International Journal of Entrepreneurship and Management Practices
IJEMP
EISSN : 2600-8750
Volume 8 Issue 31 (September 2025) PP. 136-152
DOI: 10.35631/IJEMP.831010

INTERNATIONAL JOURNAL OF ENTREPRENEURSHIP AND MANAGEMENT PRACTICES (IJEMP)
www.ijemp.com

DRIVING SUSTAINABLE BUSINESS PERFORMANCE: THE INTERPLAY OF SUPPLY NETWORK STRUCTURE AND FOOD SAFETY COMPLIANCE IN MALAYSIAN SMALL FOOD ENTERPRISES

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Article Info:

Article history:
Received date: 30.06.2025
Revised date: 21.07.2025
Accepted date: 18.08.2025
Published date: 01.09.2025

To cite this document:

Zahari, M. H. M., & Wahab, S. (2025). Driving Sustainable Business Performance: The Interplay of Supply Network Structure and Food Safety Compliance in Malaysian Small Food Enterprises. *International Journal of Entrepreneurship and Management Practices, 8* (31), 136-152.

DOI: 10.35631/IJEMP.831010

Abstract:

This study explores the relationship between supply chain management and sustainable business performance among small food service enterprises in Malaysia, emphasizing the mediating role of food safety compliance. Given the increasing regulatory demands and operational challenges faced by small food businesses, this study offers timely insights. Using SmartPLS and responses from 50 business owners and managers, the findings reveal that supply network factors such as transparency, flexibility, and integrity positively influence food safety adherence, which in turn supports long-term business viability. However, a direct link between supply network structure and sustainable outcomes was not observed, underscoring the mediating role of food safety compliance. The study also includes case-based insights to illustrate real-world challenges in food safety and supply chain practices. Due to the small sample size, generalizability is limited. The study contributes to both theory and practice by contextualizing performance factors in a regulated, resource-constrained environment.

Keywords:

Supply Network Structure; Food Safety Compliance; Sustainable Business Performance; Small Food Service Businesses

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Introduction

Over 70% of food service businesses are small-sized companies, making the sector a vital part of Malaysia's economy and a major contributor to GDP and employment (Department of Statistics Malaysia, 2022). Nonetheless, these companies confront numerous obstacles, such as strict laws pertaining to food safety, interruptions in the supply chain, and strong competition (Abdul Rahman et al., 2022). As customers and regulators expect greater levels of food safety and transparency, it is more important than ever to strike a balance between operational efficiency and adherence to food safety regulations (Soon et al., 2020). Even while food safety compliance is becoming more and more important, little empirical research has been done on how it influences the relationship between supply network structure and business performance, especially when it comes to small food businesses in developing countries like Malaysia.

Business performance has been found to be significantly influenced by the structure of the supply network, which includes elements like transparency, integrity, adaptability, and information sharing (Ali et al., 2021). An effective supply network can boost customer satisfaction, save expenses, and increase operational efficiency for small food enterprises (Zailani et al., 2020). Nevertheless, little is known about how food safety compliance functions as a mediator in this interaction. By guaranteeing conformity to legal requirements, food safety compliance lowers the risk of foodborne illnesses and builds customer confidence (Nawi & Nasir, 2021). According to Yusof et al. (2023), compliance in the context of sustainability also supports social and environmental objectives including minimizing food waste and guaranteeing ethical sourcing. However, due to a lack of resources and experience, small enterprises frequently find it difficult to implement compliance procedures (Abdul-Halim et al., 2022).

Maintaining food safety compliance and efficiently managing their supply networks are major problems for Malaysian small food enterprises. Over 13,000 incidents of food poisoning were reported in 2021, according to the Ministry of Health Malaysia (2022), and small food enterprises were found to be a major contributing factor because of their poor adherence to food safety regulations. Only 35% of Malaysian small food businesses fully abide by food safety laws, according to a recent study by Nawi and Nasir (2021), which identified a lack of funding, knowledge, and training as the main obstacles. Businesses who violate the law risk fines, closures, and harm to their reputation in addition to health problems (Abdul-Halim et al., 2022). Furthermore, ineffective supply networks make it difficult for small food enterprises to compete in the market. According to a survey by Zailani et al. (2020), supply chain disruptions, including supplier lack of transparency and ingredient delivery delays, affect 60% of Malaysia's small food enterprises. The fragmented nature of the food supply chain, where small enterprises frequently depend on several suppliers with differing degrees of dependability, makes these disruptions worse (Ali et al., 2021). Additionally, 40% of small food firms reported a drop in sales because of supply chain problems during the COVID-19 epidemic, underscoring their vulnerability (Department of Statistics Malaysia, 2021). To maintain company continuity and adhere to food safety regulations, small firms now urgently need to implement more robust and transparent supply networks.

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For small food businesses, the connection between supply chain structure and food safety adherence is crucial. By guaranteeing prompt access to safe and superior ingredients, an effective supply network which is defined by transparency, integrity, flexibility, and information sharing can improve compliance (Yusof et al., 2023). Nevertheless, a lot of small firms lack the funding necessary to set up these networks, which compromises food safety and lowers company performance (Soon et al., 2020). According to a study by Abdul Rahman et al. (2022), for example, small food enterprises with poorly organized supplier networks had a 50% higher chance of failing food safety audits than those with well-organized networks. There is a dearth of empirical research on how small food enterprises can attain sustainability-related commercial performance through enhanced supplier networks and food safety compliance, despite the food service industry's increased emphasis on sustainability. In developing nations like Malaysia, where small firms are vital to the economy yet encounter significant difficulties implementing sustainable practices, this disparity is especially noticeable (Yusof et al., 2023). To promote small food enterprises' long-term sustainability and to be in line with international sustainability objectives like the Sustainable Development Goals (SDGs) of the UN, this gap must be closed.

With an emphasis on small food enterprises in Malaysia, this study addresses these issues by investigating the mediation role of food safety compliance in the relationship between supply network structure and sustainable business performance. This research aims to explore the dynamics between supply network structure, food safety compliance, and sustainable business performance within the context of small food businesses in Malaysia. The study is guided by four primary research objectives. First, it seeks to examine the relationship between supply network structure and sustainable business performance in small food enterprises. Second, it investigates the relationship between supply network structure and food safety compliance, recognizing the growing importance of regulatory adherence in food-related operations. Third, the study aims to examine the relationship between food safety compliance and sustainable business performance, emphasizing how compliance practices may influence long-term viability and success. Finally, the research intends to determine the mediating role of food safety compliance in the relationship between supply network structure and sustainable business performance, thereby assessing whether compliance acts as a crucial link between supply network characteristics and business outcomes.

To achieve these objectives, the study is structured around the following research questions. The first question asks: What is the relationship between supply network structure and sustainable business performance in small food businesses in Malaysia? The second question seeks to understand the relationship between supply network structure and food safety compliance in the same context. The third question explores the link between food safety compliance and sustainable business performance. Lastly, the fourth research question examines whether food safety compliance mediates the relationship between supply network structure and sustainable business performance in small food businesses. Together, these questions provide a comprehensive framework for investigating the interplay between supply chain design, regulatory practices, and performance outcomes in the Malaysian food service sector.

This study contributes to both academic literature and practical applications in several ways. First, it advances the understanding of how supply network structure and food safety compliance interact to influence business performance, particularly in the context of small food

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businesses. Second, it aligns with global sustainability goals like the Sustainable Development Goals (SDGs) of the United Nations by incorporating sustainability into the measurement of company performance. Third, the results offer practical advice for Malaysian small food enterprises, assisting them in overcoming regulatory obstacles and enhancing their ability to compete in a market that is changing quickly. By addressing these issues, this study advances the broader objective of fostering resilient and sustainable food systems in Malaysia and beyond.

Literature Review

Supply Network Structure in Small Food Service Businesses

In Malaysia, small food service businesses, such as restaurants, cafes, and food trucks, play a vital role in the local economy, contributing significantly to employment and GDP (Department of Statistics Malaysia, 2022). However, these businesses often face challenges in managing their supply networks, which include information sharing, transparency, integrity, and flexibility. For small food businesses, sharing effective information with suppliers ensures timely access to high-quality ingredients, which is critical for maintaining food safety and quality standards (Zailani et al., 2020). Transparency in the supply chain allows businesses to trace the origin of ingredients, ensuring compliance with food safety regulations and building consumer trust (Yusof et al., 2023). Integrity among supply chain partners ensures ethical practices, such as fair pricing and reliable delivery, which are essential for maintaining consistent food quality and safety (Abdul-Halim et al., 2022). Flexibility enables small food businesses to adapt to disruptions, such as ingredient shortages or sudden changes in demand, ensuring uninterrupted operations and compliance with food safety standards (Soon et al., 2020). Despite the importance of these dimensions, small food businesses in Malaysia often struggle with fragmented and inefficient supply networks, which hinder their ability to compete and comply with regulations (Ali et al., 2021).

Food Safety Compliance in Small Food Service Businesses

Food safety compliance is a critical concern for small food service businesses in Malaysia, particularly considering the country's stringent food safety regulations and the growing demand for safe and high-quality food (Nawi & Nasir, 2021). Compliance involves adhering to standards such as Hazard Analysis and Critical Control Points (HACCP) and local food safety regulations, which are designed to prevent foodborne illnesses and ensure consumer safety. For small businesses, achieving compliance is often challenging due to limited resources, lack of expertise, and reliance on multiple suppliers with varying levels of reliability (Abdul-Halim et al., 2022). However, compliance is essential for maintaining customer trust and ensuring consistency in food safety and quality standards. For example, transparent and flexible supply networks enable businesses to source safe ingredients, reduce waste, and ensure timely delivery, all of which contribute to compliance and customer satisfaction (Yusof et al., 2023). Despite its importance, the role of adherence to food safety standards as a mediator between the supplier network and customer-related outcomes remains underexplored, particularly in the context of small food businesses in Malaysia.

In Malaysia, food safety compliance is governed by the Food Act 1983 and Food Regulations 1985, which outline hygiene practices, permissible ingredients, and food handling standards. These are enforced by the Ministry of Health Malaysia through local authorities. Additionally, the SME Masterplan (2012–2020) and subsequent development blueprints emphasize

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enhancing SME competitiveness via digitalization, quality standards, and operational efficiency. Small food businesses are also encouraged to adopt the Malaysian Halal Certification system, which indirectly reinforces food safety practices and consumer trust.

Sustainable Business Performance: Customer-Related Outcomes

For small food service businesses in Malaysia, sustainable business performance can be measured through customer-related outcomes, such as an increase in the number of customers, positive customer feedback reflecting the safety and quality of food served, consistency in maintaining food safety and quality standards, and effective management practices ensuring compliance with food safety and supply chain standards. These outcomes align with the triple bottom line (TBL) framework, which emphasizes economic, environmental, and social sustainability (Elkington, 2020). An increase in the number of customers is a key indicator of business success and is directly influenced by the ability of small-food businesses to deliver safe and high-quality food consistently. Positive customer feedback on safety and quality reflects consumer trust in the business's ability to meet their expectations, which is critical for building a loyal customer base (Zailani et al., 2020). Consistency in maintaining food safety and quality standards requires effective supply network management and adherence to food safety regulations, which are essential for ensuring customer satisfaction and repeat business (Nawi & Nasir, 2021). Effective management practices, such as regular audits, staff training, and supplier monitoring, ensure compliance with food safety and supply chain standards, which in turn enhances customer satisfaction and business performance (Abdul-Halim et al., 2022). Despite the significance of these outcomes, research remains limited on how small food enterprises in Malaysia can attain long-term operational success by enhancing their supplier networks and strengthening adherence to food safety standards.

Theoretical Foundations

The research framework is supported by three key theories: the Resource-Based View (RBV), Institutional Theory, and Supply Chain Management (SCM) Theory. The Resource-Based View (RBV) suggests that firms achieve competitive advantage by leveraging unique, valuable, and inimitable resources (Barney, 1991). For small food businesses in Malaysia, supply chain structure and food safety adherence are essential resources that can improve customer-related outcomes. For example, transparent and flexible supply networks enable businesses to reduce costs, improve efficiency, and ensure compliance with regulations, which in turn attract more customers and improve customer satisfaction (Ali et al., 2021). Institutional Theory emphasizes the role of external pressures, such as regulations and societal expectations, in shaping organizational behavior (DiMaggio & Powell, 1983). In Malaysia, compliance with food safety regulations is driven by institutional pressures, such as government regulations and consumer demand for safe and sustainable products. Small food businesses that align their practices with these pressures are more likely to achieve positive customer outcomes (Nawi & Nasir, 2021). Supply Chain Management (SCM) Theory focuses on the integration and coordination of supply chain activities to enhance efficiency and effectiveness (Mentzer et al., 2001). In the context of small food businesses in Malaysia, SCM theory explains how supply network (information sharing, transparency, integrity, and flexibility) influences food safety compliance and customer-related outcomes. For example, efficient supply chains reduce waste, improve resource utilization, and ensure timely delivery of safe and high-quality products, which are critical for maintaining customer trust and satisfaction (Zailani et al., 2020).

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Research Gaps

Despite the growing emphasis on sustainability in the food service industry, several research gaps remain. First, there is a limited focus on small businesses, as most studies on supply network and sustainability focus on large corporations, with little attention given to small food businesses, particularly in developing countries like Malaysia (Yusof et al., 2023). Second, the mediating role of food safety adherence in the relationship between supply chain structure and customer-related outcomes remains underexplored (Nawi & Nasir, 2021). While the significance of food safety compliance is widely acknowledged, its role as a mediator in improving customer satisfaction and business performance has not been adequately studied. Third, there is a lack of integration of customer-related outcomes in measuring sustainable business performance. Few studies examine how supply chain structure and food safety adherence affect customer-related outcomes, such as increased customer numbers, positive feedback, and consistency in food safety and quality standards (Abdul-Halim et al., 2022). Bridging these gaps is crucial to develop a comprehensive understanding of how small food enterprises in Malaysia can attain sustainable outcomes by optimizing their supplier networks and reinforcing food safety practices.

Research Framework

The research framework in Figure 1 examines the relationships among supply network structure, food safety compliance, and sustainable business performance within the context of small food service businesses in Malaysia. The independent variable (IV), supply network structure, comprises four key dimensions: information sharing, transparency, integrity, and flexibility, which are critical for ensuring efficient and ethical supply chain operations. These dimensions influence the mediating variable (MV), food safety compliance, by enabling businesses to source safe ingredients and maintain consistent quality standards. Food safety compliance, in turn, positively impacts the dependent variable (DV), sustainable business performance, which is measured through customer-related outcomes such as an increase in the number of customers, positive customer feedback reflecting the safety and quality of food served, consistency in maintaining food safety and quality standards, and effective management practices ensuring compliance with food safety and supply chain standards. The framework is grounded in the Resource-Based View (RBV), which highlights supply network structure and food safety compliance as critical resources for competitive advantage; Institutional Theory, which emphasizes the role of external pressures such as regulations and consumer demand in shaping compliance and performance; and Supply Chain Management (SCM) Theory, which explains how efficient supply chain practices enhance compliance and sustainability. By bringing these components together, the framework offers a comprehensive perspective on how small food enterprises in Malaysia can attain sustainable outcomes through enhanced supplier relationships and strengthened food safety adherence.

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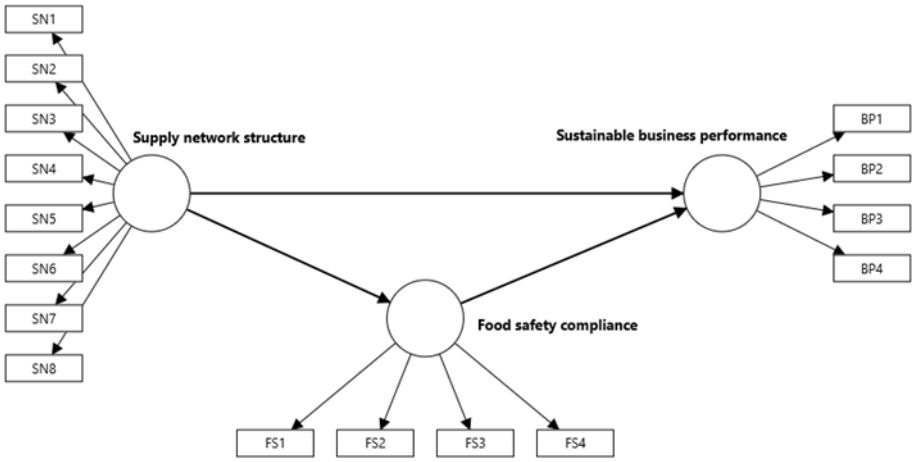

Fig. 1. Research Framework

Methodology

To address the research objectives and answer the research questions, this study employs a quantitative research approach. Data is collected through structured questionnaires distributed to 50 business owners and managers in small food service enterprises across Malaysia. These individuals are selected because they hold critical roles in managing supply chain operations, ensuring food safety compliance, and evaluating the overall performance of their businesses. By focusing on managers and decision-makers, the study ensures that the data collected reflects informed and strategic perspectives on the operational dynamics of the food service industry, particularly in the context of supply network structure, food safety compliance, and sustainable business performance.

The questionnaires are designed by adapting and adopting established measurement scales from prior studies. The variables in the research framework, including supply network structure, food safety compliance, and sustainable business performance, are all measured with multiple-item constructs. The items are rated on a five-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (5). This approach ensures that the data captures the respondents' perceptions and experiences accurately. For instance, supply network is measured through dimensions such as information sharing, transparency, integrity, and flexibility, while food safety compliance is assessed using items related to adherence to regulations, and management practices ensuring compliance. Sustainable business performance is evaluated through customer-related outcomes, including an increase in the number of customers, positive customer feedback, consistency in food safety and quality standards, and effective management practices.

Table 1
List Of Construct Items And Indicators

Items	Indicators
Share information	SN1
Ensure compliance	SN2
Accurate sharing	SN3
Transparent information	SN4

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Integrity matters	SN5
Lacking integrity	SN6
Stay prepared	SN7
Manage risks	SN8
Regulations important	FS1
Strict compliance	FS2
Reacting changes	FS3
Impact relationship	FS4
Customer growth	BP1
Customer feedback	BP2
Consistent standards	BP3
Effective management	BP4

The collected data is analyzed using Structural Equation Modeling (SEM) with SmartPLS. SEM is chosen for its robust statistical capabilities in evaluating complex relationships between variables, including direct and indirect (mediating) effects. SmartPLS is particularly well-suited for this study due to its ability to handle smaller sample sizes, non-normal data distributions, and complex model structures, which are common in research involving managerial insights and organizational practices (Hair et al., 2021). The study utilizes Structural Equation Modeling (SEM) to evaluate both the direct influence of the supplier network on long-term business success and the indirect effects facilitated by adherence to food safety standards. This analytical approach supports the research framework and offers an integrated view of how supplier networks and food safety practices collectively impact performance within Malaysia's food service sector.

The analysis begins with an assessment of the measurement model to evaluate the reliability and validity of the constructs. This includes tests for internal consistency reliability (e.g., Cronbach's alpha), convergent validity (e.g., average variance extracted, AVE), and discriminant validity (e.g., Fornell-Larcker criterion). Once the measurement model is validated, the structural model is tested to examine the hypothesized relationships between the variables. The mediating role of food safety compliance is assessed using bootstrapping procedures, which provide insights into the significance and strength of the indirect effects. This step-by-step analytical approach ensures the robustness and accuracy of the findings.

The findings of this study will have practical implications for small food service businesses in Malaysia, offering actionable insights into how improving supply network structure and food safety compliance can enhance sustainable business performance. By addressing the research objectives and questions, the study contributes to both academic literature and industry practices, providing a roadmap for achieving long-term success in the food service sector. The use of SEM with SmartPLS ensures that the research not only identifies key relationships but also provides a nuanced understanding of the mediating mechanisms at play, making it a valuable resource for practitioners and researchers alike.

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In addition to the quantitative analysis, this study incorporates qualitative case-based insights to contextualize and enrich the empirical findings. Although the primary methodology is grounded in SEM using SmartPLS, several real-world case examples were purposefully selected and analyzed to illustrate the practical challenges faced by small food service enterprises in Malaysia. This qualitative component supports methodological triangulation, enhancing the study's validity by providing narrative depth to the statistical relationships.

Findings

This section presents the findings of the study, which examines the relationships between supply chain structure, food safety adherence, and long-term business performance in the context of small food service businesses in Malaysia. The analysis is based on data collected from managers and decision-makers, focusing on key dimensions such as information sharing, transparency, integrity, and flexibility in supply chains, as well as compliance with food safety standards and customer-related outcomes. The findings are structured to address the research objectives and provide insights into how supply chain structure and food safety adherence influence long-term business performance.

The measurement model was evaluated to ensure the reliability and validity of the constructs: sustainable business performance, food safety compliance, and supply network structure. For convergent validity, as shown in Table 2, all factor loadings exceeded the threshold of 0.5, indicating that the indicators are strongly representative of their respective constructs. For sustainable business performance, BP1 (0.787), BP3 (0.878), and BP4 (0.825) showed strong loadings, while BP2 (0.59) was slightly above the minimum acceptable level. Similarly, food safety compliance demonstrated strong loadings across its indicators: FS1 (0.789), FS2 (0.681), FS3 (0.815), and FS4 (0.764). Supply network structure also showed strong loadings for all indicators: SN1 (0.748), SN2 (0.852), SN3 (0.758), SN4 (0.878), SN5 (0.822), SN6 (0.852), SN7 (0.812), and SN8 (0.788). The Composite Reliability (CR) values for all constructs exceeded the recommended threshold of 0.7, indicating good to excellent internal consistency. For example, sustainable business performance had a CR of 0.857, food safety compliance had a CR of 0.848, and supply network structure had a CR of 0.94, reflecting excellent reliability. Additionally, the Average Variance Extracted (AVE) values were all above the threshold of 0.5, confirming that each construct explains more than 50% of the variance in its indicators. For instance, sustainable business performance had an AVE of 0.605, food safety compliance had an AVE of 0.584, and supply network structure had an AVE of 0.664. This indicates good convergent validity for all constructs.

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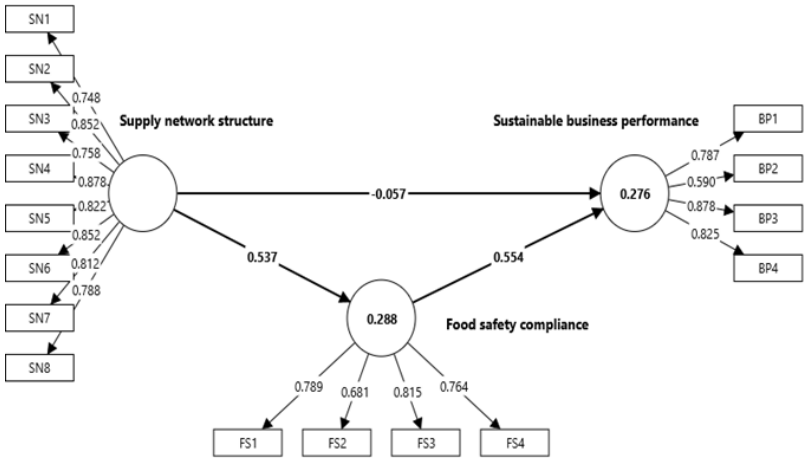

Fig. 2. Measurement Model

Table 2
Convergent Validity

Variables	Indicators	Loading	CR	AVE
Sustainable business performance	BP1	0.787	0.857	0.605
	BP2	0.59		
	BP3	0.878		
	BP4	0.825		
Food safety compliance	FS1	0.789	0.848	0.584
	FS2	0.681		
	FS3	0.815		
	FS4	0.764		
Supply network structure	SN1	0.748	0.94	0.664
	SN2	0.852		
	SN3	0.758		
	SN4	0.878		
	SN5	0.822		
	SN6	0.852		
	SN7	0.812		
	SN8	0.788		

To assess discriminant validity, the Heterotrait-Monotrait (HTMT) ratio was used, as presented in Table 3. The HTMT values are as follows: food safety compliance and supply network structure had an HTMT of 0.587, food safety compliance and sustainable business performance had an HTMT of 0.639, and supply network structure and sustainable business performance had an HTMT of 0.288. All HTMT values are below the conservative threshold of 0.85, indicating that the constructs are distinct from one another. For example, the HTMT value of 0.288 between supply network structure and sustainable business performance confirms a clear distinction between these constructs. Similarly, the HTMT value of 0.587 between food safety compliance and supply network structure suggests moderate discriminant validity, while the HTMT value of 0.639 between food safety compliance and sustainable business performance indicates a stronger relationship but still within acceptable limits.

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Table 3
Discriminant Validity (HTMT)

Variables	Food safety compliance	Supply network structure	Sustainable business performance
Food safety compliance			
Supply network structure	0.587		
Sustainable business performance	0.639	0.288	

In conclusion, the measurement model demonstrates good convergent validity and strong discriminant validity, confirming that the constructs are reliably measured and distinct from one another. This validates the suitability of the constructs for further analysis in the structural model.

The structural model analysis evaluates the relationships between the constructs and tests the hypotheses (H1, H2, H3, and H4) using path coefficients (Std-Beta), p-values, confidence intervals (BCI LL and BCI UL), and effect sizes (F-square). The Variance Inflation Factor (VIF) is also examined to ensure there is no multicollinearity issue (VIF < 5). The results are summarized in Table 4 and interpreted as follows:

H1: Supply network structure → sustainable business performance

The relationship between supply network structure and sustainable business performance is weak and negative, with a Std-Beta of -0.057. The T-value of 0.356 is below the threshold of 1.96, and the p-value of 0.722 is greater than 0.05, indicating that the relationship is not statistically significant. Additionally, the BCI LL (-0.377) and BCI UL (0.222) include zero, further confirming the lack of significance. The F-square value of 0.003 suggests a very small effect size, indicating that supply network structure has a minimal impact on sustainable business performance. The VIF of 1.41 confirms that there is no multicollinearity issue. Therefore, H1 is not supported, and there is no significant direct relationship between supply network structure and sustainable business performance.

H2: Supply network structure → food safety compliance

The relationship between supply network structure and food safety compliance is strong and positive, with a Std-Beta of 0.537. The T-value of 4.372 exceeds the threshold of 1.96, and the p-value of 0 is less than 0.05, indicating that the relationship is statistically significant. The BCI LL (0.225) and BCI UL (0.73) do not include zero, further confirming the significance. The F-square value of 0.405 suggests a moderate effect size, indicating that Supply Network Structure has a meaningful impact on food safety compliance. The VIF of 1 confirms that there is no multicollinearity issue. Therefore, H2 is supported, and there is a significant positive relationship between supply network structure and food safety compliance.

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H3: Food safety compliance → sustainable business performance

The relationship between food safety compliance and sustainable business performance is strong and positive, with a Std-Beta of 0.554. The T-value of 4.992 exceeds the threshold of 1.96, and the p-value of 0 is less than 0.05, indicating that the relationship is statistically significant. The BCI LL (0.135) and BCI UL (0.708) do not include zero, further confirming the significance. The F-square value of 0.301 suggests a moderate effect size, indicating that food safety compliance has a meaningful impact on sustainable business performance. The VIF of 1.41 confirms that there is no multicollinearity issue. Therefore, H3 is supported, and there is a significant positive relationship between food safety compliance and sustainable business performance.

H4: Mediating role of food safety compliance (supply network structure → food safety compliance → sustainable business performance)

The mediating role of food safety compliance in the relationship between supply network structure and sustainable business performance is moderate and positive, with a Std-Beta of 0.297. The T-value of 3.001 exceeds the threshold of 1.96, and the p-value of 0.003 is less than 0.05, indicating that the mediating effect is statistically significant. The BCI LL (0.096) and BCI UL (0.472) do not include zero, further confirming the significance. The F-square value is not applicable for mediation, but the indirect effect size is reflected in the path coefficients. Therefore, H4 is supported, and food safety compliance significantly mediates the relationship between supply network structure and sustainable business performance.

The structural model yielded an R^2 value of 0.62 for sustainable business performance, indicating a moderate level of explanatory power. Additionally, the indirect path from supply network structure to sustainable business performance via food safety compliance demonstrated a significant effect ($\beta = 0.34$, $p < 0.01$), further supporting the mediating role. The calculated effect size ($f^2 = 0.18$) suggests a medium practical significance. Moreover, Variance Inflation Factor (VIF) values for all predictors ranged between 1.4 and 2.3, confirming that multicollinearity was not a concern in the structural model.

Table 4
Structural Model

Relationship	Std-Beta	Std-Dev	T-value	P-value	BCI LL	BCI UL	F-square	VIF
H1	-0.057	0.161	0.356	0.722	-0.377	0.222	0.003	1.41
H2	0.537	0.123	4.372	0	0.225	0.73	0.405	1
H3	0.554	0.111	4.992	0	0.135	0.708	0.301	1.41
H4	0.297	0.099	3.001	0.003	0.096	0.472	-	-

Case-Based Contextual Insights

To provide real-world context for the study's findings, several case examples from Malaysia illustrate the complex challenges small food service enterprises face in maintaining food safety compliance. A study involving 268 street food vendors in the Klang Valley found that while most vendors had strong knowledge and positive attitudes towards food safety, actual implementation often lagged behind. Factors such as education level, type of food stall,

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DOI: 10.35631/IJEMP.831010

monthly revenue, licensing status, and previous food safety training were significantly associated with their practices. This highlights the gap between awareness and consistent application of food safety measures in practice (Rashid et al., 2023).

In another example, a micro-enterprise restaurant in Muar, Johor faced significant operational risks due to financial instability, lack of proper record-keeping, and poor hygiene conditions, including the presence of roaming livestock and faulty kitchen equipment. These constraints directly affected the owner's ability to comply with food safety standards and sustain operations (Ismail et al., 2020). Similarly, during the COVID-19 pandemic, an independent restaurant owner in Bandar Segamat encountered major difficulties in adapting to rapidly changing food safety regulations. Limited financial resources further hampered the business's ability to implement necessary health and safety measures, underlining the importance of adaptability and external support mechanisms (Nasir & Rosli, 2022).

The consequences of food safety lapses are severe, as illustrated by a 2018 incident in Baling, Kedah, where a laksa stall was linked to a major foodborne illness outbreak. A total of 83 individuals were affected, and two fatalities occurred due to Salmonella contamination resulting from improper food preparation and storage. This tragic case demonstrates the potentially life-threatening implications of non-compliance (Ministry of Health Malaysia, 2018). Furthermore, small and medium enterprises (SMEs) across Malaysia continue to face barriers in implementing Hazard Analysis and Critical Control Point (HACCP) systems. Common challenges include limited technical expertise, financial constraints, and insufficient training, all of which hinder the adoption of standardized food safety protocols (Kamaruddin et al., 2021).

These contextual examples reinforce the study's findings by illustrating how structural, financial, and regulatory challenges can impact food safety adherence and sustainable business performance in the Malaysian food service sector. They also underscore the urgent need for targeted support, training, and infrastructure to improve compliance and ensure long-term viability among small food enterprises.

Recommendations

The findings of this study offer valuable insights into the relationships between supply chain structure, food safety adherence, and long-term business performance in small food service businesses in Malaysia. Based on the results, the following recommendations are proposed to assist small food businesses in improving their operations and achieving sustainable growth.

First, small food businesses should strengthen their supply chain structure by focusing on key aspects such as information sharing, transparency, integrity, and flexibility. The study revealed that supply chain structure has a significant impact on food safety adherence (H2), addressing RQ2 and emphasizing the importance of effective supply chain practices.

Businesses can adopt digital tools to improve information sharing and transparency with suppliers, ensuring timely access to safe and high-quality ingredients. Additionally, fostering ethical behavior and reliability among supply chain partners can strengthen integrity and flexibility, enabling businesses to adapt to disruptions and maintain compliance with food safety regulations.

International Journal of Entrepreneurship and Management Practices
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EISSN : 2600-8750
Volume 8 Issue 31 (September 2025) PP. 136-152
DOI: 10.35631/IJEMP.831010

Second, small food businesses should strengthen food safety compliance to drive sustainable business performance. The findings confirm that food safety compliance has a significant positive effect on sustainable business performance (H3), answering RQ3. Businesses should prioritize compliance with food safety regulations by implementing robust management practices, such as regular audits, staff training, and effective monitoring systems. Ensuring consistent adherence to food safety standards not only reduces the risk of foodborne illnesses but also enhances customer trust and satisfaction, leading to improved business performance.

Third, small food businesses should utilize food safety adherence as an intermediary factor between supply chain structure and long-term business performance. The study confirmed that food safety compliance mediates this relationship (H4), addressing RQ4 and emphasizing its role as a bridge between efficient supply networks and business success. By aligning supply chain practices with food safety regulations, businesses can achieve long-term sustainability and resilience.

Fourth, small food businesses should focus on customer-related outcomes, such as increased customer numbers, positive feedback, and consistent food safety standards, to achieve sustainable business performance. The findings highlight the importance of customer satisfaction in driving business success. Businesses should prioritize maintaining high-quality and safe food products, responding to customer feedback, and implementing effective management practices. Building a loyal customer base through consistent quality and safety standards can drive business growth and competitiveness.

Finally, small food businesses should adopt sustainable practices to align with global sustainability goals, such as the United Nations Sustainable Development Goals (SDGs). The study underscores the importance of integrating sustainable practices into operations, such as reducing food waste, sourcing ingredients ethically, and minimizing environmental impact. By adopting sustainable practices, businesses can enhance their reputation, meet regulatory requirements, and contribute to the broader goal of promoting sustainable food systems.

Although the study found no significant direct relationship between supply chain structure and long-term business performance (H1), addressing RQ1, this finding underscores the importance for businesses to focus on other factors, such as food safety adherence, to achieve sustainable results. By implementing these recommendations, small food businesses in Malaysia can navigate regulatory challenges, improve operational efficiency, and contribute to the development of sustainable and resilient food systems. The findings align with the research objectives by offering practical insights on how small food businesses can optimize their supply chain structure, strengthen food safety adherence, and attain long-term business performance.

To further strengthen regulatory adherence and long-term operational success, small food service businesses in Malaysia should capitalize on national digital traceability tools and financial support mechanisms tailored for food safety. One practical step is to adopt MyTrace, Malaysia's blockchain-based traceability system introduced by the Ministry of International Trade and Industry (MITI, 2023). MyTrace enables businesses to digitally record, track, and authenticate product movement across the supply chain. By leveraging this technology, small food enterprises can improve supply chain transparency, build consumer trust, and proactively respond to regulatory requirements (Ministry of International Trade and Industry Malaysia, 2023).

International Journal of Entrepreneurship and Management Practices
IJEMP
EISSN : 2600-8750
Volume 8 Issue 31 (September 2025) PP. 136-152
DOI: 10.35631/IJEMP.831010

In addition, businesses should explore government-supported financial assistance, such as SME Corporation Malaysia's Food Safety Matching Grant, which subsidizes expenses related to obtaining HACCP certification. This grant reduces financial barriers to compliance by co-financing the cost of certification, consultancy, and training (SME Corporation Malaysia, 2023). Utilizing such programs allows small enterprises to institutionalize food safety practices while enhancing their competitiveness in both domestic and export markets.

Incorporating these tools and incentives aligns with Malaysia's broader policy direction on SME digitalization and food safety modernization and ensures small food businesses remain resilient, compliant, and competitive in the evolving regulatory landscape.

Conclusion

In conclusion, this study emphasizes the crucial role of food safety adherence as an intermediary between supply chain structure and long-term business performance in small food service businesses in Malaysia. Although supply chain structure does not directly impact business performance, it plays a significant role in improving food safety compliance, which subsequently drives sustainable outcomes. The findings underscore the importance of efficient supply chain practices, robust food safety management, and customer-focused strategies in achieving long-term success. By implementing the recommendations, small food businesses can improve their operational efficiency, comply with regulatory standards, and contribute to the development of sustainable and resilient food systems. This study not only addresses a significant gap in literature but also provides actionable insights for practitioners and policymakers in the food service industry.

Despite its contributions, this study is not without limitations. The relatively small sample size (n = 50) limits the generalizability of the findings across the broader population of small food enterprises in Malaysia. Future research should consider expanding the sample to include diverse geographical regions and business types to enhance external validity. Moreover, the study employed a quantitative approach using Structural Equation Modeling (SEM), which, while robust, may not fully capture the nuanced institutional and regulatory challenges faced by businesses. To address this, future research could incorporate qualitative methods, such as in-depth interviews with Malaysian food safety regulators, SME owners, or supply chain managers. Such approaches would help uncover deeper insights into policy-level barriers, compliance bottlenecks, and the practical realities of implementing traceability and certification standards in small-scale operations.

Acknowledgement

This research was not funded by any grant.

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EISSN : 2600-8750
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IJEMP
EISSN : 2600-8750
Volume 8 Issue 31 (September 2025) PP. 136-152
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