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Use of Mobile Food Delivery Application as Mediator of Customer Satisfaction and Loyalty: Context of Restaurants in Davao City

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Abstract

The study aimed to explore customer satisfaction influences customer loyalty, with the use of mobile food delivery applications as a mediating factor. It was conducted within the context of restaurants in Davao City and utilized a descriptive-correlational study design along with mediation analysis. Correlational analysis was performed to examine the relationships between the variables. The researchers surveyed 300 students from both public and private schools who had prior experience with mobile food delivery applications, using adapted and modified questionnaires. The data analysis involved calculating means, standard deviations, Pearson Product Moment Correlation, regression analysis, medgraph, and the Sobel Z-test. The findings revealed that respondents exhibited very high levels of customer satisfaction, customer loyalty, and usage of mobile food delivery applications. Additionally, the research identified a significant correlation among the variables, and it was determined that the use of mobile food delivery applications has a significant partial mediating effect on the relationship between customer satisfaction and customer loyalty.

SGD Indicator: #12 responsible consumption and production.
8 decent work and economic growth
#13 climate action

Convenience of using mobile food delivery applications offers, however, problems such as application performance glitches, inconsistent order accuracy, and unreliable delivery times can significantly diminish the user experience (Chen, Lee & Wu, 2023). System dissatisfaction, cancellation and refund issues, and delivery time delays are key factors contributing to dissatisfaction in delivery applications. These factors influence users' private and public complaint behaviors (Kim, 2024). Despite widespread use, several issues affect their efficacy in fostering customer satisfaction and loyalty. Key concerns include application usability, delivery timeliness, order accuracy, and the quality of customer service (Chen, Lee & Wu, 2023; Gupta & Agrawal, 2024). Consequently, dissatisfaction may arise from shortcomings in these areas during application use, such as engagement, convenience, safety, and interactivity, which impact loyalty in mobile restaurant delivery applications (Giraldo, Ramirez & Piedrahita, 2024).

Subsequently, the quick increase in the popularity of online food delivery service has affected the traditional offline restaurant industry. With a simple click of a mouse, ordering food has turned into a comfortable and effortless habit. (Andal, Singh & Nair, 2022).Additionally, discrepancies between the application-promised delivery times and actual service and inaccuracies in order fulfillment can erode

consumer satisfaction and loyalty (Gupta & Agrawal, 2024). These issues are compounded by variability in customer service quality, which can further detract from the overall experience and affect repeat business (Kumar & Patel, 2024). On the other hand, mobile food delivery applications intersect with several Sustainability Development Goals (SDGs). The most relevant SDG is Goal 12: Responsible Consumption and Production. These applications can contribute to this goal by promoting efficient resource use through optimized delivery routes and reduced food waste via better order management (United Nations, 2024). Additionally, they can support Goal 8: Decent Work and Economic Growth by creating job opportunities for delivery personnel and fostering economic activity within local communities (United Nations, 2024). Nevertheless, regarding more of the Sustainable Development Goals, there are issues associated with Goal 13: Climate Action, since delivery traffic and unnecessary packaging contribute to the degradation of the environment. Solving these challenges entails the adoption of sustainability in the delivery processes, for instance, packing deliveries using an environmentally friendly approach as well as the general management of delivery services to minimize adverse impacts on the environment (United Nations, 2024).

As for the assessment of food delivery applications, it is helpful to measure customer satisfaction. The food business continues to grow steadily, while electronic commerce is rapidly growing internationally. People's perceptions towards online food orders also differ according to specified factors, including the ease or convenience level of buying food online, inventiveness in information technology, level of trust towards e-commerce rms, and other external influences (Sharma, Gupta & Verma, 2020).

According to Eaint (2022), It has been demonstrated that customer satisfaction and loyalty towards online food delivery services rise with improvements in service quality and customer trust. It also emphasizes the focus on quality and customer relations, as you cannot gain people’s trust by making mistakes or doing a subpar job. Satisfying customers’ expectations concerning the quality of the food delivered can also increase their satisfaction level.

Moreover, customer satisfaction towards food delivery applications is influenced by factors such as user experience, information quality, performance expectancy, habit, social influence, service quality, trust, food quality, perceived usefulness, enjoyment, and innovation. By understanding and addressing these factors, food delivery applications can enhance customer satisfaction and promote continued usage (Rita, Oliveira & Farisa, 2022).

Various factors influence consumers' loyalty towards mobile food delivery applications. The quality of the food and e-service offered by the mobile application is a significant determinant of consumer loyalty (Muninggar, Mulyana & Putra, 2022). Customers tend to show greater loyalty to a mobile food delivery application when they believe the food provided is of higher quality. Additionally, a favorable experience with the electronic service given by the application also contributes to the likelihood of customer loyalty. Customer satisfaction is an additional significant factor to consider. It has also been demonstrated that customer satisfaction serves as a mediator in the association between food quality, e-service quality, and customer loyalty (Carandang, Dula & Magsino, 2022).

Customer satisfaction with the quality of food and electronic service the mobile application offers positively influences their inclination towards loyalty to the platform. The aspect of perceived value also holds considerable importance in influencing customer loyalty towards mobile food delivery applications. In the same way, it has been indicated that perceived value positively affects consumer loyalty, encompassing elements such as price, convenience, and quality (Kwon, Bae & Cha, 2022). Customer loyalty towards a mobile application is more likely to be observed when customers think that the

application adequately fulfills their requirements and expectations while providing them with a favorable value proposition regarding the monetary investment made.

Moreover, Ahn, Ryu & Han (2021) have identified that various aspects, including trust, commitment, and social exchange, can influence customer loyalty towards mobile food delivery applications Customers demonstrate greater loyalty when they trust the application, maintain a commitment to using it, and sense a shared connection with the service. Customers who exhibit higher levels of innovation, demonstrate a consistent pattern of application usage, and are susceptible to the influence of others are more inclined to show loyalty towards the application. Furthermore, customers' loyalty towards mobile food delivery applications is subject to the effect of multiple aspects, encompassing food quality, electronic service quality, customer satisfaction, perceived value, trust, commitment, social interchange, personal innovativeness, habit, and social influence. The comprehension and effective handling of these aspects can facilitate firms in augmenting consumer loyalty and enhancing the efficacy of their mobile food delivery applications.

The food and beverage industry has experienced significant impact because of the advancement and integration of mobile applications. The availability of a mobile application for food and beverage procurement facilitates the convenient acquisition of sustenance from a wide range of locations. Incorporating user experience has emerged as a significant factor in enhancing consumer satisfaction and fostering customer loyalty (Adawiyah, 2022). The success of the online food delivery business can be attributed to various factors, including its reputation, promotional efforts, and customer service, which collectively contribute to enhancing customer satisfaction. The concept of customer loyalty within the realm of service marketing is crucial. The constancy of the relationship can be attributed to loyalty, which is a response closely linked to a commitment or guarantee of promise fulfillment. Moreover, it is common for continuous purchases to be portrayed as a manifestation of the commitment principle and a practical limitation on the same domain as the service provider. Customer loyalty serves as a reliable metric for assessing the strength of the relationship between consumers and a particular product or service, contingent upon their satisfaction and desire to maintain an ongoing purchasing affiliation (Setyawan,2021).

The focus of this study is to determine the mediating effect of use of mobile food delivery application on the significant relationship between customer satisfaction and customer loyalty in the context of restaurants. Specifically, to assess the level of customer satisfaction in terms of food quality, e-service quality, price, payment, delivery and time; to ascertain the level of customer loyalty towards restaurants in terms of behavioral, attitudinal, cognitive, conative, affective, trust and commitment; to measure the level of use of mobile food delivery application in terms of information, payment, safety factor, usefulness and convenience; to find out the significant relationship between, customer satisfaction and customer loyalty, customer satisfaction and use of mobile food delivery application and; use of mobile food delivery application and customer loyalty towards restaurants; to determine the significant mediation of use of mobile food delivery application to the significant relationship between customer satisfaction and customer loyalty in the context of restaurants.

The following null hypotheses are formulated and will be tested at 0.05 level of significance. There is no significant relationship between customer satisfaction and customer loyalty towards restaurants and the use of mobile food delivery applications has no significant mediating effect on the relationship between customer satisfaction and customer loyalty in the context of restaurants.

This study was anchored to the following theories: The Technology Acceptance Model (TAM) which explores how users perceive and accept technology. In the context of food delivery applications, the research factors influencing users' willingness to adopt and use these applications include perceived ease of use and perceived usefulness. (Davis et al., 1989). Also, The Kano Model categorizes service quality attributes into ve categories - basic needs, performance needs, excitement needs, indifferent needs, and reverse needs. It helps researchers understand how different attributes impact customer satisfaction Matzler et al., (1996). The study also stands on the Perceived Value Theory, which emphasizes the crucial role of customer loyalty in food delivery applications. Customers assess the value they receive from using the application, considering factors such as the variety of restaurant choices, menu options, pricing, delivery speed, and overall service quality Parasuraman (1991).Lastly, the Expectation Confirmation Theory (ECT) Believes that customer satisfaction is shaped by whether their prepurchase expectations are met or unmet. In the context of food delivery applications, if customers' experiences with the application meet or exceed their expectations regarding convenience, speed, and food quality, they are more likely to be satisfied and loyal to both the applications and the restaurant Oliver et al.(1994).

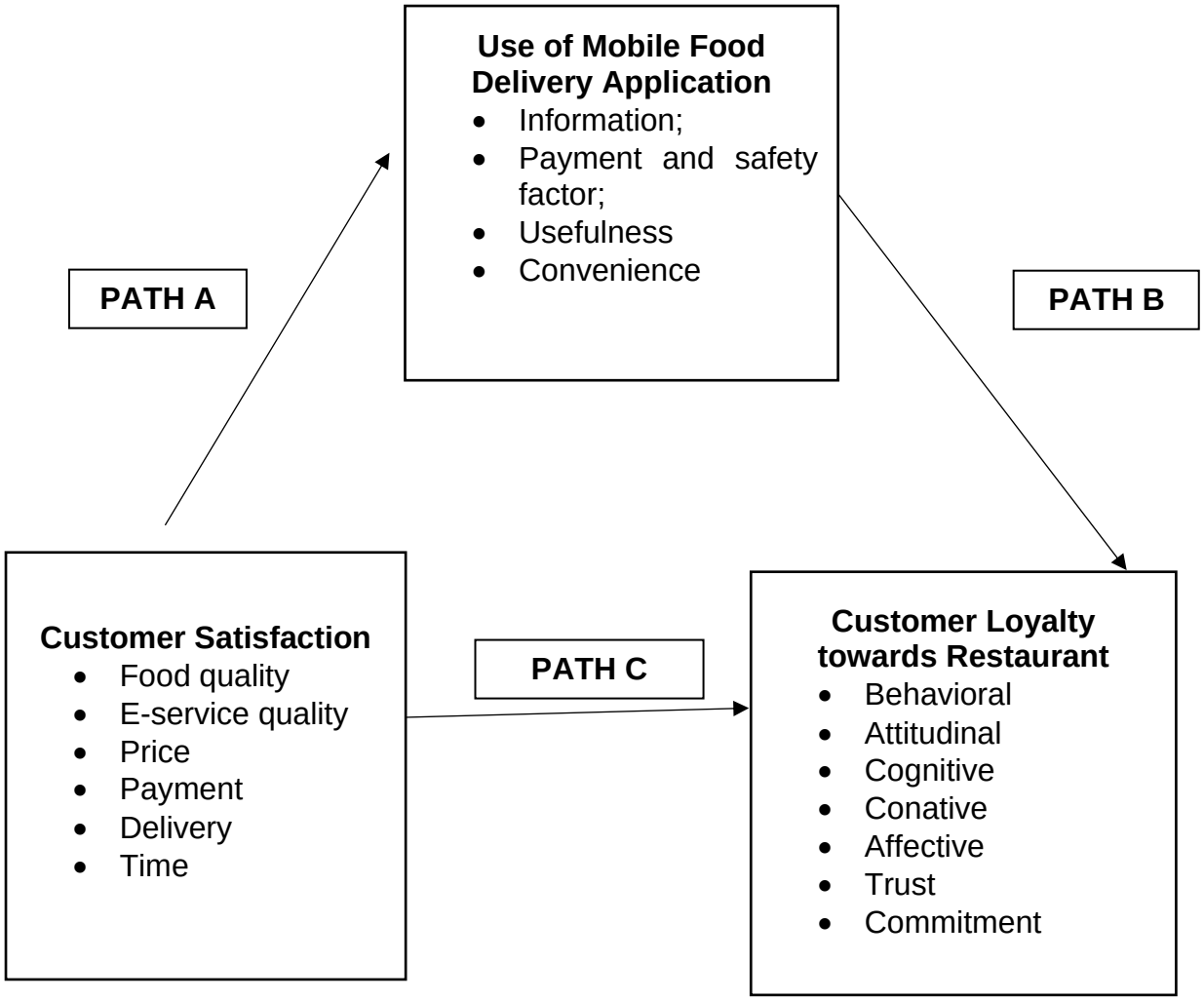

Figure 1. Conceptual Framework of the Study

The conceptual framework is presented the Figure 1. Path A is the link between customer satisfaction and use of food mobile food delivery application. Customer satisfaction gauge the level of happiness

customers feels regarding company's products, services, and capabilities American Journal of Applied Sciences. (2006) . Electronic service quality refers to the extent to which online websites improve the efficiency and effectiveness of customers' browsing and consumption, including service links such as distribution and consultation. Price defines the amount of money expected and required. Payment defines the process of paying someone. Delivery refers to the act of taking goods or food to the people or place of work. Time defines the measurable period during which an action or process.

Path b is the link between the use of mobile food delivery applications and customer loyalty. Jeon (2017) posited that the mediator variable that mediates the independent and dependent variables. Use defines the action of using something or the state of being used for a purpose. Information is represented by a particular arrangement or sequence of things. Payment pertains to the process of providing or receiving monetary compensation. Safety involves controlling recognized risks to maintain an acceptable level of danger. Usefulness is defined by the quality of being valuable, especially in terms of practical application or relevance. Convenience refers to the appropriateness for executing an action or meeting a requirement.

Path C is the link between customer satisfaction and loyalty American Journal of Applied Sciences. (2006), is the dependent variables. And it describes the set. Customer loyalty defines the ongoing emotional connection between you and your customer is reflected in their willingness to make repeat purchase from you rather from the competitors. Behavioral defines simply a form of customer loyalty characterized by repeated purchase that occur without any underlying justification such as action. Attitudinal defines their consistent attitudes result in habitual buying behaviors. Cognitive defines built on thinking and believing a brand or product to be superior. Affective defines based on emotions with differences focused on intention or willingness to buy (American Journal of Applied Sciences,2006)

The significance of this study will address the global hospitality sector increasingly integrating technology, understanding the nuanced role of Mobile Food Delivery Applications becomes crucial. This research enriches the academic discourse by providing empirical evidence on how these applications influence customer loyalty, a key driver of business sustainability. Furthermore, it offers a theoretical framework that connects differences in existing models by highlighting the importance of technology as a mediator in customer satisfaction and loyalty dynamics. Informing future studies in various contexts, including different cultural settings and industries, thereby expanding the generalizability and applicability of the findings. The findings can also support the development of more user-friendly and inclusive food delivery platforms, ensuring that technology serves diverse populations effectively. Moreover, this research contributes to the broader societal goal of improving the quality of life by facilitating access to food services, promoting local businesses, and potentially reducing food waste through efficient delivery systems.

Mobile food delivery applications are closely linked with several Sustainable Development Goals (SDGs). One of the most pertinent is Goal 12: Responsible Consumption and Production, as these platforms can drive more efficient use of resources by streamlining delivery routes and cutting down on food waste through improved order management systems (United Nations, 2024). Furthermore, add to Goal 8: Decent Work and Economic Growth by creating employment opportunities for delivery drivers and supporting local businesses (United Nations, 2024). However, there are challenges concerning Goal 13: Climate Action, as the environmental toll from increased delivery traffic and excessive packaging materials adds to pollution. Addressing these concerns calls for the incorporation of sustainability measures in delivery operations, such as adopting eco-friendly packaging solutions and optimizing delivery processes to lessen the environmental impact (United Nations, 2024).

METHOD

This section discusses the research method and procedure utilized by the researcher. It encompasses research respondents, materials, and instrument, as well as the design and procedure.

Research Respondents

The study was conducted in Cluster I of both public and private schools in Davao City. The researchers distributed a total of 300 survey questionnaires to study respondents. The surveyed 300 students from both public and private schools in Cluster one of Davao City who had prior experience with online Food delivery applications. The study's participants were picked from a combination of public and private schools. The study involved a total of 150 respondents from public schools. The study included a sample of 150 respondents from the two private school institution that offers Senior High School.

The researchers utilized the stratified cluster sampling technique. To identify the target respondents for the study, researchers employ a method known as stratification, whereby individuals are categorized into subgroups, or strata, based on shared traits. In this study, the target respondents are students. The methodology employed in this study involves a hybrid approach, incorporating both cluster sampling and basic random sample techniques. The target population is divided into distinct groups.

The initial step involves gathering demographic data from respondents, namely pertaining to their age, gender, frequency of purchase, and senior high school level. The research instrument encompasses an established questionnaire that is intended to gather data from a specific group of participants. The respondents targeted for this study are Senior High School students who fall within the age range of 18 years old and above. Furthermore, these individuals are required to possess an online food delivery application loaded on their mobile devices and have actively utilized this application within the preceding five-month period.

Materials and Instrument

The tool utilized to gather data in this research was a survey questionnaire consisting of three parts. The first part was adapted from the study of Ghosh (2020), it has 5 indicators that consists of the following: electronic service with 4 questions, price with 3 questions, payment and safety with 3 questions then delivery with 4 questions, and lastly is the time with 3 questions. The second part was adopted from the study of the American Journal of Applied Sciences (2006), it has 7 indicators that consist of the following: behavioral with 4 questions, attitudinal with 4 questions, cognitive with 5 questions; conative with 3 questions, affective with 4 questions; trust with 4 and commitment with 4 questions. The last part was adopted from the study of Jeon (2017), it is composed of 4 indicators: information with 6 questions, payment with 6 questions, usefulness with 4 questions, and convenience with 2 questions.

The rating scale below was applied to analyze the participants' responses on customer satisfaction, customer loyalty, and use of mobile food delivery applications.

Range of mean scores used to assess customer satisfaction, loyalty, and the use of mobile food delivery applications is categorized as follows: A mean score between 4.20 and 5.00 indicates a "Very High" level, meaning that customer satisfaction, loyalty, and usage of these applications are consistently observed. Scores ranging from 3.40 to 4.19 represent a "High" level, suggesting that these factors are frequently manifested. A mean score in the range of 2.60 to 3.39 is considered "Moderate," implying that these aspects are occasionally observed. When the mean score falls between 1.80 and 2.59, it is classified as "Low,"

indicating that satisfaction, loyalty, and application use are seldom evident. Finally, a score from 1.00 to 1.79 denotes a "Very Low" level, where these attributes are virtually never observed.

In conclusion, the research instruments received validation from a panel of experts. To improve participants' comprehension of the questionnaire, the researcher incorporated the feedback and corrections offered by the experts. To further ensure the questionnaire's reliability, it undergoes pilot testing with 30 respondents and will be tested using Cronbach Alpha. The alpha coefficient for the 63-item questionnaire is .984, indicating that the items exhibit outstanding internal consistency. In social sciences research, a reliability coefficient of 0.70 or higher is typically deemed "acceptable," underscoring the strong reliability of this instrument.

Design and Procedure

The study utilized quantitative research, particularly descriptive-correlational research design. Descriptive-correlational design is a non-experimental research design that uses correlational statistics to describe and quantify the level of association or relationship between two or more variables or sets of scores (Creswell & Creswell, 2017). Moreover, this design provided an objective and unbiased assessment of the strength and direction of the relationship among variables (Leavy, 2022).

In addition, this study employed a mediation analysis to establish the extent to which a presumed causal variable influences an outcome variable through a mediator variable. Hence, the study design was used to distinguish and the component of the procedure that brings about the strength of correlation between customer satisfaction and customer loyalty through the mediating variable, use of mobile food delivery application.

Before conducting the survey, the researcher ensured that the respondents were fully informed about the research and their rights. A briefing and debriefing session was conducted with the help of the school's senior high supervisors and class advisers .The data was gathered through a survey questionnaire, which the researcher personally delivered to the respondents. Attach in the questionnaires are the form including informed consent, minor assent, and parents' consent, which were pre-requisite documents to be signed before taking the survey. Informed consent was given to respondents aged 18 and above, while minor assent and parent consent were given to the participants aged 17 and below.

To achieve more thorough interpretation and analysis of the data, the following statistical methods will be applied. Mean will be used to determine the level of customer satisfaction, customer loyalty, and use of mobile food delivery application. Pearson r, this will be used to determine the significance of the relationship between customer satisfaction and customer loyalty; customer satisfaction and use of mobile delivery application; use of mobile delivery application and customer loyalty. Regression will be used to determine the coefficient as input to the medgraph. And lastly, the medgraph using the Sobel z-test will be used to prove the mediation and to strengthen the result that will be obtained.

The researcher secured certification and approval from the University of Mindanao Ethics Review Committee with Protocol No. UMERC-2024-146. Upon receiving the certificate and approval, the letter to conduct the study was sent to the Office of Schools Division Superintendent Davao City and Principal's Office of the two private academic institutions and two Public academic institutions. The researcher waited for the school principals' affixed signature and approval. The researcher worked with the registrar to obtain the population of senior high school students enrolled in the A.Y. 2023-2024 in the respective institution.

RESULTS AND DISCUSSION

In this section is analysis and interpretations of the results on the use of mobile food delivery applications as a mediating factor on the relationship between customer satisfaction and customer loyalty in the context restaurants. The outputs of the set of data were presented and ordered based on the objectives of this study. First is to assess the level of customer satisfaction, customer loyalty and use mobile food delivery applications. second, to find out the significant relationship between customer satisfaction and customer loyalty towards restaurants; customer satisfaction and use of mobile food delivery applications and use of mobile food delivery applications and customer loyalty. Lastly, to determine the significant mediation of use of mobile food delivery applications to the relationship between customer satisfaction and customer loyalty in the context of restaurants.

With an overall standard deviation (SD) 0.71, and mean score 4.23, it is revealed that, the level of customer satisfaction is Very High. To look at it closely, the results revealed that Time has the highest mean score of 4.36. while the payment has the lowest mean score of 4.21. This indicates that time is highly related to the overall satisfaction of customers. Highlights that service quality is a critical determinant of customer satisfaction.

Some sources contend that perceived service quality directly impacts customer perceptions and loyalty. The variability indicated by the standard deviation suggests that while most customers perceive high service quality, consistent delivery across all touchpoints is essential to minimize dissatisfaction (Parasuraman, Zeithaml, & Berry, 1985).

As stated by Kim and Chen (2024), Time has emerged as a critical component, particularly in terms of service velocity and timeliness. Discover that customer concern is bent towards fast service delivery and proper handling of complaints significantly define satisfaction levels. Also, about electronic service quality, the aspect determining customer satisfaction. as to why a range of communication and software qualities are considered vital, it is understood that factors such as effective and user-friendly website, quick and helpful customer support, and dependable system contribute to improving the customers' satisfaction. (Zhang, Liu, and Chen 2023)

Table 1 Level of Customer Satisfaction

Indicators	SD	Mean	Descriptive Level
E-Service Quality	0.83	4.19	High
Price	0.75	4.23	Very High
Payment	0.83	4.14	High
Delivery	0.84	4.21	Very High
Time	0.81	4.36	Very High
Overall	**0.71**	**4.23**	**Very High**

Based on the findings, the level of customer loyalty as perceived by the respondents is very high with the overall mean 4.26 and standard deviation of 0.75. The indicator that got the highest mean score is affective with 4.37 mean and standard deviation of 0.76. And the indicator that got the lowest mean is cognitive with 4.20 and standard deviation of 0.82.

Kim et al. (2022) emphasized that Purchase behaviors, also known as behavioral measure (e. g. multiple purchases), and psychological measures which include perception of the brand by the customer are critical

to the study of customer loyalty. Illustrates that the behavioral and psychological perspectives are equally important in the development and maintenance of customer loyalty where positive attitudes significantly explain actual purchase behaviors. Also stress that the combination of behavioral evidence and attitudinal information enhances the possibility of comprehending customer loyalty (Martinez & Gomez, 2023).
However, conative which refers to the disposition towards certain behaviors in the future (for example, promoting the brand in future) is also important even though it is not presented in the current study's findings It has been established that there is a positive correlation between affective and behavioral loyalty, as well as conative loyalty, indicating that strengthening emotional and behavioral connections with customers can aid in shaping their future engagement. (White et al.,2023).
As a whole, the findings stress that the role of customer loyalty as a key instrument to build long-term customer relationships. This implies that affective loyalty might be the outcome of the favorable feelings that brands instill on their customers and the experiences that these customers make with the brands hence making them loyal (Lee & Han, 2022).

Table 2 Level of Customer Loyalty

Indicators	**SD**	**Mean**	**Descriptive Level**
Behavioral	0.83	4.29	Very High
Attitudinal	0.83	4.22	Very High
Cognitive	0.82	4.20	Very High
Conative	0.88	4.21	Very High
Affective	0.76	4.37	Very High
Trust	0.87	4.23	Very High
Commitment	0.85	4.27	Very High
Overall	**0.75**	**4.26**	**Very High**

Based on the findings, the Level of Mobile Food Delivery Application Perceived by the respondents is high with an overall mean of 4.32 with a standard deviation of 0.70. The indicator that got the highest mean score 4.36 is and with standard deviation of 0.84 is. convenience.
The indicator of convenience receiving the highest mean score (4.36) aligns with extensive research emphasizing its crucial role in the success of mobile food delivery applications. Based on Zhang et al. (2023), emphasized that convenience can be considered as one of the most primary facets, which influence the degree of user satisfaction, as it relates to the ability and effectiveness of the food ordering process. Likewise, Smith and Johnson (2022) pointed out that convenience includes factors like delivery speed, easy to navigate or understand GUI, and integrates smoothly with other services as these are some of the reasons why people perceive the application to be of high value. Moreover, information about such aspects as the menu, restaurants' ratings, and delivery time given by mobile applications of food delivery services is also one of the essential factors impacting user perceptions. As pointed out by Kim et al. (2021), it means higher perceived information accuracy and completeness will lead to higher perceived user satisfaction as users have all necessary information. This reinforces the argument regarding the role of information quality in user interactions with mobile food delivery applications. Convenience is increased and user interactions are streamlined with features like several payment options, real-time tracking, and

fast order placement. Increasing consumer satisfaction and loyalty can be achieved (Lin, Au, & Baum, 2024). Convenience is increased and user interactions are streamlined with features like several payment options, real-time tracking, and fast order placement. Increasing consumer satisfaction and loyalty can be achieved

Table 3 Level of Mobile Food Delivery Application

Indicators	SD	Mean	Descriptive Level
Information	0.80	4.29	Very High
Payment and Safety	0.71	4.28	Very High
Usefulness	0.76	4.34	Very High
Convenience	0.84	4.36	Very High
Overall	**0.70**	**4.32**	**Very High**

Table 4 demonstrates the correlation between different indicators of Customer Satisfaction and Loyalty. This yielded an overall r = .830 with a p-value of .000 which is lesser than 0.05. This signified a rejection of the null hypothesis. Customer loyalty indicators (Behavioral, Attitudinal, Cognitive, Conative, Affective, Trust, Commitment, Overall loyalty) and e-service quality dimensions (Service Quality, Price, Payment, Delivery, Time) are significantly correlated. This finding is fully consistent with other recent studies that demonstrate a positive and significant relationship between customer satisfaction and customer loyalty. As per Nguyen et al. (2022), multiple parameters like behavioral, attitudinal, and affective measures are connectivity with the overall satisfaction, which demonstrates how changes in service quality help to build customer loyalty. Likewise, Smith & Johnson (2023) observed that the levels of satisfaction are directly linked with the loyalty in terms of multiple aspects, thus supporting the study.The connection between electronic service quality variables—such as service quality, price, payment, delivery, and time—and customer loyalty is supported by literature that highlights their significant impact on customer satisfaction and loyalty. As noted by Patel (2023) and Kim et al. (2024), higher service quality and timely delivery are essential factors for organizations looking to retain customers. These insights strengthen the robust correlation identified in this research, confirming that enhancements in these dimensions will reliably result in greater customer loyalty.

These correlations highlight the importance of providing high-quality service experiences to increase customer loyalty. Gaining an understanding of and making improvements to these aspects can increase consumer satisfaction while fostering strong customer loyalty, that will enhance productivity and provide the company a competitive edge in the marketplace. In addition, in the age of digital technology, businesses can strengthen their consumer relationships and promote long-term success by focusing on improving service quality, refining pricing tactics, and increasing operational efficiencies. SERQUAL Model supports the result it possesses the five key dimensions that includes tangibility, reliability responsibility, assurance and empathy. If the assurance is present, it could create service expectation. And empathy is high, there would be good service performance then the customer will receive a good quality service. That will result to customer satisfaction and loyalty.

Table 4 Significance of the Relationship between Customer Satisfaction and Loyalty

Customer Satisfaction	**Loyalty**							
	Behavioral	Attitudinal	Cognitive	Conative	Affective	Trust	Commit-ment	**Overall**
E-Service Quality	.661** .000	.632** .000	.653** .000	.613** .000	.617** .000	.679** .000	.664** .000	**.723** .000**
Price	.659** .000	.672** .000	.694** .000	.636** .000	.659** .000	.651** .000	.683** .000	**.744** .000**
Payment	.611** .000	.643** .000	.666** .000	.578** .000	.602** .000	.657** .000	.689** .000	**.711** .000**
Delivery	.676** .000	.637** .000	.694** .000	.636** .000	.684** .000	.707** .000	.724** .000	**.761** .000**
Time	.680** .000	.574** .000	.608** .000	.548** .000	.665** .000	.699** .000	.646** .000	**.705** .000**
Overall	**.749** .000**	**.719** .000**	**.755** .000**	**.686** .000**	**.735** .000**	**.774** .000**	**.776** .000**	**.830** .000**

Table 5 shows the importance of the link between Customer Satisfaction and Mobile Food Delivery Application. The table shows the link between customer satisfaction Among the 4 indicators under E-service Quality, Price, Payment, Delivery and Time and Food Mobile Delivery Application among the 4 indicators Information, Payment and safety, Usefulness and Convenience.

Table 5 Significance of the Relationship between Customer Satisfaction and Mobile Food Delivery Application

Customer Satisfaction	**Mobile Food Delivery Application**				
	INFORMATION	PAYMENT AND SAFETY	USEFULNESS	CONVENIENCE	**Overall**
E-Service Quality	.646** .000	.650** .000	.547** .000	.552** .000	**.666** .000**
Price	.695** .000	.689** .000	.553** .000	.509** .000	**.675** .000**
Payment	.601** .000	.656** .000	.533** .000	.573** .000	**.652** .000**
Delivery	.682** .000	.702** .000	.638** .000	.619** .000	**.728** .000**

Time	.607** .000	.622** .000	.680** .000	.630** .000	**.702** **.000**
Overall	**.735** **.000**	**.756** **.000**	**.672** **.000**	**.658** **.000**	**.780** **.000**

Employing the Technology Acceptance Model, it has been established that perceived ease of use and perceived usefulness are the key factors that determine user satisfaction and acceptance of the technology. The use of this model has been realized in several scenarios such as in mobile applications. These studies also support that TAM has useful applicability in predicting aspects of users' satisfaction with MFDAs. For instance, Lee and Chen (2023) show that perceived usefulness and ease of use are essential for the evaluation and reception of the mobile food delivery applications. For this reason, Patel (2023) also echoed the same opinion to state that users' positive experience on the functionalities of the app and the quality of services. The conclusion that overall user satisfaction level is high is supported by the satisfaction scores in each of the dimensions that has been identified meaning that users have positive perception of overall service quality and their user experience. Kim et al. (2024) and Zhang et al. (2023)'s studies also confirm that notions of service quality as in delivery services, measurability, ease of use, and simple payment procedures are paramount to obtaining high levels of satisfaction among the users. Such findings are in support of the current study where it has been realized that user's rate MFDAs positively on various dimensions of service quality.

Consistent with TAM, the current study's high satisfaction scores suggest that users find the mobile food delivery applications both useful and easy to use. Nguyen et al. (2022) highlight that perceived usefulness and ease of use are significant predictors of user satisfaction in mobile applications. Their research shows that when users perceive an app as beneficial and easy to navigate, their overall satisfaction improves, supporting the current study's results.

The connection to the Technology Acceptance Model (TAM) is reinforced by recent research that associates technology acceptance with overall satisfaction in mobile applications. Lopez and Garcia (2024) discuss how technology acceptance factors, such as perceived ease of use and usefulness, contribute to positive user experiences and high satisfaction scores in mobile service applications. Their work provides additional evidence that TAM effectively explains the relationship between satisfaction and technology use in the context of mobile food delivery applications.

The outcomes indicate Overall satisfaction scores are consistently high across all dimensions (.666 to .780, $p < .000$). This comprehensive measure reflects how positively users perceive the mobile food delivery application, considering all aspects of service quality and user experience. It supports the Technology Acceptance Model that states the relationship between customer satisfaction and the Mobile food delivery Application. This implies that the vital role of technology in the presence of customer satisfaction. This concludes that a very high correlation has a p.value of 0.000, therefore the null hypothesis is rejected.

Table 6 shows the importance of the link between Mobile Food Delivery Application and Loyalty. The table shows the link between Mobile Food Delivery Application and the 4 indicators Information, Payment and safety, Usefulness and Convenience. And Customer loyalty and 6 indicators behavioral, Attitudinal, Cognitive, Conative, Affective, Trust and Commitment.

The consistently high satisfaction scores reported reflect a positive user perception of mobile food delivery applications. Recent research reinforces this finding, emphasizing that various dimensions of service quality and user experience play a significant role in shaping satisfaction with mobile food delivery

applications. According to Kim et al. (2023), high overall satisfaction is achieved when mobile food delivery apps excel in aspects such as usability, reliability, and service quality. Their research highlights that positive user experiences are often associated with high satisfaction scores and enhanced loyalty.
Furthermore, the positive and significant correlation between the overall satisfaction and customer loyalty also endorsed the recent literature on the satisfaction–loyalty link in the context of MFDA services from mobile food delivery applications. Patel (2024) states that with an emphasis on the factors of satisfaction, one could conclude that the improved satisfaction with the mobile food delivery services is directly attributable to the improved customer loyalty. This is in concordance with the empirical evidence from other studies, such as that of Lee and Chen (2023) who argue that customers' satisfaction has positive impact on loyalty which is expressed in behaviors including repeat patronage and recommendations. Moreover, It has been found that a combination of high quantity and quality creates complexity, as satisfaction itself is multi-dimensional. This means it involves multiple aspects of the environment where mobile food delivery apps operate, such as service quality, delivery speed, and the ease of navigation on the touch-screen interface. From the Nguyen et al. (2022) & Zhang et al. (2023) – the components of the service quality – timely delivery, order accuracy and easy-to-navigate design to enhance satisfaction level and promote loyalty. These studies find out that adopting a multiple perspective on the way service quality can be increased may help to develop both perceived satisfaction and further customer loyalty.
The outcomes indicate that there are Overall satisfaction are consistently very high across all dimensions (**.647 to .770, p < .001**) the null is rejected. This comprehensive measure reflects how positively users perceive the mobile food delivery application, considering all aspects of service quality and user experience. Based on the result there is a significant relationship between Mobile Food Delivery Application and Customer Loyalty. This supports the Theory of the Perceived Value Theory that states customers assess the value of services they receive using the application that correlate to the aspect of being loyal to the specific restaurant.

Table 6 Significance of the Relationship between Mobile Food Delivery Application and Loyalty

Mobile Food Delivery Application	**Loyalty**							
	Behavioral	Attitudinal	Cognitive	Conative	Affective	Trust	Commit-ment	**Overall**
INFORMATION	.684** .000	.662** .000	.654** .000	.629** .000	.649** .000	.604** .000	.639** .000	**.725** .000**
PAYMENT AND SAFETY	.649** .000	.662** .000	.671** .000	.651** .000	.667** .000	.614** .000	.672** .000	**.736** .000**
USEFULNESS	.647** .000	.592** .000	.595** .000	.559** .000	.628** .000	.591** .000	.626** .000	**.679** .000**
CONVENIENCE	.613** .000	.592** .000	.556** .000	.517** .000	.585** .000	.521** .000	.589** .000	**.636** .000**
Overall	**.719** .000**	**.695** .000**	**.685** .000**	**.654** .000**	**.701** .000**	**.647** .000**	**.700** .000**	**.770** .000**

Data was submitted to the medgraph after being subjected to a linear regression analysis. The mediation analysis which was established by Baron and Kenny (1986) pertains to the mediating effect of a variable to the correlation between two other variables.

Table 7 Regression analysis showing the influence of customer satisfaction on loyalty as mediated by mobile food delivery application

Step	Path	B	S.E.	β
1	c	.864	.034	.830***
2	a	.769	.036	.780***
3	b	.330	.051	.312***
4	c’	.611	.050	.586***

* $p<0.05$

The significant Sobel z-value and p-value < 0.05 indicate that the mediation effect of the mobile food delivery application is statistically significant. This implies that mobile food delivery applications play a role in influencing customer loyalty but do not fully account for the relationship between customer satisfaction and loyalty. The partial mediation suggests that customer satisfaction affects loyalty both directly and through the mobile application, which enhances but does not entirely explain the connection between satisfaction and loyalty.

According to the aforementioned literature, Kim and Lee (2023) also investigated the impact of mobile applications on customer loyalty in the service sector. They discovered that although mobile applications enhanced the customer experience by enhancing convenience and easy access, it did not fully solve the moderating impact of customer satisfaction on loyalty.

Therefore, it is evident that customer satisfaction still has a direct impact on loyalty even in situations where mobile applications act as a middle link. As for the impact of customer satisfaction on customer loyalty, Nguyen et al. (2022) noted that even with the inclusion of mobile apps as digital platforms of service delivery, customer satisfaction continued to play an influential role in influencing customer loyalty. Based on their findings, their work aligns with partial mediation, highlighting that mobile applications enhance the customer experience but do not wholly act as a substitute for satisfaction on loyalty.

Additionally, when the regression coefficient shows a significant decrease in the final step while still remaining significant, it indicates that there is only partial mediation. This suggests that a portion of customer satisfaction is mediated by the mobile food delivery application, while other elements are either directly influenced or indirectly impacted by factors not included in the model. Furthermore, in step 4 (indicated as c’), the effect of the mobile food delivery application on adapting to change was noted to diminish after accounting for the mediation. This partial mediation is supported by the fact that the effect remained significant at $p<0.05$.

Moreover, Wang and Zhang (2024) investigated the impact of mobile technology on consumer behavior, particularly in the context of food delivery services. They found that while mobile apps significantly enhance the connection between customer satisfaction and loyalty, the apps do not entirely mediate the

relationship. This reinforces the idea that customer satisfaction retains its direct impact on loyalty, aligning with the concept of partial mediation.

Table 8 Results of statistical analysis on presence (or absence) of mediating effect

Combination of Variables	Sobel z	p-value	Mediation
customer satisfaction → mobile food delivery application→ loyalty	6.173599	<0.05	Partial mediation

* $p<0.05$

Additionally, the result of the computation of mediating effects is shown in Figure 8. The Sobel test in table 8 yielded a z-value of 6.17, p<0.05. This means that mediating effect is partial, such that the original direct effect customer satisfaction to of adaptation to change was reduced upon the addition of mobile food delivery application. The positive value of Sobel z indicates that the addition of mobile food delivery application reduces the effect of customer satisfaction on adaptation to change.

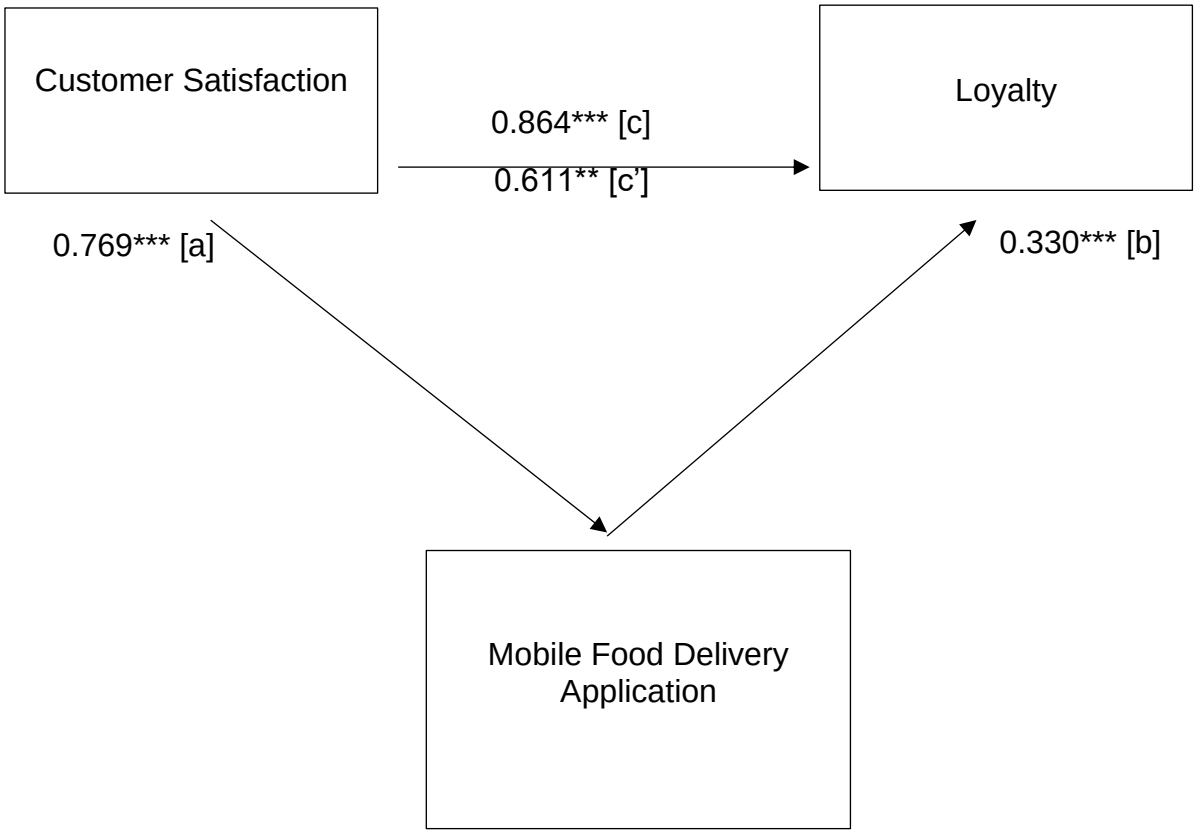

Figure 2. Medgraph showing the mediation analysis

Mediation Analysis

Sobel z 6.173599, $p<0.05$*

Percentage of the total effect that is mediated	29.359242%
Ratio of the indirect to direct effect	0.415613

Effect Size Measures

Unstandardized Coefficients

Total:	0.864
Direct:	0.611
Indirect:	0.769
Ratio Index:	0.890

As stated, Kim et al. (2024) emphasizes that mediators, such as service quality and user experience, play a vital role in explaining the relationship between satisfaction and loyalty in mobile applications. Their findings suggest that mediators can significantly amplify the impact of satisfaction on loyalty by providing additional pathways for influence.

Moreover, the effectiveness of mobile food delivery applications as a mediator aligns with theories related to technology acceptance and user satisfaction. Lee et al. (2023) found that mobile application features significantly mediate the relationship between user satisfaction and continued use. This suggests that mobile applications are crucial in translating customer satisfaction into loyalty (Lee, Park, & Kim, 2022). The connection between service quality and customer loyalty has been well-documented. Also, Zhang et al. (2023) discuss how service quality in mobile food delivery services mediates the relationship between customer satisfaction and loyalty, reinforcing the idea that service attributes significantly impact customer retention and loyalty.

Perceived convenience in mobile food delivery applications mediates the relationship between satisfaction and loyalty, like the role of the mobile food delivery application in your study (Patel, 2024). TAM demonstrates that perceived usefulness and ease of use mediate the connection between user satisfaction and loyalty in mobile applications, which supports the significant mediation effect observed in your study (Lee & Chen, 2023).

Moreover, the computed effect size for the mediation test seen between three variables is shown in the figure. The effect size determines the extent of the effect of customer satisfaction on customer loyalty can be associated with the indirect path. The total effect value of 0.864 is attributed to the beta of customer satisfaction towards customer loyalty. The direct effect value of 0.611 is the beta of customer satisfaction towards customer loyalty with mobile food delivery application included in the regression. The indirect effect value of 0.780 is the value obtained from the original beta between customer satisfaction and customer loyalty that now passes through mobile food delivery application to customer loyalty (a*b, where “a” denotes the path ESE → IC and “b” pertains to path between IC→ ATC). The indirect effect is divided by the overall effect to obtain the ratio index; in this case, 0.769 by 0.864 equals 0.890. It seems that about 89% of the total effect of customer satisfaction on customer loyalty goes through the mobile food delivery application.

CONCLUSION AND RECOMMENDATION

Based on the study's findings, various recommendations are presented to strengthen the effectiveness of mobile food delivery applications and improve customer satisfaction. First, food delivery customers can leverage insights from this study to better understand service aspects of mobile food delivery applications and align their expectations with service offerings. This alignment will help ensure that their needs are met and increase overall satisfaction. Second, food delivery service providers should focus on regularly updating and enhancing their systems to include new features, improve performance, and provide a smoother user experience.

Additionally, they should invest in stronger consumer protection programs to safeguard users. Third, restaurants are encouraged to maintain high food quality and invest in staff training to ensure employees are well-informed and capable of delivering exceptional service. Building community engagement and partnerships can also enhance the restaurant's reputation and customer loyalty. Lastly, mobile food delivery applications should maintain a strong presence on social media and review platforms, and ensure their websites are user-friendly to facilitate positive interactions and engagement with user

The result of the offer significant insights into the relationship between customer satisfaction and mobile food delivery applications, framed within the Expectation Confirmation Theory (ECT). ECT suggests that customer satisfaction is influenced by the extent to which their post-purchase experience confirms or disconfirms their pre-purchase expectations. In the context of food delivery apps, if customers find that the app meets or surpasses their expectations regarding convenience, speed, and food quality, they are more likely to be satisfied and remain loyal both to the app and the associated restaurant. This is consistent with the theoretical framework proposed by Oliver et al. (1994). The study might not account for the varied user experiences with different mobile food delivery apps or the specific operational practices of individual restaurants, which could influence customer satisfaction and loyalty in diverse ways.

To address this, future studies should incorporate a dynamic research design that allows for periodic updates and assessments. This could involve using a longitudinal approach to track changes over time or implementing a real-time data collection system to capture the impact of technological advancements and emerging trends. Additionally, research could explore the impact of specific app features (such as delivery time tracking or personalized recommendations) on customer satisfaction and loyalty to provide more nuanced insights into what drives user engagement in a constantly evolving market.

The study also indicates that the mobile food delivery application function as a mediating factor in the relationship between independent variables (such as service quality and features) and dep les (such as customer loyalty and satisfaction), demonstrating partial mediation in this dy

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