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Food Quality as a Determinant of Student Satisfaction in Higher Education Food Courts

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ABSTRACT

This study examines the relationship between food quality attributes (taste, freshness, temperature, and healthy options) and student satisfaction in university food courts at Universiti Teknologi MARA (UiTM), Pulau Pinang Branch. Drawing upon service quality theory and expectation-confirmation perspectives, the study employs a quantitative cross-sectional design. Data were collected from 132 students using structured questionnaires and analysed using descriptive statistics and regression. The findings indicate that all four food quality attributes are significantly and positively associated with student satisfaction, with taste emerging as the strongest predictor. Freshness and temperature also demonstrate substantial positive relationships, while healthy options contribute meaningfully to overall satisfaction. The findings highlight the importance of maintaining high food quality standards to enhance students' campus dining experiences. Practical implications for university food service management are discussed.

1. INTRODUCTION

University food courts significantly influence student satisfaction by providing not only nourishment but also a social environment that shapes the overall campus experience. Beyond their functional role in meeting students' dietary needs, campus dining facilities serve as communal spaces where students interact, socialise, and spend substantial portions of their daily routines. As such, food courts contribute meaningfully to students' perceptions of institutional support and service quality. Empirical evidence suggests that key food quality attributes, including taste, freshness, temperature, and the availability of healthy options, play central roles in shaping perceived value and overall satisfaction with university food services (Haque et al., 2024; Khalid et al., 2025; Serhan & Serhan, 2019).

Studies conducted in Malaysian and international university contexts consistently indicate that food quality, alongside service quality, setting or ambience, and price perceptions, are critical determinants of student satisfaction (Haque et al., 2024; Khalid et al., 2025; Serhan & Serhan, 2019). While service quality

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and setting quality are frequently identified as strong predictors, food quality remains a foundational element because it directly relates to the core product being delivered. For instance, Khalid et al. (2025) and Serhan and Serhan (2019) report that setting and service factors may enhance the dining experience, but satisfaction cannot be achieved when food quality expectations are unmet. Similarly, Haque et al. (2024) emphasise that food quality attributes significantly influence students' evaluations of campus dining services, reinforcing the centrality of sensory and product-related characteristics in satisfaction formation.

Within the Malaysian higher education context, research further underscores the need to improve food quality standards. Although food pricing in university cafeterias may be perceived as reasonable, particularly among international students, food quality remains an area that requires improvement to increase overall satisfaction (Akbara et al., 2021). This suggests that affordability alone does not guarantee positive evaluations of campus food services; rather, students prioritise sensory appeal, freshness, and overall food standards when forming satisfaction judgments.

In addition to food-related attributes, complementary service dimensions such as staff behaviour, cleanliness, and responsiveness also contribute meaningfully to positive dining experiences (Andaleeb & Caskey, 2007; Raihen et al., 2023). These factors influence students' holistic perceptions of service encounters. However, despite the recognised importance of service and environmental attributes, food quality remains the central offering in any food service operation. Without adequate taste, freshness, and temperature control, even strong service delivery may not sufficiently compensate for deficiencies in the core product.

From a broader institutional perspective, improving multiple dimensions of food quality has implications beyond immediate dining satisfaction. Enhanced campus food services have been associated with improved student well-being, stronger engagement, and more positive academic and social experiences (Akter et al., 2020; Sadekin et al., 2020). Therefore, understanding the specific food quality attributes that strongly influence student satisfaction is essential for strategic campus food service management.

Despite the significance of these elements being acknowledged, there remains a notable absence of empirical studies that specifically isolate the multidimensional attributes of food quality that dictate student dining satisfaction in campus food courts. Prior literature has historically concentrated on broader or peripheral hospitality constructs. For instance, recent studies have evaluated the impact of physical surroundings and design aesthetics on dining hall satisfaction (Mohd Fauzi & Rusali, 2024), the critical role of service speed and staff attentiveness in shaping customer impressions (Yago, 2025), or the general effects of food and environmental atmospherics in neighbouring institutional branches (Misiran et al., 2022). Furthermore, other investigators have examined the broad, combined effects of general service quality, pricing, and cafeteria hygiene on student satisfaction (Haque et al., 2024). While these near-peer studies offer valuable contextual insights, none replicate or address the precise focus of the present study. Specifically, there is a complete deficiency of targeted research that isolates and models the four core food quality attributes (taste, freshness, temperature, and healthy food options) and determines their direct, individual impacts on student satisfaction within the unique, high-traffic food courts of the Universiti Teknologi MARA, Pulau Pinang Branch. This study directly addresses this empirical gap, providing a localised, attribute-specific framework that other studies overlook.

1.1 Research Objectives

The main objective of the study is to evaluate the influence of food quality and its attributes on student satisfaction in the food courts at the Universiti Teknologi MARA, Pulau Pinang Branch. The following objectives further support the main objective:

- RO1: To evaluate the influence of food quality attributes on student satisfaction
- RO2: To investigate the influence of food taste on student satisfaction
- RO3: To determine the influence of food freshness on student satisfaction

RO4: To identify the influence of food temperature on student satisfaction

RO5: To assess the influence of healthy food options on student satisfaction

2. LITERATURE REVIEW

2.1 Theoretical Foundation

Drawing on Oliver's (1980) Expectation-Confirmation Theory (ECT), satisfaction arises when perceived performance confirms or exceeds expectations. In university dining contexts, performance perceptions are formed through concrete product-based attributes, specifically: sensory (taste, temperature), quality-signalling (freshness), and value-based (healthy options) characteristics. According to Oliver's framework, students enter the dining environment with baseline expectations regarding these food quality attributes. Once they consume the food, they evaluate the actual performance. If the sensory attributes (such as taste and temperature) and quality signals (freshness and healthy options) meet or exceed their expectations, cognitive confirmation occurs, which directly translates into student dining satisfaction. Conversely, if these attributes fall short, disconfirmation occurs, leading to dissatisfaction. Rather than modelling food quality as a single aggregated construct, this study conceptualises it as a multidimensional formative structure composed of distinct attributes that independently shape satisfaction evaluations, thereby, aligning with more recent applications of expectation-confirmation frameworks in hospitality research (Haque et al., 2024; Khalid et al., 2025; Lee & Whaley, 2018).

2.2 Food Quality Attributes

Food quality is believed to influence customer loyalty and satisfaction in the food service sector. In this study, key food quality attributes in the university's food courts include taste, freshness, temperature, and healthy food options. These attributes are believed to affect students' overall dining experience, their perceptions of value, and the food's sensory appeal (Bashir et al., 2013; Namkung & Jang, 2007). Supporting this, recent research has confirmed that high overall food quality remains the baseline expectation for institutional dining satisfaction (Haque et al., 2024; Khalid et al., 2025).

H₁: Food quality attributes positively influence student satisfaction.

2.3 Food Taste

Taste is widely recognised as a primary determinant of customer satisfaction in restaurant contexts (Namkung & Jang, 2007). In university food courts, which often operate as captive markets with limited alternative options, the sensory experience of taste becomes the core driver of repeat dining decisions. Flavorful, well-prepared, and seasoned meals enhance students' dining experiences, positive emotional responses, and word-of-mouth recommendations (Sriyalatha & Kumarasinghe, 2021). Within the expectation-confirmation process, taste acts as the primary sensory confirmation mechanism. When the taste of meals consistently meets or exceeds prior culinary expectations, students develop a higher cognitive evaluation of overall food service quality, leading to satisfaction (Lee & Whaley, 2018).

H₂: Food taste positively influences student satisfaction.

2.4 Food Freshness

Food freshness serves as a critical signal of raw ingredient quality, proper hygiene, and nutritional preservation. In high-volume institutional dining settings, such as campus food courts, students associate fresh ingredients with high standards of preparation, food safety, and care (O'Donnell et al., 2022). Empirically, freshness has been found to reduce health concerns and build consumer trust in food vendors (Luong & Hussey, 2022). From an academic standpoint, freshness operates as an experiential cue that reinforces the credibility of food service providers. When students perceive the ingredients as fresh, it confirms their expectations of hygiene and healthfulness, thereby acting as a powerful antecedent of overall dining satisfaction.

H₃: Food freshness positively influences student satisfaction.

2.5 Food Temperature

Food temperature affects both sensory perception and food safety. Proper temperature control preserves the intended flavour profiles and textures of meals while minimising the risk of microbial growth and time-temperature abuse (Ndraha et al., 2018). Serving food at optimal temperatures (e.g., hot foods served hot, cold foods served cold) enhances taste perception and overall sensory enjoyment (Green & Nachtigal, 2012; Lemon, 2021). In campus food courts, where food is often prepared in advance or kept in holding stations, maintaining appropriate serving temperatures represents a critical operational execution metric. Students interpret temperature management as a direct indicator of operational diligence and kitchen quality standards, which significantly impacts their final satisfaction evaluations.

H4: Food temperature positively influences student satisfaction.

2.6 Healthy Food Option

The availability of healthy food options has become increasingly critical as the contemporary student population becomes more health-conscious. Modern students are increasingly aware of dietary quality, nutritional balance, and well-being. They actively seek out dining facilities that offer nutritious menu options, such as low-calorie meals, fresh vegetables, and balanced portions (Li et al., 2022). Expanding healthy food offerings enhances the perceived value of campus dining facilities and signals institutional responsiveness to students' evolving lifestyle needs (Sulek & Hensley, 2004). When campus dining options align with students' health-oriented values and dietary requirements, it positively shapes their overall satisfaction with on-campus services.

H5: Healthy food options positively influence student satisfaction.

3. STUDY FRAMEWORK

Figure 1 demonstrates the study framework linking the constructs under study. This study conceptualises food quality as a multidimensional construct comprising four first-order attributes: taste, freshness, temperature, and healthy options. Rather than modelling food quality as a higher-order reflective construct, each attribute is treated as an independent predictor of student satisfaction. This approach allows for the identification of the relative strength of each quality dimension and avoids conceptual overlap between aggregated and disaggregated constructs.

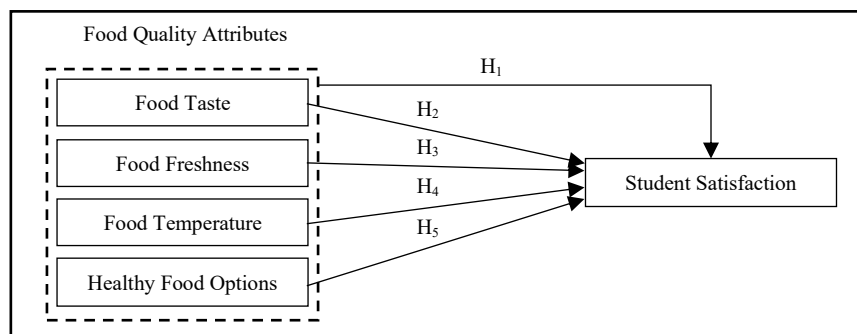


Figure 1. Study Framework

Adapted from Bashir et al. (2013), Haque et al. (2024), and Khalid et al. (2025)

4. METHOD

4.1 Research Design

This study employed a quantitative, cross-sectional survey design conducted in a natural campus setting. The 'natural campus setting' refers to conducting the study within the actual, everyday dining environment

of the university food courts during their typical operating hours. This approach allowed for capturing authentic, real-time student evaluations immediately after their dining experiences without artificial manipulation or experimental intervention, thereby enhancing the ecological validity of the findings.

4.2 Population and Sampling

The population consisted of 5,827 active students enrolled at the Universiti Teknologi MARA, Pulau Pinang Branch during the October 2025–February 2026 semester. Using G*Power analysis and established regression sampling guidelines (Tabachnick et al., 2007), the minimum required sample size was 116 respondents. A total of 132 usable responses were collected using purposive sampling. Participants were required to have dined at the campus food courts.

4.3 Instruments

A structured questionnaire was developed based on established literature and adapted from recent campus dining studies to ensure currency and contextual relevance (Haque et al., 2024; Serhan & Serhan, 2019). The instrument contained five sections: Food Taste (5 items), Food Freshness (5 items), Food Temperature (5 items), Healthy Food Options (5 items), and Student Satisfaction (5 items). Responses were measured using a five-point Likert scale (1 = strongly disagree, 5 = strongly agree) (Sullivan & Artino Jr, 2013).

4.4 Data Collection

Data collection was conducted over a four-week period during the October 2025–February 2026 semester. The survey was distributed using a dual-mode approach: electronically via QR codes linked to Google Forms posted on dining tables, and physically via printed questionnaires distributed by research assistants. Data collection occurred during peak dining hours (lunch from 12:00 PM to 2:00 PM, and dinner from 6:00 PM to 8:00 PM) at the main campus food courts to ensure a diverse and representative sample of students who had just consumed their meals.

4.5 Data Analysis

Data were analysed using IBM SPSS Version 30. Descriptive statistics, including means and standard deviations, were calculated to examine central tendencies. Multiple regression analysis was conducted to assess the relationships between individual food quality attributes and student satisfaction. Statistical significance was evaluated at $p < .05$. Prior to testing, standard regression assumptions (collinearity, autocorrelation, homoscedasticity, and normality of residuals) were verified.

4.6 Reliability Coefficient

A test of internal reliability was conducted on the questionnaire scales before proceeding with the main data analysis. The reliability coefficient, specifically Cronbach's alpha, measures the internal consistency of the scales and is essential for verifying instrument quality (Tavakol & Dennick, 2011). In reporting reliability, standard academic thresholds are applied where a Cronbach's alpha value between .70 and .80 is considered 'acceptable,' between .80 and .90 is 'good,' and .90 and above is 'excellent' (Tavakol & Dennick, 2011; Wongsunopparat & Yunjia, 2022). As presented in Table 1, the Cronbach's Alpha values for the scales range from .837 to .934, indicating good to excellent reliability and confirming that the instruments are highly reliable for subsequent hypothesis testing.

Table 1. Each Section's Reliability Coefficient

Questionnaire	No. of Items	Cronbach's Alpha
Section B: Food Taste	5	.895
Section C: Food Temperature	5	.906
Section D: Food Freshness	5	.837
Section E: Healthy Food Options	5	.901
Section F: Student Satisfaction	5	.934

5. FINDINGS

5.1 Respondents' Demographic Profile

The demographic analysis of the 132 respondents indicates that the majority were female (75.8%). Most respondents were in the 21–25 years age bracket (68.2%). Regarding their level of education, more than half held bachelor's degrees (53.8%), and all respondents were single (100.0%).

5.2 Descriptive Statistics

Table 2 below presents the descriptive statistics of the respondents. Healthy food options recorded the highest mean score ($M = 4.33$, $SD = 0.92$), followed by student satisfaction ($M = 3.93$, $SD = 0.91$), food taste ($M = 3.89$, $SD = 0.88$), food temperature ($M = 3.77$, $SD = 0.93$), and food freshness ($M = 3.70$, $SD = 0.99$).

Table 2. Overall Descriptive Statistics for Each Section

	<i>N</i>	Minimum	Maximum	<i>M</i>	<i>SD</i>
Food Taste	132	1	5	3.89	.875
Food Freshness	132	1	5	3.70	.995
Food Temperature	132	1	5	3.77	.926
Healthy Food Option	132	1	5	4.33	.920
Student Satisfaction	132	1	5	3.93	.914

5.3 Regression Analysis

To examine the hypothesised relationships, hierarchical multiple regression analysis was conducted using IBM SPSS Statistics Version 30. Prior to hypothesis testing, regression assumptions were assessed. Multicollinearity diagnostics indicated acceptable levels (VIF values ranged from 1.82 to 2.47, below the recommended threshold of 5; tolerance values exceeded 0.40). The Durbin–Watson statistic (1.94) indicated no autocorrelation concerns, and visual inspection of residual plots confirmed normality, linearity, and homoscedasticity.

In Model 1, overall food quality (composite index) was entered as a predictor of student satisfaction. The model was statistically significant, $F(1,130) = 307.42$, $p < .001$, explaining 70.3% of the variance in student satisfaction ($R^2 = .703$; Adjusted $R^2 = .699$). Food quality demonstrated a strong positive association with satisfaction ($\beta = .839$, $p < .001$), supporting H_1 .

Table 3. Model 1 – Overall Food Quality Attributes

Predictor Variable	β (Beta)	F-statistic	p-value	R^2	Adjusted R^2	Interpretation
Overall Food Quality (Composite Index)	.839	307.42	< .001	.703	.699	Strong positive association with student satisfaction; supports H_1

In Model 2, the four food quality attributes (taste, freshness, temperature, and healthy food options) were entered simultaneously. The overall model remained significant, $F(4,127) = 75.61$, $p < .001$, accounting for a substantial proportion of variance in satisfaction ($R^2 = .704$; Adjusted $R^2 = .694$).

Table 4. Model 2 – Individual Food Quality Attributes

Predictor Variable	β (Beta)	F-statistic	p-value	R^2	Adjusted R^2	Interpretation
Food Taste	.39	75.61	< .001	.704	.694	Strongest predictor of satisfaction; supports H_2
Food Temperature	.27		< .001			Significant positive predictor; supports H_3
Food Freshness	.21		< .01			Significant positive predictor; supports H_4
Healthy Food Options	.18		< .01			Significant positive predictor; supports H_5

Food taste emerged as the strongest predictor of student satisfaction, with a standardised beta coefficient of .39 ($p < .001$). Food temperature also showed a significant positive effect, with $\beta = .27$ ($p < .001$). Food freshness contributed meaningfully to satisfaction, with $\beta = .21$ ($p < .01$). Similarly, the healthy food options dimension was a significant predictor, with $\beta = .18$ ($p < .01$). Taken together, these findings indicate that all four attributes were significant predictors, and thus hypotheses H₂ through H₅ were supported.

6. DISCUSSION

The findings provide strong empirical support for the multidimensional role of food quality attributes in shaping student satisfaction within university food courts. Consistent with Expectation-Confirmation Theory, satisfaction arises when key performance dimensions, particularly sensory attributes, meet or exceed students' expectations.

6.1 The Influence of Food Quality Attributes on Student Satisfaction

Table 5. Research Objective 1, Research Question 1, and Hypothesis 1

Research Objective 1	Research Question 1
To evaluate the influence of food quality attributes on student satisfaction	What is the influence of food quality attributes on student satisfaction?
Hypothesis 1: Food quality attributes positively influence student satisfaction.	

Table 5 presents the relationship between food quality attributes and student satisfaction. The findings confirm that food quality attributes collectively exert a significant positive influence on student satisfaction, supporting H₁. This result aligns with Wooten et al. (2018), who emphasise that food quality dimensions are central determinants of satisfaction in university dining contexts. Similarly, Smith et al. (2020) argue that when food service performance meets or exceeds expectations, students develop favourable evaluations of campus dining services.

Drawing from expectation-confirmation perspectives, satisfaction arises when perceived performance confirms prior expectations. In institutional food environments, perceptions of performance are largely shaped by tangible product attributes. The model's high explanatory power indicates that food-related attributes are the foundational drivers of satisfaction in university food courts.

6.2 The Influence of Food Taste on Student Satisfaction

Table 6. Research Objective 2, Research Question 2, and Hypothesis 2

Research Objective 2	Research Question 2
To investigate the influence of food taste on student satisfaction	What is the influence of food taste on student satisfaction?
Hypothesis 2: Food taste positively influences student satisfaction.	

The findings underscore the pivotal role of food taste in shaping student satisfaction, supporting H₂. Food taste emerged as the strongest predictor of satisfaction, reinforcing the primacy of sensory gratification in dining evaluations. This finding aligns with Lee and Whaley (2018), who identify taste as the core experiential determinant of perceived food quality.

In institutional dining environments where alternative options may be limited, taste becomes central to repeated patronage decisions and overall service evaluation. Flavorful and well-prepared meals enhance emotional responses and encourage positive dining experiences. Conversely, poorly prepared or bland meals can diminish satisfaction and generate negative perceptions of campus food services.

From a theoretical standpoint, taste functions as the primary confirmation mechanism within expectation-confirmation processes. When taste meets or exceeds expectations, students are more likely to report satisfaction. Thus, sensory performance appears to outweigh other evaluative dimensions in shaping overall judgments.

6.3 The Influence of Food Freshness on Student Satisfaction

Table 7. Research Objective 3, Research Question 3, and Hypothesis 3

Research Objective 3	Research Question 3
To determine the influence of food freshness on student satisfaction	What is the influence of food freshness on student satisfaction?
Hypothesis 3: Food freshness positively influences student satisfaction.	

Food freshness demonstrated a significant positive relationship with student satisfaction, supporting H₃. This finding is consistent with O'Donnell et al. (2022), who emphasise that freshness enhances sensory appeal while signalling quality and attentiveness in food preparation.

Freshness operates as an experiential cue for hygiene, nutritional value, and institutional care. Students may interpret the use of fresh ingredients as evidence of operational responsibility and quality assurance. Such perceptions strengthen trust in campus food providers and reinforce positive evaluations.

Beyond immediate sensory effects, freshness contributes to the perceived credibility and reliability of food services. While its predictive strength was lower than that of taste and temperature, its significant effect highlights its importance as a quality-signalling attribute in institutional dining environments.

6.4 The Influence of Food Temperature on Student Satisfaction

Table 8. Research Objective 4, Research Question 4, and Hypothesis 4

Research Objective 4	Research Question 4
To identify the influence of food temperature on student satisfaction	What is the influence of food temperature on student satisfaction?
Hypothesis 4: Food temperature positively influences student satisfaction.	

The results indicate that food temperature significantly influences student satisfaction, supporting H₄. Food temperature demonstrated a substantial effect, underscoring the operational importance of service execution. Ndraha et al. (2018) note that temperature control is critical not only for preserving sensory qualities but also for ensuring compliance with food safety regulations.

Temperature enhances flavour perception and texture integrity while simultaneously signalling competence in food-handling practices. Its relatively strong predictive power suggests that students interpret proper temperature management as an indicator of overall quality assurance. Meals served at appropriate temperatures reflect operational precision and attentiveness to service standards.

Conversely, inadequate temperature control may diminish satisfaction and raise hygiene concerns. Thus, temperature functions both as a sensory enhancer and as a credibility signal within campus food service operations.

6.5 The Influence of Healthy Food Options on Student Satisfaction

Table 9. Research Objective 5, Research Question 5, and Hypothesis 5

Research Objective 5	Research Question 5
To assess the influence of healthy food options on student satisfaction	What is the influence of healthy food options on student satisfaction?
Hypothesis 5: Healthy food options positively influence student satisfaction.	

The healthy food options were found to positively and significantly influence student satisfaction, supporting H₅. However, although statistically significant, healthy options exhibited the smallest standardised effect among the predictors.

This suggests that while health consciousness is increasingly relevant, it functions as a complementary rather than dominant satisfaction driver. Students may value the availability of nutritious choices, but

immediate sensory experiences such as taste and temperature appear more influential in shaping evaluative judgments.

Consistent with Li et al. (2022), contemporary students demonstrate growing awareness of dietary quality and nutritional balance. The presence of healthy alternatives signals institutional responsiveness to evolving student preferences and contributes positively to perceived value. However, the comparatively lower predictive strength indicates that health-oriented attributes enhance satisfaction when combined with strong sensory performance rather than replacing it. Therefore, universities should balance sensory excellence with nutritional diversity to optimise student dining satisfaction.

7. CONCLUSION

This study demonstrates that core food quality attributes, specifically taste, freshness, temperature, and the availability of healthy options, are critical determinants of student satisfaction within the food courts of Universiti Teknologi MARA, Pulau Pinang Branch.

Several limitations warrant consideration. First, the cross-sectional design captures student opinions at a single point in time, which limits the ability to track how dining satisfaction fluctuates across the academic calendar. For instance, student dining satisfaction might vary significantly between the relaxed early weeks of the semester and the high-stress final exam period. Future research using longitudinal designs could track these shifting satisfaction dynamics over an entire academic year.

Second, relying on self-reported measures collected directly within the physical food courts introduces potential response biases. Students completing the survey via table-pasted QR codes on their mobile devices may have had their evaluations influenced by their immediate circumstances, such as academic fatigue, post-lecture hunger, or the social dynamics of dining in groups. Future studies could combine subjective student surveys with objective indicators, such as sales volumes from specific stalls or real-time temperature audits of food-holding units, to mitigate methodological bias.

Third, the single-institution focus on the UiTM Pulau Pinang branch limits the direct generalisability of these findings to other higher education environments. Penang is widely celebrated as Malaysia's culinary capital; consequently, students residing here may possess uniquely elevated culinary expectations and distinct local taste preferences compared to students in other regions. Additionally, campus dining structures and vendor varieties differ across Malaysian states. Cross-campus comparative studies would help establish whether these food quality thresholds remain consistent nationwide.

Finally, the study's purposive sampling method primarily captured the perspectives of students who actively and regularly frequent the main campus food courts during peak operating hours. This may exclude students who prefer cooking in their residential colleges, bringing packed meals, or relying on off-campus food delivery services. Future research should implement broader, probability-based sampling. Additionally, expanding the conceptual model to examine how student dining satisfaction interacts with non-food factors, such as monthly allowances, peak-hour waiting times, and the cleanliness of communal handwashing stations, would offer a more holistic understanding of the campus dining ecosystem.

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9. CONFLICT OF INTEREST STATEMENT

The authors declare that there are no financial, personal, or professional relationships that could be perceived as influencing the research reported in this manuscript. The research was conducted independently, and the authors have no competing interests to disclose.

10. AUTHORS' CONTRIBUTIONS

Mohd Alif Aziz: contributed to the study's conceptualisation and research design, data collection, preliminary data analysis, and manuscript drafting. **Nurul Adibah Norkhalid:** contributed to the development of the study framework, data interpretation, and critical revision of the manuscript. **Muhammad Alif Firdaus Sahronizam** and **Athirah Jumaat:** assisted with data collection, data entry, and statistical analysis using SPSS. **Muhammad Arif Aizat Bashir:** supervised the overall research project, validated the research methodology and analysis, and provided substantial critical revisions and final approval of the manuscript for publication. All authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

11. DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES

During the preparation of this work, the author(s) used Google NotebookLM to assist with the organisation, synthesis, and review of information from the materials provided, and Grammarly to assist with grammar, spelling, language, and writing style. After using these tools/services, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

12. DATA AVAILABILITY/SUPPLEMENTARY MATERIALS

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

13. ETHICS STATEMENT

This study was reviewed and approved by the UiTM Pulau Pinang Branch Ethics Research Committee (BERC) (Reference No.: BERC/11/2025 (UG/MR/405)). The research was conducted in accordance with the approved research proposal and applicable ethical requirements. Informed consent was obtained from the participants, and the anonymity and confidentiality of participants' information were maintained throughout the study.

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