

ANALYSIS OF THE WILLINGNESS TO PAY FOR THE CONSUMPTION OF GANYONG AS A LOCAL FOOD IN GUNUNGKIDUL REGENCY

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Abstract

The food system's reliance on homogeneous commodities and imported products has created vulnerabilities in food security. Local foods, which are considered to have economic potential and could serve as a solution to this problem, have not yet been adequately developed. This study aims to analyze consumers' willingness to pay for ganyong as a local food in Gunungkidul Regency and to evaluate its economic potential if developed optimally. The method used was a statistical analysis of 107 respondents who directly provided their willingness-to-pay values for ganyong as a local food. The results show that the WTP for ganyong in Gunungkidul Regency is Rp10,000/kg. In terms of preferences, taste and nutritional value were found to have a significant influence on WTP, while sociodemographic characteristics such as age, gender, education, and expenditure level did not show a significant direct influence. These findings can serve as a reference for unlocking the significant economic potential of developing ganyong as a local food crop in Gunungkidul Regency. This study concludes that ganyong, as a local food crop, has a high willingness-to-pay value, strong competitiveness, and great potential to support food security while boosting local economic growth in Gunungkidul Regency.

Keywords: *Willingness to pay, local food, economic potential, ganyong*

1. Introduction

The ongoing population growth requires a food system that can continue to meet increasing food needs. This food system must be able to withstand crises while maintaining food availability, suitability, and accessibility (Boccardo *et al.*, 2023). However, the current reality is that the global food system is heavily reliant on imported products and homogeneous food commodities. Homogeneous global food sourced from imports is highly vulnerable to unstable global political conditions. Such a food system is not only vulnerable to political conditions but can also place economic pressure on communities, particularly small-scale local farmers.

This food system has also created a pattern of high consumption dependence on non-local food products. The consumption of wheat, for example, is so high that Indonesia became the world's largest wheat importer from 2020 to 2022, with imports reaching 12.9 million tons (Saputra & Setyowati, 2024). This dependence is not limited to imports, the homogenization of staple food sources also reflects this trend. Indonesians rely on rice as their primary staple food, with 90% of their diet consisting of rice (Dewanti *et al.*, 2024). This is not an ideal situation, as such consumption patterns can foster resistance to local food sources.

With these various problems, local food is currently developing into a solution to meet existing food needs. Local food is growing because basically every region has the potential for food diversification. Economically, this represents a significant market opportunity. Local food, often valued more highly for its perceived health and environmental friendliness, can provide economic benefits to the local food supply chain. Therefore, understanding consumers'

willingness to pay for local food can inform local food development policies and objectively assess its economic potential.

However, assessments of willingness to pay for local food remain limited. In Gunungkidul Regency, for example, which has the potential for local ganyong crops, these have not yet been properly assessed or developed. On the other hand, rice as the primary staple food is under immense pressure in Gunungkidul Regency. According to data from the Gunungkidul Agriculture and Food Agency, from 2009 to 2019 alone, 2,665 hectares of agricultural land were converted to other uses, and as a result, food crop production in Gunungkidul Regency has not yet reached its full potential, achieving only 74.90% of the target. Pressure from climate change has also had a tangible impact on the decline in farmers' crop yields in Gunungkidul Regency, ranging from 40% to 100%, which amounts to crop failure (Widada *et al.*, 2014).

The willingness to pay (WTP) analysis is an instrument that can assess the value of a commodity and the strength of consumer preferences (Bredert *et al.*, 2006). This article uses WTP analysis to assess the economic potential of ganyong as a local food commodity in Gunungkidul Regency. As a local food crop, there has been no previous research on the economic potential of ganyong. Therefore, the research presented in this article offers a novel perspective on consumers' assessment of ganyong as a local food crop in Gunungkidul Regency. This scientifically objective assessment can serve as a crucial foundation for local food development policies designed to address the threat of food crises while simultaneously boosting economic benefits.

Nowadays, the food system plays a vital role in human life. Beyond being a basic necessity, food security has become an integral component of economic development and poverty reduction (Chavas, 2017). The supply chain within the food system holds significant economic potential through the various activities it encompasses. Every stage in the food and agricultural system has the potential to add economic value (Cucagna & Goldsmith, 2018). With proper assessment, the utilization of food commodities can form an agro-industrial system. This agro-industrial system will require a short yet effective food supply chain that makes the most of local resources (Meilizar *et al.*, 2024). This highlights the critical role of economic factors in food commodities. The greater the economic potential, the higher the likelihood that food commodities can be successfully developed.

Based on a literature review, research on local food systems has also continued to grow (Cappelli *et al.*, 2022). However, as a solution, the implementation of local food systems cannot be applied universally and must take into account the local context—including the supply chain, the products, and the geographic location (Enthoven & Broeck, 2021). This is what makes local food systems unique and offers greater benefits. With local food distributed locally, shipping costs are reduced, leading to lower prices (Bingham *et al.*, 2022). Therefore, from an economic perspective, it can also be argued that a sustainable food system should not only provide affordable food but also be able to cover production costs and ensure fair wages within the system (Schmitt *et al.*, 2017). Nevertheless, consumers demonstrate a willingness to pay a premium for fresh local food products compared to processed ones (Printezis *et al.*, 2019).

Given the significance of this economic value, the ganyong can become a local food commodity that not only meets food needs but also offers strong economic potential. Ganyong tuber production alone can reach 45–50 metric tons per hectare (Histifarina *et al.*, 2023). This represents significant production potential that can provide greater profits for farmers. Ganyong also offers a wide range of processing possibilities beyond direct consumption. For example, blending ganyong with wheat flour to make noodles could serve as a solution to diversify wheat imports while producing a product with characteristics acceptable to consumers (Handajani & Pangesthi, 2019). Furthermore, innovative and cost-effective processing methods that extend the shelf life of local foods can support the sustainability of these local

food products (Sayekti *et al.*, 2024). Such improved processing will enable the economic potential of ganyong to be utilized more effectively.

Another economic benefit of developing ganyong as a local food source is the reduction in environmental costs. Local food systems are considered a solution to the environmental pressures caused by conventional food systems. Conventional food systems have been shown to cause a range of health issues as well as greenhouse gas emissions (Zerbian *et al.*, 2022). On the other hand, short food supply chains are more effective at reducing carbon footprints and greenhouse gas emissions (Jarzebowski *et al.*, 2020). Production within local food supply chains also offers advantages in terms of creating economic value-added and preserving environmental biodiversity (Schmitt *et al.*, 2016). This is also consistent with the potential of ganyong, which can be cultivated as an intercrop, thereby helping to maintain biodiversity.

The economic potential of ganyong can also be derived through its nutritional attributes. A willingness to pay analysis in India also showed that consumers are increasingly willing to purchase healthier foods (Ali & Ali, 2020). Ganyong starch products are gluten-free, making them safe for consumption by children with special needs and those with celiac disease (Parwiyanti *et al.*, 2018). This attribute gives ganyong a competitive edge for development into higher-priced processed products. Fresh gluten-free bread products are five times more expensive than fresh bread containing gluten (Vychov, 2025). This represents significant economic potential for the development of ganyong-based products. In addition to being gluten-free, another key attribute of ganyong is its low glycemic index. In a study conducted in Mexico, tortillas labeled as low-glycemic sold for 3.44 times the price of regular tortillas (Arámburo-Gálvez *et al.*, 2017). Since ganyong can be processed into low glycemic index and gluten-free foods, it has the potential for greater economic value if this labeling is developed and appropriately applied to various ganyong-based processed products.

With these various attributes, ganyong, as a local food, also has economic potential in reducing healthcare costs. Ganyong is high in fiber and can help prevent various diseases such as obesity, diabetes, colorectal cancer, and coronary heart disease (Noriko & Pambudi, 2014). The resistant starch content, along with the curcumin properties and short-chain amylose in *Canna edulis* (ganyong), has also been proven effective and promising for drug delivery to the large intestine (Zhang *et al.*, 2024). This scientific research demonstrates how processed and modified forms of ganyong can be beneficial not only as a substitute to enhance food security but also, in sophisticated ways, offer health benefits in modern medicine. With growing awareness of healthy lifestyles and nutrition, the nutritional content of ganyong can provide added value compared to other commodities.

Another economic opportunity that can be exploited is that, since Gunungkidul Regency is a tourist destination in this study, local food can also be developed to enhance the tourist experience. In the tourism experience, local culinary tourism is an important attraction (Purnomo *et al.*, 2023). Therefore, positioning processed ganyong products as a local specialty of Gunungkidul Regency can represent economic potential. Furthermore, the production of this traditional food can also help preserve the sustainability of local social and cultural identity (Ossowska *et al.*, 2024). A study conducted on the island of Hawaii found that 78% of tourist respondents were willing to pay a premium for sustainable local food (Linnes *et al.*, 2023). Therefore, there is essentially no need to worry about the nutritional value and economic benefits of ganyong (Syafaruddin *et al.*, 2011).

Given the challenges posed by the threat of global food imports and the homogenization of food sources, this article discusses how the assessment of local foods can serve as a solution to these issues. Ganyong, as a local food, offers attributes that make it suitable for consumption and capable of boosting the local economy. However, to this day, there has been no research or assessment regarding the economic potential of ganyong as a local food commodity in Gunungkidul Regency. Consequently, this study has two purposes: to analyze the willingness-

to-pay for ganyong as a local food commodity and to analyze its economic potential if developed optimally.

2. Methods

The method used to analyze the economic potential of ganyong in Gunungkidul Regency employed descriptive statistical analysis based on questionnaire data and ganyong productivity figures. The questionnaire was distributed to 107 respondents, as residents of Gunungkidul Regency aged 18–65 selected through purposive sampling. Ganyong productivity values were obtained from interviews with the Gunungkidul Regency Agriculture and Food Service. The willingness to pay (WTP) analysis was chosen because it can be used to assess the extent to which consumers are willing to choose and pay more for local food (Fan *et al.*, 2019). Using the contingent valuation method (CVM) approach, respondents were asked directly about the amount they were willing to pay. In developing countries, the use of willingness-to-pay analysis can help provide an objective assessment despite the economic constraints faced by the community (Blare *et al.*, 2019).

After that, the WTP data obtained from the questionnaire were analyzed using descriptive statistics through frequency distribution tables to determine the maximum, minimum, and average values for ganyong. The data were then subjected to a difference test, using both the t-test and ANOVA. These tests were conducted to determine whether there were differences among the respondent groups, thereby identifying the factors most likely to influence WTP values. This statistical analysis was performed using Microsoft Excel with the Real Statistics add-in. The WTP values were then multiplied by ganyong productivity data to provide a comprehensive picture of the economic potential of ganyong. Ganyong productivity data were expressed in kilograms, based on actual productivity and potential production derived from land potential and consumer demand.

3. Results

Willingness to pay for ganyong

Based on primary data collected from 107 respondents, the willingness to pay (WTP) for fresh ganyong per kilogram is Rp10,000 based on the mode and median, and Rp10,916 based on the mean. The overall data distribution, which is right-skewed, makes Rp10,000 the appropriate overall WTP value in this study. The highest willingness-to-pay value was Rp25,000, indicated by one respondent, and the lowest was Rp7,000, indicated by 31 respondents. Picture 1 shows that, in order, Rp10,000, Rp7,000, and Rp15,000 are the three willingness-to-pay values with the highest occurrence percentages. The WTP value of Rp10,000 is higher than the market price at which farmers sell fresh ganyong at the market, which ranges from Rp3,000 to Rp4,000 per kilogram. This indicates that ganyong has greater economic potential, with a willingness to pay that exceeds the actual market price of ganyong in Gunungkidul Regency. These results also indicate that there is a consumer surplus for people who consume ganyong.

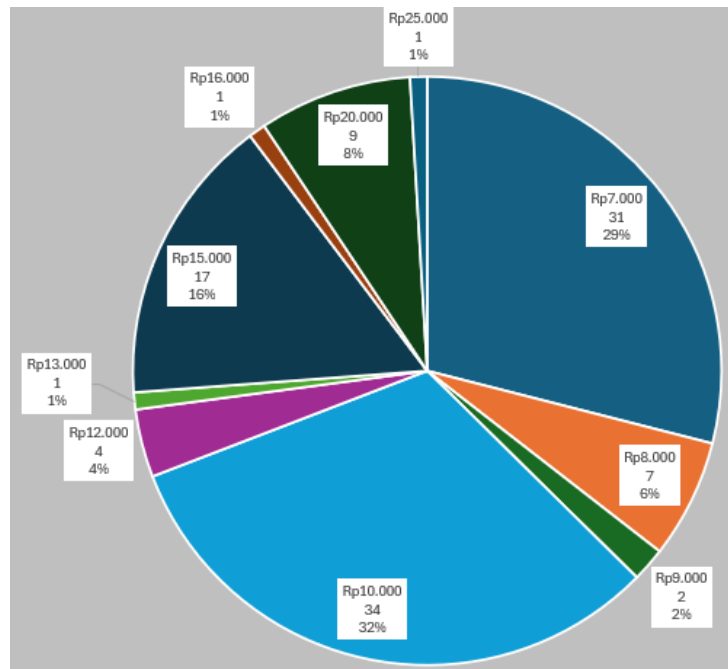


Figure 1. Diagram showing the percentage distribution of WTP values

The influence of sociodemographic characteristics and preferences on the willingness to pay for ganyong

More specifically, based on Table 1, both male and female respondents had average WTP values that were not significantly different. The average WTP value for men was Rp10,934 and the average WTP value for women was Rp10,901. Although the highest WTP value, at Rp25,000, was for women, the average WTP value for women was lower than for men. This condition was because the distribution of WTP values for women was not much above Rp10,000 and there were 18 respondents who chose Rp7,000 as the lowest value for their willingness to pay. The WTP value for both male and female respondents was mostly chosen Rp10,000 as the amount they were willing to pay to buy fresh ganyong. In addition, the T-test also produced a p-value > 0.05 , meaning that there was no significant difference between male and female respondents. This also confirmed that there was no gender preference in the value of willingness to pay.

Table 1 Frequency distribution of WTP values by gender

WTP	Gender	
	Male	Female
Rp.7.000	13	18
Rp.8.000	2	5
Rp9.000	2	0
Rp.10.000	14	20
Rp.12.000	2	2
Rp.13.000	1	0
Rp.15.000	7	10
Rp.16.000	1	0
Rp.20.000	4	5
Rp.25.000	0	1
Average	Rp10.934	Rp10.901

Next, in Table 2 shows the distribution of WTP values by respondent age group, as well as the percentage breakdown for WTP values less than Rp10,000, Rp10,000, and WTP values greater than Rp10,000. Based on the table, it can be seen that in the youngest age group (18–25 years) and the oldest age group (55–60 years), there is a balanced percentage between those willing to pay more than Rp10,000 and those willing to pay less than Rp10,000. In the 26–34 and 45–54 age groups, the percentage of respondents willing to pay more than Rp10,000 is lower than those willing to pay less than Rp10,000. Meanwhile, the 35–44 age group showed a higher percentage of WTP values exceeding Rp10,000. On average, the 35–44 age group had the highest average WTP value, reaching Rp12,050. This figure aligns with the higher percentage of WTP values exceeding Rp10,000. The 55–60 age group had the second-highest average WTP value, with an average WTP of Rp11,786. Meanwhile, the lowest average WTP value was found in the 45–54 age group, at Rp9,231. The two youngest age groups, 18–25 years old and 26–34 years old, showed WTP values of Rp10,949 and Rp10,238, respectively. These results indicate that, based on the crosstab analysis, there is no specific pattern suggesting that age influences the willingness-to-pay for ganyong as a local food. This finding is further confirmed by the ANOVA and Kruskal-Wallis tests, both of which yielded non-significant results.

Table 2 Frequency distribution of WTP values and their percentages for WTP values <Rp10,000, Rp10,000, and >Rp10,000 by age group

WTP	18-25 years old		26-34 years old		35-44 years old		45-54 years old		55-60 years old	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Rp7.000	9	33,33%	7	42,86%	4	25%	6	61,54%	5	35,71%
Rp8.000	2		2		1		2		0	
Rp9.000	2		0		0		0		0	
Rp10.000	13	33,33%	8	38,10%	7	35%	2	15,38%	4	28,57%
Rp12.000	3	33,33%	0	19,05%	0	40%	1	23,08%	0	35,71%
Rp13.000	1		0		0		0		0	
Rp15.000	5		2		5		2		3	
Rp16.000	1		0		0		0		0	
Rp20.000	3		2		3		0		1	
Rp25.000	0		0		0		0		1	
Average	Rp10.949		Rp10.238		Rp12.050		Rp9.231		Rp11.786	

Based on educational level, the highest average WTP value was found among respondents with a college education. Greater openness to new knowledge and a better understanding led this group to tend to have the highest average WTP value. Based on the 16 respondents in this group, the average WTP value was Rp11,563. This value is slightly higher than the average WTP value for the group of respondents with a junior high school education level, which was Rp11,536 based on 28 respondents. Although the value is high, there are outliers in this group: one respondent selected a WTP value of Rp20,000 and another selected a WTP value of Rp25,000 as the highest WTP value in the study. The group with an elementary school education level had a WTP of Rp10,400, while the group with a high school education level, which was the largest group in terms of the number of respondents, totaling 57 respondents had a WTP of Rp10,491.

Based on these results, the cross-tabulation analysis in Table 3 does not indicate a pattern where higher levels of education lead to an increase in the average WTP value; instead, there is a decrease in WTP from the junior high school group to the senior high school group. This finding is further confirmed by the ANOVA and Kruskal-Wallis tests, both of which yielded p-values > 0.05 . These results indicate that educational level does not influence preferences regarding the determination of willingness-to-pay for ganyong.

Table 3 Frequency distribution of WTP values by education level

WTP	Level of Education				
	Never Attended School	Elementary School	Junior High School	Senior High School	College
Rp.7.000	0	1	9	18	3
Rp.8.000	0	0	0	5	2
Rp9.000	0	0	0	2	0
Rp.10.000	1	3	8	16	6
Rp.12.000	0	0	0	4	0
Rp.13.000	0	0	0	0	1
Rp.15.000	0	1	9	6	1
Rp.16.000	0	0	0	1	0
Rp.20.000	0	0	1	5	3
Rp.25.000	0	0	1	0	0
Average	Rp10.000	Rp10.400	Rp11.536	Rp10.491	Rp11.563

Table 4 shows a cross-tabulation between WTP values and monthly consumption expenditures. There are three expenditure groups: the group with expenditures of less than one million rupiah per month, which has the largest number of respondents; the group with consumption expenditures of one to two million rupiah per month, comprising 36 respondents; and the final group with expenditures exceeding two million rupiah. When viewed in terms of average values, the highest WTP is found in the group with monthly consumption expenditures of one to two million rupiah. In the group with expenditures of less than one million rupiah, WTP values were present for almost all options except Rp13,000. Based on this cross-tabulation analysis, it cannot be concluded that WTP values will increase with higher levels of consumption expenditure among respondents. In the comparison tests using ANOVA and the Kruskal-Wallis test, p-values greater than 0.05 were also obtained, indicating no significant differences in WTP values among the expenditure groups.

Table 4 Frequency distribution of WTP values based on monthly consumption expenditures

WTP	Monthly Consumption Expenditures		
	<1Millions Rupiah	1-2 Millions Rupiah	>2 Millions Rupiah
Rp7.000	23	8	0
Rp8.000	2	4	1
Rp9.000	2	0	0
Rp10.000	21	12	1
Rp12.000	2	2	0

Rp13.000	0	0	1
Rp15.000	10	7	0
Rp16.000	1	0	0
Rp20.000	6	3	0
Rp25.000	1	0	0
Total	68	36	3
Average	Rp10.882	Rp11.028	Rp10.333

Although none of the respondents' characteristics had a direct effect on differences in WTP values, preferences were found to significantly influence these differences. Descriptively, the WTP values among the group of respondents who selected price preferences were the lowest. Table 5 shows that, on average, this group had a WTP value of Rp9,833, and the median WTP value for this group was Rp9,500. These values were lower than those of the respondent groups who prioritized taste and nutrition in their willingness-to-pay preferences. The "taste" group had the highest average WTP value at Rp11,650, followed by the "nutrition" group with an average WTP value of Rp11,580.

Based on the ANOVA test, a p-value of 0.046849 was obtained, which is below 0.05. This result confirms that there is a significant difference in preferences that influences the WTP value. Based on the multiple linear regression test, each group also had a p-value below 0.05. The regression model results for WTP for ganyong in Gunungkidul Regency show that the group of respondents who prioritized price had a base value of Rp9,527. The group of respondents who prioritized nutrition were willing to pay Rp2,053 more than the group that prioritized price. The group of respondents who prioritized taste had the highest WTP, with an additional Rp2,122 on top of the base value chosen by the price-prioritizing group. Therefore, the WTP for ganyong as a local food in Gunungkidul Regency will be higher if consumers rate its taste and nutritional value as good. Meanwhile, consumers who tend to prioritize price have a lower willingness to pay for ganyong.

Table 5 WTP values based on consumer preferences

Preference	Number of Respondents	Average WTP	Median WTP
Nutrition	31	Rp11.580	Rp10.000
Taste	40	Rp11.650	Rp10.000
Price	36	Rp9.833	Rp9.500

The Economic Potential of Ganyong

Local foods essentially offer vast economic potential, particularly for local communities. In this study, ganyong as a local food provides economic benefits to the local community in Gunungkidul Regency, ranging from farmers and processors to consumers. For farmers, ganyong, as a secondary crop, offers high economic potential without requiring significant maintenance costs. For processors, ganyong serves as a versatile raw material with good economic value. For consumers, the diversification of food options through ganyong provides an economic benefit by offering more affordable food with good nutritional content that is readily available.

In this study, the WTP for fresh ganyong was found to be Rp10,000. This figure is higher than the market price of fresh ganyong sold by farmers. Farmers in Gunungkidul Regency sell their fresh ganyong for an average of between Rp3,000 and Rp4,000 per kilogram.

A short supply chain can increase value and has the potential to generate additional income for ganyong farmers. Farmers can sell their ganyong directly at the market at a higher price or to traders who sell directly to consumers. This can be achieved provided there is an increase in ganyong production, both in terms of quality and quantity. The practice of most farmers, who typically only allow ganyong to grow as an intercrop or along the edges of their fields, needs to be changed in order to boost production.

Consumer willingness to purchase ganyong is greatly influenced by the product's quality and quantity. In terms of quality, ganyong products must meet high standards to increase their economic value. The ganyong plant should no longer be overlooked; rather, it requires proper care to produce high quality tubers. Processed ganyong products, such as noodles and various pastries, require high quality ganyong to ensure consistency in taste and nutritional value. In terms of quantity, production must also be increased to improve availability. Limited availability currently leads consumers to prefer other food products that are easier to obtain. Increased production will also help stabilize ganyong prices.

This study also collected data on the amount respondents were willing to spend on ganyong in a month. Based on the average calculation, the amount respondents were willing to spend on ganyong consumption was Rp60,243 per month. When compared to the average per capita monthly food expenditure in Gunungkidul Regency, which reached Rp684,320, this value represents 8.8% of the total expenditure on food that respondents are willing to allocate to ganyong consumption. As a source of dietary diversification, this figure indicates a positive trend toward a willingness to consume ganyong. This willingness could represent economic potential if it can be met through appropriate ganyong production.

The data from each respondent regarding their willingness to pay for ganyong consumption this month was then compiled. This data was then averaged across the 107 respondents surveyed. The result was 5.56 kg/month for ganyong consumption. When this figure is multiplied by 10% of the population of Gunungkidul Regency, the result is 418,773.64 kg, or approximately 418.7 metric tons, representing the monthly demand for ganyong production. With annual production reaching only 450 metric tons, there remains a significant gap in ganyong production. If this demand were met every month, annual ganyong production would need to reach 5,025 metric tons. Multiplied by the WTP value, the economic potential of ganyong could reach Rp50,252,836,800 annually. This figure is based solely on fresh ganyong; in practice, ganyong can be processed into a variety of products. Given the limitations of this assessment, the economic potential of ganyong as a local food source could, in fact, be even higher due to the wide range of processed ganyong products available.

An economic assessment based on the WTP value of fresh ganyong indicates a high value that exceeds the actual market price of ganyong. Calculations comparing the community's willingness-to-pay figures with the potential number of consumers in Gunungkidul Regency demonstrate that ganyong, as a local food crop, possesses significant economic value. Based on the questionnaire analysis, it was also found that the acceptance of ganyong is very high. These results indicate that ganyong, as a sustainable local food crop in Gunungkidul Regency, has proven to have high economic potential, supported by positive public perceptions.

4. Conclusion

This study shows that ganyong, as a local food crop, has significant potential for food security and economic growth. Fresh ganyong was found to have a high willingness-to-pay value of Rp10,000. This value is higher than the actual price of ganyong in Gunungkidul Regency, indicating substantial economic potential if developed and providing a consumer

surplus. Consumers also rate local foods more highly based on nutritional value and taste rather than price. The economic potential of ganyong itself is substantial, given its high willingness to pay and significant production potential. With an estimated annual potential of Rp50,252,836,800, ganyong can be developed as a local food crop to support food security in Gunungkidul Regency. This study demonstrates that local food possesses strong competitiveness and economic potential, as evidenced by its high willingness-to-pay value.

Limitations

Despite its contributions, this study has limitations. This study has generalizability potential based on questionnaire data collected with a 10% margin of sampling error among the population of Gunungkidul Regency. Respondents' WTP assessments, which were described only descriptively without direct sensory consumption of ganyong, also have the potential to introduce biased findings. Future research is expected to assess the economic potential of local foods using more comprehensive data.

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