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Original Article

Evaluating the Implementation of HACCP Systems in Food Establishments in Lapu-Lapu City, Cebu: Pathways to ISO 22000:2005 Certification

Analiza A. Payao[1*], Ronald B. Payao[2]

[1]College of Hospitality and Tourism Management, Lapu-Lapu City College, Lapu-Lapu City, Philippines
[2]College of Management, Business, and Accountancy (CMBA), Cebu Institute of Technology-University, Philippines
Email: [1)] analizapayao@llcc.edu.ph, [2)] ronaldbpayao@gmail.com

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Abstract

This descriptive-correlational study attempted to evaluate food safety procedures based on the Hazard Analysis Critical Control Point System (HACCP) among selected food establishments in Lapu-Lapu City, Philippines. A total of ninety-six (96) respondents who belong to personnel, supervisors, and managers of the food establishments participated in the data gathering. These respondents were selected purposively since the set criteria by the researchers should be strictly followed. Weighted mean and Chi-square were utilized to analyze the collected data using a survey questionnaire. Based on the findings, it was found that participating establishments achieved an 'outstanding' status, as evidenced by high satisfaction ratings from respondents, indicating their commitment to following HACCP as a standard protocol in meeting stakeholder expectations. Additionally, the perceptions of managers, supervisors, and personnel regarding food safety compliance were strongly aligned, highlighting a well-integrated and collaborative approach to maintaining food safety protocols. These results underscore the establishments' commitment to regulatory compliance and customer satisfaction, providing insights into their readiness for higher standards such as HACCP implementation and ISO 22000:2005 certification.

Keywords: Hazard Analysis Critical Control Point System (HACCP), Food Establishment, Food Safety Procedure, ISO 2200:2005, Lapu-Lapu City.

1. Introduction

Food is considered the basic need to sustain life and nourish the body. It is also one of the most critical factors in alleviating hunger, which is why the food business is one of the largest industries in the world right now. Addressing hidden hunger, which affects over two billion people, requires integrated approaches that combine sustainable agriculture with improved diet diversity and livelihoods (Burchi et al., 2011).

The food industry can play a significant role by investing in agriculture, supporting food fortification, and developing low-cost nutritious foods. Collaboration between private and public sectors is crucial for long-term solutions (Yach et al., 2010). Foodservice is generally used to broadly represent the word restaurant, which encompasses all sorts of public and private locations that provide food for sale. According to Barrows et al. (2012), the word restaurant covers a broad range of food service operations. The term comes from the French word restaurant, meaning "restorer of energy." The term was used as early as the mid-1700s

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to describe public places that offered soup and bread. Today, any public place selling prepared food for consumption on-premises or off-premises can be described as a restaurant."

Restaurant and bar services are among the most promising businesses in the world today. In fact, the restaurant business is one of the most dynamically growing types of entrepreneurial activity in the world today, with the most active development in America and the Asia-Pacific regions (Nykyforov, 2020). Many investors have ventured into this kind of business in the Philippines, and problems concerning food safety, quality, and service efficiency can be prevented by equipping the management staff with appropriate knowledge and skills in food service and quality management.

According to McSwane et al. (2000), the American food industry employs about ¼ of the nation's workforce and produces 20% of America's Gross Domestic Products (GDP). Billions of dollars' worth of food is sold yearly in America, making food a prominent part of their business and recreational activities. According to a survey by the National Restaurant Association (NRA), 54 billion meals in the United States are eaten in restaurants, schools, and work cafeterias each year; this figure shows that food safety must be monitored well with the help of government agencies and the food industry.

One of the most challenging parts of controlling food safety in the Philippines is implementing a standardized control system that must be followed by different food establishments regardless of their classification since each establishment has its standard. A study highlighted that food safety in the Philippines is assured through proper control, hygiene, and sanitation, with government bodies responsible for food safety under the Departments of Health and Agriculture (Perilla, 2003). Another study viewpoint claimed that the Philippine food system has low sustainability scores in resilience, nutrient adequacy, ecosystem stability, and safety but scores better in sociocultural wellbeing, food affordability, and waste reduction (Golloso-Gubat et al., 2024).

Perdigon et al. (2006) cited that in the European Union, all food establishments must follow the Hazard Analysis Critical Point (HACCP) system; in the United States, seafood, meat, eggs, milk, and juices must follow the HACCP system; in the Philippines, HACCP system is compulsory only for seafood exporters and meat processors under the jurisdiction of the National Meat Inspection Service. Hence, food establishments not required by the law have started implementing the structures necessary for HACCP implementation.

Control of food safety must focus on the food itself, the people involved in handling food, either as employees or customers, and the facilities, including large and small equipment. The condition of food purchased must be considered in terms of purchasing, storage, production, and when it is served to the customer. A study mentioned that shelf display, pricing, and in-store decision-making factors can influence customer purchase intentions and choices for food products in retail environments, impacting nutrition and obesity (Castro et al., 2018). On the other hand, Employee hygiene and good food handling practices are essential to a sanitation program. Contamination from a customer is more difficult to control (Hazée & Van Vaerenbergh, 2021); the design and construction of food service facilities and equipment will impact the effectiveness of the sanitation program (Marriott et al., 2018); moreover, maintenance of facilities is also critical.

Food safety is a critical concern, especially in Lapu-Lapu City, Cebu, a popular destination known for its vibrant tourism and dining industry. Ensuring that food establishments maintain high safety standards protects public health and enhances customer trust. The Hazard Analysis and Critical Control Points (HACCP) system provides a proven method for identifying and managing food safety risks. However, while many establishments aim to implement HACCP, there are challenges in fully integrating its principles into daily

operations. Achieving ISO 22000:2005 certification, an international standard for food safety management, can further elevate food establishments' credibility and performance but requires additional compliance measures and resources. Therefore, since there are many food establishments in Lapu-Lapu City in Cebu, problems with food safety may also occur.

Given the above discussions, the researchers considered the conduct of this study timely and relevant. As a proponent of food safety, the researchers of this study evaluate how food establishments in Lapu-Lapu City implement HACCP systems if these establishments comply with the standards. Also, it explores if the perception of personnel differs from that of supervisors and managers regarding food safety procedures. Moreover, the findings will help local establishments improve food safety practices and pave the way for accreditation, benefiting businesses and customers.

2. Literature Review

2.1. Food Safety Practices

The Food Safety Act of 2013, officially known as Republic Act No. 10611, was enacted on August 23, 2013, by the Senate and the House of Representatives during the Fifteenth Congress of the Republic of the Philippines. This legislation aims to strengthen the country's food safety regulatory framework to safeguard consumer health and enhance the market accessibility of locally produced foods and food products. In a study, Roberts & Roberts (2001) emphasizes that food safety is a universal concern, affecting everyone who consumes food, whether they consciously consider it or not. Safe and wholesome food encompasses a broad range of critical elements. Also, food safety practices are categorized into those directly related to food technology, such as Good Manufacturing Practice (GMP), and those indirectly related, like Good Research Practice (GRP) and Good Educational Practice (GEP) (Raspor, 2008). Therefore, these practices are crucial in maintaining food safety throughout the supply chain.

From a nutritional perspective, food provides essential nutrients that sustain human health and contribute to the prevention of chronic diseases, supporting well-being throughout life. From a safety perspective, it ensures that food is free from harmful substances such as toxins, pesticides, chemical and physical contaminants, and microbiological pathogens like bacteria and viruses that have the potential to cause illness. Food packaging can transfer harmful materials into foods, posing a risk to food safety and human health (Alamri et al., 2021). Furthermore, Kleter et al. (2009) indicated that establishing databases for contaminants and proactive reconnaissance can help prevent and identify hazardous substances in foods, enhancing food safety.

2.2. ISO 9001:2000 International Organization for Standardization (ISO)

ISO aims to promote the development of standardization and related world activities to facilitate the international exchange of goods and services and develop cooperation in intellectual, scientific, technological, and economic activity. Vanichchinchai (2022) expressed that ISO 9001 certification significantly improves lean manufacturing and supply chain relationships but has insignificant impacts on production, purchasing, and distribution. One reason to implement and certify ISO 9001:2000 is that some customers may require it. Customers recognized the value of ISO 9001:2000 certified suppliers. Additionally, some industries require companies to evaluate and audit their suppliers. The requirement to audit these suppliers is often waived for ISO 9001:2000 certified suppliers, thus saving the company money.

As the purpose of the standard implies, companies should want to implement the ISO 9001:2000 standard to improve their effectiveness and increase customer satisfaction (Moodaliyar, 2010). Improved system effectiveness and customer satisfaction typically result in greater profitability through gains in efficiency and increased sales of happy customers.

2.3. ISO 22000:2005 Food Management Systems

ISO 22000:2005 is the global standard that sets the requirements for an effective food safety management system (FSMS). ISO 22000:2005 specifies requirements for a food safety management system. An organization in the food chain must demonstrate its ability to control food safety hazards to ensure food is safe during human consumption. Achieving an ISO standard demonstrates that your company is serious about delivering quality systems through tested processes, environmental management, food management systems, and other critical related areas (Babić, 2011). Internally, ISO standards provide focus and discipline; externally, you will achieve credibility, authority, and recognition.

ISO 22000 will bring your business the following benefits: ISO 22000 will give you a comprehensive, systematic, and proactive approach to identifying food safety hazards and implementing effective control measures; the standard will make it easier for you to apply the Hazard Analysis and Critical Control Points (HACCP) principles; comply with current food safety standards across different continents; ISO 22000 will help to document all techniques, methods and procedures in a thoroughly systematic way; Increase traceability, efficiency and resourcefulness in the food chain; this standard will enable you to participate in ample scale food; chains around the world; and ensure that your supply chain is secure to meet growing food requirements.

2.4. Hazard Analysis and Critical Control Points (HACCP)

The HACCP system is a system developed to implement effective control of a food product. As per Early (1997), HACCP is a preventive approach to food safety management, giving food manufacturers greater confidence in consumer safety, compliance with legislation, and the ability to improve food safety control.

Perdigon et al. (2006) state that HACCP focuses on potentially hazardous foods (HPF) and how they are handled. Potentially hazardous foods could support rapid and progressive growth of infectious and toxin-producing micro-organisms. The University of Rhode Island added that implementing the HACCP system in an inflight kitchen provides the manager with a systematic means of looking at all parts of the food production and service system to assess potential hazards. It also enables kitchen management to systematically determine the critical control points to prevent problems and monitor those points once they have been identified. Perdigon et al. (2006) added that HACCP is a proven system. Properly applied, it will give confidence that the safety of food produced or served in the establishment is effectively managed. In implementing the HACCP system, all personnel, from top management to the kitchen aid, are involved and focused on producing safe food. Furthermore, successful HACCP implementation depends on the competency of people, prerequisite programs, and internal belief in the approach, with training and education crucial for effective implementation and maintenance (Mortimore, 2001).

3. Methods

This study utilized a descriptive-correlational method of research. It is the most appropriate method because, as Calderon & Gonzales (1993) indicated, “descriptive research is a purposive process of gathering, analyzing, classifying, and tabulating data about prevailing

conditions, practices, beliefs, processes, trends, and cause-effect relationships and then making an adequate and accurate interpretation about such data with or without the aid of statistical methods. Furthermore, Baquilid (1999) added that the descriptive research method emphasizes existing conditions, practices, or phenomena that affect certain observable circumstances. Its primary objective is to effect changes or improvements in the given situation.

3.1. Research Environment

This study was conducted in Lapu-Lapu City, Cebu. Figure 3 shows the map of Lapu-Lapu City. Lapu-Lapu City is a first-class city in the province of Cebu, Philippines. The city occupies most of Mactan Island, just one-kilometer southeast of the island of Cebu. Also, it covers the whole of Olango Island, five kilometers further to the southeast, plus a few other islets. The city is linked to Mandaue City on mainland Cebu by the Mactan-Mandaue Bridge and the Marcelo Fernan Bridge.

3.2. Research Respondents

This study's respondents were the regular, contractual, or permanent personnel and managers/supervisors of the selected food establishments in Lapu-Lapu City, Cebu. Purposive sampling was adopted to select these respondents because they were chosen based on their knowledge of the desired information. Hence, their answers to the questionnaire were very reliable. The respondents were determined to use Slovin's formula. So, sampling will be adopted since the total population of this group of respondents was large, and it was difficult to interview all managers and supervisors of all food establishments.

Table 1. Key Respondents of the Study

Respondents	f	%
Personnel of Selected Food Establishments	69	72
Supervisors and Managers of Selected Food Establishments	27	28
Total	96	100

3.3. Research Instrument

The survey questionnaire was constructed for this study without a standard one. However, before its actual use, there will be a try-out to validate the relevance of the questions and to check possible misunderstandings of some terms that will be used in this study. It will be finalized based on the results of the try-out. Only one set of questionnaires was adopted in this study, and personnel and managers/supervisors answered it. The first item concerned the personnel aspects, including the personnel profile, attitude, and personal grooming and hygiene; the second dealt with the physical elements, including location, building, and facilities and equipment. These were the only items that were relevant and practical questions for both personnel and managers/supervisors.

The status of the food establishments was evaluated using the criteria (4) for Outstanding, (3) for Very Satisfactory, (2) for Satisfactory, and (1) for Not satisfactory. It is "outstanding" if the customers' wants and desires are satisfied 100%. It is "very satisfactory" if the customers' wants and desires are confident from 85% to 99%. It is "satisfactory" if the customers' wants and desires are satisfied from 75% to 84%. It is "not satisfactory" if the customers' wants and desires are satisfied below 75%.

The perception of the personnel managers and supervisors on the compliance of the existing food safety procedure will be assessed using the criteria: (4) Very Well Complied, (3)

Well Complied, (2) Complied, and (1) Least Complied. It is "very well complied" if the food and beverages served to the customers greatly satisfied them and with no problems related to food safety, it is "well complied" if it slightly satisfies customers and with no issues related to food safety, it is "complied" if customers are somewhat satisfied with the food and come up with a slight complaint about food safety issues, and it is "least complied" if customers are not happy with the food and complaints about the food relative to food safety issues.

On the other hand, the next part of the survey questionnaire explored the problems encountered in implementing the food safety procedures and to what extent they have affected the management. The effect of the problems will be measured in terms of seriousness. The seriousness of the issues will be evaluated using the criteria (4) Very Serious, (3) Serious, (2) Less Serious, and (1) Not Serious.

It is severe if the existence of the perceived problem has made the condition of the food safety procedure poor. However, it is serious if the perceived problem has only made the condition of the food safety procedure fair. On the other hand, it is less severe if, despite the existence of the perceived problem, the condition of the food safety procedures made satisfactory, and it is not severe if, despite the existence of the perceived problem, the condition of the food safety procedure is still very acceptable.

3.4. Research Procedures

The researchers will administer the survey questionnaire after the research committee approves it. In the case of the personnel, the administration of the survey questionnaire lasted until the quota was completed, but preferably only one week. However, for managers and supervisors, researchers leave the survey questionnaire and retrieve it after 2 to 3 days. While distributing the survey questionnaires, the customer who did not complete the questionnaire researcher informed the respondents that they brought home the questionnaire and that the customers gave it to the restaurant in 3 to 4 days. This option proved ineffective because of circumstances beyond the researchers' and the respondent's control; the latter will be dropped from the list of samples, and a replacement will be made.

3.5. Treatment of Data

After all the pertinent data were gathered, they were compiled, tallied, and tabulated. Then, the data were subjected to various statistical treatments to answer the questions proposed in this study. The statistical treatments included frequency determination, percentage computation, ranking, and weighted mean. The formula for computing percentage in this study will be as follows:

$$P = (F / N) \times 100$$

Where,
P= Percentage,
F= Frequency,
N = Number of cases, and
100 = Constant conversion factor.

The ranking will be determined by arranging the highest to the lowest percentages. In case of a tie, the following equation will be adopted:

$$R = (a_1 + a_2 + a_3 + \ldots + a_n) / x$$

Where:
R= Ranking,
$a_1, a_2, a_3 \ldots a_n$ = Rank number of cases with equal scores, and
x= Number of cases with equal scores.

The weighted mean will be computed using the following formula:

$$Wm = (fWp) / N$$

Where:
Wm = Weighted mean,
f = Frequency,
Wp = Weighted point, and
N = Number of cases

The Chi-square was computed using the following formula

$$X^2 = \frac{\sum(O-E)^2}{E}$$

Where:
X^2 = chi-square
O = observed frequency
E = Expected frequency

3.6. Scoring Procedure

In interpreting the weighted mean of the status of the selected food establishments, the following scales, ranges, descriptive equivalents, and qualitative interpretation were used:

Table 2. Scoring Procedure in terms of Compliance

Scale	f	Descriptive Equivalent	Qualitative Interpretation
4	3.26-4.0	Very Well Complied	It is "very well complied" if the result of the food safety procedures is 100% complied.
3	2.51-3.25	Well Complied	It is "well complied" if the result of the food safety procedures is 85%-99%.
2	1.76-2.50	Complied	It is "complied" implemented if the result of the food safety procedures is 75%-84%.
1	1.0-1.75	Least Complied	It is "least complied" if the result of the food safety procedures is below 75%.

3.7. Ethical Considerations

In this research, the researchers followed all ethical guidelines. They focused on three main ideas: respect for people, doing good, and fairness. They treated the respondents as individuals and gave them the highest protection out of respect. Also, the principle of fairness was important in this study as it aimed to distribute pretty based on what each person deserves. The study highly considered the following guidelines: (a) equal share for everyone, (b) support based on individual needs, (c) rewards based on individual effort, (d) contributions to society, and (e) achievements based on merit.

a) Risk-benefit assessment

The respondents were exposed to both risks and benefits. First and foremost, when key respondents participated in the suggested research procedure, they would likely lose time, feel apprehensive and uncomfortable, and be hesitant to determine whether to participate. They may believe that it was disruptive to their work or that it was essentially inconvenient for them. They would need adequate time to respond because some also do not like to listen to or answer

the survey; others would be willing to join but would need more time to finish the whole procedure; instead of doing it that day, they opted to finish it the next day.

b) Content, comprehension, and documentation of informed consent

A survey questionnaire was created to collect the required data for this study. This served as the foundation for the guide for conducting the data collection. It gave them enough information about the study to allow them to make informed, voluntary, and logical responses. The researchers informed them about the study's time limit and data requirements, an essential aspect of responsible research. The researchers established a data management plan at the study's outset to streamline processes related to the research's key concept. The respondents were informed about the importance of their contributions and how the data would be organized for clarity. They were educated about data collection methods to ensure a robust study design.

The respondents were aware of the commitment involved, including the time required for participation and the selection process. They understood that the study was voluntary and aimed at the main researcher's post-graduate degree, with no external funding involved. Informants were briefed on potential risks and benefits and the provision for compensation for their time. The confidentiality policy was also explained, reassuring participants that their involvement was voluntary and that they could withdraw without penalty. Researchers also provided resources for informants to voice questions, comments, or concerns about the study.

c) Authorization to access private information

The researchers took the necessary steps to obtain permission from the relevant department to access the respondent's private information. After a thorough review, this authorization was granted and discussed with the respondents before the data collection. The consent form did not allow access to private information, which must be obtained separately. As outlined in the consent, only individuals who required knowledge of the study for university purposes were permitted access to this information.

d) Confidentiality procedures

Privacy and confidentiality were strictly adhered to, preserving the study's primary information. Complete secrecy was always respected.

e) Conflict of interest

The researchers declared no conflicts of interest during the interview, and the key sources were informed that it was entirely optional.

f) Incentive or compensation

The respondents were not compensated during the data gathering. Instead, they have expressed gratitude for their participation in this research.

4. Results and Discussion

This part of the study evaluated the perceptions of the personnel and managers/supervisors regarding compliance with food safety procedures based on HACCP. There were two sets of perceptions: one for the managers/supervisors and the other for the rank-and-file employees of the selected food establishments in Lapu-Lapu City.

It very well complied if the food safety procedures of the selected food establishments in Lapu-Lapu City had extensively followed the standard food safety practices based on HACCP, it well complied if the selected food establishments followed the central standard food safety practices based on HACCP, it complies if the selected food establishments slightly followed the standard food safety practices based on HACCP, and it least complies if the selected food

establishments do not mind so much about following the standard safety procedures based on HACCP.

4.1. Purchasing and Receiving

The compliance of the food safety procedures based on HACCP was evaluated in terms of purchasing and receiving using the abovementioned criteria. The respondents identified eight food safety procedures, as shown in Table 3.

Table 3. Result of Purchasing and Receiving as Part of Food Safety Procedures from the Lens of the Respondents

Food Safety Procedures	Supervisors/ Managers		Staff		Total Average	
	Weighted Mean	Descriptive Equivalent	Weighted Mean	Descriptive Equivalent	Weighted Mean	Descriptive Equivalent
1. Purchased food from a reputable and reliable supplier who follows GMP (Good Manufacturing Processes)	3.15	Well Complied	3.46	Very Well Complied	3.30	Very Well Complied
2. Purchased food by specification	3.74	Very Well Complied	3.49	Very Well Complied	3.61	Very Well Complied
3. Purchased food in safe containers, packaging and wrapping	3.85	Very Well Complied	3.54	Very Well Complied	3.69	Very Well Complied
4. Purchased all items attentively by using five senses (sight, smell, taste, touch, and hear)	3.96	Very Well Complied	3.89	Very Well Complied	3.92	Very Well Complied
5. Always check the quality and quantity of food received	4.0	Very Well Complied	3.82	Very Well Complied	3.91	Very Well Complied
6. Checked the temperature of frozen meat, fish, and poultry upon delivery	3.23	Very Well Complied	3.25	Very Well Complied	3.24	Well Complied
7. Prepare a schedule of deliveries considering food needs available, equipment, and time of the day	4.0	Very Well Complied	3.62	Very Well Complied	3.81	Very Well Complied
8. Food received and inspected were kept in clean wrappers or containers before storage	3.78	Very Well Complied	3.74	Very Well Complied	3.87	Very Well Complied
Total	3.71	Very Well Complied	3.60	Very Well Complied	3.66	Very Well Complied

Table 4. Chi-square on the Perception of Purchasing and Receiving Food

O	E	O-E	$(O-E)^2$	$(O-E)^2/E$
168	153.28125	14.71875	216.641602	1.41336009
34	46.125	-12.125	147.015625	3.18733062
14	16.3125	-2.3125	5.34765625	0.32782567
0	0.28125	-0.28125	0.07910156	0.28125
377	391.71875	-14.71875	216.641602	0.55305395
130	117.875	12.125	147.015625	1.24721633
44	41.6875	2.3125	5.34765625	0.12827961
1	0.71875	0.28125	0.07910156	0.11005435
TOTAL	768	0		7.24837062

degrees of freedom (df) Computation	
df = (R-1)(C-1)	
df = 2-1 (4-1)	Tabular Value
df = 1(3)	df_3 = 7.82 at .05
df = 3	df_3 = 11.34 at .01

Comparing CV and TV
CV = 7.25 (Insignificant)

4.2. Storing Foods

Likewise, the compliance of the food safety procedures of the selected food establishments was evaluated in terms of storing food using the same criteria mentioned above. The respondents identified ten food safety procedures, as shown in Table 5.

Table 5. Result of Storing Foods as Part of Food Safety Procedures from the Lens of the Respondents

Food Safety Procedures	Supervisors/ Managers		Staff		Total Average	
	Weighted Mean	Descriptive Equivalent	Weighted Mean	Descriptive Equivalent	Weighted Mean	Descriptive Equivalent
1. Foods were stored in areas designated for food storage only	3.89	Well Complied	3.89	Very Well Complied	3.89	Very Well Complied
2. Store perishable items immediately in refrigerator/freezer	3.70	Very Well Complied	3.69	Very Well Complied	3.69	Very Well Complied
3. Follow the FIFO procedure (First in, First out)	4.0	Very Well Complied	3.91	Very Well Complied	3.95	Very Well Complied
4. Always check the temperature of frozen meat, fish, and poultry in the storage area	3.56	Very Well Complied	3.58	Very Well Complied	3.57	Very Well Complied
5. Always check for the damage and spoilage items in the storage area	3.92	Very Well Complied	3.73	Very Well Complied	3.82	Very Well Complied
6. Label the items in the storage area	3.70	Very Well Complied	3.56	Very Well Complied	3.63	Well Complied

(name and date purchased)						
7. Throw food in the storage that was not sold or consumed by a pre-determined date	3.67	Very Well Complied	3.46	Very Well Complied	3.56	Very Well Complied
8. keep potentially hazardous food out of the temperature danger zone (5˚C and 57˚C)	3.33	Very Well Complied	3.46	Very Well Complied	3.39	Very Well Complied
9. Keep all storage areas clean and dry	4.0	Very Well Complied	3.96	Very Well Complied	3.98	Very Well Complied
10. Store each item on the proper storage shelf	4.0	Very Well Complied	3.85	Very Well Complied	3.92	Very Well Complied
Total	3.78	Very Well Complied	3.71	Very Well Complied	3.75	Very Well Complied

Table 6. Chi-square on the Perception of Storing Food

O	E	O-E	$(O-E)^2$	$(O-E)^2/E$
223	215.605428	7.394572025	54.67969543	0.253610013
34	38.0480167	-4.048016701	16.38643922	0.430677881
12	15.782881	-3.782881002	14.31018868	0.906690526
1	0.563674322	0.436325678	0.190380098	0.337748396
542	549.394572	-7.394572025	54.67969543	0.099527185
101	96.9519833	4.048016701	16.38643922	0.169016029
44	40.217119	3.782881002	14.31018868	0.355823317
1	1.436325678	-0.436325678	0.190380098	0.132546609
TOTAL	958	1.77636E-15		2.685639956

degrees of freedom (df) Computation	
df = (R-1)(C-1)	
df = 2-1 (4-1)	Tabular Value
df = 1(3)	df_3 = 7.82 at .05
df = 3	df_3 = 11.34 at .01

Comparing CV and TV
CV = 2.68 (Insignificant)

4.3. Preparing Foods

Likewise, the compliance of food safety procedures of the selected food establishments was evaluated on the aspect of preparing food with the same criteria mentioned above. The respondents identified seven food safety procedures, as shown in Table 7.

Table 7. Result of Preparing Foods as Part of Food Safety Procedures from the Lens of the Respondents

Food Safety Procedures	Supervisors/ Managers		Staff		Total Average	
	Weighted Mean	Descriptive Equivalent	Weighted Mean	Descriptive Equivalent	Weighted Mean	Descriptive Equivalent
1. Wash hands using the proper procedures	3.66	Well Complied	3.70	Very Well Complied	3.68	Very Well Complied
2. Wash, rinse, sanitize, and dry all food-contact surfaces and equipment that will be in contact with the food	3.78	Very Well Complied	3.60	Very Well Complied	3.69	Very Well Complied
3. Train food service employees who prepare or serve food on how to wash fresh fruits and vegetables properly	3.45	Very Well Complied	3.46	Very Well Complied	3.45	Very Well Complied
4. Follow the manufacturer's instructions for the proper use of chemicals	3.78	Very Well Complied	3.49	Very Well Complied	3.63	Very Well Complied
5. Personal hygiene of the kitchen personnel/staff	4.0	Very Well Complied	3.87	Very Well Complied	3.93	Very Well Complied
6. Using suitable utensils when handling ready-to-eat foods	4.0	Very Well Complied	3.96	Very Well Complied	3.98	Well Complied
7. Follow appropriate methods of food preparation	3.92	Very Well Complied	3.91	Very Well Complied	3.91	Very Well Complied
Total	3.80	Very Well Complied	3.71	Very Well Complied	3.76	Very Well Complied

Table 8. Chi-square on the Perception of Preparing Food

O	E	O-E	$(O-E)^2$	$(O-E)^2/E$
158	148.5	9.5	90.25	0.607744108
24	31.5	-7.5	56.25	1.785714286
7	8.71875	-1.71875	2.954101563	0.338821685
0	0.28125	-0.28125	0.079101563	0.28125
370	379.5	-9.5	90.25	0.237812912
88	80.5	7.5	56.25	0.698757764
24	22.28125	1.71875	2.954101563	0.132582398
1	0.71875	0.28125	0.079101563	0.110054348
TOTAL	672	0		4.1927375

degrees of freedom (df) Computation	
df = (R-1)(C-1)	
df = 2-1 (4-1)	Tabular Value
df = 1(3)	df_3 = 7.82 at .05
df = 3	df_3 = 11.34 at .01

Comparing CV and TV
CV = 4.19 (Insignificant)

4.4. Cooking Foods

Likewise, the compliance of food safety procedures based on HACC was evaluated regarding cooking food. The respondents identified seven food safety procedures, as shown in Table 9.

Table 9. Result of Cooking Foods as Part of Food Safety Procedures from the Lens of the Respondents

Food Safety Procedures	Supervisors/ Managers		Staff		Total Average	
	Weighted Mean	Descriptive Equivalent	Weighted Mean	Descriptive Equivalent	Weighted Mean	Descriptive Equivalent
1. Using leftover foods in cooking	1.03	Least Complied	1.36	Least Complied	1.19	Least Complied
2. When cooking potentially hazardous food, the internal portion always reaches the required minimum temperature	3.63	Very Well Complied	3.33	Very Well Complied	3.48	Very Well Complied
3. Cooking stuffed meat, fish, poultry, and pasta at a minimal internal temperature (74˚C) for 15 seconds	2.89	Well Complied	3.1	Well Complied	2.99	Well Complied
4. Cooking potentially hazardous food in the microwave, such as egg, poultry, fish, and meat, at a minimum internal temperature of 74˚C.	3.22	Well Complied	3.31	Very Well Complied	3.26	Very Well Complied
5. Cooking ground meat at 68˚C for 15 seconds	3.23	Well Complied	3.67	Very Well Complied	3.45	Very Well Complied
6. Cooking fish at minimum internal temperature (63˚C) for 15 seconds	3.29	Well Complied	3.49	Very Well Complied	3.39	Very Well Complied
7. Fruit or vegetables that will be hot-held for service must be cooked at a minimum temperature of 57˚C	3.51	Very Well Complied	3.67	Very Well Complied	3.59	Very Well Complied
Total	2.97	Well Complied	3.13	Well Complied	3.05	Well Complied

Table 10. Chi-square on the Perception of Cooking Food

O	E	O-E	$(O-E)^2$	$(O-E)^2/E$
71	84.65625	-13.65625	186.4931641	2.202946198
71	59.34375	11.65625	135.8681641	2.289510927
18	21.9375	-3.9375	15.50390625	0.706730769
29	23.0625	5.9375	35.25390625	1.528624661
230	216.34375	13.65625	186.4931641	0.862022425
140	151.65625	-11.65625	135.8681641	0.89589558
60	56.0625	3.9375	15.50390625	0.276546823
53	58.9375	-5.9375	35.25390625	0.598157476
TOTAL	672	0		4.1927375

degrees of freedom (df) Computation	
df = (R-1)(C-1)	
df = 2-1 (4-1)	Tabular Value
df = 1(3)	df_3 = 7.82 at .05
df = 3	df_3 = 11.34 at .01

Comparing CV and TV
CV = 9.36 (Insignificant at 0.1)

4.5. Serving and Holding Foods

Likewise, compliance with food safety procedures based on HACCP was evaluated when serving and holding food. The respondents identified nine food safety procedures using the abovementioned criteria, as shown in Table 11.

Table 11. Result of Serving and Holding Foods as Part of Food Safety Procedures from the Lens of the Respondents

Food Safety Procedures	Supervisors/ Managers		Staff		Total Average	
	Weighted Mean	Descriptive Equivalent	Weighted Mean	Descriptive Equivalent	Weighted Mean	Descriptive Equivalent
1. Imposed strict personal hygiene practices to all personnel who handle, prepare, and serve foods to prevent food contamination	3.89	Very Well Complied	3.74	Very Well Complied	3.81	Very Well Complied
2. Consistency in serving hot food in hot and cold food in cold.	4.0	Very Well Complied	3.91	Very Well Complied	3.95	Very Well Complied
3. Always use clean and sanitized utensils for serving and separate utensils for each food.	3.96	Very Well Complied	3.80	Very Well Complied	3.88	Very Well Complied
4. Minimizing bare-hand contact with cooked or	4.0	Very Well Complied	3.91	Very Well Complied	3.95	Very Well Complied

ready-to-eat food, like handling food with tongs or gloves.						
5. Always properly handle dishes and glasses.	3.89	Very Well Complied	3.73	Very Well Complied	3.81	Very Well Complied
6. Providing food safety guidelines to consumers.	3.59	Very Well Complied	3.67	Very Well Complied	3.63	Very Well Complied
7. Using rigid, insulated containers to maintain proper temperature when delivering food off-site.	3.15	Very Well Complied	3.30	Very Well Complied	3.22	Very Well Complied
8. In holding cooked foods, always cover the food to prevent contamination	3.89	Very Well Complied	3.64	Very Well Complied	3.76	Very Well Complied
Total	3.37	Very Well Complied	3.30	Very Well Complied	3.34	Very Well Complied

Table 12. Chi-square on the Perception of Serving and Holding Food

O	E	O-E	$(O-E)^2$	$(O-E)^2/E$
189	182.25	6.75	45.5625	0.25
35	42.1875	-7.1875	51.66015625	1.224537037
18	16.59375	1.40625	1.977539063	0.119173729
1	1.96875	-0.96875	0.938476563	0.476686508
459	465.75	-6.75	45.5625	0.097826087
115	107.8125	7.1875	51.66015625	0.479166667
41	42.40625	-1.40625	1.977539063	0.046633198
6	5.03125	0.96875	0.938476563	0.186529503
TOTAL	864	0		2.880552729

degrees of freedom (df) Computation	
df = (R-1)(C-1)	
df = 2-1 (4-1)	Tabular Value
df = 1(3)	df_3 = 7.82 at .05
df = 3	df_3 = 11.34 at .01

Comparing CV and TV
CV = 2.88 (Insignificant)

4.6. Cooling Foods

Likewise, compliance with food safety procedures based on HACCP regarding cooling food was evaluated. The respondents identified four food safety procedures using the abovementioned criteria, as shown in Table 13.

Table 13. Result of Cooling Foods as Part of Food Safety Procedures from the Lens of the Respondents

Food Safety Procedures	Supervisors/ Managers		Staff		Total Average	
	Weighted Mean	Descriptive Equivalent	Weighted Mean	Descriptive Equivalent	Weighted Mean	Descriptive Equivalent
1. Follow the requirements of cooling from 57˚C to 5˚C within 2 hours and 21˚C to 5˚C in the next four hours	2.34	Complied	2.77	Well Complied	2.55	Well Complied
2. Cooling foods by cutting large items into smaller pieces.	3.11	Well Complied	3.04	Well Complied	3.07	Well Complied
3. Use a safe method for cooling food by placing containers into a sink or pot filled with ice water.	3.45	Very Well Complied	3.37	Very Well Complied	3.41	Very Well Complied
4. Using ice or ice water as an ingredient in cooling foods.	4.0	Very Well Complied	3.73	Very Well Complied	3.86	Very Well Complied
Total	3.23	Well Complied	3.23	Well Complied	3.23	Well Complied

Table 14. Chi-square on the Perception of Cooling Food

O	E	O-E	$(O-E)^2$	$(O-E)^2/E$
60	55.6875	4.3125	18.59765625	0.333964646
22	26.15625	-4.15625	17.27441406	0.660431601
16	20.8125	-4.8125	23.16015625	1.1128003
10	5.34375	4.65625	21.68066406	4.057200292
138	142.3125	-4.3125	18.59765625	0.130681818
71	66.84375	4.15625	17.27441406	0.258429757
58	53.1875	4.8125	23.16015625	0.435443596
9	13.65625	-4.65625	21.68066406	1.587600114
TOTAL	384	0		8.576552125

degrees of freedom (df) Computation	
df = (R-1)(C-1)	
df = 2-1 (4-1)	Tabular Value
df = 1(3)	df_3 = 7.82 at .05
df = 3	df_3 = 11.34 at .01

Comparing CV and TV
CV = 8.58 (Insignificant at 0.1)

4.7. Reheating Foods

Lastly, the compliance of food safety procedures based on HACCP regarding reheating food was evaluated. The respondents identified three food safety procedures using the same criteria, as shown in Table 15.

Table 15. Result of Reheating Foods as Part of Food Safety Procedures from the Lens of the Respondents

Food Safety Procedures	Supervisors/ Managers		Staff		Total Average	
	Weighted Mean	Descriptive Equivalent	Weighted Mean	Descriptive Equivalent	Weighted Mean	Descriptive Equivalent
1. Foods were reheated at an internal temperature of 74˚C for 15 seconds within 2 hours	2.15	Complied	2.13	Complied	2.14	Complied
2. Reheating leftovers and serve it to customers	1.0	Least Complied	1.07	Least Complied	1.04	Least Complied
3. Strict monitoring of required temperature in reheating	1.08	Least Complied	1.33	Least Complied	1.21	Least Complied
Total	1.41	Least Complied	1.51	Least Complied	1.46	Least Complied

Table 16. Chi-square on the Perception of Reheating Food

O	E	O-E	$(O-E)^2$	$(O-E)^2/E$
6	6.46875	-0.46875	0.219726563	0.033967391
3	5.625	-2.625	6.890625	1.225
9	8.4375	0.5625	0.31640625	0.0375
63	60.46875	2.53125	6.407226563	0.105959302
17	16.53125	0.46875	0.219726563	0.013291588
17	14.375	2.625	6.890625	0.479347826
21	21.5625	-0.5625	0.31640625	0.014673913
152	154.53125	-2.53125	6.407226563	0.041462336
TOTAL	288	0		1.951202356

degrees of freedom (df) Computation	
df = (R-1)(C-1)	
df = 2-1 (4-1)	Tabular Value
df = 1(3)	df_3 = 7.82 at .05
df = 3	df_3 = 11.34 at .01

Comparing CV and TV
CV = 1.95 (Insignificant)

4.8. Discussion

Table 3 revealed the responses of both personnel and managers/supervisors regarding purchasing and receiving practices. It can be noted that in the aspect of "always check the quality and quantity of food received" and "prepare a schedule of deliveries considering food needs of available, equipment, and time of the day," the managers/supervisors evaluate a weighted mean of 4.0 with a descriptive equivalent of "very well complied." The first two highest aspects that were evaluated by the personnel were the aspects "always check the quality and quantity of food received" with a weighted mean of 3.91 and a descriptive equivalent of "very well complied" and "food received and inspected were kept in clean wrappers or containers before storage" with weighted mean 3.87 and a descriptive equivalent of "very well complied."

It can be noted that among eight parameters, seven of them were evaluated "very well compiled. However, in the aspect "Purchased food from a reputable and reliable supplier who follows GMP (Good Manufacturing Processes)," the managers/supervisors evaluated "well complied." In contrast, the personnel evaluated the same aspect as "very well compiled. In fact, multiple studies expressed the same thought of the above-mentioned findings. During the pandemic, individuals with higher food safety concerns and better hygiene practices were likelier to not contract the virus. At the same time, purchasing behaviors were similar across infection status, as per the study of Isin et al. (2024). Also, good handling practices, such as defrosting chicken meat, time and temperature of egg cooking, and yolk point, can reduce the risk of foodborne outbreaks in chicken meat and eggs, according to Hessel et al. (2019). Furthermore, purchasing and receiving raw materials is crucial for food safety procedures, as it prevents cross-contamination and potential client and reputation loss (Ramli & Wong, 2022).

In Table 4, the computed chi-square (X2) value obtained is 7.25, less than the tabular value of 11.34 at the .01 significance level with df 3; therefore, it is insignificant. This means that the perceptions of personnel and managers/supervisors about purchasing and receiving food in selected food establishments in Lapu-Lapu City, Cebu, were almost the same. Hence, the null hypothesis was accepted. Table 6 shows that the average weighted mean in storing food resort was 3.75, with a descriptive equivalent of "very well complied." The respondents evaluated all ten parameters as "very well complied." It further reveals that the first three parameters assessed by the managers/supervisors in storing food with the highest weighted mean were "store each item on the proper storage shelf," "Keep all storage areas clean and dry," and "always check for the damage and spoilage items in the storage area." Personnel evaluated the first three highest weighted mean in the aspects "Keep all storage areas clean and dry," "Follow the FIFO procedure (First in, First out)," and "Foods were stored in areas designated for food storage only." A series of published outputs shared the same evidence, wherein one study mentioned that rigorous compliance with hygienic rules during food production, processing, transport, and storage is essential to guarantee food safety and prevent foodborne diseases (Gallo et al., 2020). Another paper expressed that sanitation is crucial for effective pest management of stored-product insects, ensuring safe food storage and reducing the likelihood of infestation before harvest (Bingham & Hagstrum, 2023). Ultimately, rigid sanitation practices in low-moisture food manufacturing and storage facilities maintain product acceptability and comply with regulatory requirements (Marriott et al., 2018).

The computed chi-square (X^2) value obtained is 2.68, as shown in Table 6, which is less than the tabular value of 11.34 at the .01 significance level with df 3; therefore, it is insignificant. This means that personnel and managers/supervisors' perceptions of food

storage in selected food establishments in Lapu-Lapu City, Cebu, were almost identical. Therefore, the null hypothesis was accepted. Table 8 reveals that the average weighted mean for preparing food was 3.76, a descriptive equivalent of "very well complied." Hence, it is shown in the table that seven out of seven parameters were evaluated "very well complied" by the respondents. Two out of seven parameters were assessed by the managers/supervisors and garnered a weighted mean of 4.0 with the descriptive equivalent of "very well complied." On the other hand, the same aspects evaluated by the personnel got the first two highest weighted mean. Significantly, the aspects were "Personal hygiene of the kitchen personnel/staff" and "Using suitable utensils when handling ready-to-eat foods." The findings implied that most food establishments in Lapu-Lapu City, Cebu, exercise outstanding food safety practices.

Malik et al. (2019) stressed that food safety is vital because it ensures that food will not cause harm to the consumer when prepared and eaten according to its intended use, protecting both human health and food businesses. Also, food safety is vital for ensuring quality and safety during all stages of food processing, preparation, and service, including harvesting, storage, and transportation (Vieira & Vieira, 1996). Furthermore, follow food safety guidelines during food preparation and cooking to reduce the risk of foodborne illness for yourself and your loved ones (Peñuela & Simonne, 2012).

The computed chi-square (X^2) value obtained is 4.19, as Table 8 reveals, which is less than the tabular value of 11.34 at the .01 significance level with df 3; therefore, it is insignificant. This means that personnel and managers/supervisors had similar perceptions of preparing food in selected food establishments in Lapu-Lapu City, Cebu. Therefore, the null hypothesis was accepted, and the alternative was rejected. Table 10 notes that the average weighted mean was 3.05, with the descriptive equivalent of "well complied." The table also shows that the parameter under "using leftover foods in cooking" was evaluated by both managers/supervisors and personnel with "less complied." This implies that most of the selected food establishments in Lapu-Lapu City, Cebu, did not use leftovers in cooking.

It can be noted that some of the evaluation results were not alike, particularly in the aspects of "cooking ground meat at 68˚C for 15 seconds" and "cooking potentially hazardous food in microwave such as egg, poultry, fish and meat in a minimum internal temperature 74˚C." The managers/supervisors rated both aspects as "well complied," while the personnel rated the same elements as "very well complied." One study indicated that inappropriate handling and storage practices can lead to cross-contamination, resulting in product integrity and safety for human consumption (Ramli & Wong, 2022). To avoid that, Ervinza et al. (2024) believed that strict management and hygiene practices and adopting food safety management systems like HACCP are crucial to mitigate risks of microbial contamination and maintain public health and consumer trust in restaurants.

In Table 10, the computed chi-square (X2) value obtained is 9.36, less than the tabular value of 11.34 at a .01 significance level with df 3. Therefore, it is insignificant. This means personnel and managers/supervisors' perceptions about preparing food in selected food establishments in Lapu-Lapu City, Cebu, were alike. Therefore, the null hypothesis was accepted. Table 12 shows that the average weighted mean was 3.34 with a descriptive equivalent of "very well complied." It can be noted in the table that one out of nine parameters resulted in a different evaluation, particularly in the aspect of "Using rigid, insulated containers capable of maintaining proper temperature when delivering food off-site." The managers/supervisors rated it as "well complied," while the personnel rated it as "very well complied."

Different studies suggest that serving and holding foods under food safety procedures is crucial to prevent cross-contamination, maintain food safety measures, and reduce the risk of

foodborne illnesses. In fact, Dudeja & Singh (2017) argued that food safety requirements in eating establishments include preparing raw materials, cooking, hot and cold holding, cooling and storing, serving and reheating leftover food, and maintaining kitchen equipment like microwaves and refrigerators. Another paper showed that food packaging materials can transfer harmful materials into foods, posing a risk to food safety and human health (Alamri et al., 2021). The computed chi-square (X^2) value obtained is 2.88, as Table 12 presents, which is less than the tabular value of 11.34 at the .01 significance level with df 3; therefore, it is insignificant. This means personnel and managers/supervisors' perceptions about serving and holding food in selected food establishments in Lapu-Lapu City, Cebu, were almost identical. Therefore, the null hypothesis was accepted.

It is noted in Table 13 that the average weighted mean was 3.23, with the descriptive equivalent of "well complied." The table also shows that in the aspect "follow the requirements of cooling from 57˚C to 5˚C within 2 hours and 21˚C to 5˚C in the next four hours," the managers/supervisors rated it as complied while the personnel rated it as "well complied." Though the respondents had different evaluations, the result was that 85%-99% complied based on the scoring table. Coorey et al. (2018) indicated that proper cooling techniques and appropriate temperatures inhibit the growth of foodborne pathogens, ensuring food safety and preventing contamination. However, one study found that many restaurants are not meeting FDA food cooling recommendations, highlighting the need for targeted training and intervention efforts to improve food safety (Brown et al., 2012). To address that, an improved food safety design for cook-chill foods, relying solely on refrigeration, can be achieved through double heating, irradiation, hydrostatic pressure, modified atmosphere packaging, low pH, salt, spices, lactate, bacteriocins, and protective cultures (Rybka-Rodgers, 2001).

In Table 14, the computed chi-square (X^2) value obtained is 8.58, less than the tabular value of 11.34 at the .01 significance level with df 3; therefore, it is insignificant. This means personnel and managers/supervisors' perceptions of cooling food in selected food establishments in Lapu-Lapu City, Cebu, were almost identical. Therefore, the null hypothesis was accepted. Table 16 notes that the average weighted mean was 1.46, with the descriptive equivalent of "least complied." The table also shows that "foods were reheated at an internal temperature of 74˚C for 15 seconds within 2 hours," all respondents agreed that the selected food establishments in Lapu-Lapu City complied with the reheating procedure.

Reheating food safely is essential since uneven cooking in microwave ovens can leave "cold spots" where harmful bacteria can survive, potentially causing foodborne illness (Stephenson, 1999). In fact, Desmarchelier et al. (1994) shared that controlling temperature and time factors during cooking and storage of food is crucial for preventing acute bacterial foodborne diseases in Malaysia.

However, a close look at the table shows that the managers/supervisors garnered only 1.08 for "Strict monitoring of required temperature in reheating" and 1.33 for the personnel. This only means that the selected food establishments in Lapu-Lapu City, Cebu, need to improve their temperature monitoring when reheating food. In Table 16, the computed chi-square (X^2) value obtained is 1.95, less than the tabular value of 11.34 at the .01 significance level with df 3; therefore, it is insignificant. This means personnel and managers/supervisors' perceptions of reheating food in selected food establishments in Lapu-Lapu City, Cebu, were almost identical. Therefore, the null hypothesis was accepted.

5. Conclusion

The results of this study reveal that the selected food establishments in Lapu-Lapu City, Cebu, achieved an 'outstanding' status, as reflected in the high satisfaction ratings provided by the respondents. This indicates that these establishments effectively meet the expectations and requirements of their stakeholders, particularly in terms of service quality and food safety standards. Additionally, the findings demonstrate a strong alignment in the perceptions of managers, supervisors, and personnel regarding compliance with food safety procedures.

This consensus underscores a well-integrated and collaborative approach to maintaining and upholding food safety standards within the establishments, reflecting their commitment to regulatory compliance and customer satisfaction. Moreover, these findings correlate with the Hazard Analysis and Critical Control Points (HACCP) system principles, as they highlight the establishments' proactive measures in identifying and managing potential safety risks, paving the way for potential alignment with ISO 22000:2005 certification.

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