Examining University Students' Satisfaction with Online Food Delivery Apps

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Abstract: Online food delivery (OFD) services have rapidly gained traction within Malaysia's food and beverage industry, reshaping traditional dining practices. This study explores the influence of visual design, navigation quality, information design, delivery service, timeliness, and security on the satisfaction of Universiti Teknologi MARA, Permatang Pauh students. Through a detailed analysis of design elements and their effects on user engagement and platform usage, the research aims to uncover how visual aesthetics impact user trust and preferences. Using stratified sampling, 200 valid responses were collected from students in the Science and Technology and Business and Management faculties. Applying the Technology Acceptance Model (TAM), the findings underscore the critical roles of perceived usefulness and behavioural control in determining students' intentions to use food delivery apps. The study provides valuable insights for enhancing OFD services within the higher education context.

Keywords: Customer satisfaction, higher education, online food delivery, Technology Acceptance Model

Introduction

The digital age is taking over the traditional ways in almost every aspect of our lives. Online banking, online stock trading, online learning and even online workplace is becoming popular. The integration of technology, culture and strategy inside the workplace is not only a trend but a prerequisite for long-term success (Razali et. al, 2024). In Malaysia's food and beverage industry, online food delivery (OFD) services have emerged as a prominent trend, revolutionising traditional take-away and dining-out practices. Online food ordering has become the new norm for enjoying meals, with Malaysia hosting a range of food delivery companies. Notably, FoodPanda was the first to aggressively establish its presence in this market (Lee, Sung, & Jeon, 2019). Economic growth and digital advancements have drastically transformed lifestyles, leading to a significant increase in online food purchases. According to Putit et al. (2016), busy individuals, constrained by time, favour food delivery applications to bypass long queues and save time. This preference is particularly strong among those with demanding schedules (Isa et al., 2021). The growing popularity of OFD services in Malaysia suggests a continued trend toward innovative ordering and receiving methods. Businesses can capitalise on this trend by partnering with food delivery companies such as DahMakan, Other Kitchen, and Cooked, among others, to enhance their market presence (Azman, Mahsuri & Ibrahim,2021). A key business strategy involves registering with various food delivery applications,

including GrabFood, Foodpanda, ShopeeFood, Airasia Food, EASI (Hungry), Bungkusit, DeliverEat, LOLOL, GemSpot, Beep Delivery, Tapau, and OdaMakan. This has led to widespread consumer adoption, making food delivery applications a significant trend in the global business landscape.

The increased demand for food delivery applications has heightened competition in the food and beverage sector. Lee et al. (2019) highlight that a busy lifestyle drives consumers to use these services to reduce waiting times and avoid commuting for food or beverages. Furthermore, during the peak of the COVID-19 pandemic, food delivery applications proved essential, allowing customers to obtain food without leaving their homes (Li et al., 2020; Zhao & Bacao, 2020).

In Malaysia, OFD services have had a profound impact on the food and beverage industry by driving business growth, increasing employee productivity, ensuring order accuracy, and building important customer databases. A key factor contributing to the development of OFD services is the growth in smartphone usage. In 2016, 17.9 million Malaysians accessed the Internet via their mobile phones, a number expected to reach 21.1 million by 2020. This increasing smartphone penetration made it more convenient for consumers to shop anywhere and anytime. Retail sales via mobile devices accounted for 15% of all online sales in 2016 and were predicted to account for 22% by 2020. The convenience of accessing OFD services through smartphones likely motivated consumers to shift from traditional offline food purchases to adopting OFD services, offering a wide selection of food choices with just a single click (Lee, Sung, & Jeon, 2019).

The food industry, like many other sectors, has significantly benefited from the e-commerce surge. The rise of food distribution apps and websites has revolutionised how food is accessed, transitioning from traditional telephone orders to digital platforms. Online food ordering, through websites or mobile apps, has seen steady growth in recent years. With ongoing technological advancements, food delivery services have shifted from phone-based orders to digital solutions, creating new opportunities for the food industry to attract a larger customer base (Ramesh et al., 2021). However, while OFD services have become integral to the food industry, the impact of these digital platforms' design on user satisfaction remains underexplored. This study aimed to thoroughly investigate the effects of visual design on user satisfaction in digital service contexts, exploring how design elements influence user interaction and platform usage. Additionally, the research sought to clarify the complex relationship between visual design, user trust, and personal preferences in digital service interactions, particularly focusing on the satisfaction of Universiti Teknologi MARA, Permatang Pauh students using OFD services.

Literature Review

Student satisfaction with Online Food Delivery (OFD) services

Online food delivery (OFD) services allow orders to be made through internet-based websites, while food delivery applications (FDA) typically restrict orders to mobile apps. FDA services can be categorised by their functionalities, including order placement, monitoring, payment, and tracking, though they are not responsible for actual food preparation. Two main categories exist: restaurant-operated FDA services (e.g., Domino's, Pizza Hut, KFC) and intermediary services like Foodpanda and Uber Eats that work with multiple restaurants (Ray, Dhir, Bala, & Kaur, 2019).

Research on university students' satisfaction with OFD services highlights several influencing factors. Azman et. al (2021) found that delivery service, time, security/privacy, and price are significant, with delivery service being the most critical. Pal (2021) pointed out that visual, navigational, and information design drive satisfaction and loyalty, with information design having the greatest impact. However, Rahman (2022) stressed that while students appreciate the convenience of OFD services, there are concerns about the overall user experience. These findings suggest a complex interaction of factors that contribute to student satisfaction with OFD services.

Interaction quality: The role of visual design

Interaction quality, particularly visual design, is a significant determinant of satisfaction in OFD applications. Multiple studies confirm that a well-designed interface contributes to higher user

satisfaction. For instance, Adekannbi (2019) and Ganatra (2021) highlighted that both information and service quality, as part of visual design, significantly influence satisfaction among university students. Rahman (2022) emphasised application quality and convenience as critical factors, while Patma (2021) noted the importance of information quality in customer satisfaction within the GoFood application.

Further studies suggest that features related to visual, information, navigation, and collaboration play a crucial role in enhancing user satisfaction (Fergyanto, Gunawan, Sondakh, & Alamsjah, 2020). The findings underscore the importance of a holistic approach to designing OFD applications, where visual design is key to improving user interaction and overall satisfaction. Previous research has shown that aesthetic appeal, layout, color schemes, and overall visual quality impact users' perceptions and trust in an app (Pal, 2021). However, there is a gap in exploring how these elements specifically affect satisfaction among university students. H1 aims to address this gap by examining the role of visual design in shaping satisfaction levels among Universiti Teknologi MARA Permatang Pauh students.

Hypothesis 1 (H1):   *There is a positive relationship between Interaction Quality (Visual Design) and satisfaction among UiTM Permatang Pauh students using food delivery mobile applications.*

Environment quality: Navigation design in OFD Apps

Environmental quality, particularly navigation design, has been extensively studied concerning its impact on university students' satisfaction with OFD services. Studies by Pal (2021) and Azman (2021) show that the quality of navigation directly impacts user satisfaction, with delivery service having a significant influence. Adi (2022) and Prasetyo et al. (2021) also emphasised navigation's role in shaping trust, satisfaction, and loyalty.

The literature suggests that navigation quality is a critical factor in user satisfaction, with studies calling for a more comprehensive framework to understand its impact across different cultural contexts and locations. Addressing these knowledge gaps will enhance strategies for improving OFD services and student satisfaction. Navigation design refers to the ease with which users can find information and complete tasks within an app. Studies have identified that clear, intuitive navigation significantly impacts user experience and satisfaction (Pal, 2021). This hypothesis was formulated to investigate whether navigation quality, such as user-friendly menus and smooth transitions between app sections, positively influences the satisfaction of UiTM students, highlighting the importance of seamless app usability in enhancing user engagement.

Hypothesis 2 (H2): *There is a positive relationship between Environment Quality (Navigation Design) and satisfaction among UiTM Permatang Pauh students using food delivery mobile applications.*

Outcome quality: Information design and user satisfaction

Outcome quality, especially information design, is crucial for user satisfaction in OFD services. Torabi (2021) emphasises the multifaceted nature of this relationship, where features like a user-friendly interface, personalised recommendations, real-time tracking, and integrated payment systems significantly enhance the user experience. For instance, Grabfood offers personalised recommendations, while Foodpanda integrates various payment methods, contributing to a seamless user experience.

Studies like Yaacob (2022) and Adeyemi (2020) highlight the importance of reliable service, high-quality information, and system quality in determining user satisfaction. These findings suggest that focusing on service quality, reliability, and information design can significantly enhance user satisfaction and loyalty among university students. Outcome quality, particularly in the context of information design, relates to how effectively an app presents details such as food descriptions, prices, delivery times, and customer reviews. Previous findings suggest that comprehensive and clear information design is a key driver of user satisfaction (Pal, 2021; Rahman, 2022). This hypothesis

addresses the need to understand the impact of information clarity and accuracy on student users' overall satisfaction, acknowledging that well-structured information can significantly enhance user trust and decision-making.

Hypothesis 3 (H3): *There is a positive relationship between Outcome Quality (Information Design) and satisfaction among UiTM Permatang Pauh students using food delivery mobile applications.*

Delivery quality and its impact on student satisfaction

Delivery quality is a multifaceted aspect of OFD services that significantly influences student satisfaction. Azman (2021) identified delivery service as the most influential factor, while Pal (2021) and Sjahroeddin (2018) pointed out the importance of food quality, e-service quality, and perceived value. Other studies, like those by Nanaiah (2020) and Amron (2022), emphasise the role of information quality, ease of use, and convenience in continued app usage.

Lin (2023) noted that pre-consumption service quality impacts food satisfaction and repurchase intention, while Zhongcao (2022) highlighted the effects of perceived severity, ease of use, and information quality during the COVID-19 pandemic. Chung & Yi (2023) also stressed the importance of delivery quality, including hygiene and customer complaint handling, in driving customer satisfaction. Delivery quality, encompassing aspects like timeliness, order accuracy, and condition of delivered food, has been consistently highlighted as a crucial factor influencing user satisfaction in OFD services (Azman, 2021). However, specific insights into how these delivery aspects affect university students' satisfaction are limited. This hypothesis aims to explore whether high delivery quality directly correlates with higher satisfaction among Universiti Teknologi MARA Permatang Pauh students, emphasizing the importance of reliable and efficient service delivery in the student segment.

Hypothesis 4 (H4): *There is a positive relationship between Delivery Quality and the satisfaction level of UiTM Permatang Pauh students using food delivery mobile applications.*

Technology Acceptance Model (TAM) and OFD services

The Technology Acceptance Model (TAM) provides a framework for understanding the factors influencing university students' satisfaction with OFD apps. Studies by Chao (2019), Lee, Sung, and Jeon (2019), and Troise et al. (2020) reveal the impact of perceived usefulness, effort expectancy, social influence, and facilitating conditions on user intentions and satisfaction.

However, gaps in the literature exist, particularly regarding the influence of contextual factors like cultural differences and economic conditions on technology acceptance. The review suggests a need for longitudinal studies and the exploration of emerging technologies like AI and AR in enhancing student satisfaction with OFD services. Delivery quality, encompassing aspects like timeliness, order accuracy, and condition of delivered food, has been consistently highlighted as a crucial factor influencing user satisfaction in OFD services (Azman, 2021). However, specific insights into how these delivery aspects affect university students' satisfaction are limited. This hypothesis aims to explore whether high delivery quality directly correlates with higher satisfaction among UiTM students, emphasizing the importance of reliable and efficient service delivery in the student segment.

Methodology

Research design

This study employs a correlation research design to explore the relationships between various factors and their impact on student satisfaction with online food delivery (OFD) apps among UiTM Permatang Pauh students. Following the framework established by Pal (2021), this design is

particularly suited to examining the strength and direction of relationships between variables, allowing for a deeper understanding of the factors influencing satisfaction levels.

Sampling method

A stratified sampling method was used to ensure a representative and diverse sample. Following the guidelines of Mondal (2020) and Pettersson (2021), the population was divided into distinct subgroups (strata) based on characteristics such as age, gender, and frequency of OFD app usage. A random sample from each stratum was then selected, ensuring that the sample reflects the population's diversity and enhances the generalizability of the findings.

Data collection

Data were collected using a structured questionnaire adapted from Pal's (2021) study, focusing on aspects of student satisfaction with OFD apps. The questionnaire employed a 6-point Likert scale to capture nuanced responses, as supported by Jensen et al. (2021) and Grimby & Frändin (2018). This scale allows for more accurate reflection of students' experiences and opinions. The questionnaire was distributed both online and in person, maximising reach and convenience for the participants.

Data generation and recording process

The data generation process involved administering the questionnaire to the selected sample. Responses were recorded directly into a secure digital database to maintain data integrity and confidentiality. To ensure accuracy, the data entry process was carefully monitored, and any incomplete or inconsistent responses were flagged for review. The data collection period lasted two weeks, with regular follow-ups to ensure a high response rate. All responses were anonymized to protect participant privacy before analysis.

Before conducting the main analysis, several assumption checks were performed to ensure the validity of the results: For Normality Test, the distribution of the data was assessed using the IBM SPSS Statistics 26 test, which confirmed that all variables were normally distributed, as the results were non-significant ($p < 0.05$). For Linearity, the relationship between the independent variables and the dependent variable was checked for linearity, ensuring that the variables were suitable for correlation and regression analyses. Lastly, Equality of Variance (Homoscedasticity), the assumption of homoscedasticity was tested to confirm that the variance of errors was consistent across all levels of the independent variables.

Data analysis

The data analysis was conducted using IBM SPSS Statistics 26. The analysis began with descriptive statistics to summarise the demographic characteristics of the respondents and their overall satisfaction with OFD apps. The following methods were then applied Correlation Analysis, to explore the relationships between variables, correlation analysis was performed, following Tuo & He's (2021) methodology. This analysis identified the strength and direction of relationships between factors affecting satisfaction. Additionally, Multiple Linear Regression Analysis. This method, as recommended by Jankovic (2022), was employed to determine the most significant predictors of student satisfaction. Regression analysis allowed for the examination of how multiple independent variables simultaneously influence the dependent variable, which in this case is overall satisfaction with OFD apps among the students. The findings from these analyses provide a solid foundation for interpreting the results and drawing conclusions about the factors that most significantly influence student satisfaction with OFD services.

Findings and Discussion

The normality of the data distribution was assessed using the IBM Statistic 26 test, given the large sample size of 206 respondents. The test results indicated that the data were normally distributed, with a non-significant result ($p < 0.05$), providing significant evidence that all the variables in the study are normally distributed.

Table 1: Correlation of analysis between the variables

Variable	Interaction quality (visual design)	Environment quality (navigation design)	Outcome quality (information design)	Delivery quality	Student satisfaction
Interaction quality (visual design)	-	-	-	-	-
Environment quality (navigation design)	0.762	-	-	-	-
Outcome quality (information design)	0.747	0.733	-	-	-
Delivery quality	0.597	0.725	0.600	-	-
Student Satisfaction	0.643	0.704	0.618	0.657	-

Table 1 presents the correlation analysis, revealing moderate to high correlations between the studied variables. The strongest correlation was observed between Navigation Design and Student Satisfaction ($\square= 0.704$), indicating a substantial positive relationship. Moderate correlations were noted between Delivery Quality and Satisfaction ($\square= 0.657$), and between Visual Design and Satisfaction ($\square= 0.643$). The lowest, though still significant, correlation was between Information Design and Satisfaction ($\square= 0.618$). These results suggest that all four factors, Navigation Design, Delivery Quality, Visual Design, and Information Design, play crucial roles in determining student satisfaction with OFD apps.

Table 2: Result of multiple linear regression analysis

Hypothesis	Regression Weights	Beta Coefficient	t-value	p-value	Hypotheses Supported
H1	VD -> SS	.643	11.971	.000	Yes
H2	ND -> SS	.704	14.136	.000	Yes
H3	ID -> SS	.618	11.197	.000	Yes
H4	DQ -> SS	.657	12.417	.000	Yes

Note: *$p<0.05$, VD: Visual Design, ND: Navigation Design, ID: Information Design, DQ: Delivery Quality, SS: Student Satisfaction

The multiple linear regression analysis, as shown in Table 2, explored the impact of various design factors on student satisfaction. Navigation Design (ND) emerged as the most influential predictor, with a beta coefficient of 0.704 and an R^2 value of 0.496. This indicates that nearly half (49.6%) of the variation in student satisfaction can be explained by the quality of the navigation design, underscoring its critical role in enhancing user experience. Visual Design (VD) also showed a significant positive influence on satisfaction, with a beta coefficient of 0.643 and an R^2 value of 0.414,

meaning that 41.4% of the variance in satisfaction is attributable to visual design. Both Information Design (ID) and Delivery Quality (DQ) demonstrated significant contributions to student satisfaction, with beta coefficients of 0.618 and 0.657, respectively. Their R^2 values—0.382 for ID and 0.432 for DQ—further confirm their substantial impact on the overall satisfaction level. All these relationships were statistically significant, with p-values of 0.000, indicating a high level of confidence in these findings.

The study supports all four hypotheses (H1, H2, H3, H4), confirming that Visual Design, Navigation Design, Information Design, and Delivery Quality significantly impact student satisfaction with OFD mobile applications. The strong positive relationships identified by the beta coefficients and R^2 values emphasise the importance of these factors in creating a satisfying user experience for university students at UiTM Permatang Pauh.

The findings suggest that enhancing these aspects of mobile application design—particularly navigation and visual elements—can lead to higher satisfaction levels among users. The results align with previous research by Adekannbi (2019) and Ganatra (2021), which also highlighted the importance of effective app design and information quality in predicting user satisfaction. This study aimed to explore the factors influencing satisfaction among UiTM Permatang Pauh students using online food delivery services, applying a multidimensional approach to user satisfaction. The findings underscore the critical role of Navigation Design and Visual Design in shaping student satisfaction, with these two factors accounting for nearly half of the satisfaction variance. The practical implications of these findings are significant for developers and service providers: by focusing on intuitive navigation and visually appealing interfaces, they can enhance user satisfaction, leading to increased usage and customer loyalty.

The study also highlights the importance of Information Design and Delivery Quality in contributing to a positive user experience. Accurate information presentation and reliable delivery services are essential for maintaining high satisfaction levels, reinforcing the findings of Pal et al. (2021) regarding the role of delivery quality in customer satisfaction. Future research should build on these findings by exploring additional factors that may influence user satisfaction with OFD services, such as personalization features and user interface adaptability. Longitudinal studies could also be conducted to examine how satisfaction levels evolve over time with continued app usage. Additionally, expanding the study to include other universities could provide a more comprehensive understanding of the factors driving satisfaction in different contexts.

Conclusion

In conclusion, the satisfaction of UiTM Permatang Pauh students with online food delivery services is influenced by demographic factors, delivery quality, and the visual and interaction design of applications. Enhancing user satisfaction necessitates improving the reliability and security of delivery services, alongside optimising visual and navigational aspects. This holistic approach provides insights into how various app features impact user experience and satisfaction. Moreover, the study enriches understanding of consumer behaviour and technology interaction, particularly within a university context. From an academic perspective, this research offers significant insights into the satisfaction levels of UiTM Permatang Pauh students using online food delivery apps. It enhances knowledge of user preferences and experiences, contributing to broader discussions on consumer behaviour and technology adoption. Practically, the study's findings provide actionable insights for the food delivery sector. Understanding satisfaction factors among UiTM Permatang Pauh students informs the development of user-centric app features, enhances service quality, and improves overall customer experiences. These advancements can potentially boost customer retention and satisfaction in a competitive market environment. The research outcomes benefit individuals, researchers, institutions, and the community, advancing knowledge and guiding future best practices in the industry.

Suggestion for Future Research

Future research should expand the sample size to include students from multiple universities across Malaysia, incorporating variables such as financial considerations, health implications, and academic performance to provide a more comprehensive analysis

Co-Author Contribution

The authors confirmed that there is no conflict of interest in this article. Author 1 and 2 carried out the fieldwork and prepared the literature review. Author 3, 4 and 5 wrote the research methodology and did the statistical analysis and interpretation of the results.

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