Therefore, joint action is needed, both from the government, entrepreneurs (retailers, groceries, distributors), farmers, consumers, academia, and NGOs, to overcome the problem of imperfect produce.

Implication

Imperfect produce on the market with low acceptance from consumers harm food sustainability. This study provides insight into the problem of consumer perception of imperfect produce by using a combination of stated and expressed preference data. Referring to the study results, even though it has an unfavorable appearance, the imperfect product's nutrition and content remain the same and are beneficial when consumed. Therefore, there are several implications for increasing consumer acceptance of imperfect produce. First, processing imperfect produce into packaged food or ready-to-eat food. Holtz (2020) states that the value and price of imperfect produce can be increased in the market through processing. Second, a marketing strategy is needed by emphasizing the normality and safety of

imperfect produce to positively influence consumer decisions towards imperfect produce (Holtz, 2020). Understanding that imperfect produce naturally can be eaten ideally and are sold at discounted prices is essential for changing attitudes and behavior (Yuan *et al.*, 2019). Last, there is a need for educational programs and campaigns that focus on FLW. This effort hopes that consumers' understanding of imperfect produce, especially those related to safety, nutritional equity, and environmental and social impacts, can be improved (Afrianto and Tamnge 2015; Afrianto *et al* 2021). This is followed by consumer awareness and behavioral changes towards imperfect product acceptance.

Future Study

As a follow-up to this study, it is necessary to conduct research related to effective educational strategies and campaigns to change consumer behavior and increase their acceptance of imperfect produce. In addition, the marketing strategy for imperfect produce is also interesting to study. Through these two things, it is hoped that a complete picture can be obtained regarding efforts to increase consumer

acceptance of imperfect produce and reduce food waste at the retailer and consumer levels

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