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Critical Analysis of the practices of shop food handlers regarding safety and hygiene: Case study in Paranaque City

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Research Questions:

1. What is the demographic profile of the respondents?
2. What are milk tea shops' food handlers' knowledge, attitudes, and practices?
3. What are the challenges facing the food handlers in their milk tea shops?
4. What are the suggestions/recommendations for improving the operation of the milk tea shops?

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Abstract

This study aims to analyze the knowledge, attitude, and practices of food handlers in milk tea shops in Paranaque, Philippines, and identify areas for enhancing food safety and hygiene practices. A mixed-method approach was employed, with data gathered through a survey questionnaire and interviews with 100 milk tea shop food handlers. The study revealed that most food handlers (70%) were aged between 21 and 25 years old, with 92.9% female and 91.4% holding a college degree. Additionally, 85% of the respondents had prior experience in the food and beverage industry. However, only 57 out of the 100 respondents had registered their businesses. The food handlers demonstrated good knowledge about food safety and sanitation, but some needed knowledge about proper food holding practices. Most food handlers had a positive attitude towards customers and food handling, but they needed to be more enthusiastic about securing business requirements due to perceived difficulties and expenses. While 30% of the respondents emphasized the importance of avoiding cross-contamination and 24% highlighted customer safety, only 44% had received formal training in proper food handling. The reasons for training included improving knowledge in food safety and hygiene practices (36%) and preventing foodborne illnesses and cross-contamination (18%). In terms of practices, the respondents needed better practices in storing, cooking, and cooling tapioca pearls, and often (4.05) mixed raw materials thoroughly using a shaker before serving due to limited staff and high pressure from customers to be served immediately. The study identified several challenges milk tea shop owners face, including limited staff, space, cleanliness maintenance, and regulatory compliance complexities. These findings underscore the need for targeted training, operational support, and regulatory assistance to enhance food safety and operational efficiency in the milk tea industry.

Aims:

The study aims to analyze food handlers' knowledge, attitudes, and practices and identify areas for enhancing food safety and hygiene practices in milk tea shops.

Research Objectives: The study sought to answer the demographic profile of food handlers and their level of knowledge, attitude, and practices in safety and hygiene practices. It also wanted to know the challenges faced by the food handlers and areas to be improved in operating milk tea shops.

Keywords: knowledge, attitude, safety and hygiene practices, preventive measures, cross-contamination, milk tea

Introduction

According to market researchers, the global bubble tea market was worth around \$1.8 billion in 2018 and \$2,407.6 million in 2019 and is expected to reach \$3.49 billion in 2026 (Valibhav & Roshan, 2020). Milk tea has gained significant popularity among Filipino teenagers and young adults since its introduction in 2008. As the demand for milk tea grew, entrepreneurs and retailers entered the market ((Bastasa et al., 2022), and Filipinos now consume an average of five cups of milk tea per month (Yim & Lee, 2019). However, the popularity of milk tea has also led to concerns about food safety and sanitation in the beverage's preparation and handling.

According to the World Health Organization (WHO, 2022), 420,000 people die yearly, and 33 million lose their lives due to foodborne diseases. Food products must be purchased, received, stored, prepared, and served under sanitary conditions because failure to follow simple and basic food sanitation procedures can cause severe illnesses and even death.

Several incidents of foodborne illnesses related to milk tea consumption in the Philippines have occurred in recent years. For instance, in Iloilo City, one man died, nine people were confined, and 34 were hospitalized after drinking milk tea beverages at Dakasi Tea House (Rendon, 2013). Another incident occurred at Ergo Cha, a milk tea shop in Sampaloc, Manila, where two customers and the owner died after consuming contaminated Hokkaido-flavored milk tea (Rappler, 2015). These incidents highlight the importance of addressing sanitation and food handling practices in milk tea shops to ensure the safety and well-being of consumers.

Assessing the knowledge, attitude, and practices of milk tea shop food handlers is crucial for understanding and improving food safety and sanitation. Research has shown that food handlers should be knowledgeable about ensuring food safety for public consumption and the consequences of eating contaminated foods (Kwol et al., 2020).

Methods

The research employed a mixed-method approach to assess food handlers' safety and hygiene practices across 65 milk tea establishments in Paranaque City, Metro Manila, Philippines. A formal communication was sent to the Local Government Unit (LGU) of Parañaque City, soliciting details on registered milk tea business proprietors, including their names, contact numbers, and locations. Subsequently, the respective milk tea store owners or personnel sought permission to conduct the study.

The researchers utilized purposive sampling to gather pertinent information from selected participants. They employed an adapted questionnaire that underwent modifications and validation by experts. Pilot testing involving 20 respondents was conducted to ensure the questionnaire's validity and reliability. The questionnaire comprised three sections, encompassing demographic profiles, levels of knowledge, attitudes, and practices. Data were collected through a self-administered questionnaire and interviews.

Statistical analyses involved frequency counting, percentage distribution, and average weighted mean to assess the gathered information.

Results and Discussion

Table 1. Frequency Distribution of Age

Age Group	Frequency
20 years old and below	16
21- 25 years old	70
26-30 years old	9
31-35 years old	3
36-40 years old	1
41-45 years old	0
51-55 years old	0
56 years old and above	1
Total	100

The figure shows that 70 of the respondents were 21-25 years old; 16 were 20 years old and below; 9 were 26-30 years old; 3 were 31-35 years old; 1 was 36 -40 years old; and one was 56 years old and above. Sayuti et al. (2020) supported this, stating that the majority of their respondents were female. However, in the study of Elsherbiny et al.(2019), most of their respondents were male.

Based on the study of Hamed and Mohammed (2020), the sex of food handlers could influence their knowledge of food safety. Their study revealed that males had higher food safety knowledge than females, which contradicts the study of Alqurashi et al. (2018), which found that females had higher food safety knowledge than men.

Table 2. Frequency Distribution of Sex

Sex	Frequency
Male	35
Female	65
Total	100

The table shows that 65 respondents were female, while 35 were male.

Table 3. Frequency Distribution of educational background

Education	Frequency
No schooling/no education at all	0
Elementary undergraduate	0
Elementary Graduate	1
Highschool Undergraduate	7
Highschool Graduate	0
Vocational/Technical Graduate	7
College Undergraduate	64
College Graduate	21
Post-graduate studies (Masters or Doctorate)	0
Total	100

Table 3 shows that 64 of the respondents were college undergraduates, 21 were college graduates, 7 were vocational/technical graduates, 7 were high school graduates, and 1 was elementary graduate.

According to Alqurashi et al. (2018), food safety knowledge was significantly associated with the staff's level of education.

Table 4. Frequency Distribution of Work Experience

Work Experience	Frequency
No working experience	18
Have working experience related to the food and beverages industry	59
Have working experience but not related to the food and beverages industry	23
Total	100

If related to food and beverage, how long you work in the food and beverage industry	Frequency
Less than 1 year	31
1-2 years	24
3-4 years	0
5 years	3
more than 5 years	1
Total	59

If not related, specify	Frequency
BPO industry (Customer service representatives)	5
Retail Industry (Cashier, merchandiser)	2
Government Industry	1
Human Resource	1
Graphic Designer	1
Online Freelancer	1
Encoder	1
Drafting	1
Events	1
Fashion	1
Total	15

Table 4 shows the working experience of the respondents. 59 respondents have working experience related to food and beverage, 23 have working experience but not related to food and beverage, and 18 have no working experience. In terms of length of working experience of the respondents related to food and beverage, 31 were less than a year, 24 1-2 years, 3 had 5 years, and 1 had more than 5 years; meanwhile, 15 out of 23 respondents had work experience not related to food and beverage. 5 were in the BPO industry, 2 in retail and others.

Work experience is important to develop better food hygiene practices as it gives workers better opportunities to undergo training and orientation. (Lema et al., 2019). It was reported that food handlers had better food hygiene practices when they had more work experience compared to those with less work experience food handlers (Lema et al., 2019; Teferi et al., 2021). The possible explanation could be that experience could help food handlers acquire better knowledge and skills regarding food handling practices, or people with more knowledge and experience are more aware of food safety risks (Chekol et al., 2019).

Table 5. Frequency Distribution of Business Profile

Business Registration	Frequency
Yes	57
No	25
Total	82

Table 5 shows that 57 respondents registered the business, 25 were not, and 18 preferred not to say.

A. Level of Knowledge

Table 6. Knowledge of Personal Hygiene

Personal Hygiene	Average	Verbal Interpretation
A.1.1. Washing hands before entering the work area	3.88	Strongly Agree
A.1.2. Washing hands for at least 20 seconds with soap and water	3.89	Strongly Agree
A.1.3. Wearing gloves when handling foods.	3.7	Strongly Agree
A.1.4. Nails must be clean and short without any nail polish or nail extension	3.8	Strongly Agree
A.1.5. Wearing a clean and complete uniform	3.8	Strongly Agree
Overall Mean	3.82	Strongly Agree

The data indicates that the respondents strongly agree with the personal hygiene practices in the food service industry. The overall mean score for the personal hygiene items is 3.82, within the "Strongly Agree" verbal interpretation range.

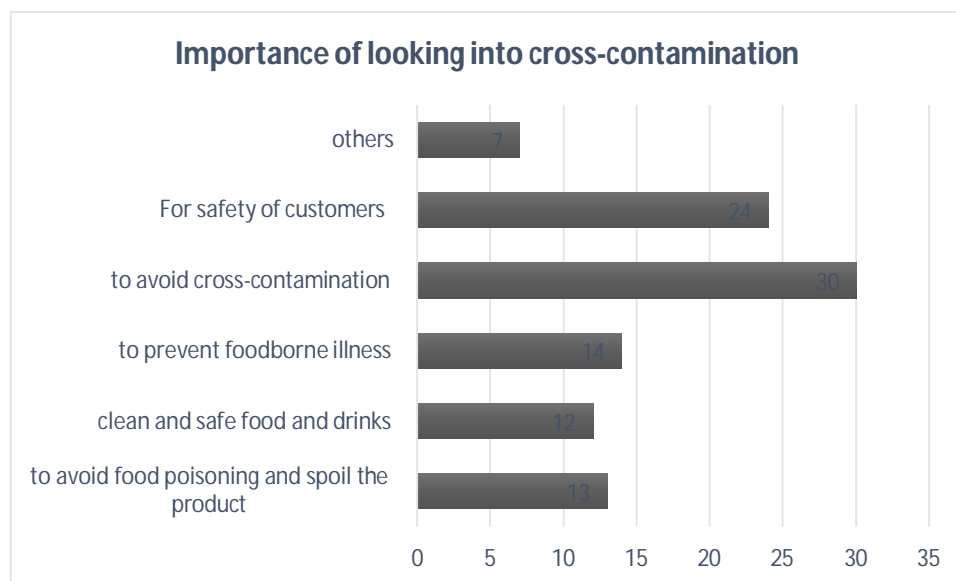
The result was supported by the findings of the studies where they found that their respondents had good knowledge (Adetunji et al., 2018) and showed very good personal hygiene practices (Al-kandari, et. al 2019).

Table 7. Knowledge on Cross-contamination

Cross Contamination	Average	Verbal Interpretation
A.2.1. Replacing gloves every after an activity is done	3.7	Strongly Agree
A.2.2. Washing of hands after a break or using the toilet.	3.85	Strongly Agree
A.2.3. Wearing proper Personal Protective Equipment (PPE) when handling food.	3.67	Strongly Agree
A.2.4. Working one at a time with milk tea ingredients.	3.12	Agree
A.2.5. Use a foot-operated waste bin to throw trash and leftovers.	3.73	Strongly Agree
Overall Mean	3.61	Strongly Agree

Table 7 illustrates the respondents' agreement level with cross-contamination prevention practices in the food service industry. The indicator with the highest weighted mean is indicator 2, with a mean of 3.85, which respondents strongly agreed with. However, indicator 4, the practice of "Working one at a time with milk tea ingredients," received a mean score of 3.12, indicating a lower understanding or implementation level. The overall weighted mean of food handlers on their knowledge of cross-contamination is 3.61, which is interpreted as strongly agree.

Adetunji et al.(2018) supported the study's results by reporting that their respondents were knowledgeable about cross-contamination.

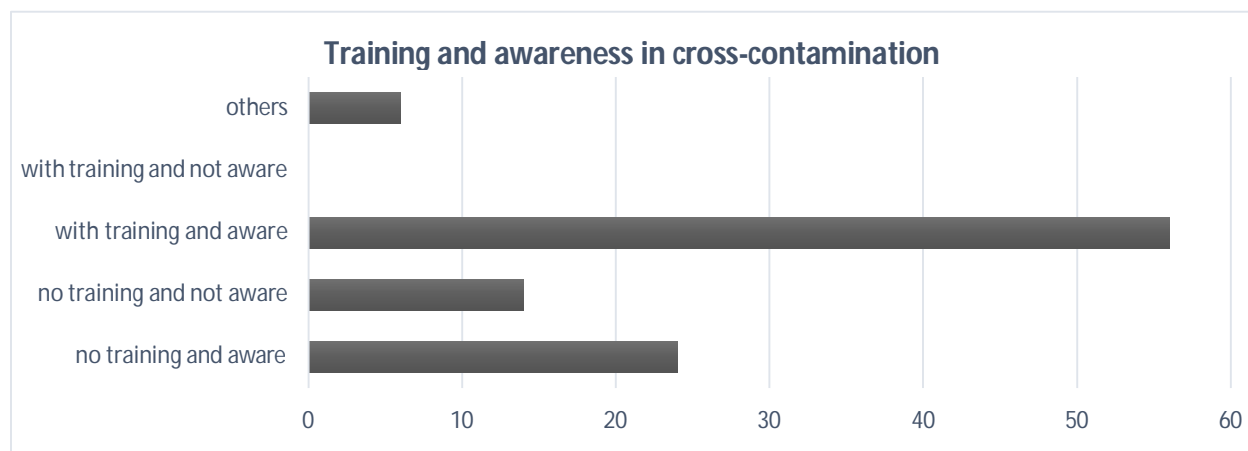
Table 8. Importance of looking into cross-contamination

Source: process by the authors

The data reveals that most respondents (30) consider avoiding cross-contamination the most important reason to examine the cross-contamination process in milk tea shops. This is followed closely by the need to ensure customers' safety (24 respondents), highlighting the critical role of cross-contamination prevention in maintaining customer trust and satisfaction. The remaining respondents cited various reasons, including avoiding food poisoning and spoilage (13), ensuring clean and safe food and drinks (12), preventing foodborne illness (14), and other reasons (7).

As indicated in the study by Riaz et al.(2020), improper handling can lead to soil and groundwater contamination, pesticide and fungicide residues, and microbial contaminants that can cause foodborne diseases. Meanwhile, the regulatory framework for food safety, which includes preventing cross-contamination, is underdeveloped. Knowledge in this area helps comply with food safety laws and ensures consistency in safety practices across the food supply chain (Halabi et al., 2023).

Studies have emphasized that ongoing training in food safety and hygiene is necessary to ensure the safety of food provided, which in turn helps maintain consumer trust in food service operations (Sani & Siow, 2014).

Table 9. Training and awareness in cross-contamination.

Source: process by the authors

The table above reveals a mixed picture regarding the respondents' training and awareness of cross-contamination. While the majority (56) reported having received training and being aware of cross-contamination, a significant portion (24) indicated they were aware of the issue despite lacking formal training. This suggests a potential gap in training programs, as some individuals have gained an understanding of cross-contamination through other means. Additionally, 14 respondents were found to need more training or awareness, representing a group that could benefit from targeted educational initiatives to enhance their knowledge and understanding of this important topic. Overall, the data highlights the need for a more comprehensive approach to training and awareness-building to ensure consistent knowledge and practices related to cross-contamination across the surveyed population.

According to the study of Alqurashi et al. (2019), consistent training of food service staff is important in improving knowledge and, thereby, better and safer food handling practices, which could contribute to food safety.

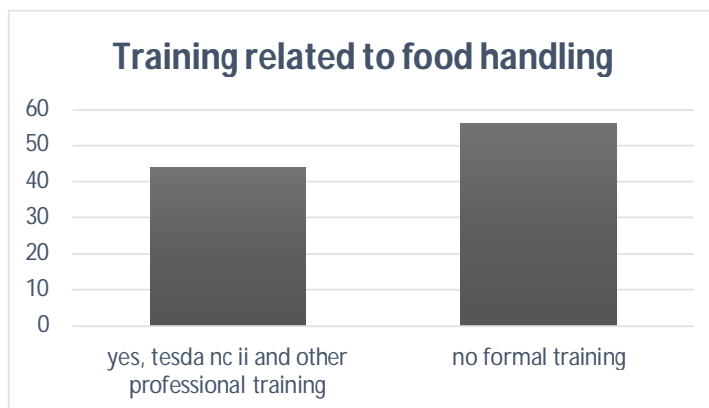
Table 10. Knowledge of Proper Handling of Food

Proper Handling of Food	Average	Verbal Interpretation
A.3.1. Use and practice of FIFO (First In, First Out) method when receiving and storing raw materials.	3.7	Strongly Agree
A.3.2. Cooling of tapioca pearls before serving.	3.42	Strongly Agree
A.3.3. Milk, cream cheese and whipped cream should be stored at 4°C and below	3.44	Strongly Agree
A.3.4. Throwing tapioca pearl and milk should be thrown after being stored at room temperature for 4 hours	3.35	Strongly Agree
A.3.5. Food handlers should know the cooking requirements for tapioca pearls and tea.	3.77	Strongly Agree
Overall Mean	3.54	Strongly Agree

Table 10 shows the respondents' knowledge of the proper holding of food. The indicator with the highest weighted mean is indicator 5, with a mean of 3.77, which respondents strongly agreed. The indicator's lowest mean is indicator 4, which throws tapioca pearls and milk after being stored at room temperature for 4 hours. The overall weighted mean of food handlers based on their knowledge of proper handling of food is 3.54, which is interpreted as strongly agreeing.

According to Osorno & Bajao (2019), 4 hours is the maximum length of time foods can stay in the temperature danger zone, which means cooked tapioca pearls should be consumed within 4 hours; if left longer than this, the quality of the pearl will decrease (Bridestine, 2022). Moreover, reheating tea can steal its flavours, nutritional value, aroma, and taste and remove its beneficial properties. Tea left for over 4 hours may accumulate microbes like moulds and bacterial growth (ETIMES,2020). Based on the findings of Akabanda et al. (2017), food handlers needed to be more familiar with time and temperature; this falls under the proper holding of food.

Table 11. Training received in food handling

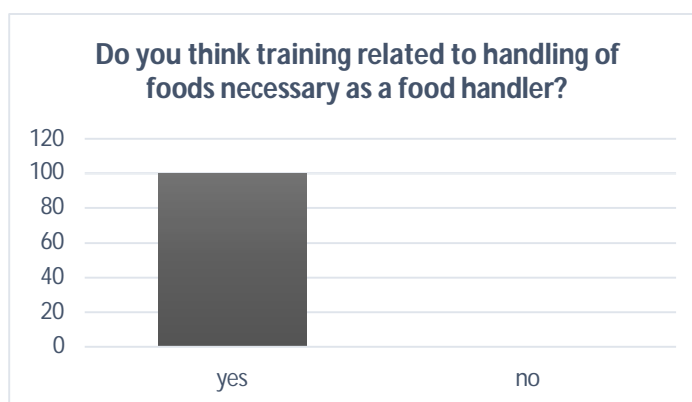


Source: process by the authors

Table 11 shows the training received by the respondents. Based on the data, 44 out of 100 respondents received training related to food handling from TESDA (NC II), school, on-the-job training seminars and workshops, while 56 respondents did not undergo formal training but instead self-taught and personal experience.

According to Elobeid (2019), management should clearly commit to food safety training among staff and personnel involved in all food handling practices. This is vital to ensure good hygienic standards. Therefore, effective and mandatory food safety training on a regular and ongoing basis should be conducted for all food service employees to minimize or prevent foodborne hazards.

Table 12. Is training related to handling foods necessary for a food handler?



Source: process by the authors

Table 12 shows that all respondents (100) agreed that food handling training is necessary for their work as food handlers.

Table 13. Reasons why training related to handling foods is necessary



Source: process by the authors

The survey data provides valuable insights into the perceived importance of training related to food handling. Most respondents 36 indicated that training is necessary to improve knowledge in food handling, food safety regulations, and hygiene practices. Another significant group, 18, cited the need to avoid foodborne illness, food poisoning, and cross-contamination as the primary reasons for training. Additionally, 17 respondents emphasized the importance of training for customers' safety, while 6 recognized the role of training in avoiding legal liabilities and protecting the business. Interestingly, a notable portion of respondents 23 did not provide any identified reasons, suggesting a potential gap in understanding the benefits of comprehensive food handling training.

Table 14. Preventive Measures

Preventive Measures	Average	Verbal Interpretation
A.4.1. Food sources and supplies need to be FDA-approved.	3.83	Strongly Agree
A.4.2. Securing sanitation permits, health permits, and monthly pest control.	2.78	Agree
A.4.3. Cleaning and Sanitizing of storage area to eliminate pests.	3.86	Strongly Agree
A.4.4 Food handlers should not work if they are sick.	3.77	Strongly Agree
A.4.5. Food handlers should practice proper waste disposal and segregation procedures	3.87	Strongly Agree
Overall Mean	3.62	Strongly Agree

The data presented outlines the respondents' perceptions of preventive measures in food handling. Among the listed practices, securing sanitation permits, health permits, and monthly pest control received the lowest mean of 2.78, interpreted as "Agree." This suggests a slightly lower level of agreement compared to other measures. The experience of encountering red tape and government regulations hindering small entrepreneurs from starting businesses adds a layer of complexity to the interpretation, indicating potential challenges in regulatory compliance and support for small businesses in the food industry. The overall weighted mean of 3.62 reflects a collective understanding and agreement among respondents regarding implementing preventive measures in food handling to ensure safety and quality standards.

B. Attitude of Food Handlers

Table 15. Attitude towards the Business

Business	Average	Verbal Interpretation
B.1.1. I believe businesses should establish food safety risk management and control procedures	3.89	Strongly agree
B.1.2. I believe businesses should have a food safety plan	3.88	Strongly agree
B.1.3. businesses should apply at least basic food safety.	3.85	Strongly agree
B.1.4. businesses should comply with the requirements (e.g., sanitary permit, business permit, health card of the employees, etc.) for the customers' safety.	3.86	Strongly agree
B.1.5. Businesses should avoid complying with requirements because it is difficult and expensive.	3.14	Agree
Overall Mean	3.72	Strongly agree

Table 15 revealed a strong positive attitude among respondents towards business. The highest mean of 3.89 was recorded for the belief that businesses should establish food safety risk management and control procedures, suggesting a robust understanding of the importance of proactive safety measures. Interestingly, the lowest mean of 3.14 was observed for the belief that businesses should refrain from complying with requirements due to the perceived difficulty and expense, reflecting a general disagreement with this notion. The overall weighted mean of 3.72 indicates "Strongly Agree".

Every business has a "food safety culture" that goes from positive to negative. A positive culture prioritizes food safety as a crucial business objective and adheres to documented systems. On the other hand, a negative culture views food safety as a low priority and often prioritizes other business objectives, resulting in poor compliance with documented food safety requirements (Johnson et al., 2022). Moreover, the result was supported by the study of Borbon & Tolentino (2020), where food establishments complied with all the government requirements regarding food safety, such as sanitary permits, mayor's permits, and the required food safety officer.

Table 16. Attitude towards the Customer

Customer	Average	Verbal Interpretation
B.2.1. Basic food safety will have a huge impact on the daily running of the business.	3.85	Strongly Agree
B.2.2. Customer's food safety is essential in my job.	3.84	Strongly Agree
B.2.3. All food handlers should have basic food safety training to ensure customer safety.	3.82	Strongly Agree
B.2.4. I believe adherence to the Food Safety Act of 2013 will reduce chances of customer food poisoning occurrence through proper labelling of food containers and ingredients in preparing milk tea	3.86	Strongly Agree
B.2.5. My goal as a food handler is to ensure the Customers' food safety.	3.84	Strongly Agree
Overall Mean	3.8	Strongly Agree

The table above revealed a strong positive attitude among respondents towards the Customer. The highest mean of 3.86 was recorded for the belief that adherence to the Food Safety Act of 2013 would reduce the chances of customer food poisoning through proper labelling and ingredient preparation. The lowest mean of 3.82 was observed for the belief that all food handlers should have at least basic food safety training to ensure customer safety, though this is still within the "Strongly Agree" range. The overall weighted mean of 3.80 indicates "Strongly Agree".

Table 17. Attitude towards Food handling

Food Handling	Average	Verbal Interpretation
B.3.1. The work area must be cleaned and sanitized before work.	3.84	Strongly Agree
B.3.2. Hands should be washed before working.	3.88	Strongly Agree
B.3.3. An apron cannot be used as a towel to clean hands.	3.66	Strongly Agree
B.3.4. I believe jewellery such as watches, necklaces, rings, and bracelets cannot be worn while handling food.	2.82	Strongly Agree
B.3.5. I believe food handlers should not rub their hands on their face, hair and body while working.	3.85	Strongly Agree
Overall Mean	3.81	Strongly Agree

The survey data highlights the respondents' strong positive attitude towards proper food handling practices. The highest mean of 3.88 was recorded for the belief that hands should be washed before working, highlighting the importance of personal hygiene in food handling. Interestingly, the lowest mean of 2.82 was observed for the belief that jewellery such as watches, necklaces, rings, and bracelets cannot be worn while handling food. While this is still within the "Strongly Agree" range, it suggests a slightly lower level of agreement compared to the other practices. This could indicate a need for further emphasis on the risks of wearing jewellery during food handling. The overall weighted mean of 3.81 indicates "Strongly Agree".

This result was supported by the study of Sabbithi et al. (2017), which states that food handlers know the core concept of safe food handling. Moreover, food handlers can be responsible for numerous foodborne diseases if proper food safety practices are not followed (Kwol et al., 2020).

C. Flow Diagram

Table 18. Purchasing Practices

Purchasing Practices	Average	Verbal Interpretation
C.1.1. Purchase raw ingredients (e.g., tea leaves, sweetener, powders, ice, tapioca pearl, milk, cream cheese, nata de coco, and other sinkers) from reputable suppliers that have sanitary permits and business permits and are approved by the Food and Drug Administration of the Philippines.	4.81	Always
C.1.2. Purchase raw ingredients (e.g., tea leaves, sweetener, powders, ice, tapioca pearl, milk, cream cheese, nata de coco, and other sinkers) that are properly sealed and labelled with production date, expiration date, etc.	4.82	Always
C.1.3. Purchased raw materials should inspect the upon delivery to assure utmost quality and using FIFO (first in, first out) must be utilized for all products to assure proper rotation.	4.82	Always
C.1.4. Purchase packaging materials (e.g, cups, lids, and straws) are from reputable suppliers that have sanitary permit, business permit, and approved by Food and Drug Administration of the Philippines.	4.8	Always
C.1.5. Purchase raw materials that are fresh and do not show any signs of decomposition, alteration, tampering, or spoilage.	4.84	Always
Overall Mean	4.82	Always

Table 18 revealed a strong emphasis on purchasing practices among the respondents. The highest mean of 4.84 was recorded for purchasing fresh, uncompromised raw materials, suggesting a deep understanding of the importance of sourcing high-quality, safe ingredients. Interestingly, the lowest mean of 4.80 was observed for purchasing packaging materials from reputable suppliers, though still within the "Always" range, indicating a slightly lower level of agreement than other practices. The overall weighted mean of 4.82 indicates a consistent "Always".

According to WHO (2022), reading and understanding food labels is important to improve food safety. On the other hand, in the study of Letuka and Nkhebenyane (2020), 84% of their food handlers indicated that they checked the expiry dates on food prior to procuring it.

Table 19. Storage Practices

Storage Practices	Average	Verbal Interpretation
C.2.1. Comply with the FIFO (First-In-First-Out) principle, e.g., use date and time coding to show the storage time	4.81	Always
C.2.2. Use of raw materials (e.g., tea leaves, sweetener, powders, ice, tapioca pearl, milk, cream cheese, nata de coco, and other sinkers) beyond its expiry date or expected shelf life is not practised.	4.38	Always
C.2.3 . Use a separate refrigerator or freezer to store uncooked food to ready-to-eat food	4.73	Always
C.2.4. Do not use insecticides in the storage area because they can contaminate the raw materials	4.77	Always
C.2.5. Keep all packaging materials (drinking straws or tubes, plastic bags or carriers and disposable cups) inside the container to prevent pest infestation and to protect from dust.	4.85	Always
C.2.6. Hold the cooked tapioca pearl in the chiller for 18 hours.	4.1	Often
C.2.7. Cover the held foods with a lidded container.	4.75	Always
C.2.8 Store the ice in a clean and secure cooler	4.83	Always
C.2.9. Store the opened fresh milk at 5°C or below inside the refrigerator for 2 days.	4.49	Always
C.2.10 Store opened cream cheese at 5C or below inside the refrigerator for 2 weeks if refrigerated on the day of purchase.	4.18	Often
Overall Mean	4.59	Always

Table 19 shows the storage practices in milk tea shops. The highest mean scores were for practices such as using date and time coding for FIFO compliance (4.81) and keeping packaging materials inside containers to prevent pest infestation (4.85). Meanwhile, the lowest mean score is for practice, indicator 6, with a mean score of 4.1. The overall weighted mean for the Storage Practices is 4.59, interpreted as "always".

According to Khan (2022), tapioca pearls should only be kept in the refrigerator for 36 hours. After this time frame, they will gradually start to harden and become crunchy in the middle. However, cooked tapioca will last for three days if it is covered with sugar or sugar syrup (Bais, 2022).

Table 20. Preparation Practices

Preparation Practices	Average	Verbal Interpretation
C.3.1. Use dedicated and cleaned utensils (e.g., tongs, scoops, spoons, small cups) when handling ready-to-eat-materials.	4.84	Always
C.3.2. Clean and sanitize the equipment surfaces, utensils and working area before preparation.	4.81	Always
C.3.3. Estimate the demand for milk tea in tapioca pearl to avoid overproduction.	4.75	Always
C.3.4. Use boiled and distilled water to dilute powder ingredients (e.g., creamer, cream cheese, and black tea) in the preparation of the milk tea.	4.67	Always
C.3.5. Use a clean and sanitized cooking pot and barrel for tapioca pearls, milk, etc.	4.83	Always
Overall Mean	4.78	Always

Table 20 shows the Preparation Practices for the milk tea business. The highest mean scores were for using dedicated and cleaned utensils (4.84), cleaning and sanitizing surfaces and equipment before preparation (4.81), and using clean and sanitized cooking pots and barrels (4.83). The lowest mean score is 4.67 for practice, "Use boiled or distilled water for diluting powder ingredients (e.g., creamer, cream cheese, and black tea) in the preparation of the milk tea." The overall weighted mean for the Preparation Practices section is 4.78, which falls under the "Always" verbal interpretation.

Table 21. Cooking Practices

Cooking Practices	Average	Verbal Interpretation
C.4.1. Make sure to follow safe cooking temperature requirements.	4.85	Always
C.4.2. Check the expiration date of the raw materials (e.g., tea leaves, nata de coco, tapioca pearl and other sinkers.) before cooking them.	4.86	Always
C.4.3. Cook the tapioca pearl at 60°C and above for 30 to 45 minutes.	4.12	Often
C.4.4. Make sure to boil the fresh milk at 60°C and above when heating or reheating it	4.15	Often
C.4.5. Be sure to boil the water to boiling point when brewing the tea and wait 3-5 minutes.	4.71	Always
Overall Mean	4.54	Always

Table 21 shows the cooking practices of the respondents. The indicator with the highest weighted average mean is indicator 2, with a mean of 4.86, which is interpreted as "always". The lowest mean scores are indicator 4, with a mean of 4.15 and indicator 3, with a mean of 4.12, which are both interpreted as "often". The overall weighted mean for the Cooking Practices section is 4.54, falling under the "Always" verbal interpretation.

According to the article published by Acorn Singapore (2020) on how to cook tapioca pearls, the quality of Tapioca Pearls should be up to a standard where they are non-slimy and thus do not get burnt easily when cooking, chewier and neither too soft nor too hard, have a great sweet caramel flavour, and remain constant in size from batch to batch.

Table 22. Cooling Practices

Cooling Practices	Average	Verbal Interpretation
C.5.1. Use potable water to cool/rinse the tapioca pearl.	4.63	Always
C.5.2. Soak the tapioca pearl in a sweetener for about 30 minutes after cooking.	4.48	Always
C.5.3. Put cooked tapioca pearl and tea in a wide, shallow container to speed up the cooling process.	4.59	Always
C.5.4. Put whipped cream in the refrigerator to make it firm.	4.57	Always
C.5.5. Put cooked tapioca pearls in the refrigerator to speed up the cooling process.	3.8	Often
Overall Mean	4.41	Always

The data shows the cooling practices for the milk tea business. The highest mean scores were for using potable water to cool/rinse the tapioca pearls (4.63), soaking the tapioca pearls in a sweetener after cooking (4.48), and putting the cooked tapioca pearls and tea in a wide shallow container to speed up the cooling process (4.59). The lowest mean score is 3.8 for practice, "Put cooked tapioca pearl in the refrigerator to speed up the cooling process", which is interpreted as often followed, highlighting a potential area for improvement in terms of the technical knowledge or expertise in properly cooling the tapioca pearls. The overall weighted mean for the Cooling Practices is 4.41, which falls under the "Always" verbal interpretation.

According to Kooljittiset's study (2016), after cooking the tapioca pearls, they should be kept at room temperature or a bit warmer, but do not put them in the refrigerator or freezer because this affects the texture and hardens the pearls.

Table 23. Serving Practices

Serving Practices	Average	Verbal Interpretation
C.6.1. Wash hands and change into a new pair of gloves after touching anything that may contaminate hands and when serving food and beverages	4.84	Always
C.6.2. Serve the milk tea immediately to the Customer in clean packaging materials	4.83	Always
C.6.3. Follow proper personal hygiene when serving (e.g., clean uniform, PPE, washed hands, no coughing or sneezing when serving food etc.)	4.84	Always
C.6.4. After serving food and beverages, wash with detergent, rinse with water, and wipe the utensils and equipment with a clean towel.	4.76	Always
C.6.5. Seal and secure the cup using a lid to avoid physical contamination.	4.86	Always
C.6.6. Ensure that the cooked materials (tea, milk, and sugar) are mixed for less than 2 minutes.	4.72	Always
C.6.7. Avoid touching my nose, mouth, eyes, hair, and any part of my body before and while mixing the milk tea.	4.87	Always
C.6.8. Use clean equipment (e.g., mixing bowl, wire whisk, electric mixer, rubber scraper, pot, etc.) before mixing.	4.87	Always
C.6.9. Put the correct measure of raw materials during mixing.	4.86	Always
C.6.10. Blend the raw materials thoroughly using a shaker	4.05	Often
Overall Mean	4.75	Always

Table 23 shows the Serving Practices in milk tea shops. The highest mean scores were for practices such as avoiding physical contamination by sealing and securing cups with lids (4.86) and maintaining personal hygiene standards while serving (4.87). The lowest mean score is for the practice, "Blend the raw materials thoroughly using a shaker," with a mean score of 4.05, indicating that this practice is often followed due to low staff and high pressure from customers to be served immediately. This highlights where there may be room for improvement in ensuring thorough blending of raw materials using a shaker during the serving process and adding more staff. The overall weighted mean for the Serving Practices section is 4.75, which falls under the "Always" verbal interpretation, indicating a high level of adherence to the specified serving practices overall.

According to the study of Cullen et al. (2017), it's important to avoid overmixing components, which could harm the product's flavor and texture, to achieve the ideal mouthfeel or texture when processing food. Ineffective mixing can result in underprocessed food that compromises food safety. Moreover, the same study stated that the quality and safety of the finished product should ultimately be considered by the food sector when assessing the success of mixing.

Table 24. The challenges faced by milk tea shops

Aspect	Challenges	Description
People	Limited Staff	Milk tea shop owners need help with having a limited number of staff, which can impact the efficiency of operations, customer service, and overall business management.
	Time Management	Effective time management is crucial for milk tea shop owners to ensure smooth operations, timely service, and meeting customer demands. Balancing various tasks and responsibilities within a limited timeframe poses a significant challenge.
Product	Spoilage of Milk	Milk tea shop owners face the challenge of cooking and storing the ingredients used in making milk tea, specifically the milk.
	Lack of Stock due to the High Cost of Raw Materials	The high costs of raw materials have led to challenges in maintaining adequate stock levels of ingredients needed for milk tea preparation.
	Consistency of Quality	There is difficulty maintaining consistency of quality in making the milk tea, such as the taste and texture of pearl tapioca and the presentation of the final product.
	Food Waste Management	Milk tea shop owners face a pressing challenge in managing food waste, including excess, expired, and substandard ingredients.
Place	Small space	Milk tea shop owners need help operating in a small

		physical space, which can limit the number of customers they can accommodate, the variety of products they can offer, and the overall customer experience.
	Maintaining cleanliness	It is difficult to maintain the cleanliness of the whole store, including the equipment, due to various reasons, such as a lack of knowledge in safety and sanitation and limited staff.
	Meeting Customer Demands and Satisfaction	Due to the small space, limited staff, and quality inconsistencies, milk tea owners find it challenging to meet customer demands, especially during peak hours.
Promotion	Lacking Marketing Strategy	Milk tea shop owners struggle to develop effective marketing strategies to attract new customers and maintain a competitive edge in the market. This leads to difficulties in differentiating their business from competitors and increasing brand visibility.
	Stiff Market competition	Many high-end milk tea brands offer the same products; thus, they need help competing with them.
	Lack of Customer Service	Managing customer expectations and providing timely and effective service can be challenging, especially during peak hours or in small spaces.
Others	Compliance with the Regulatory Requirements set by the government	Milk tea shop owners in the Philippines need help with compliance with regulatory requirements set by the government due to too high

		compliance costs, excessive regulatory requirements, and cumbersome compliance processes.
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Source: process by the authors

Table 23 reveals a range of challenges milk tea shop owners face across different aspects of their business. In terms of People, limited staff impacts operational efficiency and customer service. Time Management is crucial for meeting customer demands amidst various responsibilities. Product challenges include milk spoilage, stock shortages due to high costs, consistency in quality, and food waste management. Place challenges involve operating in small spaces and maintaining cleanliness. Promotion challenges include needing more effective marketing strategies, stiff market competition, and customer service issues. Lastly, compliance with regulatory requirements poses challenges due to high costs and complex processes. These challenges collectively highlight milk tea shop owners' obstacles in managing their businesses effectively and meeting customer expectations while navigating competitive markets and regulatory landscapes.

Conclusion

The following conclusions were drawn based on the results of the study.

1. According to the demographic profile, 70% of respondents are 21-25 years old, indicating a youthful and dynamic workforce. Furthermore, the sex distribution shows a slight female dominance, with 65 (92.9%) while 35 (50.0%) respondents identified as male. Regarding education, the majority, 64 (91.4%), hold a college undergraduate degree, with a smaller proportion holding higher degrees. The work experience of the respondents indicates that 59 (85.0%) have experience related to food and beverage, with varying lengths of experience. Additionally, the business profile reveals that 57 (81.4%) respondents have registered their businesses, 25 were not, and 18 prefer not to say.
2. Based on the respondents' knowledge and training on cross-contamination prevention in milk tea shops. The data reveals a lower understanding or implementation level, with a mean score of 3.12 for "Working one at a time with milk tea ingredients." This suggests a potential risk of compromised food preparation standards and increased cross-contamination, possibly influenced by insufficient staffing. Regarding the importance of addressing cross-contamination, most respondents (30) consider avoiding cross-contamination as the most critical reason, followed closely by the need to ensure customer safety (24 respondents). This highlights the critical role of cross-contamination prevention in maintaining customer trust and satisfaction.
3. The study also examined the training received by respondents related to food handling. While the majority (56) reported having received training and being aware of cross-contamination, a significant portion (24) indicated they were aware of the issue despite

lacking formal training. This suggests a potential gap in training programs, as some individuals have gained an understanding of cross-contamination through other means. Additionally, 14 respondents were found to need more training or awareness, representing a group that could benefit from targeted educational initiatives. Furthermore, the data shows that all respondents (100) agreed that training related to food handling is necessary for their work as food handlers. The primary reasons cited include improving knowledge in food handling, food safety regulations, hygiene practices (36 respondents), and the need to avoid foodborne illness, food poisoning, and cross-contamination (18 respondents). Lastly, the study examined preventive measures, where securing sanitation permits, health permits, and monthly pest control received the lowest mean of 2.78, interpreted as "Agree." This suggests a slightly lower level of agreement than other measures, potentially indicating challenges in regulatory compliance and support for small businesses in the food industry.

4. The key findings for the attitudes of milk tea shop owners and employees towards various aspects of their business operations. Regarding the attitude towards the business, the data reveals that the lowest mean score of 3.14 was observed for the belief that businesses should refrain from complying with requirements due to perceived difficulty and expense. This reflects a general disagreement with this notion, suggesting that milk tea shop owners and employees recognize the importance of regulatory compliance despite the potential challenges. Regarding the attitude towards customers, the lowest mean score of 3.82 was observed for the belief that all food handlers should have at least basic food safety training to ensure customer safety. While this is still within the "Strongly Agree" range, it indicates a slightly lower level of agreement than other customer-related attitudes. This finding highlights the need for a stronger emphasis on comprehensive food safety training for all food handlers to ensure customer safety and satisfaction.
5. Regarding the attitude towards food handling practices, the lowest mean score of 2.82 was observed for the belief that jewellery such as watches, necklaces, rings, and bracelets cannot be worn while handling food. Although this is still within the "Strongly Agree" range, it suggests a slightly lower level of agreement compared to other food handling practices. This could indicate a need for further emphasis on the risks associated with wearing jewellery during food handling and the importance of adhering to strict hygiene protocols.
6. The research findings revealed that milk tea shops' storage, cooking, cooling, and serving practices need areas for potential improvement. In storing practices, the lowest mean scores for holding cooked tapioca pearls in the chiller and storing opened cream cheese suggest room for enhancing storage protocols to ensure food safety and quality. Similarly, in cooking practices, lower mean scores for technical knowledge in cooking tapioca pearls and heating/reheating fresh milk indicate areas where improvements in cooking techniques are needed. The cooling practices reveal a need for better expertise in cooking and cooling tapioca pearls to maintain food safety standards. Lastly, the low mean score for blending raw materials using a shaker in serving practices underscores the importance of thorough blending, potentially influenced by staffing constraints and customer demands for immediate service. These findings emphasize the significance of enhancing technical knowledge, improving storage and cooking techniques, and addressing staffing challenges

to uphold food safety standards and enhance customer satisfaction in milk tea establishments.

7. The challenges milk tea shop owners face across different aspects of their business. In terms of People, limited staff impacts operational efficiency and customer service. Time Management is crucial for meeting customer demands amidst various responsibilities. Product challenges include milk spoilage, stock shortages due to high costs, consistency in quality, and food waste management. Place challenges involve operating in small spaces and maintaining cleanliness. Promotion challenges include needing more effective marketing strategies, stiff market competition, and customer service issues. Lastly, compliance with regulatory requirements poses challenges due to high costs and complex processes. These challenges collectively highlight milk tea shop owners' obstacles in managing their businesses effectively and meeting customer expectations while navigating competitive markets and regulatory landscapes.

Recommendations

The following are the recommendations based on the above conclusions,

1. It is advisable for milk tea shops to promote diversity and inclusivity, offering equal opportunities to both female and male employees. This can be achieved by continuing to provide training and development opportunities to retain talent and foster growth among employees. Additionally, the government should support entrepreneurs through collaboration and partnerships, encouraging them to register their businesses and provide assistance and resources to help milk tea shop owners and managers navigate the process of securing necessary permits, such as sanitation and health permits, and implementing effective pest control measures.
2. To enhance the knowledge, attitude, and practices of food handlers in milk tea shops, it is recommended that comprehensive and mandatory food handling training be implemented. This training should cover various topics, including cross-contamination prevention, food safety regulations, hygiene protocols and customer service principles. This will equip food handlers with the necessary knowledge and skills to uphold safety standards, deliver exceptional customer service, and maintain professionalism in their interactions with customers and colleagues.
3. Milk tea shop owners should prioritize improving operational efficiency by increasing staff numbers, implementing effective time management strategies, and optimizing product quality and inventory management to minimize waste and spoilage. Additionally, they should invest in marketing strategies to differentiate themselves in a competitive market, enhance customer service, and ensure compliance with regulatory requirements by streamlining processes and reducing costs. By addressing these challenges, milk tea shop owners can better manage their businesses, meet customer expectations, and maintain a competitive edge in the market.

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