



Migrant Food Handlers' Impacts on Food Quality and Safety in Malaysia Food Service Industry

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ABSTRACT

This study aims to empirically examine the migrant food handlers' perceived knowledge, skills, and attitudes and their impact on food quality and safety in the context of Malaysia's foodservice industry. Using the data gathered from 198 supervisors and managers from food premises in Malaysia and analysis using SPSS (version 20) and SmartPLS 3.0 software, this research found that migrant food handlers have moderate perceived knowledge, skills and attitudes in food handling practices impact the food quality and safety. Specifically, this study confirmed that knowledge and attitudes positively and significantly affect food quality and food safety. However, insignificant results were found between skills and food safety, even though it showed a substantial impact on food quality. The findings are original and unique. It is one of the first studies to investigate the knowledge, skills, and attitude of migrant food handlers their effect on food quality and food safety, especially in Malaysia. Besides, this study extends the established theories from the literature on knowledge, skills and attitudes analysing in the foodservice sector. Therefore, this research finding is valuable for food services practitioners to focus on enhancing food quality and safety through the migrant workforce.

JEL Classification: L66, P23

Keywords: Migrant workers; Knowledge; Skill and attitudes (KSAs); Food quality; Food safety

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INTRODUCTION

The incidences of food and waterborne diseases (i.e. Cholera, Dysentery, food poisoning, Hepatitis A, and Typhoid) drive consumers' more significant demand for better food quality and safety (Gruenfeldova et al., 2019). The recent food poisoning attack on 16 Malaysian SEA Games athletes has even agonised the public, hence sparked doubts on the country's food supply chain transparency (Ali et al., 2017; Chuah et al., 2016; Woh et al., 2016). Addressing food quality and safety issues is a complex and daunting task due to the high involvement of people along the food processing chains, thus complicating the regulations' compliance. Managing human resources in the food sector has always been challenging, specifically in retaining capable and competent workers; due to the high turnover rate in the industry (Soomro et al., 2021). The challenges have intensified with the escalating demands in the foodservice sector due to the COVID-19 pandemic and its restrictions. The clash between these demands and the workforce shortage in the country's foodservice industry has eventually led to the Government's decision to accept migrant labours into the industry. Hiring migrant labours aims to overcome the human resources shortage caused by locals' unwillingness to fill this 5D (Dirty, Demeaning, Dangerous, Demanding and Difficult) jobs (Woh et al., 2016). According to Zaleha et al. (2011) foreign labour has significantly impact on the productivity which that meant the government need times to reduce the dependency on foreign workers. Whilst recruiting migrant labours may be the solution to the foodservice industry, the employment of these unskilled migrant labours as cooks specifically has posed significant concerns among the consumers regarding their questionable competencies. Exacerbating that, problems surrounding the migrant labours also may harm the safety and quality of the food produced (Bernama, 2016; Cheng, 2017; Mucci et al., 2019; Woh et al., 2016).

To ensure that these migrant workers are deemed fit to work in the foodservice industry, a few mechanisms and regulations have been implemented by the Malaysian Government, such as Malaysia Halal Food Standards (MS 1500:2009) and the 1983 Food Act 1985 food Regulation. For instance, MS 1500:2009 emphasises the utmost hygienic and safe way in food preparation, handling, and storage (Viverita and Ratih, 2017; Mohamed et al., 2016; Othman et al., 2016). In addition to that, under the 1983 Food Act and 1985 food Regulation, the workers are required to undergo a food handling training program as a platform for them to gain a better understanding of food safety aspects (Masyita et al., 2017; Ministry of Health (MOH), 2019). This is in line with the suggestions given by Taha et al. (2020) and Haslinda et al. (2014), which pointed up the significant role of food safety knowledge and training among food handlers to ensure safety and quality in food produced. However, uncertainty about migrant food handlers' competencies is still eminent despite all the regulations. A statistic from Human Resources Development Fund (HRDF) (2018) shows a decreasing rate of trained workers in the food and beverage services sector. This situation is perplexing, especially with the rising demands in the industry.

Literature has continuously debated on the topics of migrant labours as the potential reservoirs of infection and foodborne disease (Woh et al., 2017). Among issues being highlighted is that some of the workers are illegal and have skipped the health screening process upon arrival to the country, leading to disease transmission to the non-immune local population (El-Bassel et al., 2016; Osman et al., 2020). Sibanyoni et al. (2017) accentuated the growing concerns on food handlers' knowledge and skills for the following reasons: (a) food handlers play a significant role in the transmission of different diseases (Woh et al., 2017) (b) food safety and quality now are a significant concern around the globe (c) poor levels of food safety knowledge, linking to various diseases triggered the feeling of uncertainty among consumers. In addition, Gruenfeldova et al. (2019) stated that the statistics of mortalities due to foodborne diseases had been reported to approximately 5000 in a year. This figure escalates with many current studies supporting a lack of knowledge among food handlers.

Even within the specialist literature on the factors contributing to food quality and safety, most previous studies have only focused on specific groups such as youth and local food handlers (Suhaila et al., 2022; Low et al., 2016; Marmaya et al., 2019; Xiao et al., 2018). Also, limited findings were observed on food industry context as previous literature were narrowed on the issues of economic impact, mental health, workplace accident and health-related problem (e.g. Adhikary et al., 2019; Aryal et al., 2019; Noor and Shaker, 2017; Sahimin et al., 2016) and merely concentrated on construction and manufacturing sectors (e.g. Adhikary et al., 2019; Haque and Ghani, 2020). This paper extends the research on the notion of food quality and safety. It examines the significant impact of KSAs (Knowledge, Skill, and Attitudes) on food quality and safety and

scrutinises it thoroughly on migrant food handlers in the food industry context. In a nutshell, this study aims to:

- investigate the effect of migrant food handlers' knowledge, skills and attitudes on the food quality and food safety produced, and
- empirically test the relationships between KSAs, food quality and safety within the food industry context.

In this research, the literature on the elaboration of KSAs (Knowledge, Skill and Attitudes) and two central notions of food studied, namely, food quality and food safety, were scrutinised thoroughly. This research explained the significance of knowledge, skills, and attitudes among food handlers, specifically with the vast intake of low-skilled migrants as food handlers in Malaysia's food industry. The research model and hypotheses are outlined in the next section. The model was tested with data from the supervisors or managers of the food premises who hire migrant labours as food handlers in the foodservice sector, using structural equation modelling with *SmartPLS* to disclose the relationships between (KSAs), food quality and safety. The outcomes reviewed about the theoretical and managerial implications are recommended for future investigation.

THE RESEARCH MODEL: DEFINITION OF KEY CONCEPTS AND HYPOTHESES

The literature has reported mixed findings concerning the topic of knowledge, skills and attitudes on food quality and safety. For instance, a study by Saudi et al. (2017) found contradicted results to the findings by Abdul-Mutalib et al. (2015) as no correlations were found between knowledge, attitude and practice. Moreover, Woh et al. (2016) highlighted that the workers generally have a poor understanding of food safety and an average level for food handling practices. Meanwhile, Lee et al. (2017) pointed out that the workers had moderate levels of food safety knowledge, yet an acceptable level of attitude and practices. The implementation of the KAP model in the studies may be the source of the contradicted results, as Husain et al. (2016) has been highlighting the limitations and obsolescence of the model. Therefore, this research aims to overcome the limitations of previous studies by exercising the Knowledge, Attitude and Skills (KSAs) assessment.

The present research has also been informed by Boyatzis's theory and performance theory. Accordingly, Boyatzis' Theory has been widely applied in the Human Resources field in an attempt to assess workers' competency (e.g. Bharwani, and Talib, 2017; Ratnawat, 2018). It suggests that any individual characteristics that can be measured and as well as be used to differentiate between excellent and low performances include skills, values, and attitudes. According to Boyatzis (1982), the concept of competency is underpinned by the theory of performance. Outstanding performance is expected to yield consistent results between employees' capability, job demands, and organisational environment. In the context of this research, we modelled the levels of perceived knowledge, skills, and attitudes (KSAs) of migrant labours as food handlers on two food criteria, namely, food quality and food safety. Figure 1 depicts the research model of the study. The research framework (as illustrated in Figure 1 below) consists of six hypotheses to be assessed, including knowledge, skills, and attitudes of the migrant food handlers as the independent variables, whilst food quality and food safety are the dependent variables.

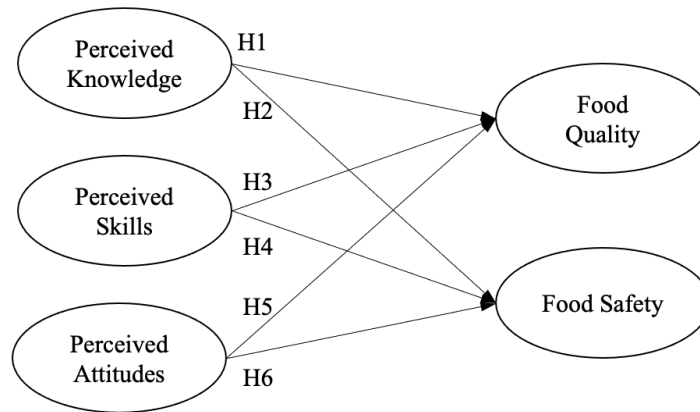


Figure 1 The Research framework

The importance of knowledge, skills, and attitudes (KSAs) of migrant food handlers

Food handlers' knowledge, skills, and attitudes are crucial in determining the food end-product (Gruenfeldova et al., 2019; Habiballah et al., 2018; Saad et al., 2018; Woh et al., 2017, 2016). Among issues that are being correlated to this group are their educational level, training inadequacy, language barrier, health status and qualification, which all could hinder the production of safe food with quality. Scholars have come to a consensus about the importance of migrant food handlers in possessing required KSAs to ensure food quality and safety. For instance, great studies have emphasised food safety training and education for food handlers (e.g. Griffith et al., 2017; Taha et al., 2020). However, in the context of food quality and safety determinants, mixed findings have been reported as scholars in the field concluded contradictory results on the impact of knowledge and attitudes of migrant food handlers on food safety (Kuo and Weng, 2021). Some studies found weak to moderate the effect of knowledge and attitude of migrant food handlers on food safety (Al-Kandari et al., 2019; Odeyemi et al., 2019; Osei Tutu and Anfu, 2019) when others discovered a direct effect (Bou-Mitri et al., 2018; Kuo and Weng, 2021; Sayuti et al., 2020).

In light of this, the educational level of food handlers will significantly determine their level of knowledge on food safety practices (Bou-Mitri et al., 2018). Suhaila et al. (2022) and Thanh (2015) proved that through education, food handlers' attitudes towards food safety and hygiene and foodborne illnesses would be improvised via knowledge acquisition. Consequently, having good knowledge would shape positive food handling practices (Hui et al., 2017). This is in line with Woh et al. (2017) and Zanin et al. (2017), which found that migrant labours with better educational backgrounds demonstrate better knowledge and attitudes on food handling practices than those with no academic experience. However, recent studies revealed that most of the migrant food handlers employed have a low level of education (e.g., Woh et al., 2016) as 89.5% of them have an educational group with no more than secondary school and show insufficient knowledge in food handling practices. Eventually, hiring low-skilled migrant food handlers with poor academic qualifications would significantly impact food safety and quality.

Other than that, different spoken languages may also hinder acquiring knowledge due to the low comprehension of our native and second languages, Malay and English, respectively (Tenzer et al., 2021). This is supported by Woh et al. (2016), indicating language barrier is linked to poor knowledge acquisition, and migrants with a better understanding of the Malay or English language are expected to acquire knowledge better. Therefore, although migrant labours are aware of their work responsibilities, they could misunderstand the given instructions, impeding their adaptation process (Kabir, 2016). Nonetheless, even though foreign workers are originated from different countries with a distinct culture of their own and speak diverse languages, they are expected to adapt quickly and mitigate the dissimilarities by learning the local language and adapting to local cultures and behaviours (Itani et al., 2015; Tenzer et al., 2021).

Next, another disturbing issue encircling migrant food handlers is their health perspective (Adhikary et al., 2019; Sadarangani et al., 2017). Migrant labours are disclosed as the source of diseases such as Tuberculosis, Malaria, Hepatitis, and AIDS, which may either be brought from their home countries or any illegal activities are done, such as prostitution, to compensate for their low earnings (Ahmed et al., 2020; Manjunath et al., 2019). Even though it is compulsory for every migrant employed to undergo a mandatory health screening test upon their arrival to the country, there are still numbers of illegal migrants who refuse to

obey the rule (El-Bassel et al., 2016; Osman et al., 2020). As evidence, Woh et al. (2016) highlighted alarming findings that fewer than 10% of the respondents went for health checks every six months. Other than that, the issues of overcrowding and lack of hygiene in the migrants' accommodation are worth being concerned about as they will impose a significant impact on their health (Karim et al., 2015). Therefore, procedures of medical examination by the Foreign Workers' Medical Examination Monitoring Agency (FOMEMA) shall be followed. Any foreign workers who are certified as unfit shall be repatriated to their respective home countries immediately, and only those certified fit is qualified to be employed (Dan et al., 2020; Dollah and Abdullah, 2018).

Food quality and safety

Food quality is one of the key elements that consumers always seek to satisfy their palate and choose the best eating place to dine in (Emond and Taylor, 2018). Food quality has become more significant in today's world with the sudden increases in demand in online food ordering due to the Covid-19 pandemic (Poelman et al., 2021; Polkowska, 2021; Yuchen, 2020). According to Xiao et al. (2018), there are several determinants of food quality worth pointing up by food makers, including nutrition, menu variety, menu design, serving size, food presentation, and tastiness of the food. In a similar vein, Yuchen (2020) stated that food quality is highly associated with customers' satisfaction, loyalty, purchase intention and repurchase intention.

On the other hand, the increase of foodborne illnesses reported worldwide has resulted in an awareness of food production cleanliness. Now, food safety is regarded as a top priority among consumers. Previous literature (e.g., Kuo and Weng, 2021; Sayuti et al., 2020) highlighted food safety is in jeopardy due to cross-contamination and food mishandling that causing exposure of microbial contamination through the food handlers' hands, mouths, and skins (Bou-Mitri et al., 2018; Griffith et al., 2017; Sahimin et al., 2020). In line with this, Sayuti et al. (2020) and Valero et al. (2016) emphasised the importance of installing good hygiene practices and handling to ensure food safety. Hence, to overcome the issue of foodborne illnesses, food industry players must adhere to the food safety standard outlined by the Government by providing food handlers with adequate food handling training. According to Emond and Taylor (2018), poor food safety knowledge is a significant factor associated with cross-contamination. Similarly, Low et al. (2016) stressed that food handlers' low awareness of food safety measures should be concern. As the food handlers take a leading role in ensuring food safety along the food chain process (Smigic et al., 2016), the migrant food handlers need to possess the required knowledge, skills, and attitudes (KSAs) in food handling practices to ensure food safety.

The relationship between knowledge of migrant food handlers in food handling as perceived by their managers and its impact on food quality and food safety

The majority of the migrant labours employed are classified as low and mid-skilled labours as they are proven to have a low level of education with no more than secondary school (Woh et al., 2016; World Bank, 2015). Despite the food safety training given to these migrant food handlers, a significant number of them still showed poor levels of food safety knowledge, linking it to various factors such as poor attendance during the training and low educational levels (Salleh et al., 2012; Woh et al., 2016). This alarming state summons for attention as Habiballah et al. (2018) affirmed that education and training inadequacy are the primary grounds for foodborne outbreaks, thus affecting food quality and safety. Numerous earlier studies conducted in different countries (e.g., Gruenfeldova et al., 2019; Taha et al., 2020) have also highlighted the issues of migrant food handlers' shortfall in the knowledge of food handling from across the world. Meanwhile, in Malaysia, Woh et al. (2016) discovered that their employers gave only a small number of the food handlers hired food handling training. Rahman et al. (2016) clearly emphasised the crucial role of knowledge among food handlers and mentioned it as a prerequisite for hygiene practices which helps in boosting workers' confidence. Therefore, to ensure these migrant food handlers acquire targeted performance, employers must calibrate the workers' knowledge, hence making them competent (Batista et al., 2020). Knowledge is an essential ingredient to produce food with quality and safety. Thus this creates an urgency to examine the state of knowledge of the migrant food handlers in food handling as perceived by their managers; therefore, the following hypotheses are proposed:

H1: There is a positive relationship between knowledge of migrant food handlers in food handling as perceived by their managers and food quality produced.

H2: There is a positive relationship between knowledge of migrant food handlers in food handling as perceived by their managers and food safety produced.

The relationship between skills of migrant food handlers in food handling as perceived by their managers and its impact on food quality and food safety

Skills are regarded as a significant factor behind spectacular job performances, and it can be identified through three basics of skills: technical skills, human skills, and conceptual skills (Boyatzis, 1982; McIver and Wang, 2016; Shet et al., 2019). In terms of cooking skills, Surgenor et al. (2017) emphasised that basic knowledge, skill and experience are essential elements to enable the cooks to have the confidence to handle the food. However, according to Warde (2017), food premises are often loaded with unskilled migrant labours even when the jobs require various skills. Due to that, low quality of work has long been associated with migrant labour (Wright and Clibborn, 2019). In line with that, to guarantee the quality of food produced, Mohani et al. (2017) and Fordyce-Voorham (2017) pointed out the importance of food handlers having the required skills from before-meal preparation to serving the meal and after-meal cleaning up. Concerns for the quality of the food produced by the low-skilled migrant cooks is also raised by locals on the taste dissimilarities between migrant cooks' with local consumers' expectations as they lack the skills and expertise to meet the consumer's expectations (Cheng, 2017). Apart from that, literature has also highlighted that inadequate skills in food handling may ensue unsafe food handling (e.g. Habiballah et al., 2018; Manning, 2018; Sibanyoni et al., 2017), hence leading to food contamination. Following this, food safety assurance greatly depends on skilled food handlers, and there is a need for employers to nurture required skills in existing workers (Chakrabarti and Chatterjea, 2017). In detail, there is a need to examine the state of perceived skills of the migrant food handlers towards food quality and food safety; hence this study hypothesised that:

H3: There is a positive relationship between the skill of migrant food handlers in food handling as perceived by their managers and food quality produced.

H4: There is a positive relationship between the skill of migrant food handlers in food handling as perceived by their managers and food safety produced.

The relationship between attitudes of migrant food handlers in food handling as perceived by their managers and its impact on food quality and food safety

Since food handlers' beliefs and norms encapsulate the effectiveness of food safety and quality, their attitudes toward creating positive food culture are required to improve food safety (Taha et al., 2019). Howe and Krosnick (2017) elaborated on the importance of attitude on how it impacts a person's action by attaching importance to a certain attitude. For instance, one will always consider food quality if they view that maintaining good hygiene while preparing food is personally significant. Respectively, having favourable attitudes towards food quality will lead to excellent food safety practices (Kunadu et al., 2016). In short, the definition of competent worker is said to comply when the person displays behaviours compliant to the requirement of the job position. A Myriad of studies has been carried out on assessing the attitudes of food handlers as they are the significant risk factor of foodborne diseases (e.g. Griffith et al., 2017; Husain et al., 2016; Odeyemi, 2016; Taha et al., 2019; Teh et al., 2016). Furthermore, according to Naeem et al. (2018), food handlers with poor food safety cultures often neglect their responsibility to provide safe-to-eat food to their customers. However, with the hiring of these low-educated migrant food handlers, their awareness of food safety is worth being concerned about. This study, in general, purported a positive connotation between the attitude of migrant food handlers in food handling and its impact on the food quality and safety aspect. Therefore, the following hypotheses are proposed:

H5: There is a positive relationship between the attitude of migrant food handlers in food handling as perceived by their managers and food quality produced.

H6: There is a positive relationship between the attitude of migrant food handlers in food handling as perceived by their managers and food safety produced.

EMPIRICAL STUDY

This research is being carried out in Malaysia as the influx of foreign workers operating food stalls and restaurants has created a feeling of scepticism and doubts among Malaysians. Consumers are significantly concerned about their food quality and safety as migrant labours are seen as potential reservoirs of infection. Likewise, low-skilled and less-than-healthy foreign workers, labour shortage, poor levels of food safety knowledge and the number of overstaying illegal foreigners have all raised concerns among locals (Bernama, 2016; Gruenfeldova et al., 2019; Saad et al., 2018; Woh et al., 2017). Based on the recent data from Malaysia's Ministry of Home Affairs Malaysia (MOHA) (2015), the majority of migrant labours employed are originated from Indonesia, followed by Nepal and other neighbouring countries such as Bangladesh, Myanmar, India, Vietnam, Cambodia, Philippines, Pakistan, China, Thailand, Sri Lanka, and Laos. Despite some measures taken by many food operators in ensuring food quality and safety, which are facilitated under: (1) Section 34 of the Food Act 1983 (Act 281), (2) Food Hygiene Regulations 2009, (3) Good Manufacturing Practices (GMP), (4) Good Hygiene Practices (GHP), (5) International Organisation for Standardisation (ISO) 9001, (6) Sanitation Standard Operating Procedures (SOP), (7) Hazard Analysis Critical Control Point (HACCP), and (8) Total Quality Management (TQM) (Ahmad et al., 2017), many literature has been discussing on similar contention, hence resulting mixed findings. Furthermore, recent cases indicate that the situation is still unresolved and more investigation on different contexts is required.

Survey instrument development and deployment

In designing a reliable measurement instrument for this paper, this study used a quantitative data collection method by distributing a structured survey questionnaire to the managers and supervisors of the migrant food handlers from food premises located in Peninsular Malaysia. The measurement items were adapted from previous research, as shown in Table 1. A pre-test was conducted with ten experts among academicians and practitioners in the food premises business to ensure content validity. In total, 37 questionnaire items were developed for this study and respondents were instructed to respond to their degree of agreement to all the closed-response statements accordingly, using a five-point Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree for independent variable constructs (e.g. Knowledge, Skills and Attitudes) and a seven-point Likert scale ranging from 1 = Far Worse Than to 7 = Better Worse Than were used for dependent variables (e.g., Food Quality and Food Safety). Since this research is carried out in Malaysia's food industry, the questionnaire is translated into our native language, Malay, to help the respondents understand the questions clearly, enhancing response rates (Ahlmark et al., 2015). The translation is done carefully and assessed by academicians to verify that all items accurately reflect the original meaning.

Table 1 Measurement Model

Section	Topic	Source	Number of Questions
Section A	Knowledge	Abdul-Mutalib et al. (2012); Woh et al. (2016); WHO (2015)	8
Section B	Skills	Fordyce-Voorham (2017); McGill et al. (2015); Sibanyoni et al. (2017)	5
Section C	Attitudes	Liu et al. (2015); Odeyemi (2016); WHO (2015); Young et al. (2019)	7
Section D	Food Quality	Chamhuri and Batt (2015); Tan et al. (2017)	4
Section E	Food Safety	Dudeja et al. (2017); Fernando et al. (2014)	6
Section F	Demographic Details	n/a	7

Data Collection

This study aims to determine the perspective of the superiors of the migrant food handlers regarding their workers' knowledge, skills and attitudes (KSAs) in food handling practices and its impacts on the quality and safety of the food produced. Therefore, the unit of analysis of this study was the food premises that hired migrant food handlers, supervisors, and managers were the targeted respondents for the survey. The study samples were carefully selected from a list of Halal certified premises obtained from Halal Hub Division, Department of Islamic Development Malaysia (JAKIM). According to Khan and Lakshmi (2018), supervisors are the most common source of employee performance information; therefore, selecting the workers' superiors as respondents would be the best way to achieve reliable research questions. In sum, a total of 198 out of 250 survey questionnaires sent were received, yielding a return rate of 79.2 per cent.

RESULT

SmartPLS package 3.0, a component-based structural equation modelling (SEM) technique, tests the hypotheses. The PLS-SEM technique is selected for two main reasons: Firstly, it would be more suitable in the early stages of the investigation, considering the exploratory character of the study and interest in identifying potential relationships between variables and secondly, PLS-SEM provides more accurate results for small-sampled studies (Henseler et al., 2015a). Correspondingly, SPSS (version 20) and SmartPLS software were also used to analyse all respondents' demographic data (see Table 2) and were presented as frequency values and percentages. This study applies a reflective measurement model as the indicator works as a representative sample of all possible items representing the construct.

Table 2 Summary of Demographic Characteristics

Demographic characteristics	Percentage of sample
<i>Position of respondents</i>	
Manager	39.4
Supervisor	60.6
<i>Years of Service of Respondents</i>	
Less than a year	18.7
More than a year	81.3
<i>Country of Origins of Migrant Food Handlers</i>	
Bangladesh	24.2
India	3.5
Indonesia	53.5
Myanmar	4.4
Nepal	4.5
Others (China)	0.5
Pakistan	2.5
Thailand	20.7
Vietnam	0.5
<i>The religion of Migrant Food Handlers</i>	
Muslims	83.8
Non-Muslims	5.1
Both	11.1
<i>Educational Level of Migrant Food Handlers</i>	
Primary School	17.7
Secondary School	36.9
University	14.1
No School	7.6
Unknown	27.8
<i>Food Handling Training for Migrant Food Handlers</i>	
Yes	76.8
No	16.2
Unknown	7.1
<i>Total Migrant Food Handlers in Premise</i>	
< 5	78.3
5 - 10	16.7
> 10	5.1
<i>Years of Service of Migrant Food Handlers</i>	
< 1 year	38.4
> 1 year	61.6

Reliability and validity (measurement model)

Discriminant validity is shown in Table 3, where the square root of the AVE value is the highest diagonal construct.

Table 3 Discriminant validity

	1	2	3	4
1 Attitudes				
2 Food Quality	0.8307			
3 Food Safety	0.8863	0.8156		
4 Knowledge	0.7742	0.8028	0.877	
5 Skills	0.8875	0.6604	0.9177	0.823

The measurement model of the study summarised in Table 4 below shows all composite reliability values that exceed the recommended value of 0.71 (Hair et al., 2017a) were retained as it indicated internal consistency reliability. Other than that, based on the findings shown, all five constructs meet the threshold values and minimum cut-off values for CR and AVE, in which all CRs are more significant than 0.7, and all AVEs are greater than 0.5 after the process of item deletion (Hair et al., 2017a). Thus, it is concluded that the constructs meet this stage's reliability and convergent validity requirement. Meanwhile, Table 4 shows the HTMT criterion used to assess the discriminant validity, and as shown, there is one value that does not fulfil the suggested threshold, which is 0.85 and 0.90 (Gold et al., 2001; Kline, 2011), however, the result of HTMT inference analysis shows that the confidence interval does not offer any value of 1 on any of the constructs (Henseler et al., 2015), which confirms discriminant validity. Besides that, before evaluating the structural model, it is essential to ensure no lateral collinearity issue in the structural model. Table 5 shows that all the inner VIF values for the independent variables (Knowledge, Skills, and Attitudes) are less than 5, indicating lateral multicollinearity is not a concern in the study (Hair et al., 2017b).

Table 4 Summary of Measurement Model

Construct and Source/ Indicators	Loadings	CR	AVE
Perceived Knowledge (Abdul-Mutalib et al., 2012; Woh et al., 2016; WHO, 2015)		0.8911	0.6719
K1 They prepare food in advance	-0.142		
K2 They know proper ways to clean equipment (refrigerator, slicing machine, mincer)	0.759		
K3 They wash hands before handling food to reduce the risk of contamination	0.713		
K4 They wear gloves while handling food to reduce the risk of transmitting the infection to consumers and staff	0.738		
K5 They use caps, masks, protective gloves, and adequate clothing to reduce the risk of food contamination	0.824		
K6 They know the correct temperature of the refrigerator/ freezer to reduce the risk of food spoilage (If related)	0.713		
K7 They know ways to store food properly	0.832		
K8 They do not reheat the food	0.333		
Perceived Skills (Fordyce-Voorham, 2017; McGill et al., 2015; Sibanyoni et al., 2017)		0.9275	0.8648
S1 They have the right hygiene skills	0.842		
S2 They have the right food waste skills	0.855		
S3 They have the right food preparation skills	0.846		
S4 They are confident when handling food	0.611		
Perceived Attitude (Liu et al., 2015; Odeyemi, 2016; WHO, 2015; Young et al., 2019)		0.8937	0.6286
A1 They are aware of their responsibility for food safety	0.817		
A2 They are aware of the importance of food safety training to prevent food poisoning	0.803		
A3 They are ready to receive training regularly	0.674		
A4 They undergo medical examination regularly	0.815		
A5 Diarrhoea does affect their work	0.613		
A6 They don't work with a bandaged hand injury	0.667		
A7 They ensure "delicious" is of the primary importance of food	0.684		
Food Quality (Chamhuri and Batt, 2015; Tan et al., 2017)		0.9138	0.6798
FQ1 Rich nutritional food that meets customer needs	0.811		
FQ2 Consistent quality of food is produced	0.773		
FQ3 Our food presentation is visually attractive	0.832		
FQ4 Our restaurant serves tasty food	0.77		
FQ5 Our restaurant offers fresh food	0.825		
FQ6 Our food is served at the appropriate temperature	0.783		
FQ7 Our restaurant offers a variety of menu items	0.745		
Food Safety (Dudeja et al., 2017; Fernando et al., 2014)		0.8964	0.6344
FS1 New development and technology are followed	0.432		
FS2 Basic hygiene procedures are implemented	0.843		
FS3 Control list and handling procedures are briefed routinely	0.77		
FS4 Only a good product is bought	0.749		
FS5 More food handling training is given	0.774		
FS6 Cross-contamination is avoided	0.847		

Note: *K1, K8, S4, A3, A5, A6, A7* and *FS1* were deleted due to low loadings.

Hypothesis testing (structural model)

Six direct hypotheses have been developed between the study constructs and were tested by assessing the direction, strength, and level of significance of the path coefficients estimated by partial least squares (PLS) using bootstrap resampling method with 5,000 resampling in the second step of PLS analysis. The R^2 of the endogenous constructs were 0.647 and 0.485 for food quality and food safety, respectively. The resulting structural model is shown in Table 5. The path coefficients yielded mixed results as indicated by the t-statistics and 95% confidence intervals. The coefficient for the predictors of Skills ($\beta = .40, p < .05; R^2 = 0.647$) and Attitudes ($\beta = .38, p < .05; R^2 = 0.647$) were found to be significant to Food Quality. Therefore,

this significant relationship supported our hypotheses of a positive connection between skills and attitude of migrant food handlers on the production of quality food (H3 and H6). Next, significant relationships were also found between predictors Knowledge ($\beta = .38, p > .01; R^2 = 0.485$) and Attitudes ($\beta = .46, p < .05; R^2 = 0.485$) to Food Safety, hence supporting hypothesis H2 and hypothesis H5. However, the relationship between Knowledge ($\beta = .11, p > .05$) was found negatively related to Food Quality as well as Skills ($\beta = .06, p > .05$) was insignificant to Food Safety. Thus, hypotheses H1 and H4 were rejected. The result of the hypotheses testing are summarised in Figure 2 below.

Table 5 Structural Model Assessment

H	Relationship	VIF	Std Beta	Std. Error	t-value	p-value	Hypothesis	R ²	f ²
H1	Knowledge -> Food Quality	2.559	0.108	0.068	1.705	0.089	Not Supported	0.647	0.011
H3	Skills -> Food Quality	3.855	0.400	0.063	6.227	0	Supported		0.126
H6	Attitudes -> Food Quality	3.509	0.380	0.079	4.77	0	Supported		0.095
H2	Knowledge -> Food Safety	2.559	0.383	0.091	4.320	0	Supported	0.485	0.117
H4	Skills -> Food Safety	3.855	0.057	0.092	0.674	0.501	Not Supported		0.002
H5	Attitudes -> Food Safety	3.509	0.459	0.085	5.318	0	Supported		0.048

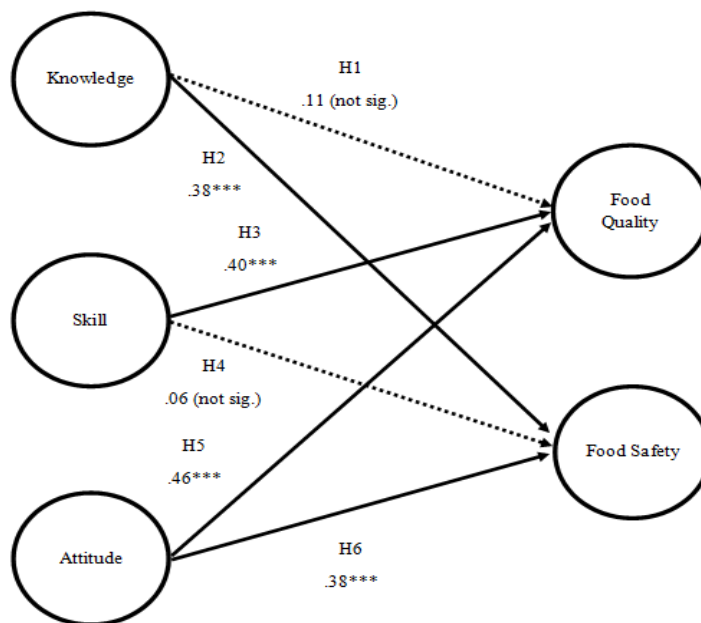


Figure 2 Result of hypotheses testing

DISCUSSION

Many studies were highlighted the impact of foreign workers on the country's wages, productivity, socio-economic and cultural profile, local employability, and trade union roles (Fadilah et al., 2011; Ramesh et al., 2012) and were merely concentrated on construction and manufacturing sectors (Zaleha et al., 2011). This paper examines not only determine perceived KSAs among migrant food handlers in the food industry but also their impact on food quality and food safety. Moreover, the primary goal of this paper is to establish a conceptual model to investigate the relationships between knowledge, skills, and attitudes (KSAs) of migrant food handlers in food handling as perceived by their respective superiors and its impact on the quality and safety of the food produced. It was purported that the migrant food handlers perceived KSAs positively correlated to food quality and safety. The established model development enlists competencies in three elements - KSAs, and hence, performance is expected to be attained when these three elements are met (Boyatzis, 1982). Furthermore, the performance is measured in food quality and food safety achieved by the food premises. Therefore, empirical testing of knowledge, skills, and attitudes (KSAs) of migrant food handlers in food handling are valuable for both practical and theoretical reasons. As such, the findings have extended many general studies that highlighted the importance of knowledge, attitude, and skills in ensuring food quality and safety (Kuo et al., 2020; Sayuti et al., 2020; Who et al., 2016)

The impact of knowledge on food safety and quality

The model reveals that knowledge is seen as one of the requirements of competence, and it leads to better performance. Additionally, knowledge in food handling is regarded as one essential requirement to ensure food quality and food safety in food premises. Therefore, it is necessary to adjust the workers' knowledge to adapt to the situation and tasks given (Batista et al., 2020). Based on the findings, it can be summarised that migrant food handlers have a moderate level of perceived knowledge in food handling practices. Therefore, the knowledge of the migrant food handlers in food handling practices should be of concern as they only have a moderate level of perceived knowledge in every food handling aspect. In terms of the relationship between perceived knowledge in food handling to food quality and food safety, the research found positive supporting evidence (0.393, $t=3.904$, $p<0.05$) for the only path between Perceived Knowledge and Food Safety, but an insignificant relationship (0.099, $t=1.351$, $p<0.05$) for the path between Perceived Knowledge and Food Quality. This research intensifies perspective with previous studies by establishing clear empirical evidence of the relationship between knowledge in food handling and food quality (e.g., Al-Shabib et al., 2016; Farahat et al., 2015; Habiballah et al., 2018; Valero et al., 2016; Zanin et al., 2017) hence, implying the importance of knowledge of food handling to attain food safety. Furthermore, the findings have extended many general studies that highlighted the

The knowledge of migrant food handlers in food handling is highly associated with food quality and food safety, in which migrant food handlers with a better educational background (i.e., University) would demonstrate better knowledge in food handling activities (Bou-Mitri et al., 2018). However, according to the findings of this study, only 14.1% of the migrant food handlers are University graduates, whilst the majority of them had only secondary school's education. On the other hand, about 35.5% of the migrant food handlers have either no education or are unknowingly educated. These findings prove that low-skilled migrant workers are being hired as our food handlers, thus reaffirming the concern of Malaysians on their competencies as food handlers. Nonetheless, based on the study findings, these migrant food handlers are found to have a moderate level of knowledge in food handling. However, the majority of the migrant food handlers (61.7%) have been working as food handlers for more than a year, suggesting that training and years of experience themselves do not guarantee absolute transfer of knowledge in food handling among the migrants.

Although training is notable as a mechanism to modify one's knowledge, the expected knowledge transfer does not automatically occur (Argote and Fahrenkopf, 2016). This is because knowledge transfer in training does not solely base on the participants but also depends on other factors facilitating it. Accordingly, Tyler et al. (2016) emphasised the roles of managers in promoting workers' training as well as maximising the knowledge transfer process as managers are the ones responsible for the work practices, regulatory and legislative requirements in the workplace. Other than that, Vasanthi and Basariya (2019) highlighted the efficiency of employers in conducting on-the-job training to their workers when compared to listening to the instructor, other than it would motivate workers to perform well in their given tasks. In a nutshell, being trained and having knowledge alone is not enough, as there is a need for close supervision and support from employers to ensure knowledge is then turned into practices (Vo et al., 2015).

The impact of skills on food safety and quality

The moderate level of perceived skills in food handling of these subjects should be of concern as food handlers must own necessary skills in food handling for them to handle the food hygienically, hence minimising the presence of pathogens or toxins in food and the surrounding environment (Husain et al., 2016; Zanin et al., 2017). Furthermore, the research has found supporting evidence for the path between Perceived Skill and Food Quality, which was positive and significant (0.414, $t=4.683$, $p>0.05$), but insignificant relationship (0.065, $t=0.632$, $p>0.05$) for the path between Perceived Skill and Food Safety. This finding is unique and does contradicting with previous studies that have established evidence on the importance of skills in food handling to attain both food quality and food safety (e.g., Husain et al., 2016; Zanin et al., 2017).

The skills of migrant food handlers in food handling are highly associated with the food quality, in which migrant food handlers who were given food handling training demonstrate required skills in food handling activities (Gruenfeldova et al., 2019; Husain et al., 2016; Zanin et al., 2017). On the other hand, Valero et al. (2016) has stressed that skills in food handling are notably important in ensuring food safety. This is because inadequate skills in food handling could easily influence microbial contamination by means that food contamination may occur from poor handling practices. Nonetheless, the reasons for the results'

contradiction could be due to the level of perceived skills owned by these food handlers, which is moderate. A few factors might affect this result, and one of them is the premises' standard of procedure in maintaining their food safety. This is because the stringency in premises' quality and safety procedure solely depends on the employers. The employers as the owner of the premises should be aware of their responsibilities in maintaining food safety in the premises by complying with the regulations outlined in Food Hygiene Regulations 2009 (Act 281) (Ruby et al., 2019). Employers should have stressed both food quality and food safety, not only the taste. Besides that, the results' contradiction could be due to the ineffectiveness of the training as some of the trainees failed to put the knowledge they learned into action (Vo et al., 2015).

Finding has shown that only 76.7% of the migrant food handlers were given food handling training whilst the majority of them are low-educated migrant workers. Therefore, close supervision from superior to assess the level of skills of their food handlers to determine specific learning activities that could help to improve the low-skilled workers' skill in food handling, eventually maintaining the quality and safety of the food produced (Kim et al., 2016; Vo et al., 2015). Having the required skills in food handling is essential to ensure both food quality and food safety will always be made a top priority in every food premises (Husain et al., 2016; Soon et al., 2017; Zanin et al., 2017). The result's contradiction proves that without a total commitment from all parties (e.g., employers, top management, supervisors), producing food safely cannot be established, despite the training given to make the food handlers competent.

The impact of attitude on food safety and quality

Concerning the attitude of migrant food handlers, the research found supporting evidence for both paths, Attitude and Food Quality (0.294, $t=2.839$, $p<0.05$) and Attitude and Food Safety (0.344, $t=4.274$, $p<0.05$), which were positive and significant corroborating with past studies (e.g., Liu et al., 2015). Food handlers' attitudes towards food handling practices are essential to be evaluated as to their thought on food safety, and food quality indicates whether they will engage in safe food handling practices (Bou-Mitri et al., 2018; Kuo and Weng, 2021). In sum, the attitude of the food handlers is regarded as one crucial psychological factor that impacts the food handlers' food safety behaviour in food handling, thus, determining the quality and safety of the food. Therefore, it is the responsibility of the food premises' owner to promote a food safety culture within the work environment to correct and maintain proper practices among the food handlers (Fujisaki and Akamatsu, 2019).

The attitudes of migrant food handlers in food handling are highly associated with food quality. Food handlers with better attitudes would act responsibly towards food safety by having some integrity in food handling. Other than that, food safety in premises will also be established with the excellent attitude of food handlers (Hui et al., 2017). For instance, food handlers with diarrhoeas are not supposed to attend work, let alone have any contact with food. Nevertheless, it is noteworthy that these migrant food handlers demonstrated a moderate level of attitudes in food handling as Hui et al. (2017) and Iwu et al. (2017) underlined the significance of food handling training. As mentality is said to reflect knowledge hence a means to shape a good attitude among food handlers, employers need to put more emphasis on training as findings of the study found that only 79% of employers managed to provide their migrant food handlers with food handling course. Besides, this finding could also have resulted from different cultural backgrounds of the food handlers as demographic details revealed that the food handlers were originated from other countries, with the majority of them from Bangladesh (89%).

Managerial implication

This study has provided critical managerial insights. This study revealed that for migrant food handlers to be competent and for food quality and food safety to be achieved, they need to equip themselves with the proper knowledge, skills and attitudes (KSAs) in food handling as they are the primary source of foodborne diseases. Therefore, we suggest that the managers emphasise the training of the migrant food handlers hired at their premises as they are categorised as low-skilled workers. Managers need to acknowledge that the responsibility of maintaining food quality and food safety lies in their hands. In other words, supervisors and managers of food premises should always instil the vision and mission of safe and quality food production as the primary organisation's policy to realise the ambition. In response, the food handlers should be provided with regular training, and the state of KSAs of the low-skilled workers should continuously be monitored. Furthermore, periodic evaluation of the migrant food handlers can also be a way for superiors to ensure the efficiency and

effectiveness of the training conducted. In other words, it is the managers' responsibility to ensure adequate training is met. Motivation is also essential in building confidence, commitment, and beliefs among food handlers to complete their tasks to avoid unsafe food. It helps workers transfer their training into actual practices. Managers should also ensure the government's rules and regulations are followed and understood, being a tool to safeguard the quality and safety of the food produced on Malaysian premises. Moreover, this could benefit the food premises as customers who prioritise the quality of food will always come back for more, boosting the premises' performance, reducing waste, and maintaining the authenticity of brand images.

CONCLUSION

This study has offered updated research regarding migrant workers' competencies as food handlers in the food service sector in Malaysia. The findings of this study managed to prove that these migrant food handlers have a moderate level of perceived knowledge, skills, and attitudes (KSAs) in food handling practices and, therefore, impacted the food quality and food safety. Food safety and food quality are always in the interest of consumers, and academicians struggle to tackle these dilemmas by conducting studies in the related field. However, the hiring of low-skilled migrant food handlers has intensified the concern due to their questionable competencies in food handling practices. Therefore, this research has attempted to contribute significant findings on the perceived knowledge, skills, and attitudes (KSAs) of the hired migrant food handlers and tried to seek a relationship between KSAs and food quality and food safety as most of the past research was conducted only in assessing knowledge, attitudes, and practices (KAP). This paper has also extended the gaps of knowledge by evaluating the perceived skills of the food handlers. This study has also attempted to produce impactful research by following guidelines and measurements from experts.

Even though this study has made a significant contribution both academically and practically, some limitations still need to be considered when interpreting the research findings. This paper considers the strength of the superior-subordinate relationship, aiming to assess the level of KSAs of the migrant food handlers based on the assessment of their respective employers. Plus, making the employers as the respondents is one of the crucial steps in the study's research methodology to avoid bias caused by the migrant food handlers, considering their language barriers. Therefore, it is suggested for future research to conduct a similar study by using migrant food handlers as the sample to enrich the current body of knowledge. In addition, considering their low educational qualification, the researcher might need a translator to translate questions for them. Designing a simple questionnaire to assess their knowledge would also be suggested.

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