Strengthening the Fruit Wine Industry in Kalinga Through Consumer-Oriented Production and Quality Management Strategies

Lope t. Buen
Kalinga-Apayao State College, Bulanao, Tabuk City, Kalinga, lopebuen@yahoo.com

Abstract
This research explored customer tastes, current production management methods, and operational hurdles that are hindering the fruit wine sector in Kalinga Province, Philippines, to serve as a foundation for formulating consumer-oriented production and quality management strategies. A descriptive-evaluative mixed-methods design was used to collect data from 102 respondents who were 93 fruit wine consumers and 9 local fruit wine processors. The data collection techniques were survey questionnaires, focused group discussions, interviews, and field observations. Based on the findings, consumers mostly like fruit wines that feature a sweet taste, fruity aroma, clear appearance, light yellowish to colorless hue, and moderate to high alcohol content. Besides that, they also liked informative labeling, culturally inspired packaging designs, and affordable pricing. On the production side, processors confronted supply constraints such as seasonal availability of raw materials, lack of processing facilities, limited laboratory testing capabilities, insufficient filtration and aging equipment, financial constraints, and strong market competition from well-established wineries. The results show that there is a difference between consumer quality expectations and what local producers can actually make at present. So, intensifying the industry will necessitate strategic interventions that concentrate on the sustainability of raw materials, upgrading of facilities, quality assurance systems, technological improvement, packaging standardization, and marketing support. These steps are critical for enhancing product quality, competitiveness, and long-term sustainability of community-based fruit wine enterprises in Kalinga and other rural agro-processing sectors.

Keywords: Fruit wine industry; Consumer preferences; Production management; Quality management; Rural agro-processing enterprises

Introduction

The fruit wine industry has emerged as an important component of rural agro-processing enterprises worldwide due to its potential to enhance agricultural value chains, promote local entrepreneurship, and stimulate rural economic development. Fruit wines derived from indigenous and tropical fruits have gained increasing attention because of changing consumer preferences toward functional beverages, artisanal products, and locally sourced food innovations. Globally, the wine market continues to expand, with consumers increasingly valuing unique flavors, cultural authenticity, and health-related attributes associated with fruit-based alcoholic beverages (Statista, 2024). In developing economies, fruit wine processing also serves as an alternative livelihood strategy that minimizes postharvest losses and increases the market value of seasonal fruits. Countries such as China, India, Brazil, and the Philippines have intensified research and commercialization efforts on non-grape wines using locally available fruits including pineapple, bignay, mango, banana, and berries (Aredes et al., 2022; Zheng et al., 2021).

In the Philippines, micro, small, and medium enterprises (MSMEs) contribute significantly to national economic growth, accounting for approximately 99.5% of all registered businesses and generating substantial employment opportunities (Department of Trade and Industry [DTI], 2023). Among community-based enterprises, fruit wine processing has become increasingly prominent in agricultural provinces where tropical fruits are abundant. In the province of Kalinga, local wine processors utilize indigenous fruits such as bugnay, pineapple, lemon, and wild cherries in the production of artisanal wines, reflecting the province's rich agricultural biodiversity and cultural identity. Local government units and agencies such as the Department of Trade and Industry (DTI) and the Department of Science and Technology (DOST) have continuously supported these enterprises through trade fairs, product development programs, and entrepreneurship initiatives. However, despite these interventions, many local processors continue to experience limitations in production efficiency, quality assurance, laboratory testing, packaging standardization, and market competitiveness. The uploaded study revealed that most processors operate on a household scale, use improvised facilities, and encounter challenges related to fermentation control, filtration, aging equipment, and compliance with food safety standards.

Recent studies emphasize that consumer preference has become a critical determinant of competitiveness in the food and beverage industry. Consumers increasingly demand products with superior sensory qualities, attractive packaging, nutritional labeling, authenticity, and sustainable production processes (Castilhos et al., 2022). In the local context, consumers of Kalinga fruit wines prefer sweeter taste profiles, fruity aroma, clearer appearance, informative labeling, and culturally inspired packaging designs. Nevertheless, the ability of local wine processors to satisfy these quality expectations remains constrained by seasonal raw material supply, inadequate laboratory facilities, limited technological capability, and insufficient marketing resources. Similar findings were observed in studies on artisanal wine industries in Southeast Asia, where small-scale producers struggle to balance traditional processing methods

with modern quality management requirements (Montaño et al., 2021). The absence of standardized production systems and quality control mechanisms may hinder product consistency, consumer trust, and long-term sustainability of local wine enterprises.

Despite the growing interest in fruit wine production and rural agro-enterprises, limited empirical studies have comprehensively examined the relationship between consumer preferences, production management practices, and operational challenges among local fruit wine processors in geographically isolated provinces such as Kalinga. Existing literature largely focuses on fermentation technology, physicochemical properties, and product development of fruit wines, while fewer studies investigate strategic management dimensions including process capacity management, facility adequacy, product positioning, and total quality management in small-scale wine enterprises. Moreover, there remains insufficient localized evidence regarding how consumer expectations influence production decisions and industry competitiveness within community-based wine sectors in the Philippines. This research gap highlights the need for a more integrated analysis that combines market preferences, operational practices, and strategic industry development approaches.

Hence, this study aims to analyze consumer preferences in relation to the prevailing production management practices of local fruit wine processors in Kalinga Province. Specifically, it seeks to determine the problems encountered by processors in meeting consumer quality expectations and to propose strategic interventions focusing on product attributes, plant facilities, process and capacity management, and total quality management. The findings of this study are expected to contribute to the strengthening of the fruit wine industry in Kalinga by providing evidence-based recommendations that may enhance product quality, operational sustainability, market competitiveness, and rural enterprise development. Furthermore, the study may serve as a valuable reference for policymakers, local government units, MSMEs, researchers, and development agencies involved in food innovation, agribusiness development, and community-based entrepreneurship initiatives in the Philippines and other developing economies.

Materials And Methods

Research Design

This study employed a descriptive–evaluative mixed-methods research design to examine consumer preferences, prevailing production management practices, operational challenges, and strategic strengthening measures in the fruit wine industry in Kalinga Province, Philippines. The quantitative component was utilized to describe the demographic characteristics of respondents and determine consumer preferences and production practices using structured survey questionnaires, while the qualitative component involved focused group discussions (FGDs), interviews, and field observations to obtain in-depth insights regarding the operational experiences, quality management practices, and constraints encountered by local fruit wine processors. The integration of quantitative and qualitative data enabled triangulation of findings and enhanced the reliability and comprehensiveness of the study.

Research Locale

The study was conducted in Kalinga Province, particularly in Tabuk City and nearby municipalities where fruit wine processing activities are prevalent. Kalinga was selected as the study area due to the increasing presence of micro, small, and medium enterprises (MSMEs) engaged in processing indigenous fruits such as bugnay (Antidesma bunius), pineapple (Ananas comosus), lemon (Citrus limon), and wild cherries into local wine products. The province also represents a suitable site for investigating rural agro-processing enterprises because of the support provided by local government units and national agencies such as the Department of Trade and Industry (DTI) and the Department of Science and Technology (DOST) in promoting local food products and entrepreneurship. Data gathering was conducted from January to November 2025.

Respondents and Sampling Procedure

The respondents of the study consisted of 102 individuals, comprising 93 fruit wine consumers and 9 local fruit wine processors operating within the province of Kalinga. Purposive sampling was used in identifying active fruit wine processors involved in local wine production, while consumers were selected through random sampling from communities, educational institutions, offices, and commercial establishments where local fruit wine products are available. Respondents were selected based on their familiarity, involvement, or consumption experience related to locally produced fruit wines. The inclusion of both consumers and processors enabled the study to capture both market expectations and operational realities of the local fruit wine industry.

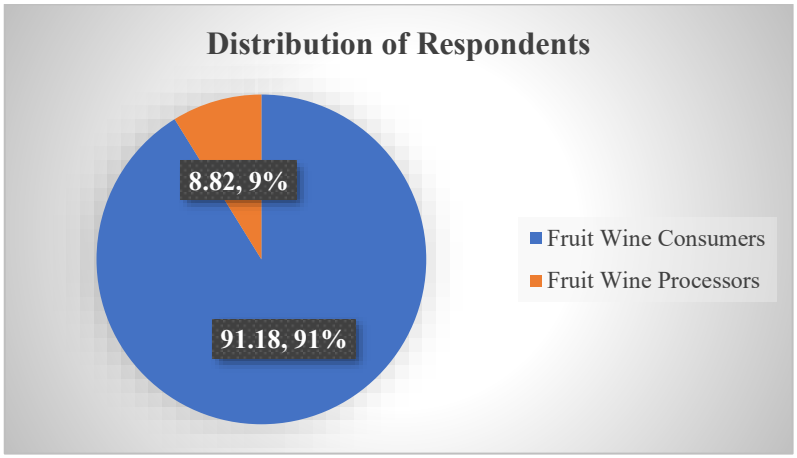

Figure 1. Distribution of respondents in terms of fruit wine consumers and processors.

Research Instruments

Two researcher-developed survey questionnaires were utilized in gathering the quantitative data for the study. The first questionnaire was intended for consumers and contained items related to demographic profile and preferences on wine quality attributes such as taste, aroma, color, alcohol content, packaging, labeling, and pricing. The second questionnaire was designed for fruit wine processors and focused on enterprise profile, production management practices, process flow, plant facilities, equipment utilization, fermentation procedures, packaging systems, and quality management practices. The instruments were validated by experts in agribusiness, food processing, and research methodology to ensure content validity and clarity, while pilot testing was conducted among selected respondents outside the study area to establish reliability and comprehensibility prior to actual data gathering.

Data Collection Procedure

The researchers secured permission from concerned authorities and respondents prior to the conduct of the study. Data were gathered through personal administration of questionnaires to ensure completeness and accuracy of responses. Focused group discussions (FGDs) and informal interviews were also conducted among fruit wine consumers, wine enthusiasts, and local processors to obtain deeper insights into consumer expectations, production experiences, quality concerns, operational challenges, and market-related issues. In addition, direct field observations were undertaken to document actual processing practices, facility conditions, fermentation systems, bottling procedures, sanitation practices, and equipment utilization employed by local wine processors within the study area.

Variables of the Study

The study examined three major variables: consumer preferences, production management practices, and operational challenges encountered by local fruit wine processors. Consumer preference variables included taste, aroma, color, clarity, alcohol content, packaging design, labeling information, and price preference. Production management variables involved plant facilities, raw material sourcing, process flow, fermentation practices, capacity management, packaging systems, and quality control measures. Operational challenge variables included seasonal availability of raw materials, financial limitations, lack of laboratory facilities, inadequate filtration and aging equipment, packaging deficiencies, and marketing competition with established commercial wineries.

Data Analysis

The quantitative data gathered from the survey questionnaires were analyzed using descriptive statistical tools such as frequency counts, percentages, weighted means, and ranking to determine the prevailing consumer preferences and production management practices among local fruit wine processors. Qualitative data obtained from interviews, FGDs, and field observations were analyzed using thematic analysis to identify recurring themes and patterns concerning operational constraints, quality management concerns, and strategic recommendations for industry strengthening. The integration of quantitative and qualitative findings enabled a more comprehensive interpretation of the operational and market dynamics of the fruit wine industry in Kalinga Province.

Ethical Considerations

Ethical standards in research involving human participants were strictly observed throughout the conduct of the study. Respondents were informed regarding the purpose, objectives, and significance of the research prior to participation, and their participation was entirely voluntary. Confidentiality and anonymity of responses were maintained, and all information gathered from respondents and participating enterprises was used solely for academic and research purposes. The researchers also ensured that no harm, coercion, or misrepresentation occurred during data gathering and documentation procedures.

Results And Discussion

Consumers Preferences

Table 1. Consumer preferences as to the degree of quality expectations along the identified indicators

Indicators of Quality	From	Scale					To
		5	4	3	2	1	
Taste	Dry	9	11	25	20	27	Sweet (1)
Color	Yellowish	24	16	29	9	14	Colorless
Scent/Aroma	Fruity	29	14	24	10	15	No Odor
Clarity	Very Clear	24	23	31	13	10	Murky (1)
Alcohol Level	15 % 8	14 % 36	13 % 12	12 % 17	11 % 11	10 % 6	Less than 10 % (3)

Table 1 reveals that respondents generally preferred fruit wine that is sweet in taste, with higher frequencies clustering toward the sweeter end of the scale. In terms of appearance, the preference leaned toward a yellowish to near-colorless color, suggesting that consumers associate lighter coloration with quality and acceptability. For aroma, the majority favored a fruity scent, indicating that volatile fruit-derived compounds are a key driver of sensory appeal. Likewise, respondents preferred wines that are very clear, implying that visual clarity is strongly linked with perceived cleanliness and product quality. In terms of alcohol content, preferences were concentrated around moderate to relatively higher alcohol levels (around 13–14%), suggesting that respondents associate moderate strength with better wine character and satisfaction.

These findings are supported by recent sensory studies showing that consumer acceptance of fruit wines is strongly driven by sweetness, fruity aroma, and overall sensory balance, particularly among young and less experienced drinkers (Zhu et al., 2023; Merlino et al., 2021). Similarly, sweetness and fruity aroma have been identified as primary determinants of liking in fruit wine products, while appearance and chemical attitudes (e.g., health beliefs) exert less influence on preference decisions (Zhu et al., 2023). However, contrasting literature suggests that more experienced wine consumers tend to prefer drier wines with greater complexity, often perceiving high sweetness as less sophisticated or lower in quality (Lesschaeve, 2020; Meillon et al., 2022). In addition, some studies in niche and natural wine markets report that slight turbidity or non-clear appearance may even be positively accepted as a sign of minimal processing and authenticity, which contradicts the strong preference for clarity observed in this study (Merlino et al., 2021; Zhu et al., 2023). These contradictions indicate that consumer preference is highly segmented, where novice consumers prioritize sweetness, fruitiness, and visual clarity, while expert consumers value structural complexity, dryness, and stylistic variation.

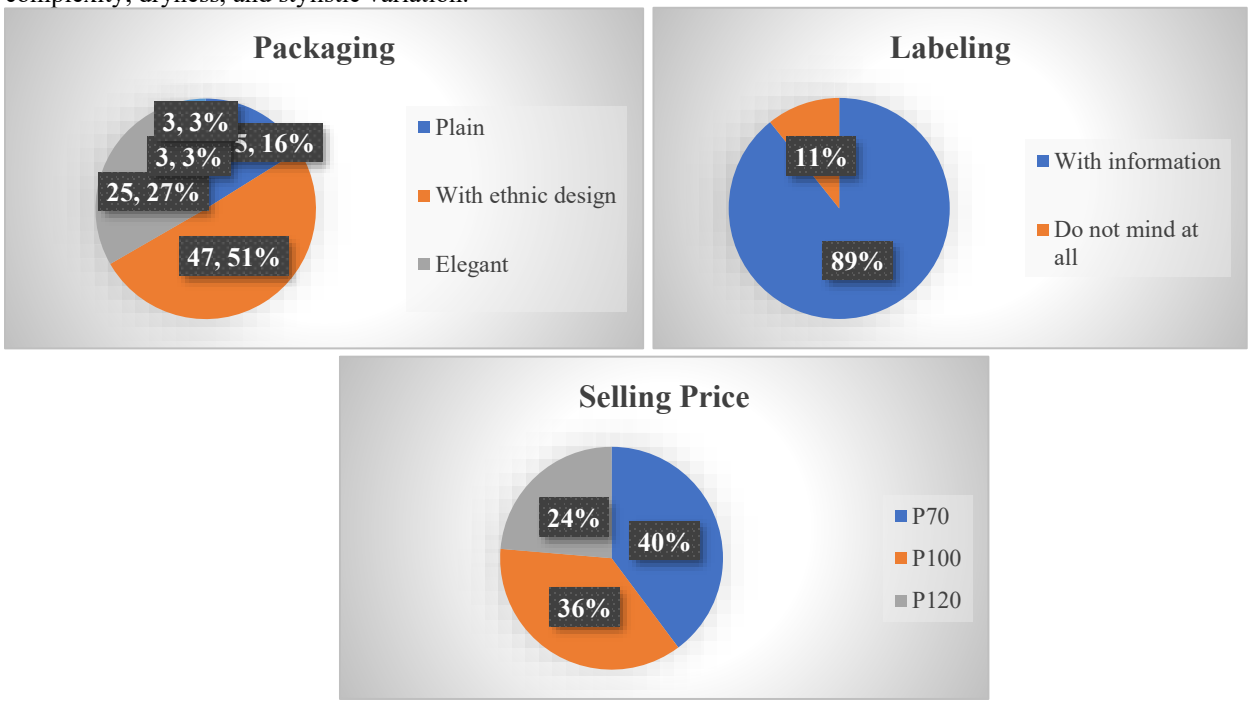

Figure 2. Consumer preferences in terms of packaging, labeling, and selling price.

Figure 2 indicate that consumers predominantly prefer a lower price point of ₱70, as reflected by 39.8% of the respondents, suggesting strong price sensitivity in fruit wine purchasing decisions. Meanwhile, 36.6% indicated acceptance of a moderate price of ₱100, while only 23.7% preferred a higher price of ₱120. This distribution implies

that affordability remains a critical factor influencing consumer demand, with most respondents clustering toward lower-cost options. The Focused Group Discussions further revealed that Bugnay wine remains the most common fruit wine produced in the locality, largely due to the seasonal abundance of Bugnay fruits. This availability has encouraged both household-level production and emerging commercial ventures, including expanded cultivation efforts such as large-scale Bugnay plantations (e.g., Ryan's Farm in Tabuk, Kalinga), indicating growing interest in scaling raw material supply for wine production.

These results are consistent with recent studies indicating that price is a primary determinant of purchase intention in fruit-based alcoholic beverages, where lower-priced products generally achieve higher consumer acceptance, especially in rural and emerging markets (Liu et al., 2022; Thach & Olsen, 2020). However, contrasting findings suggest that in more developed wine markets, consumers may associate higher prices with better quality, leading to a willingness to pay premium prices for perceived authenticity and craftsmanship (Szolnoki & Taits, 2021; Mueller & Szolnoki, 2021). This contradicts the present finding where lower pricing dominates preference, indicating that respondents may belong to a more price-sensitive consumer segment rather than a premium wine market. In terms of production trends, recent agribusiness studies highlight that fruit wine industries relying on locally abundant raw materials such as wild or seasonal fruits (e.g., Bugnay) tend to develop cost-efficient production systems but remain vulnerable to seasonality constraints (Barba et al., 2021; Zhu et al., 2023). This supports the FGDs result, although other studies argue that dependence on seasonal fruit sources can limit scalability and consistency of supply, potentially restricting long-term industrial expansion if not supported by cultivation programs and supply chain stabilization strategies (Barba et al., 2021).

Production Management Practices

A. Location and plant facilities

Wine Processing Plant Layout

The study found out that none of the fruit wine processors have detailed engineering blueprint of their plant layout.

Criteria for Evaluation of Processing Plant

In the evaluation of processing plant location, most of the processors did not comply with BFAD/DOH specifications. This is for the reason that most of them are using their own kitchen for the processing, fermentation and racking activities.

B. Facilities and Equipment

Most of the wine processors used their own kitchen to process wine. However, some have facilities to process just like in schools where processing is introduced to students. But actually, many don't have the facilities.

The processors use laddles and blenders in the crushing and pressing, while sterilized bottles and jars were used for fermentation. Bottles are being for racking and cheese cloth and strainers were used for filtering.

Water and soap are used for cleaning and sanitizing with the aid of a brush. Long neck bottles are used and plastic containers are utilized for aging. The labeling of bottles use sticker papers with computer prints and designs. The sealing equipment use bottle sealer and hair dryer.

C. Process and Capacity Management

In the quality control, it is only on the evaluation of colors where they base the quality. Some establish quality on the raw materials used while others claim it is on the process. The inspection procedure is done during processing.

Of the nine (9) fruit wine processors interviewed only three (3) are actually processing pineapple fruit wine. This could be attributed to the fact that pineapple is not a primary produce in the province of Kalinga, aside from the fact that it is seasonal. When pineapple fruits are in season, the fruits being sold in Kalinga come from Nueva Vizcaya and other nearby provinces. Only a part of the pineapple fruit produce is being supplied by the local farmers in the province.

It ca be noted that most of the wine producers produce bugnay wine because of its availability in the community. Bugnay trees abound even on backyards of households thereby there is no problem on its supply when it is in season. Some farmers in Kalinga have even venture to large scale plantations of bugnay trees, thereby assuring a steady supply of bugnay fruits as long as it is their fruiting season.

The following are problems encountered in local fruit wine processing:

1. The raw material is a seasonal fruit. There is no sustainability with the production. Lack of supplies and materials, financial constraints would also bar the processor in ingredient preparation.

For fruit processors who are into pineapple wine production, this is really a concern considering that their supply would depend on sellers that bring in their products from Isabela, Cagayan and Nueva Vizcaya. For the fruits processors who are into bugnay wine making they have to process their wines while the Bugnay trees in Kalinga are still loaded with their ripened fruits. Generally the price per liter (or caltex in the lingua franca), of fresh ripened fruits of bugnay when it is in season in Kalinga is P15.00.

2. On fermentation, it is the weather that would affect fermentation and aging. Not all the processors could afford to put up a space in that process.

Based on the interviews with the fruit wine processors in the province of Kalinga, they process their wines in their own kitchens or they have set up working spaces with their household for their wine processing activities ; hence they cannot yet come up with a temperature controlled room to ferment their wines.

3. Lack of laboratory facilities is also seen as a problem especially on measuring PH level, alcohol level, and sugar level. Lack of equipment on racking was also seen.

According to the fruits wine processors, although they have wine recipes to follow, they cannot determine the PH level, alcohol level, and sugar level because they do not have the equipment to use and they do not have the money to subject their wine produce to laboratory tests by the BFAD or DOST.
On the lack of racking equipment, space is the utmost consideration since the processors are working in their own houses; there is a possibility that during the racking stage the wine containers may not really be left alone. There is a possibility of the containers being transferred in location when the space is needed.
4. Sediments were identified to be not well filtered, thus the need for a filtering equipment.
According to the fruits wine processors, they use the cheese cloth to filter their wine. They are constrained by their financial resources to buy a good filtering equipment. Another respondent said that sediments appear in the wine if the racking process is not maximized because of the high demand for the fruit wine they would have to sell it a few months after its processing.
5. Processors do not have also personalized bottles. The bottling consisted of different types of packaging the product. Likewise, no barrels are available for the aging process.
Again, the financial constraints on the part of the fruit wine processors would bug them at the bottling stage, the respondents claimed that they use recycled bottles from the emptied commercial wine bottles which they buy from commercial stores and outlets.
The local fruits wine producers explained that if they will order personalized bottles from Sa Miguel Corporation it would entail a large sum because they have to order by the thousands.
6. On marketing, there is a strong competition with established wineries. The promotion of the product is more expensive as compared to the return of investment.
The respondents claimed that although the local fruit wine is slowly gaining popularity, the established brand names are still more popular among buyers in the locality. They also claimed that they cannot afford advertisements to mass media at the moment. It is a relief according to them that the Local Government Unit and the DTI are helping them make their products known by encouraging them to display and sell in trade fairs during festivals in the town, province and in the region.

Conclusion

The study revealed that wine consumers generally prefer a sweeter taste profile, with a light yellowish to colorless appearance, fruity aroma, clear clarity, and higher alcohol content. In terms of packaging, preferences were divided, with half of the respondents favoring ethnic design while others showed varying preferences for elegant, plain, or combined packaging styles, and a small proportion expressing indifference. A strong majority (89.2%) emphasized the importance of clear product labeling with complete information. Regarding pricing, consumers predominantly preferred a lower price point of ₱70 (39.8%), followed by ₱100 (36.6%) and ₱120 (23.7%), indicating price sensitivity among buyers. On the production side, fruit wine processors in Kalinga identified several key constraints affecting their ability to meet consumer expectations, including seasonal and unstable raw material supply, financial limitations, and inadequate processing space. Additional challenges included environmental sensitivity during fermentation and aging, lack of laboratory facilities for quality testing (e.g., pH, alcohol, and sugar levels), insufficient filtration and racking equipment, absence of standardized bottles and aging barrels, and limited marketing capacity due to strong competition and high promotional costs. Overall, these findings highlight a gap between consumer preferences and current production capabilities, underscoring the need for strategic improvements in product development, facility upgrading, process optimization, and quality management systems to enhance competitiveness and market responsiveness of local wine processors.

Recommendations

1) The problem on sustainability could be addressed if the supply of pineapple will be sufficient for the processors.
2) Financial assistance should be provided by the local government to the processors.
3) Laboratory facilities should be made available to the processors in the locality; even on a communal level through the women groups such as the KALIPI or through the cooperatives.
4) The consumers should patronize the fruit wine product of the community.
5) The DTI, DOST and the Local Government Units should come up with a way to help the local fruit wine producers subject their products to BFAD analysis.
6) Further studies should be conducted on the sustainability of the fruit wine industry in the province.

References

1. Aredes, R. S., Santos, K. M. O., Fonseca, M. D., & Ribeiro, E. J. (2022). Advances in tropical fruit wine production: Processing technologies, quality characteristics, and market trends. Food Reviews International, 38(7), 1224–1245. https://doi.org/10.1080/87559129.2021.1888972

2. Castilhos, M. B. M., Deliza, R., & Rosenthal, A. (2022). Consumer perception and acceptance of fruit-based fermented beverages: A systematic review. Foods, 11(9), 1284. https://doi.org/10.3390/foods11091284
3. Department of Trade and Industry. (2023). 2023 MSME statistics in the Philippines. Government of the Philippines. https://www.dti.gov.ph
4. Montaño, M. N. E., Reyes, V. E., & Cruz, R. T. (2021). Challenges and opportunities among community-based food processing enterprises in Southeast Asia. Asia-Pacific Social Science Review, 21(3), 45–59.
5. Statista. (2024). Global wine market revenue and consumption trends. https://www.statista.com
6. Zheng, J., Liu, Y., & Wang, H. (2021). Recent developments in fruit wine fermentation technology and quality enhancement. Journal of Food Processing and Preservation, 45(6), e15548. https://doi.org/10.1111/jfpp.15548
7. Lesschaeve, I. (2020). Consumer wine expertise and preference development: A review of sensory and behavioral studies. International Journal of Wine Business Research, 32(3), 345–360.
8. Meillon, S., Viala, D., Medel, M., & Gilbert, F. (2022). Sweetness perception and preference in alcoholic beverages: Influence of consumer experience. Food Research International, 156, 111210.
9. Merlino, V. M., Fracassetti, D., & Vigentini, I. (2021). Is the consumer ready for innovative fruit wines? Perception and acceptability of young consumers. Foods, 10(7), 1545. https://doi.org/10.3390/foods10071545
10. Zhu, Y., Su, Q., Jiao, J., Kelanne, N., Kortesniemi, M., Xu, X., Zhu, B., & Laaksonen, O. (2023). Exploring the sensory properties and preferences of fruit wines based on an online survey and partial projective mapping. Foods, 12(9), 1844. https://doi.org/10.3390/foods12091844
11. Barba, F. J., Meléndez-Martínez, A. J., & Gálvez, F. (2021). Food sustainability in fruit-based fermented beverages: Challenges and opportunities. Trends in Food Science & Technology, 109, 241–252.
12. Liu, S., Xie, H., & Yu, X. (2022). Price sensitivity and consumer willingness to pay for alcoholic beverages in emerging markets. Journal of Retailing and Consumer Services, 66, 102950.
13. Mueller, S., & Szolnoki, G. (2021). The role of demographic factors in wine consumption preferences: A cross-country study. Journal of Wine Economics, 16(2), 145–162.
14. Szolnoki, G., & Taits, D. (2021). Price–quality perception in wine consumption: Evidence from European consumers. Wine Economics and Policy, 10(2), 101–110.
15. Thach, L., & Olsen, J. (2020). Wine consumer segmentation and evolving preferences in emerging markets. Journal of Food Products Marketing, 26(4), 311–326.
16. Zhu, Y., Su, Q., Jiao, J., Kelanne, N., Kortesniemi, M., Xu, X., Zhu, B., & Laaksonen, O. (2023). Sensory properties and consumer preferences of fruit wines: An empirical study. Foods, 12(9), 1844. https://doi.org/10.3390/foods12091844