

Food Safety Culture in Foodservice Operations: A Cross-sectional Survey and Cluster Analysis in Malaysia Tourist Spots

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Abstract

In the present globalization context, most organizations are dealing with increased diversification of employees and customers. In the context of food safety, the changing demographic profile of food service employees poses a challenge in managing food safety and ensuring safe food handling practices among employees. Therefore, this study aims to examine the segmentation of food safety culture based on diversity factors in food service operations by using cluster analysis. A cross-sectional study was conducted in food service operations in Malaysia's main tourism areas, and a self-administered questionnaire was delivered to 400 food handlers. A two-step cluster analysis identified three clusters based on the perceived level of organization food safety culture. Heterogeneity of diversity factors across the clusters was observed in nationality ($\chi^2=7.367$, $p=0.025$), age ($\chi^2=17.796$, $p=0.023$), and employment status ($\chi^2=13.230$, $p=0.001$). The finding characterized the respondents' organizations in cluster 1 as "experienced communicator", which is comprised of local workers (89.3%) and full-time workers (87.6%). Meanwhile, the respondents' organization was characterized as "diverse adaptor", where the workers were observed to have a high proportion of young adults group aged between 18-34 years old worker (82.6%). The respondents' organizations in Cluster 3 were characterized as "inexperienced support-seeker", which workers in this cluster were dominated by part-time workers (32.2%) and the young adult group aged between 18-24 years old (50.2%).

Keywords: Food safety culture, organizational characteristics, food handlers, foodservice operation, food tourism

Introduction

Food service establishments are one of the most visited places in every tourist spot worldwide, as tourists often seek out these places to experience the local cuisine, flavours, and

culinary culture of the destination they are visiting. However, the tourist's perception of the destination could be impacted by the uncomfortable experience of food services (Ayaz & Acar, 2020). Besides, destination choices and overall vacation experiences can be affected by food service (Lee et al., 2019). Many researchers have agreed that food service establishment is one of the platforms that foodborne disease could occur (Angelo et al., 2017; Centres for Disease Control and Prevention (CDC), 2017; Da Cunha, 2021; De Boeck et al., 2019; Greig et al., 2007; Seow et al., 2021; Taha et al., 2020; Young et al., 2014). In addition, 64% of the total reported foodborne illness outbreaks, which are associated with 489 outbreaks, were from restaurants, where most of these restaurant outbreaks, 48% occurred from establishments with sit-down dining (CDC, 2017). As food safety is an important issue for tourists and the industry at every destination, the food service establishment has been responsible for overseeing food safety at tourist destinations. Consequently, it is imperative for both the tourism and food service industries to take a more proactive approach to ensuring food safety at tourism destinations (Lee et al., 2019). Foodborne disease outbreak is associated with management failures such as inadequate planning, poor organization, and control (Griffith, 2000; Griffith et al., 2017).

It has been noted that the restaurant industry is diverse regarding its workforce (Durrani & Rajagopal, 2016). The changing demographic profile of food service employees poses a challenge in managing food safety and ensuring safe food handling practices among employees (Sneed & Strohbahn, 2008). Notable workforce challenges are contributed by multigenerational workers, diverse ethnic groups, high employee turnover, low employee literacy, and limited employee skill (Arendt et al., 2014). As a result, food service managers face insurmountable challenges in ensuring food safety among employees. Particularly, employees of diverse backgrounds pose challenges to an organization's effort to cultivate positive food safety culture.

Food safety culture has emerged as a new concept to understand food safety as it goes beyond food safety management systems, an organization's prevailing food safety culture, and the organization's internal and external environment. There is an increasing number of studies focusing on food safety culture as a measure to enhance food safety performance (Griffith et al., 2010; Powell et al., 2011; Fatimah et al., 2014; De Boeck et al., 2015; Nyarugwe et al., 2018; Jespersen et al., 2017; Manning, 2018; Nayak & Taylor, 2018; Nyarugwe, 2020; De Andrade et al., 2020). A positive food safety culture cultivated in the organization could motivate employees to adhere to good food safety practices, thereby preventing foodborne illness among tourists. Being complex organizations comprising multiple units, each with its own culture, it would be challenging to evaluate all the diverse cultures across the business. Therefore, this study aims to compare food safety culture differences based on employees' diversity factors in food service.

Methodology

Sample

This study employed the non-experimental, cross-sectional survey research design. The targeted populations in this study were food handlers and supervisors of food service operations. The term "food handler" refers to "anyone who works in a food and beverage establishment that handles food or contacts any equipment or utensils that are likely to come into contact with food, such as cutlery, plates, and bowl (Legesse et al., 2017, p.1)." Meanwhile, a food service supervisor supervises, directs

and coordinates the work of those that prepare, portion, and serve food (Mashuba, 2016). A quota sampling technique is used in the selection of food service operations. In this type of sampling, the unit analysis of the study in which food handlers and supervisors were selected from the food service operations that were categorized into micro-size, small-size and medium-size foodservice establishments in Malaysia. The sample that fits in this study will then be selected to fill this quota (Iliyasu & Etikan, 2021). A sampling list of food service operations was developed based on the operation size and selected states of the tourist region. The food service operations are listed by referring to the Ministry of Health of Malaysia on Bersih, Selamat dan Sihat (BeSS) listing and the list of TripAdvisor Malaysia.

The food service operations involved in this study are micro-size, small-size, and medium-size operations located in three selected states of tourist regions in Malaysia: Kuala Lumpur, Selangor, and Perak. These three states were selected based on the statistics of the Domestic Tourism Survey

2019 by the State. Based on the number of domestic visitors' arrivals, the selected states in this study were among the three (3) top states in the Peninsular that recorded the highest visitors' receipts in the year 2019 (Department of Statistics Malaysia, 2020). The sample size for this study was calculated using G*power 3.1.9.4 software developed by Faul et al. (2009). Overall, this study successfully sampled 400 respondents from the food service operations. The selection of the sample to participate in this study was made based on several criteria: 1) have a minimum of 1-year experience in a particular restaurant operation, 2) involved with food handling, 3) age above 18 years old, and 4) can communicate either Malay or English language.

Measurement

The survey questionnaire was designed in English language and translated into the Malay language by Coordinator of, Editing and Translation Unit from the Centre for the Advancement of Language Competence (CALC), Universiti Putra Malaysia. The questions dealing with company profiles were only answered by the owner or manager of the food service operation involved in this study. The survey questionnaire is comprised of 50 close-ended questions that consist of two (2) sections. The questionnaire is divided into two sections which demographic profile and food safety culture. The first section (Section A) was designed to obtain the respondent's demographic profile pertaining to nationality, age, gender, educational qualification attained, duration of working experience, job title, and employment status.

Next, section B was constructed to measure ten dimensions of food safety culture. A total of 42 questions were included for the ten dimensions: 1) Leadership (7 items), 2) Food safety management system (6 items), 3) Communication (5 items), 4) Accountability (4 items), 5) Environmental factors (4 items), 6) Teamwork (3 items), 7) work pressure (3 items), 8) customer perception (3 items), 9) risk awareness (3 items) and 10) home culture (3 items). Each of the items has to be rated by the respondents on a seven-point Likert scale with endpoints of strongly disagree (1) and strongly agree (7). This food safety culture measurement tool was adopted from previous studies and has been validated (Wiśniewska et al., 2019; De Boeck et al., 2015; Fatimah et al., 2014; Carter & Sarter, 2012).

Data collection method

Prior to data collection, the pre-test among experts in food safety and food handlers was conducted to validate the content of the questionnaire survey. The duration of data collection for each state took about one to two weeks to reach a targeted number of respondents through a self-administered questionnaire. The data collection was conducted through a face-to-face distribution approach. The first location for the questionnaire survey distribution was in Selangor, followed by Kuala Lumpur and Perak. Before the data collection was performed, each of the targeted food service operations was contacted to seek permission to conduct a survey and set a time and date available to participate in this survey. The contact number of food premises are gathered from the details on TripAdvisor and the restaurant's website. The researcher contacted the food premises to seek permission to conduct a survey from the restaurant's owner or manager and explain the survey's purpose. Subsequently, questionnaire surveys were distributed at mutually agreed times and dates with the food handlers.

Data Analysis

After all the questionnaires were safely returned from the respondents, a preliminary check was performed to ensure the respondents had responded to all of the questions in each section of the survey questionnaire. No missing data was identified because respondents answered completely all the questions provided. The data analysis process started with preliminary data analysis, which is data screening to examine the missing values, outliers, and normality. This study also performed descriptive statistics to analyze the participants' demographic information and the food service operations' profile.

In this study, a two-step clustering analysis was carried out using ten (10) variables (leadership, food safety management system, communication, accountability, environmental factors, teamwork, work pressure, customer focus, and home culture) to categorize participants into different clusters. The two-step clustering approach is appropriate when the number of clusters is not known in advance (Tran et al., 2019). The choice of a similarity measure and the determination of the number of clusters was based on the Log-likelihood distance and Schwarz's Bayesian information criterion (BIC), respectively. After clusters were identified within the sample, group comparisons were performed. The data were further analyzed using the Chi-square test and post hoc ANOVA analysis with Turkey correction conducted to determine any significant differences in diversity factors among the clusters with a significance of $p < 0.05$. In addition, an ANOVA test was performed to examine the differences in the element of food safety culture among the clusters. Data analysis was conducted with SPSS v.26. Descriptive analysis was used to describe the characteristics of the study sample.

Results**Profile of companies**

This section elaborates on the company profile of the food service operation that participated in this study, including state, category of industry, type of restaurants, restaurant outlet, and food quality/safety certification obtained. Table 4.6 indicates that a total of hundred (100) food service operations participated in this study, mainly from the small category (41.0 %) and from the micro category (38.0%). Most food service operations are casual dining (66.0%), and 49.0% of food service operations have another restaurant outlet. About half of the foodservice operations are not certified in any food quality and safety

certification (51.0%). However, the certified food service operations (43.0%) mainly acquired Halal Certification (32%).

Table 1: Profile of Companies (n=100)

Characteristics		Frequency (n)	Percentage (%)
Industry Category	Micro	38	38.0
	Small	41	41.0
	Medium	21	21.0
Type of restaurant	Casual dining	66	66.0
	Café	22	22.0
	Fast food restaurant	9	9.0
	Fine dining	3	3.0
Availability restaurant's outlet	Yes	49	49.0
	No	51	51.0
Availability of food quality/safety certificate	Yes	43	43.0
	No	57	57.0
Type of food safety Certification	Halal	32	32.0
	Bersih, Selamat dan Sihat (BeSS)	2	2.0
	Makanan Selamat Tanggungjawab Industri (MeSTI)	2	2.0
	Halal & Bersih, Selamat dan Sihat (BeSS)	3	3.0
	Halal & Makanan Selamat Tanggungjawab Industri (MeSTI)	4	4.0

Cluster Analysis

The two-step cluster analysis yielded three clusters (ratio of distance measures = 3.00). The number of participants in cluster 1 (n = 177), 2 (n = 132) and 3 (n = 59) are accounted for 48.1%, 35.9% and 16.0% of the whole sample, respectively. The three clusters were formed based on food handlers' responses to questions on elements of food safety culture: leadership, food safety management system, communication, accountability, environmental factors, customer perception, risk awareness, home culture, teamwork, and work pressure.

Diversity Factors of the Three Clusters

According to the Chi-square test analysis, several significant differences in demographic profile were presented across the three clusters, particularly nationality, age, job title, and employment status (mainly at a significance level < 0.05). The result reveals that cluster 1 comprised 48.1% of food handlers, characterized by Malaysian (89.3%) workers. The result observed that this cluster consisted of various generations of the age group, which ranged from young adults 18-24 years old to older adults' group >55 years old. Besides, the food handlers in this cluster were mainly full-time workers (87.65%) compared to part-time workers (12.4%).

In cluster 2, a few features were substantially different from other clusters, where this cluster reported the highest percentage of non-Malaysian food handlers (18.1%); even within the cluster, it is dominated by Malaysian workers (81.8%). The food handlers in this cluster were a mainly young adult group aged between 25-34 years old (44.7%) and showed fewer workers aged between 45-55 years old (2.3%) while no workers above 55 years old (0%). This cluster also reported a high proportion of full-time workers (85.6%) compared to part-time workers (14.45%).

Cluster 3 accounted for a mere 16.0% of food handlers, with a larger proportion of Malaysian workers (94.9%) than other clusters. This cluster was observed to have the highest proportion of food handlers from the young adult group, where half of the food handlers were aged between 18 to 24 years old (50.8%). The result reported that cluster 3 has the highest proportion of part-time workers (32.2%) compared to other clusters.

The result showed no significant differences between clusters in gender, education level, duration working in the food industry and current company, and attended food handlers training.

Table 2

Demographic profile and diversity factors of the whole sample and three clusters

Demographic Profile	Whole Sample (n=368)		Cluster						Overall	
			1 (n=177)		2 (n=132)		3 (n=59)			
	n	%	n	%	n	%	n	%	χ^2	p
**Nationality									7.367	*0.025
Malaysian	322	87.5	158	89.3	108	81.8	56	94.9		
Non-Malaysian	46	12.5	19	10.7	24	18.2	3	5.1		
*Gender									1.424	0.491
Male	195	52.9	94	53.1	66	50.0	35	59.3		
Female	173	47.1	83	46.9	66	50.0	24	40.7		
*Age									17.796	*0.023
18-24 years old	147	39.9	67	37.9	50	37.9	30	50.8		
25-34 years old	138	37.5	60	33.9	59	44.7	19	32.2		
35-44 years old	55	15.0	28	15.8	20	15.1	7	11.9		
45-55 years old	22	6.0	16	9.0	3	2.3	3	5.1		
>55 years old	6	1.6	6	3.4	0	0	0	0		
**Education Level									5.664	0.685
UPSR/PMR	31	8.4	15	8.5	9	6.8	7	11.9		
SPM/STPM	147	39.9	66	37.3	55	41.7	26	44.1		
Certificate/Diploma	107	29.1	54	30.5	36	27.3	17	28.8		
Bachelor Degree	36	9.8	20	11.3	11	8.3	5	8.4		
Other	47	12.8	22	12.4	21	15.9	4	6.8		
**Duration working in the food industry									6.122	0.410
<2 years	155	42.1	72	40.7	55	41.7	28	47.5		
3-4 years	91	24.7	40	22.6	37	28.0	14	23.7		
5-10 years	81	22.0	39	22.0	31	23.5	11	18.6		
>10 years	41	11.1	26	14.7	9	6.8	6	10.2		
Duration working in the current company									8.044	0.235
<2 years	240	65.2	116	65.5	81	61.4	43	72.9		
3-4 years	72	19.6	36	20.3	27	20.5	9	15.3		
5-10 years	33	8.9	11	6.2	18	13.6	4	6.8		
>10 years	23	6.3	14	8.0	6	4.5	3	5.0		
Job title									9.652	*0.008
Supervisor	86	23.4	52	29.4	28	21.2	6	10.2		
Food Handler	282	76.6	125	70.6	104	78.8	53	89.8		
**Employment Status									13.230	*0.001
Full time	308	83.7	155	87.6	113	85.6	40	67.8		

Part time	60	16.3	22	12.4	19	14.4	19	32.2
Attended food handler training								
Yes	288	78.3	142	80.2	103	78.0	43	72.9
No	80	21.7	35	19.8	29	22.0	16	27.1

a p from Chi square test for percentage comparison; Italic: < 0.05

b *primary dimension diversity factors and **secondary dimension of diversity factors

Cluster 1: Experienced Communicator

Food handlers in this cluster reported the most favourable scores of the entire sample on all measures. The respondents rated the highest level of food safety culture, with mean scores ranging from 6.6478 to 6.8983. The pattern of food safety culture for this cluster shows that they highly rate the element of customer focus (m=6.8983), teamwork (m=6.8475), and communication (m=6.7955). On the other hand, this cluster rated low on the elements of risk awareness (m=6.7269), accountability (m=6.7175), and work pressure (m=6.6478). Food handlers in this group rated relatively high in communication compared to the other clusters, which is not the case for other clusters.

The demographic makeup of cluster 1 is a large proportion of Malaysian workers (n=89.3%) who are mainly full-time workers (n=87.7%). Worth noting that the cluster consisted of more food handlers from older age groups, including 45-55 years olds (n= 9%) and more than 55 years olds (n=3.4%) compared to the other clusters. This profile reflects that experienced and mature workers value good communication in their workplace to ensure food safety compliance.

Cluster 2: Diverse Adaptor

Meanwhile, cluster 2 shows, in general, relatively favourable scores, albeit not so much as those in cluster 1. A high rating was reported, with the mean score of food safety culture ranging from 5.5833 to 6.2146. The elements of customer focus (m=6.3157), teamwork (m=6.2146) and leadership (m=6.1623) are the top highly rated elements in this cluster. Food handlers in cluster 2 rated lower for the elements of work pressure (m=5.5833), food safety management system (m=5.9331), and risk awareness (m=6.0126) elements. Particularly, the score measuring the food safety management system is low in relation to the other clusters.

Cluster 2 substantially differs from other clusters, where it reported the highest percentage of non-Malaysian food handlers (n=18.1%) within the cluster. The food handlers in this cluster were mainly the adult group aged between 25 and 34 years old (n=44.7%) and showed fewer workers aged between 45 and 55 years old (n=2.3%) while no workers above 55 years old (n=0%). This cluster also reported a high proportion of full-time workers (n=85.6%) compared to part-time workers (n=14.45%). This cluster profile suggests that foreign workers prefer a standard system of compliance established through organization policy and guidelines with regard to food safety.

Cluster 3: Inexperienced Support-seeker

The food handlers in this group are characterized by relatively less favourable scores on the measures, with the mean scores ranging from 4.8079 to 5.333. Similar to cluster 2, their rates are high on customer focus (m=5.3333), leadership (m=5.3220), and teamwork (m=5.2203).

In comparison to other clusters, food handlers in cluster 3 gave a low rating on the element environmental factors. The overall lowest mean scores rated by this cluster are the elements of accountability (m=5.0508), environmental factors (m=5.0085), and work pressure (m=4.8079).

A large proportion of food handlers within this cluster are from the young adult group, where half of the food handlers were aged between 18 and 24 years old (n=50.8%). Additionally, the result reported that cluster 3 has the highest proportion of part-time workers (n=32.2%) compared to other clusters. Such profile suggests these food handlers are more likely to have less experience and exposure working in many food service operations. As inexperienced workers, they expected more support from their current organization in performing jobs, including providing adequate supplies, facilities, and infrastructure to comply with food safety practices.

Table 3

Mean Values and Ranks of Food Safety Culture Elements of the Three Clusters

Element of food safety culture	Mean			Overall		Between cluster		
	Cluster 1	Cluster 2	Cluster 3	F	p	1 to 2	1 to 3	2 to 3
Leadership	6.7885 (4)	6.1623 (3)	5.3220 (2)	218.996	*0.000	*0.000	*0.000	*0.000
Food safety management system	6.7505 (6)	5.9331 (9)	5.0593 (7)	342.626	*0.000	*0.000	*0.000	*0.000
Communication	6.7955 (3)	6.1424 (4)	5.0915 (6)	357.871	*0.000	*0.000	*0.000	*0.000
Environmental Factors	6.7768 (5)	6.0379 (7)	5.0085 (9)	341.253	*0.000	*0.000	*0.000	*0.000
Risk Awareness	6.7269 (8)	6.0126 (8)	5.1186 (5)	213.381	*0.000	*0.000	*0.000	*0.000
Teamwork	6.8475 (2)	6.2146 (2)	5.2203 (3)	277.345	*0.000	*0.000	*0.000	*0.000
Work pressure	6.6478 (10)	5.5833 (10)	4.8079 (10)	230.018	*0.000	*0.000	*0.000	*0.000
Accountability	6.7175 (9)	6.1117 (5)	5.0508 (8)	282.846	*0.000	*0.000	*0.000	*0.000
Customer focus	6.8983 (1)	6.3157 (1)	5.3333 (1)	245.390	*0.000	*0.000	*0.000	*0.000
Home Culture	6.7439 (7)	6.0429 (6)	5.1695 (4)	166.476	*0.000	*0.000	*0.000	*0.000

^a ANOVA and Post-hoc ANOVA for mean comparison; *<0.05

Overall, the results indicated that diversity factors could shape employees' perception of each food safety culture element in their organization. Therefore, to enhance food safety practices, organizations should manage the diversity factors reflected in each cluster's employee profile. Specifically, an organization with a higher number of employees within cluster 1 (i.e., mainly higher in employees over 35 years old) has to strengthen customer focus and communication to maintain a strong food safety culture. Meanwhile, organizations with a higher number of employees within Cluster 2 (i.e., generally higher in foreign employees) and Cluster 3 (i.e., mostly young adult and part-time workers) could establish organizational factors, particularly regarding food safety management systems and environmental factors (i.e., workplace supports). However, in general, the industry has to combat the issue of work pressure, as this element was reported as the lowest element rated by workers across the three clusters.

Discussion

A cluster analysis was performed to identify whether meaningful subgroups can be found concerning food handlers' diversity factors. Three clusters were identified from food handlers' ratings of food safety culture from the main tourist spots in Malaysia. The first cluster, *Experienced Communicators*, consists of food handlers who are experienced and mature workers, mainly full-time, and from older age groups. They highly value communication, teamwork, and customer focus, which are reflected in their favourable scores on these aspects of food safety culture. They have relatively high scores in various measures, showcasing their commitment to food safety compliance. While the second cluster, *Diverse Adapters*, includes a diverse group of food handlers, with a substantial percentage of non-Malaysian workers, predominantly young adults. This group adapts well to teamwork, leadership, and customer focus elements of food safety culture. Their preference for standardized compliance systems reflects their adaptability to organization policies and guidelines, even though their scores are slightly lower than those in Cluster 1. *Inexperienced Support-Seekers* are food handlers in Cluster 3 who exhibit lower scores across several measures, indicating their relatively limited experience and exposure. This cluster is characterized by a significant proportion of young adults and part-time workers. Their preference for support from the organization in terms of supplies, facilities, and infrastructure suggests they might be less experienced and need more guidance and resources for food safety practices. Their ratings on environmental factors and accountability are relatively low. A past study has identified that employing workers from various ethnicities is one of the barriers food businesses face in instilling the food safety culture value in their employees. Because of the differences in traditional practices, employees of different nationalities performed food safety practices differently (Nayak & Waterson, 2017). The current study result is coherent with the previous study conducted among migrant workers within the food service sector, where the finding demonstrated the association of nationality with food handling practices and nationality factor has a significant effect on food handling practices (Woh et al., 2016). The cluster, predominantly comprised of young adult groups, has emphasized management factors such as leadership and accountability. Risk awareness was reported as favourable in comparison to the older age groups. This is consistent with the previous study, which found that younger employees (18-29 years old) reacted less positively to the risk judgment of their organization compared to older employees (50-60 years old) (Glass, 2007; Karp et al., 2002). Regarding accountability, the past study found that the younger group had higher mean scores for reward and punishment than the older employee (Arendt et al., 2014). The younger employee groups were more motivated to follow safe food-handling practices in the workplace if rewards and punishment were applied.

The current study reported that part-time workers had a less favourable perception of surrounding support (i.e., environmental factors). Previous studies have described that due to other interests or time commitments, many part-time employees consciously choose and desire to be less involved in connections with their organizations (Ferber & Waldfoegel, 1998; Fatimah et al., 2014). Ghezzi and Ayoun (2012) explained that part-time employees might fail to follow food safety practices because it is not their chosen career or they are unconcerned about following the job description's strict standards and rules. The finding of this study could describe that less attachment between the organization and part-time employees related to food safety might be because the organization felt this group of workers are less critical for their organization. Research on part-time workers has been conducted using role theory (Katz & Kahn, 1978) to determine the degree to which part-time employees are included in their

focal organization (Haines et al., 2018). Part-time workers are often considered less included than their full-time counterparts (Miller & Terborg, 1979; Thorsteinson, 2003; Haines et al., 2018). The study by Ellis et al. (2010) discovered that respondents working part-time in the food service industry strongly agreed more than those working full-time regarding the effect of communication, reward-punishment, and resources on their motivation to perform safe procedures.

This study suggests that to cultivate a positive food safety culture in the organization, the higher management in operation has to treat food safety equivalently to all employees regardless of their employment status. As such, the management must ensure that all workers, including part-time workers, receive food safety training. Besides, the operation's food safety procedure must be consistently enforced on the workers at all levels. The management also has to recognize the workers who consistently adhere to food safety practices and reward these workers regardless of their employment status. If these practices were implemented, the management could enhance the performance of part-time workers in following safe handling practices and ultimately improve food safety standards in the organization.

Conclusion

The findings of this study could be valuable for a food service organization to improve its practices, policies, and training programs related to safe food handling. They can use the insight from this study to understand how the food service industry's diverse workforce, consisting of multigenerational employees, different ethnic groups, and employment status, could influence the factors that motivate them to perform safe food handling practices. By tailoring their approaches to their diverse workforce's specific motivations and needs, organizations can enhance food safety measures and reduce the risk of foodborne incidents. In this globalization era, the food service industry has to expect an increasing number of diverse workforces. Therefore, this study could be a guideline for the food service industry in taking proactive steps to address food safety culture elements in the organization by improving aspects of food safety culture that are poorly perceived while preserving those elements that contribute positively to food safety. The goal is to ensure consistent and effective food safety practices across different generations and ethnicities within the foodservice industry. It is important to note that this study is a pioneering study that holds theoretical significance by expanding the understanding of food safety culture in the context of food service operations in a tourist region by adding depth in examining the segmentation of food safety culture based on diversity factors in food service operations.

This study focused on the food service operations located in the tourist destination in Malaysia. However, the food service operations involved in this study were only selected in the peninsular region of Malaysia (Selangor, Kuala Lumpur and Perak), which these states were among the five (5) top states that recorded the highest visitors' receipts in 2019. Nevertheless, the result presented in this study might be limited to food handlers working in the selected settings. It would be interesting if future studies could advance the research by discovering other tourist region area, including non-peninsular Malaysia (Sabah and Sarawak) and the other tourist region in peninsular Malaysia that was recorded as the most visited states in 2020, such as Pulau Pinang, Kedah and Negeri Sembilan (Department of Statistic Malaysia, 2021). The compilation of data from several

states of tourist regions can be considered in future studies to identify differences in food safety culture elements perceived in the food service establishment. The finding would assist the food service industry and tourism sectors in gaining a better understanding of the behaviour of food handlers in operations that portray health risks to consumers.

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