

Compliance on Food Safety and Quality Assurance Practices of Strawberry-Based Food Processors in La Trinidad, Benguet

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DOI: <https://doi.org/10.5281/zenodo.10590102>

Published Date: 30-January-2024

Abstract: Extent of awareness and compliance on food safety and quality assurance practices of strawberry-based food processors was determined along good manufacturing practices, food acceptability and inclusivity, and product labeling. Differences on extent of awareness and level of compliance when grouped according to position in the enterprise, years of business, and type of food processing facility was also determined. Respondents were 75 food processors from 25 strawberry-based enterprises within Barangays Balili, Betag, Lubas and Puguis, La Trinidad, Benguet. Descriptive-qualitative survey research method was used. Study revealed that strawberry-based food processors are Completely Aware on all identified practices. Product labeling regulations obtained the highest awareness rating of 3.94. Awareness when grouped according to type of food processing facilities was seen to significantly differ. Level of compliance of respondents on all standard practice identified is seen to be of Moderate Level. GMP regulations obtained the highest compliance level with 3.84 mean rating. No significant differences on level of compliance were seen when identified clusters are considered. Most common factors for non-compliance of food processors include their limitations of available financial and physical resources to comply with these regulations.

Keywords: Compliance, Food Safety, Quality Assurance, Strawberry-based Food Processors, La Trinidad.

I. INTRODUCTION

In global food manufacturing industries, Micro, Small and Medium Enterprises (MSMEs) are major contributors to global economic, inclusive and social development [1] where food manufacturers –including strawberry-based food processors– do belong. Such MSMEs are critical actors in ensuring access to food and nutrition security worldwide [2] hence guarantee of producing safe, clean and acceptable food products is a must that shall be highly considered critical by the food manufacturing industry for the assurance of quality and safety of food products for human consumption [3],[4].

Despite being considered critical, issues on food safety and quality assurance had still prevailed such as the estimated 600 million cases annually for foodborne illnesses from unsafe foods that affect the global health and economies [5]. The World Health Organization [6] has also recorded an estimate of almost 1 in 10 persons become ill after eating contaminated food and a total of 420,000 die every year which results to a loss of 33 million healthy life years due to foodborne disease caused by poor food safety practices. In terms of product quality assurance, poor product labeling has also caused illnesses and fatality such as 47.0% food allergic individuals in Canada have reported their food allergy cases are attributed to inappropriate labeling of food products [7]. As an effect, the impact on failure to deliver quality and safe food products may cause loss of confidence and the closing down of a business, resulting to severe economic damage [9]. To which, the Food and Agriculture Organization of the United Nations and the World Health Organization [9] has developed the “Assuring Food Safety and Quality: Guidelines for Strengthening National Food Control Systems” as a tool in practice of food safety and quality assurance for food processing and manufacturing industries through government intervention and monitoring

programs. Additional to which, various international guidelines have been also developed and listed to assist in food safety and quality assurance practices, particularly the Codex Alimentarius indicated as a guide for international food standards [10].

In Philippine setting, abundance of food processing MSMEs is identified in 2019 wherein 32.4% of all manufacturing sector in the Philippines are into food-related processing enterprises [11]. These MSMEs are highly into developing “pasalubong” products that boosts local employment, stimulates economy, and instills hometown and national pride [12] and these “pasalubong items” produced include various candied items, pastries, preserves and other delicacies that each locality has to offer.

Food safety and quality assurance is highlighted critical in the country’s food production. It is greatly emphasized by Department of Health [13] that food safety is a public concern and increasing concern for food safety is undeniable as *Escherichia coli*, *Salmonella*, and other agents cause food-borne outbreaks. Through which, industry standards had been set in the country via laws to regulate food safety and quality assurance of all food products [14]. However, despite presence of these mandates in the country, issues still arise on failure to assure food safety and quality in the country as APEC [15] cited that MSMEs in Philippines faces challenges in food safety and quality assurance including “...product contamination due to poor plant sanitation and improper application of food additives and packaging materials” and these are caused by “...inadequate technical resources, insufficient investment, lack of awareness and understanding for food safety requirements” which have contributed to the national issues on food borne illnesses, food poisoning, food allergy cases and alike. Bigueja [16] validates further the issue in food safety through her study wherein it was stated that adaption of Good Manufacturing Practices and related food safety and quality assurance standards had been fairly or rarely adopted by MSMEs. Claims made by food manufacturers on certain benefits of their products can be misleading at times such as the claims by the bread manufacturers that their product is sugar-free yet it does not pass the Codex standards [17].

Strawberry-based food processors in La Trinidad, Benguet, take part of the MSME population as there had been an abundance of strawberry produce in the locality [18] and the crop is considered as one of main agricultural produce of the municipality, labeling it as the “One Town, One Product” [19]. Manufacturing strawberries into various value-added products such as preserves, jams and pastries had been an intervention to decrease post-harvest wastages in crop production [20], [21] since strawberries are considered to have high moisture content, making it highly perishable [18] hence strawberry-based food processing has been practiced as a means of livelihood of MSMEs in the locality.

Food safety and product quality assurance is mandated to the strawberry-based MSMEs of La Trinidad as various industry standard practices for producing clean and safe food products is a must as laws to regulate food safety and quality assurance are made to be complied up to barangay level for LGUs and agencies to regulate [14]. Strawberry-based food processors are not exempted from the issues being faced by MSMEs in food safety and quality assurance. In 2018, FDA released a General Public Advisory wherein two strawberry-based product produced from La Trinidad are found to be unregistered under the agency and have not been issued a certificate of product registration hence, the public is warned from purchasing these products [22]. Through informal observation, various strawberry-based food products sold in stalls located at strawberry farm in La Trinidad, Benguet are seen to be somewhat non-compliant to the guidelines set forth by respective agencies, thus diminishing compliances on food quality assurance practices. Additionally, there had been minimal reports available on monitoring, assessment and evaluation of the compliance and practices on food safety and quality assurance of strawberry-based MSMEs of La Trinidad thus supports the stipulations of Hasnan et al., [23] for the lack of reports and researches on compliance on food safety regulations of MSMEs. Hence, compliance on food safety and product quality assurance is aimed to be determined amongst the strawberry-based MSMEs of La Trinidad to know if regulations are being complied by the food processors in the municipality.

The impact of determining the compliance to food safety and quality assurance regulations among the strawberry-based food processors is deemed to contribute to promoting to the stakeholders the assurance and acceptance of strawberry-based food products of La Trinidad, Benguet to be clean, safe and of quality for human consumption. Hence, the study aimed to determine the degree of compliance on food safety and quality assurance standards of Strawberry-based Micro, Small and Medium Enterprise Food Processors in La Trinidad, Benguet.

Specifically, the study sought answers to the following questions:

1. What is the extent of awareness on food safety and quality assurance practices of Strawberry-based MSME food processors along Good Manufacturing Practices, Food acceptability and inclusivity and Product labeling?
 - 1.1. Are there differences in the awareness on food safety and quality assurance practices when respondents grouped according to the position in the enterprise, years of business, and type of food processing facility?;

2. What is the level of compliance on food safety and quality assurance practices of Strawberry-based MSME food processors along Good Manufacturing Practices, Food acceptability and inclusivity and Product labeling?
 - 2.1. Are there differences in the level of compliance on food safety and quality assurance practices when grouped according to the position in the enterprise, years of business, and type of food processing facility?; and
3. What are the factors considered in the non-compliance of Strawberry-based MSME food processors on food safety and quality assurance practices?

II. METHODOLOGY

Industry standards and certifications had been set in the global and Philippine setting for Good Manufacturing Practices, Food acceptability and inclusivity, and Product labeling as components of food safety and quality assurance practices that has been assessed for this study. These standards and certifications were sourced out through the standards and regulations set including the Republic Act 10611 or the Food Safety Act of 2013 [14]. Under the Good Manufacturing Practices, regulations include the IRR on P.D. 856 or the Code on Sanitation of the Philippines [24], and the FDA Circular No.2021-01 Guidelines for the Use of the FDA eServices Portal System for License to Operate (LTO) Application of Food Traders and Food Distributors [25]. Further, regulations on food acceptability and inclusivity for public consumption regulations are found on the Senate bill 964 or the Act to Prescribe Nutrition Labeling for Foods [26], and Administrative order 2014-0029 or the Rules and regulations on the Licensing of Food Establishments and Registration of Processed Food, and Other Food Products, and For Other Purposes [27]. Moreover, as part of assuring food safety and quality, regulations on processed food product were also considered through the Administrative Order 2014-0030 or the Revised Rules and Regulations Governing the Labeling of Pre-packed Food Products [28] and the R.A. 7394 or the Consumer Act of the Philippines [29].

Descriptive-quantitative survey method of research was employed in the study. The survey questionnaire was used to gather data from 75 food processors of 25 strawberry-based enterprises within Barangays Balili, Betag, Lubas and Puguis of La Trinidad, Benguet. The survey-questionnaire is composed of Part 1 for the profile of respondents; Part 2 for the extent of awareness on food safety and quality assurance practices and standards; Part 3 for the level of compliance on food safety and quality assurance practices and standards; and Part 4 for the factors considered in non-compliance on food safety and quality assurance practices and standards. The questionnaire was subjected for a pre-test via dry-run among the strawberry-based food processors in barangays of Pico and Poblacion, La Trinidad, an adjacent location with various food processors that is near to the Barangays identified as locale of the study. Reliability test was made for the questionnaire by collecting the data from the dry-run made and has subjected the data for a test using the Cronbach alpha coefficient. To which, the questionnaire yielded a reliability coefficient of 0.909 which indicated that the alpha value of the internal validity of the tool is equivalent to high reliability. The 4-point likert-scale and weighted mean were utilized in scaling and analyzing the responses of the respondents, and the ANOVA through F-Test was used to determine the significant level of differences on hypothesized differences according to profile.

III. RESULTS AND DISCUSSION

Extent of Awareness on Food Safety and Quality Assurance Practices of Strawberry-Based MSME Food Processors

Table 1. Extent of awareness on food safety and quality assurance practices of strawberry-based MSME food processors

Indicators	Mean	Descriptive Equivalent	Rank
A. Good Manufacturing Practices	3.88	Completely Aware	
1. Assure health safety check of food processors via Medical examination, Attended mandatory Food Handlers orientation Seminar, and Secure Health card as certification	3.84	Completely Aware	4
2. Comply to appropriate use of food processing attire and gears by food processors	3.89	Completely Aware	4
3. Acquire sanitary permit for operations as proof of sanitary compliance	3.81	Completely Aware	6
4. Obtain FDA License to Operate for legal enablement of food manufacturing	3.64	Completely Aware	7
5. Practice on appropriate facility maintenance and conditioning, regular cleanliness and sanitation procedures	4.00	Completely Aware	2
6. Proper storage of raw materials and processed products	4.00	Completely Aware	2

7. Practice on waste management, including sewage disposal and drainage	4.00	Completely Aware	2
B. Food acceptability and inclusivity	3.76	Completely Aware	
1. Nutrient content must be displayed properly on product via standardized Nutri Facts format	3.71	Completely Aware	2
2. All ingredients, including food allergens must be completely identified	3.96	Completely Aware	1
3. Products are registered under FDA and shall acquire Certificate of Product Registration	3.60	Completely Aware	3
C. Product labeling	3.94	Completely Aware	
1. The following must be clearly presented on the product label			
a) Product name	4.00	Completely Aware	3
b) Registered trademark	4.00	Completely Aware	3
c) Complete address of the processing facility	4.00	Completely Aware	3
d) Net weight content	4.00	Completely Aware	3
e) Storage condition	3.76	Completely Aware	7
f) Manufacturing and Expiration date	3.84	Completely Aware	6
g) Misleading claims must NOT be presented on label	4.00	Completely Aware	3
i. The food is claimed to be a Vitamin and Nutrient rich product (but not presented on nutrition facts)	4.00	Completely Aware	
ii. The food is claimed to be curing and/or a treatment to a disease or illness (without proven verification)	4.00	Completely Aware	
iii. Use of photographs and or graphics that are not personally generated (unauthorized use -violation to intellectual property)	4.00	Completely Aware	
AVERAGE	3.68	Completely Aware	

Table 1 displays the results of the extent of awareness on food safety and quality assurance practices of strawberry-based MSME food processors. The study finds out that generally, regulations on GMP, Food Acceptability and Inclusivity, and Product Labeling do highly exist on the awareness of the local strawberry-based MSME food processors as the rating for all regulations obtained a mean rating of 3.68, equivalent to “Completely Aware”. In context, results infer that respondents do recognize that there is sufficient information learning ways and opportunities for them to be aware of these regulations. This validates the result of the study of Vladimirov [30] wherein information capacity and the information environment of enterprises are the main factors for their awareness and adaption of efficient food safety and quality management system. As da Cunha et al. [31] suggests that theoretical food safety training is an effective tool for improving knowledge, attitude and practice, the result of this study also deduces that sufficient learning procedures may have undergone through by the respondents, either intrinsically (self-learning ways) or extrinsically (through government programs), to be highly aware of these mandates. As such, the regulations and ordinances on food safety and quality assurance practices via the government efforts of information dissemination through trainings and seminars, memorandum circulars, and having these as requirements to be complied and shall be monitored regularly are effectively shown and is prevalent as the strawberry-based food processors in La Trinidad are found to be highly and completely aware on these regulations being observed.

Extent of awareness on:

Good Manufacturing Practices (GMP)

Results from the study has indicated that all the respondents highly aware on the regulations on GMP as the general average obtained was 3.88, equivalent to “Completely aware” description. GMP awareness implies that the strawberry-based MSMEs are highly aware of the critical role of general sanitary measures in the work place. Abdul-Mutalib et al. [32] validates this generalization as his study has assessed that general sanitary measures obtained the highest level of awareness among food handler respondents. It can be also validated that food processors tend to be generally aware – within acceptable level – on GMP practices [33]. Generally, the GMP awareness of the respondents can imply that food business operators are lectured and made aware on requirements for food safety regulations and their understanding of these requirements enable them to comply with regulations.

Food Acceptability and Inclusivity

The survey as shown on Table 1 has indicated that respondents are highly aware on the regulations related to Food Acceptability and Inclusivity as the general average obtained was 3.76, equivalent to “Completely aware” description. Implications points out those strawberry-based MSMEs are highly aware on these regulations particularly on indicating the contents of their products via stipulation of the used ingredients. Indicating product ingredients and nutrition facts on food

labels are highly promoted and regulated by the FDA and DOH [28] wherein ingredients and nutrition facts are mandatory to be printed on the product labels. This further implies that food processors are aware on these regulations in order to guarantee the customers on product contents, and to avoid consuming such product if a specific ingredient is against their diet, making it unacceptable for their food preference [34], [35].

Product Labeling

In the regulations for Product Labeling, the respondents are completely aware on the set directives as it obtained a general average of 3.94, equivalent to “Completely aware” description. Results on level of awareness on product labeling suggests that respondents are highly aware of the regulations on food product labeling as it is commonly deemed beneficial for the food processors where these product labels appropriately done serves as an initial appeal of product towards the consumers. As mentioned by Messer et al. [36], product consumers are progressively being exposed to product labels that communicate specific processing aspects of the food manufacturing of the product. This validates that consumers are being cautious on product labels to which producers or manufacturers do make sure that it is the objective of their product labels to inform and educate the consumers on their products. Further, results suggest that the stipulation and mandate of FDA, DOH, DTI, and local implementing agencies and units in appropriate product labeling are highly known by the respondents, as they assure that they are conscious about such.

Differences in the Awareness of Strawberry-Based MSME Food Processors on Food Safety and Quality Assurance Practices According to Moderator Variables

Differences in awareness according to:

Position in the enterprise

Table 1.1. Differences in the Awareness of Strawberry-Based MSME Food Processors on Food Safety and Quality Assurance Practices According to Position in the enterprise

Indicators	Position in the Enterprise		
	Owner	Manager/ Supervisor	Food processing staff
A. Good Manufacturing practices	4.0	4.0	3.80
B. Food Acceptability and Inclusivity	3.88	4.0	3.65
C. Product Labeling	3.97	4.0	3.92
AVERAGE	3.95	4.00	3.79
<i>p-value: 0.06</i>		<i>α: 0.05</i>	<i>Not Significant</i>

Numerical differences among the positions in the enterprise as shown on Table 1.1 reveals that managers obtained the highest mean rating of 4.0 followed by owners with 3.95 while food processing employees had 3.79. In terms of the extent of awareness, supervisory employees and owners of strawberry-based MSMEs are more knowledgeable and well-informed on regulations indicated. Hence, it implies that higher level enterprise positions are needed and expected to be more equipped with higher level of knowledge to operational procedures as it is a must for management skill. However, the p-value of 0.06, as shown on Table 1.1, indicates that no significant difference is seen in the extent of awareness on food safety and quality assurance practices amongst the positions involved. This implies that in the level of awareness among the food processors’ position in the enterprise, minimal gaps does not vary in much essence hence indicates that despite their position, there is a high level of awareness on food safety and quality assurance practices needed to be accomplished and complied to.

Years of business operations

Table 1.2. Differences in the Awareness of Strawberry-Based MSME Food Processors on Food Safety and Quality Assurance Practices According to Years of business operations

Indicators	Years of business operations			
	5 years and below	6-10 years	11-15 years	16 years & above
A. Good Manufacturing practices	3.82	3.98	4.00	4.00
B. Food Acceptability and Inclusivity	3.72	3.76	4.00	4.00
C. Product Labeling	3.94	3.94	4.00	4.00
AVERAGE	3.82	3.89	4.00	4.00
<i>p-value: 0.08</i>		<i>α: 0.05</i>	<i>Not Significant</i>	

In terms of range of years of business operations, as shown on Table 1.2, those within 11-15 years and 16 years and above operations obtained the highest mean on 4.0, followed by 6-10 years with 3.89 mean rating, and by the 5 years and below with 3.82 mean rating. Differences in ratings indicate that the extent of awareness of established and tenured strawberry-based MSMEs provides them advantage on awareness for the regulations for food safety and quality assurance practices. However, having a p-value of 0.08 implies that there is no significant difference on the extent of awareness when grouped according to their years of operations. As such, there is no vast gap of awareness among enterprises despite long or short period of operations. This further implies that younger enterprises, of years even below 5 years, becomes immediately aware on regulations as it is instilled immediately to them through ordinances that upon business registrations, compliance to these practices is deemed mandatory.

Type of Processing Plant/Facility

Table 1.3. Differences in the Awareness of Strawberry-Based MSME Food Processors on Food Safety and Quality Assurance Practices According to Position in the enterprise

Indicators	Position in the Enterprise		
	Home-based food processing	Commercial processing facility	Government-assisted/ shared service facility
A. Good Manufacturing practices	3.85	4.00	4.00
B. Food Acceptability and Inclusivity	3.68	4.00	4.00
C. Product Labeling	3.92	4.00	4.00
AVERAGE	3.82	4.00	4.00

p-value: 0.03

α: 0.05

Significant

On the type of plant/ facility of the MSME respondents, the numerical differences as shown on Table 1.3 indicates that the level of compliance of commercial-type processing facilities and government assisted enterprises equally obtained the highest mean rating of 4.0 while the home-based enterprises acquired a mean rating of 3.82. Statistical difference of 0.03 p-value which is lower than the set alpha value of 0.05 degree of significance supports the fact that there is a significant difference on the extent of awareness of respondents on food safety and quality assurance practices according to their type of processing facility. On product contamination related to food safety, Vieira et al. [37] validated that there is a significant difference on microbiological quality of food in terms of the non-commercial and commercial production of enteral diet foods as it is found out that local, non-commercial products contained high bacterial contamination. This provides an example that commercial enterprises and government-assisted enterprises are more aware and has been applying the regulations versus the local, home-based food processors. Additionally, this result goes to show that the scale of operations matter as per compliance and awareness are considered. Henson and Heathman [38] and Herath et al. [39] states that the probability of knowing and adopting particular food safety or quality assurance practices varies according to the size and extent of operations of an enterprise. This validates the fact that home-based food processing, as smaller enterprises considered, are on lower level chance to adopt such identified regulations and standard practices.

Level of Compliance on Food Safety and Quality Assurance Practices of Strawberry-Based MSME Food Processors

Table 2. Level of Compliance on food safety and quality assurance practices of strawberry-based MSME food processors

Particulars	Mean	Descriptive Equivalent	Rank
A. Good Manufacturing Practices	3.84	High Level of Compliance	
1. Assure health safety check of food processors via Medical examination, Attended mandatory Food Handlers orientation Seminar, and Secure Health card as certification	3.65	High Level of Compliance	7
2. Comply to appropriate use of food processing attire and gears by food processors	3.72	High Level of Compliance	5.5
3. Acquire sanitary permit for operations as proof of sanitary compliance	4.00	High Level of Compliance	2
4. Obtain FDA License to Operate for legal enablement of food manufacturing	3.80	High Level of Compliance	4
5. Practice on appropriate facility maintenance and conditioning, regular cleanliness and sanitation procedures	3.72	High Level of Compliance	5.5

6. Proper storage of raw materials and processed products	4.00	High Level of Compliance	2
7. Practice on waste management, including sewage disposal and drainage	4.00	High Level of Compliance	2
B. Food acceptability and inclusivity		1.93	Low Level of Compliance
1. Nutrient content must be displayed properly on product via standardized Nutri Facts format	1.80	Low Level of Compliance	2
2. All ingredients, including food allergens must be completely identified	3.00	Moderate level of Compliance	1
3. Products are registered under FDA and shall acquire Certificate of Product Registration	1.00	Never Complied at all	3
C. Product labeling		3.43	High Level of Compliance
The following must be clearly presented on the product label			
a) Product name	4.00	High Level of Compliance	3
b) Registered trademark	4.00	High Level of Compliance	3
c) Complete address of the processing facility	4.00	High Level of Compliance	3
d) Net weight content	4.00	High Level of Compliance	3
e) Storage condition	1.00	Never Complied at all	7
f) Manufacturing and Expiration date	3.00	Moderate level of Compliance	6
g) Misleading claims must NOT be presented on label	4.00	High Level of Compliance	3
i. The food is claimed to be a Vitamin and Nutrient rich product	4.00	High Level of Compliance	
ii. The food is claimed to be curing and/or a treatment to a disease or illness	4.00	High Level of Compliance	
iii. Use of photographs and or graphics that are not personally generated	4.00	High Level of Compliance	
<u>AVERAGE</u>		<u>3.07</u>	<u>Moderate level of Compliance</u>

Table 2 presents in general the result of the level of compliance of strawberry-based food processors on food safety and quality assurance practices. Study reveals that the respondents are moderately complying with the regulations as the overall rating obtained an average of 3.07, equivalent to “Moderate level of Compliance”. This infer that respondents are satisfactorily compliant to the regulations set forth for the food safety and quality assurance practices however are not highly compliant and these may be caused due to various factors considered by the strawberry-based food processors, particularly the capacity to implement the regulations made known to them through the mandatory requirements for obtaining permits and licenses, or through the promotion and dissemination of laws, ordinances and memorandums for these regulations and practices.

Level of Compliance on:

Good Manufacturing Practices (GMP)

On the GMP standards in the Strawberry-based food processing activities, the respondents turned out to be collectively in high level of compliance to the indicators as it obtained a general average of 3.84. Results on the GMP level of compliance imply that strawberry-based food processors are highly compliant and are obedient on regulations set forth for GMP within their operations. Unlike observed recommendations for food processing MSMEs to highly improve their food safety compliances as it is seen to be of low level of compliance and are below set expectations due to various factors encountered and considered [16],[25],[40], the findings for strawberry-based food processors contradicts these views on MSMEs as they display considerable compliance on GMP within their strawberry-based food processing activities. Despite high level of compliance, complying with employee health check and knowledge trainings can be enhanced as it is beneficial in increasing understanding on occupational health and safety [41] and to ensure knowledge on food safety by gaging hazards and control measures at food production [42] Home-based strawberry-based MSMEs tend to employ processing staff in part-time status wherein the staff are not being declared as an official employee and therefore not being required to undergo examinations and trainings. Further, most of small enterprises are found to have difficulties to get licenses to operate from the Food and Drug Administration such as the findings of Barroga et al. [43] for the MSMEs in Davao Region. This somewhat validates why some strawberry-based food processors are yet to comply with this regulation alongside their other requirements needed to be fulfilled.

Food Acceptability and Inclusivity

The mean rating of 1.93 was obtained by the strawberry-based food processors for the food acceptability and inclusivity regulations which indicate low level of compliance. As a validation measure, observation on the product labels was done for the ingredients, allergens, and for the Nutrition Facts regulations. For the FDA Certificate of Product Registration, the FDA Verification Portal was used to countercheck if products do obtain such certification. Implications of these results points out that the low level of general compliance on indicated regulations validate that as per product label, most products presents the list of ingredients however, no food manufacturer was able to include the food allergens present on their products. This confirms Rimbawan’s [44] claim that 95% of MSME respondents are compliant in including their ingredient on the product label list however does not present food additives information. Low level of compliance on standards of Nutrition fact regulations imply that majority of enterprises were not able to subject their food products for nutrient analysis. Due to various internal and external factors for consideration, it was determined that MSMEs tend to not include nutrition facts of their products and subject these products for nutrient analysis [45],[46]. Also, FDA Certificate of Product Registration is mandated to assure compliance of commercial products with technical requirements and suggested standards for quality [22], however was never complied by respondents as the products were not given such certification as per validation with the FDA Portal. This further implies that despite high level of awareness on this regulation, all MSMEs are yet to consider their application for the Certificate of Product Registration. Generally, moderate to low level of compliance on food acceptability and inclusivity regulations suggests that local strawberry-based food processors tend to miss out the importance and benefits of the regulations. With the mindfulness of consumers nowadays on product details, issues in trustworthiness of products and the enterprise may be at risk. Standard labeling- particularly for ingredients, nutritional information, and allergens- helps the product labels to function as a consumer protection tool [47] hence it shall be strictly considered to be adhered to retain marketability and confidence to the product.

Product Labeling

In general, respondents are of “High level of compliance” on product labeling regulations as it obtained a mean rating of 3.43. Accordingly, with existing programs on product labeling regulations, results validate that strawberry-based food processors highly adopts the product labeling regulations as it is seen visible on their products. Barroga et al. [43] validates this as she claimed that packaging and labeling has been one of the most adopted technological innovations of MSMEs in Davao Region. Despite such, setbacks are still seen in product labeling i.e. manufacturing and expiration date and the storage condition of products. Strawberry-based enterprises are highly compliant in declaring expiration dates but on the manufacturing date, there had been few enterprises who indicated such within their product labels. The lack of manufacturing date declaration has been an issue found on many MSME food products developed [48], [49]. Consumers highly look for manufacturing dates on products as it is second most important detail on food labels, next to expiration dates [50]. Storage condition of products has been also observed to be missing from all strawberry-based food products. This detail is vital as it is likely to accompany shelf life labels as an additional instruction since it affects greatly the shelf life of products [51].Tendency to not include storage conditions is usually due to minimal knowledge on regulations and basic assumption of shelf-life stability of the food products [51], [52].

Differences in the Level of Compliance of Strawberry-Based MSME Food Processors on Food Safety and Quality Assurance Practices According to Moderator Variables

Differences in the Level of Compliance according to:

Position in the enterprise

Table 2.1. Differences in the Level of Compliance of Strawberry-Based MSME Food Processors on Food Safety and Quality Assurance Practices According to Position in the enterprise

Indicators	Position in the Enterprise		
	Owner	Manager/Supervisor	Food processing staff/employee
A. Good Manufacturing practices	3.88	3.98	3.80
B. Food Acceptability and Inclusivity	1.93	2.22	1.89
C. Product Labeling	3.43	3.43	3.43
AVERAGE	3.08	3.21	3.04
<i>p-value: 0.98</i>		<i>a: 0.05</i>	<i>Not Significant</i>

Results based on Table 2.1 reveals that manager/ supervisors obtained the highest mean rating of 3.48, followed by the owners with 3.42 while the food processing employees obtained 3.40. Numerical differences indicate that in terms of the level of compliance, managerial and supervisory employees of the strawberry-based MSMEs tend to be the most compliant on the application of the regulations indicated. However, the p-value of 0.98 significance value implies that there is no significant difference in the level of compliance in the operations of the strawberry-based MSMEs on food safety and quality assurance practices in terms of positions of the respondents in their enterprise. Hence, compliance of food processors depending on the position in the enterprise does not vary significantly and is not depending on their role and degree of function in the strawberry-based food processing operations.

Years of business operations

Table 2.2. Differences in the Level of Compliance of Strawberry-Based MSME Food Processors on Food Safety and Quality Assurance Practices According to Years of business operations

Indicators	Years of business operations			
	5 years and below	6-10 years	11-15 years	16 years & above
A. Good Manufacturing practices	3.78	3.92	4.00	4.00
B. Food Acceptability and Inclusivity	1.73	2.13	2.67	2.67
C. Product Labeling	3.43	3.43	3.43	3.43
AVERAGE	2.98	3.16	3.37	3.37

p-value: 0.93

α: 0.05

Not Significant

Level of compliance of respondents according to range of years of business operations has been observed as shown on Table 2.2 wherein 11-15 years and 16 years and above operations obtained the highest mean on 3.37, followed by 6-10 years with 3.16, and by the 5 years and below with 2.98. Differences in ratings reflect that those who had been operating for longer years are more compliant than those younger enterprises. However, the p-value result of 0.88 suggests that there is no significant difference on compliance of respondents when grouped according to years of business operations. Implication of this leads to the fact that the emerging enterprises' compliances than those operating for many years already does not vastly and hugely differ. Despite such, younger enterprises are still deemed the least compliant based on ranking of mean compliance rating as it is validated by Wilcock et. al. [53] that the tendency for newly made enterprises to train employees and involve themselves on food safety measures is lowly considered hence compliance is deemed lower for the young enterprises. Nonetheless, despite years of operations, strawberry-based food processing enterprises tend to comply with the same regulations and at the same time, collectively face the same challenges and issues resulting to their non-compliance on the food safety and quality assurance regulations.

Type of processing plant/facility

Table 2.3. Differences in the Awareness of Strawberry-Based MSME Food Processors on Food Safety and Quality Assurance Practices According to Type of processing plant/facility

Indicators	Position in the Enterprise		
	Home-based food processing	Commercial processing facility	Government-assisted/shared service facility
A. Good Manufacturing practices	3.80	3.97	4.00
B. Food Acceptability and Inclusivity	1.84	2.13	2.67
C. Product Labeling	3.43	3.43	3.43
AVERAGE	3.02	3.18	3.37

p-value: 0.9

α: 0.05

Not Significant

As per the level of compliance according to type of plant/ facility, government assisted processing facilities obtained the highest mean rating of 3.37 followed by commercial-type processing facilities with 3.18 and home-based enterprises with 3.02. This implies that as per processing plant/facility, that government –assisted facilities are the most compliant in consideration that these facilities have the access and assistance for requirements on food safety and quality assurance practices through the available laws and ordinances made for food manufacturing enterprises. However, a p-value of 0.9 indicates that there is no significant difference on the level of compliance of these enterprises according to their type of processing facility as despite the type of food processing plant/ facility, minimal differences were only seen to separate the compliance level among the three classifications. Supplementary implication of this result is that strawberry-based food processors, despite type of facility, are in mutual compliance and non-compliance on the regulations in contemplation to factors considered by respondents in complying with these food safety and quality assurance regulations.

Factors affecting the non-compliance of Strawberry-based MSME food processors on Food Safety and Quality Assurance Practices

Table 3. Factors affecting the non-compliance Strawberry-based MSME food processors on food safety and quality assurance practices

Factors affecting the NON- COMPLIANCE	f (n=75)	Percentage (%)	Rank
1. I do not have available financial resources needed for compliance as well as for the maintenance in implementing these practices	69	92%	1
2. I was able to incur additional expense just to comply to these practices	66	88%	3
3. I may encounter burdens such as time constraints that may affect my regular business operations as I process my compliance to these practices	63	84%	4
4. I find the regulations inconsistently promoted, regulated and monitored by concerned government agencies	60	80%	5
5. I am not confident of the food safety legislation and enforcement officers regulating these practices	46	61%	8
6. I have not been penalized for not complying to these practices to be complied	57	76%	6
7. I do not receive any benefit or funding assistance for complying to these regulations	55	73%	7
8. I do not see any impact in my operations, sales and marketability of my products if I comply to these practices	0	0%	9
9. I do not have enough physical resources and materials to comply to the regulatory requirements	67	89%	2

For the factors affecting the non-compliance of the strawberry-based food processors, it was found that primarily, they do not comply on some regulations due to not having available financial resources needed for compliance and maintenance in implementing these practices, and secondarily, they do not have enough physical resources and materials to comply with the regulatory requirements. It is a huge factor for food processors for not having enough financial and physical resources within their operations to effectively comply with the regulations. Hence, it is a problem for food processors to acquire and obtain available such resources in order to comply with non-complied regulations. This non-compliance factors are further validated as a concern by the fact that MSMEs are facing personal capacity, mainly financial, in order to properly comply with food safety and quality assurance standards [38], [39], [47], [49], [53]. Tertiary factor found for non-compliance is that food processors were able to incur additional expense just to comply with these practices while the fourth factor is that they encounter burdens such as time constraints that can affect their regular business operations as they process their compliance to these practices. Results imply that complying with the regulations is really in need of enough time and financial resource hence these serves as an additional financial and time constraint as complying with the regulations may disrupt their regular operations. Associated compliance costs and time requirements for food safety and quality assurance practices are deemed negligible and burden as an additional expenditure in operational costs and time-scheduling [54].

The governmental roles and interventions, clustering the fifth to eighth factors considered for non-compliance, are among the least considered. It can be entailed that there are available programs and actions done by government agencies to promote, monitor and support compliance of the respondents however some respondents still consider it as reasons for non-compliance hence improvement on the actions of government regulators may be considered. This is supplemented by the statement of Farida and Ayuningtyas [55] that regulations on MSMEs products can be ideal when the government can intensify promotion and communication, budget and resource provision, monitoring, and evaluation.

Lastly, no respondent has considered that there is a negative effect if they will comply with the regulations. Therefore, it can be implied that strawberry-based food processors do not highly see food safety and quality assurance standards to be non-beneficial, burden, and shall be set aside from their manufacturing operations.

IV. CONCLUSION

Strawberry-based food processors of La Trinidad, Benguet are found to be completely aware on the identified regulations on food safety and quality assurance practices along good manufacturing practices, food acceptability and inclusivity, and product labeling. This implies that there is effective and prevalent information dissemination on these food safety and quality assurance regulations via the government efforts of awareness campaigns through trainings, seminars, memorandum circulars, monitoring activities, and having these as requirements for permits and licenses. The type of processing plant/facility was found to affect the level of awareness of strawberry-based food processors on food safety and quality

assurance regulations while position in the enterprise and the years of operations does not affect their level of awareness to these practices.

The level of compliance of strawberry-based MSME food processors on food safety and quality assurance regulations are generally found to be of moderate level of compliance. Satisfactory and considerable compliance level was attained by the strawberry-based food processors in complying with the regulations set forth for food safety and quality assurance practices. With the gap found in attaining high compliance level, moderate level compliance can be associated to various factors considered by strawberry-based food processors, particularly their capacity to apply the regulations despite knowing these via information awareness, requiring these for permits and licenses, and the monitoring activities done. Further, strawberry-based food processors are yet to completely comply with this regulation alongside their other requirements needed to be fulfilled in order to attain high level of food safety and quality assurance.

Main factors considered for non-compliance of strawberry-based food processors of La Trinidad, Benguet include the reasons that they do not have available financial resources needed for compliance and maintenance in implementing these practices, they do not have enough physical resources and materials to comply to the regulatory requirements, and they were able to incur additional expense just to comply to these practices. The results imply that the available resources and the capacity of food processors hinders and limits the level and degree of compliance on the identified regulations despite the identified high level of awareness. To which, strawberry-based food processors believe that they lack enough resources to comply however is aware and is willing to comply since they believe that there is no negative implications in complying with these regulations.

V. RECOMMENDATIONS

Strawberry-based MSME food processors of La Trinidad, Benguet should maintain their current awareness but shall continue in seeking and reviewing the concepts and regulations particularly if there are updates needed to be complied as seeking for further learning opportunities will help in elevating their awareness for complying to these regulations. Non-complied food safety and quality assurance regulations shall be aimed to be complied as the provided gap in non-compliance can be narrowed and improving level of compliance on the identified regulations can further elevate the assurance of safe and quality food products by becoming proactive while assuring the relevant benefits in terms of marketability, good reputation, and confidence of their of food products.

Funding support and assistance programs shall be sought by the strawberry-based MSME food processors from the government-regulating bodies who implements and monitors these regulations in order to elevate their capacity to comply to these regulations. It is also suggested that these local and national government agencies who serve as regulating bodies shall develop policies and programs to reach out and provide compliance enhancement support as well as extending technical assistance and funding support to these strawberry-based MSMEs via seminars, trainings, mentorships, grants and aid programs, and other technical assistance.

Perceptions were only assessed by the study through self-awareness check on the level of awareness hence result was seen to be limited only with what the food processors thought of their available capacity. To which, further conduct of studies using summative assessment can be done to check the existing available knowledge of the food processors against the set standards and regulation to further validate their level of awareness on the food safety and quality assurance practices.

Similar studies can also be conducted in the wider scope within the neighbor city and municipalities within province as strawberry-based food products are also being processed by local MSMEs of these places. Non-strawberry food products can also be assessed as these too are perceived contributory to the identity of the tourism of La Trinidad as a “pasalubong” product. Also, varied types of methodologies can be incorporated to be employed in similar study to be conducted such as qualitative and/or mixed method approach, case study, knowledge assessment through summative examinations, among others.

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