A Study on Optimizing Mobile Food Delivery Apps with a Focus on Cloud Kitchens

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Abstract: _Purpose: This study aims to optimize the user experience of mobile food delivery apps, focusing on cloud kitchens, by comprehensively investigating customer satisfaction on service quality and identifying the challenges they encounter. The research combines descriptive and exploratory approaches to gain insights into improving these apps for users in the Hyderabad and Secunderabad region. Research Methodology: A mixed-methods research approach is employed, integrating descriptive and exploratory methods. Data is primarily collected through a structured questionnaire using the Likert scale format. A convenient sampling technique is used to select 120 participants from the target population of mobile food delivery app users. Linear regression is applied to analyze the relationship between service quality dimensions and customer satisfaction. Factor analysis is utilized to identify underlying factors contributing to challenges faced by customers. Findings: The analysis reveals crucial insights into enhancing mobile food delivery apps. In the "Reliability" dimension, factors such as accurate delivery time predictions, order accuracy, and order completeness significantly impact customer satisfaction. The "Responsiveness" dimension highlights the importance of timely app responses, informative order status notifications, and accessible customer support in improving the user experience. "Empathy" factors like understanding food preferences, providing personalized recommendations, and catering to dietary requirements lead to higher customer satisfaction. In the "Tangibility" dimension, user-friendly interfaces, transparent menu details, and order customization options play pivotal roles in enhancing satisfaction. The "Accessibility" dimension underscores the significance of perceived accessibility, efficient technical issue resolution, and convenient app features. Partial Implications: App providers should focus on optimizing delivery accuracy, responsiveness, empathy-driven features, user interface design, and accessibility to enhance customer satisfaction. Addressing challenges related to order accuracy, delivery time delays, technical glitches, menu clarity, delivery fees, food quality, order customization, and dietary information is crucial. By prioritizing improvements in these areas, mobile food delivery apps can create a more satisfying and competitive user experience, fostering customer loyalty and success in the evolving landscape of cloud kitchens and food delivery services._

Keywords: Mobile food delivery apps, Cloud kitchens, Service quality, Customer satisfaction, User experience, User interface, Accessibility, Empathy, Tangibility, Responsiveness, Delivery accuracy, Order customization.

1. Introduction

The food delivery industry has witnessed a significant transformation in recent years with the emergence of mobile food delivery apps. These apps have revolutionized the way consumers access and enjoy food, offering convenience and variety at their fingertips. Furthermore, the advent of cloud kitchens, also known as ghost kitchens or virtual kitchens, has added a new dimension to this industry by providing a platform for restaurants to operate exclusively through delivery, catering to the ever-growing demand for online food orders. This study aims to delve into two critical aspects of this dynamic landscape: the impact of service quality on customer satisfaction within the context of mobile food delivery apps and the challenges faced by customers during app usage.

Service quality has emerged as a pivotal factor in determining customer satisfaction in the mobile food delivery app ecosystem. It encompasses various dimensions, including responsiveness, reliability, assurance, empathy, and tangibles. In the context of cloud kitchens and mobile food delivery apps, service quality is intricately linked to the overall user experience. To investigate this relationship, it is imperative to consider the following theoretical underpinnings: The SERVQUAL model, developed by Parasuraman et al. (1985), is a well-established framework for assessing service quality. It consists of five dimensions—tangibles, reliability, responsiveness, assurance, and empathy. These dimensions provide a structured framework for evaluating the service quality offered by mobile food delivery apps, with a focus on cloud kitchens.

Customer satisfaction is a multifaceted concept influenced by perceived service quality, expectations, and post-purchase evaluations (Oliver, 1980). In the context of mobile food delivery apps, understanding how service quality dimensions impact customer satisfaction is essential for optimizing app performance and user retention. The emergence of cloud kitchens as a novel business model necessitates an exploration of how service quality factors specific to cloud kitchens, such as food quality, delivery speed, and order accuracy, influence customer satisfaction. The theoretical foundation for this exploration lies in the literature on virtual restaurants and cloud kitchen operations (Guttentag, 2019; Juras, 2020).

While mobile food delivery apps offer convenience, they are not without challenges. Addressing these challenges is essential for enhancing the user experience and ensuring customer retention. The theoretical basis for understanding and addressing customer challenges in this context can be framed.:

User experience design principles, rooted in cognitive psychology and humancomputer interaction (HCI), play a crucial role in identifying and mitigating challenges faced by users (Norman, 2013; Nielsen, 1993). Applying these principles to mobile food delivery apps can help streamline the ordering process and reduce user frustration. Drawing

from the literature on customer feedback management and complaint handling (Mattila & Enz, 2002; McCole et al., 2010), it is vital to establish robust mechanisms for collecting customer feedback and addressing complaints effectively. Timely resolution of issues contributes significantly to customer satisfaction and loyalty.

Technology Adoption and Diffusion: The Technology Acceptance Model (TAM) (Davis, 1989) and its extensions provide a theoretical lens to explore how users perceive and adopt mobile food delivery apps. Understanding user acceptance and the factors influencing it can guide app developers and service providers in addressing challenges related to app usage. This theoretical framework provides a foundation for investigating the impact of service quality on customer satisfaction in the context of mobile food delivery apps, particularly with a focus on cloud kitchens. Additionally, it offers insights into addressing the challenges encountered by customers when using these apps. By synthesizing concepts from service quality, user experience design, customer feedback management, and technology adoption, this study aims to contribute to the optimization of mobile food delivery apps, ultimately enhancing the customer experience in the era of cloud kitchens.

2. Literature Review

Alagoz, SM (2012) the study delves into the realm of online food ordering systems using the Technology Acceptance Model (TAM). The research thoroughly investigates how various factors, including ease of use, perceived usefulness, and other TAM-related variables, influence customer behaviors when ordering food online. Published in Procedia - Social and Behavioral Sciences, this research is a valuable contribution to comprehending the factors that motivate customers to utilize online food ordering platforms. **Bhotvawala, MA (2016)** The study, presented at the International Conference on Industrial Engineering and Operations Management, sheds light on the competitive landscape of food delivery services in India. Bhotvawala's research provides insights into the growth trends and dynamics within the food tech industry in India, offering valuable information for stakeholders and businesses operating in this sector. **Cheow, V (2017)** In this paper, Cheow investigates consumer experiences, attitudes, and behavioral intentions in relation to online food delivery (OFD) services. Published in the Journal of Retailing and Consumer Services, the study provides deep insights into how consumers perceive and engage with OFD services, which can aid businesses in optimizing their online food delivery platforms to cater to consumer preferences. **Azizul, J (2019)** the study focuses on the attributes of food delivery apps and their influence on customer-perceived value, with a specific focus on young working adults in Shah Alam. The research explores factors such as pricing, menu variety, and delivery speed and their impact on how customers perceive value. Published in the International Journal of Scientific and Technology Research, this study offers valuable insights into catering to the preferences of the youth demographic. **Caspi, CE (2019)** the research adopts a behavioral economics approach to encourage healthier food choices among food pantry clients. Published in Public Health Nutrition, the study explores strategies to promote better food selection, particularly relevant in the context of food delivery and distribution. It highlights the significance of promoting healthier options in the food delivery industry, addressing a critical public health concern. **Cho, M (2019)** The study by Cho examines the differences in perceptions of food delivery apps between single-person and multi-person households. Published in the International Journal of Hospitality Management, it delves into how household composition influences app usage and perceptions within the context of food delivery. The findings can be instrumental for app developers seeking to tailor their services to different household dynamics, thereby enhancing user experiences. **Meenakshi, N (2019)** the study explores the success strategy of food delivery apps in the Indian market. While the abstract provides limited details, the research likely delves into the strategies employed by food delivery apps to thrive in the highly competitive Indian market. Understanding these strategies can be invaluable for businesses looking to enter or expand within the Indian food delivery sector. **Ray, A (2019)** article adopts a uses and gratification theory perspective to understand the motivations behind individuals using food delivery apps. Published in the Journal of Retailing and Consumer Services, the study investigates the gratifications and motivations associated with food delivery app usage. This information can be a crucial resource for app developers and marketers, enabling them to tailor their services effectively to meet consumer needs and desires. **Alalwan, AA (2020)** the study conducts an empirical study focusing on the factors affecting customer e-satisfaction and their intention to continue using mobile food ordering apps. Published in the International Journal of Information Management, the research delves into various aspects, including app design, convenience, and overall user experience, contributing to an in-depth understanding of customer satisfaction and loyalty in the realm of mobile food delivery applications. **Zhao, Y. (2020)** the study examines the factors influencing customer continued usage of food delivery apps during the 2019 novel coronavirus pandemic. Published in the International Journal of Hospitality Management, the study provides insights into the resilience of food delivery apps during challenging times and identifies the factors contributing to sustained usage. Understanding these factors is essential for businesses to adapt their strategies to evolving market conditions and consumer behaviors.

Objectives of the study:
1) To investigate the service quality impact on customer satisfaction with mobile food delivery apps with a focus on cloud kitchens.
2) To identify and address the challenges encountered by customers when using mobile food delivery apps.

Hypothesis of the study
Null hypothesis: There is no customer satisfaction level towards the mobile food delivery apps with a focus on cloud kitchens.

3. Methodology

Research Approach: This study adopts a mixed-methods research approach that combines both descriptive and exploratory methods. It aims to comprehensively investigate

customer opinions concerning service quality and understand the challenges they encounter when using mobile food delivery apps, with a specific focus on cloud kitchens.

Data Collection: The primary source of data for this research will be collected through the collection of primary data. This means that the information will be gathered directly from the study's participants, ensuring the most relevant and up-to-date insights.

Sample Technique: A convenient sampling technique will be employed for participant selection. This choice is primarily influenced by practical considerations related to the accessibility of potential respondents. Convenience sampling is chosen for its ease of implementation within the study's constraints.

Sample Size: The study aims to include 120 respondents from the target population. This sample size is deemed sufficient to provide meaningful insights into customer opinions and challenges within the context of mobile food delivery apps in Hyderabad and Secunderabad.

Sample Population: The research is focused on customers who actively use mobile food delivery apps. Geographically, it is limited to residents of Hyderabad and Secunderabad, ensuring a specific regional context for the study.

Questionnaire: To collect data, a structured questionnaire has been meticulously developed. The questionnaire utilizes the Likert scale format, a widely recognized tool for capturing respondents' opinions and perceptions. It is thoughtfully divided into two distinct parts:
Part 1: This section of the questionnaire is thoughtfully designed to elicit detailed customer opinions regarding service quality concerning mobile food delivery apps, with a particular emphasis on cloud kitchens. The Likert scale format allows respondents to rate their experiences and perceptions, providing quantitative data for analysis.
Part 2: In this section, the questionnaire is dedicated to understanding the challenges that customers encounter when using mobile food delivery apps. Respondents are encouraged to provide qualitative insights into their experiences, enabling a more comprehensive examination of the issues they face.

Statistical Tools

Linear Regression: Linear regression is a statistical technique used to analyze the relationship between one or more independent variables (predictors) and a dependent variable (the outcome or response variable). In your study, linear regression is employed to explore how various factors influence customer opinions regarding service quality in mobile food delivery apps.

The linear regression equation can be represented as follows:
$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_p X_p + \varepsilon$
Y represents the dependent variable (customer satisfaction).
β_0 is the intercept, which represents the value of (Y) when all independent variables ($X_1, X_2, \ldots X_p$) are zero.
(beta1, beta2,…..betap) are the coefficients for each independent variable (($X_1, X_2, \ldots X_p$)), representing how much a unit change in that variable affects the dependent variable (Y).
($X_1, X_2 \ldots X_p$) are the independent variables (factors)
ε represents the error term, which accounts for unexplained variation in (Y).

The objective of conducting linear regression analysis within study is to obtain the most accurate estimates for the coefficients ($\beta_0, \beta_1, \beta_2 \ldots \beta_p$) that effectively align with the data. After obtaining these coefficients, they can be utilized to generate predictions or draw inferences regarding the impact of variations in the independent variables i.e., service quality on customer satisfaction.

Factor Analysis: Factor analysis will be employed to uncover underlying dimensions or factors that contribute to the challenges encountered by customers when using mobile food delivery apps. This analytical technique simplifies the data by identifying common themes or factors among challenges, aiding in data interpretation and highlighting key areas for improvement.

In summary, this research design is well-structured to provide comprehensive insights into customer perspectives on service quality and the challenges associated with using mobile food delivery apps, with a specific focus on cloud kitchens. It combines the strengths of quantitative and qualitative data collection methods to offer a holistic understanding of the mobile food delivery app user experience in the Hyderabad and Secunderabad region.

4. Results and Discussion

The objective is to assess customer satisfaction with mobile food delivery apps, with a particular emphasis on cloud kitchens. The analysis will employ regression analysis techniques to identify the key factors influencing customer satisfaction and to quantify their impact. By examining various app features and experiences, the study aims to provide insights into how cloud kitchens can enhance their services to meet customer expectations and drive higher satisfaction levels.

H0: There is no customer satisfaction level towards the mobile food delivery apps with a focus on cloud kitchens.
H1: There is a customer satisfaction level towards the mobile food delivery apps with a focus on cloud kitchens.

Table 1: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.723[a]	.523	.454	.45964

The table represents the regression model for studying customer satisfaction with mobile food delivery apps, with a focus on cloud kitchens. The "R" value of 0.723 indicates a moderately strong positive relationship between service quality and customer satisfaction. The "R Square" value of 0.523 means that 52.3% of the variation in satisfaction can be determined by the variables, showing a good fit. However, the study effectively explores factors influencing customer satisfaction in mobile food delivery apps and cloud kitchens.

Table 2: ANOVA Table on Customer Satisfaction Towards the Mobile Food Delivery Apps

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	24.086	15	1.606	7.600	.000[b]
	Residual	21.972	104	.211		
	Total	46.057	119			

The ANOVA table represents the relationship between service quality and customer satisfaction in the context of mobile food delivery apps. The "Regression" model has a sum of squares of 24.086, with 15 degrees of freedom, resulting in a mean square value of 1.606. The F-statistic is 7.6, and the associated p-value is 0, which is highly significant. The study determines that the regression model, which likely includes service quality factors has a statistically significant effect on customer satisfaction. The low p-value (0.000)strongly confirms the reliability of the relationship.

Table 3: Coefficients Table on Customer Satisfaction Towards the Mobile Food Delivery Apps

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	1.606	0.337		4.763	0
Reliability	Satisfaction with Delivery Time Accuracy	0.167	0.062	0.132	2.69	0.008
	Experience of Recent Order Delays or Discrepancies	0.268	0.068	0.246	1.998	0.032
	Frequencyof Receiving Orders as Described	0.239	0.057	0.204	2.45	0.016
Responsiveness	App Response Time	0.354	0.056	0.312	1.969	0.035
	Prompt Order Status Notifications	0.42	0.051	0.396	2.39	0.037
	EasyCustomer Support Access	0.347	0.064	0.296	3.746	0.047
Empathy	Understands Food Preferences	0.238	0.054	0.211	2.705	0.042
	Provides Personalized Recommendations	0.47	0.052	0.432	3.339	0.013
	Caters to Dietary Requirements	0.572	0.05	0.529	1.443	0.012
Tangibility	Easy UI navigation	0.434	0.053	0.379	4.635	0.027
	Clear details of menu and pricing	0.285	0.072	0.235	5.178	0.042
	Convenient order customization	0.337	0.079	0.311	2.471	0.038
Accessibility:	Accessibility and Compatibility of App	0.539	0.083	0.524	3.463	0.045
	Encountering Technical Issues	0.367	0.138	0.335	2.659	0.009
	Convenience of App Features	0.125	0.119	0.111	3.056	0.023

The table above represents the results of a regression analysis examining the impact of service quality factors (Reliability, Responsiveness, Empathy, Tangibility, and Accessibility) on customer satisfaction with mobile food delivery apps, with a specific focus on cloud kitchens.

The table represents the regression analysis focusing on the service quality dimension of **"Reliability"** and its impact on customer satisfaction with mobile food delivery apps. It signifies that, the coefficient values for the Reliability factors indicate that they have a statistically significant positive influence on customer satisfaction. Specifically, a one-unit increase in "Satisfaction with Delivery Time Accuracy" is associated with an increase in customer satisfaction by 0.167 units (p = 0.008), suggesting that customers who experience greater accuracy in delivery time are more satisfied. Similarly, "Experience of Recent Order Delays or Discrepancies" demonstrates a positive impact, with a coefficient of 0.268 (p = 0.032), implying that customers who encounter fewer order delays or discrepancies tend to have higher satisfaction levels. "Frequency of Receiving Orders as Described" is positively related to satisfaction, with a coefficient of 0.239 (p = 0.016), indicating that customers who consistently receive orders as described are more satisfied.

Followed by the impact of the service quality dimension **"Responsiveness"** on customer satisfaction within mobile food delivery apps using linear regression analysis. The table specifically focuses on the factor "App Response Time" which demonstrates a significant positive effect (B = 0.354, p = 0.035), indicating that faster app response times lead to increased customer satisfaction. Similarly, "Prompt Order Status Notifications" also exhibit a substantial positive impact (B = 0.42, p = 0.037), indicating that timely and informative notifications regarding order status positively contribute to customer satisfaction. Furthermore, "Easy Customer Support Access" has a significant positive association (B = 0.347, p = 0.047), implying that providing easy and accessible customer support options within the app enhances overall customer satisfaction. The study results indicate that responsiveness-related features in mobile food delivery apps have a positive and significant influence on customer satisfaction.

Similarly, the impact of service quality dimensions, specifically focusing on **"Empathy",** on customer satisfaction with mobile food delivery apps using linear regression analysis. The factor "Understands Food Preferences" (B = 0.238, p = 0.042) exhibits a statistically significant positive influence, indicating that mobile food delivery apps that show an understanding of users' food preferences tend to lead to higher levels of customer satisfaction. Additionally, "Provides Personalized Recommendations" (B = 0.47, p = 0.013) and "Caters to Dietary Requirements" (B = 0.572, p = 0.012) both have strong and statistically significant positive effects on customer satisfaction, indicating that apps that offer personalized recommendations and accommodate diverse dietary needs are associated with increased levels of customer satisfaction. The results demonstrate a significant positive relationship between Empathy-related factors and customer satisfaction.

In terms of **Tangibility**, a dimension of service quality, on customer satisfaction with mobile food delivery apps using linear regression, the analysis reveals several significant insights. Specifically, for Tangibility-related factors, it's evident that a better user interface (UI) navigation experience (B = 0.434, p = 0.027) has a statistically significant positive influence on customer satisfaction. The study implies that users who find it easier to navigate within the app tend to report higher levels of satisfaction. Moreover, the provision of clear details regarding menu items and pricing (B = 0.285, p = 0.042) also contributes positively to customer satisfaction, indicating that transparency in these aspects enhances the overall user experience. Furthermore, the ability for customers to conveniently customize their orders (B = 0.337, p = 0.038) significantly contributes to higher levels of satisfaction. The study states the importance of improving the tangibility aspects of mobile food delivery apps, including user interface design, information clarity, and order customization options, to enhance customer satisfaction.

"Accessibility" dimension of service quality within mobile food delivery apps, as assessed through linear regression analysis. Specifically, the Accessibility and Compatibility of the app (B = 0.539, p = 0.045) emerge as a strong positive predictor of customer satisfaction. It indicates that customers who perceive the app as accessible and compatible with their devices or preferences are more likely to report higher satisfaction levels. Moreover, the presence of Encountering Technical Issues (B = 0.367, p = 0.009) also plays a statistically significant role in enhancing customer satisfaction. On the contrary, encountering technical issues positively impacts satisfaction, possibly indicating that prompt resolution of such issues or a smooth technical support experience may lead to greater overall satisfaction. Lastly, the Convenience of App Features (B = 0.125, p = 0.023) demonstrates a positive, though slightly weaker, influence on customer satisfaction, indicating that customers value convenience features within the app. The study demonstrates the importance of ensuring accessibility, addressing technical issues efficiently, and enhancing convenience features to sustain customer satisfaction in the realm of mobile food delivery apps.

The regression analysis reveals that customers highly value aspects such as timely and accurate delivery, responsiveness in terms of app performance and support, personalized recommendations, clear menu details, accessibility, and the ability to address technical issues promptly. However, the study rejects the null hypothesis and states that there exists a significant satisfaction of customers towards mobile food delivery apps with a focus on cloud kitchens. Therefore, mobile food delivery app providers should focus on improving these aspects comprehensively so as to create a satisfying and competitive user experience, ultimately fostering customer loyalty and success.

The study aims to identify and address the challenges that customers face when utilizing mobile food delivery apps. To achieve this objective, the study employs an Exploratory Factor Analysis (EFA) as the analytical approach. The EFA seeks to categorize and understand the diverse challenges encountered by users, providing insights that can guide app
enhancements and improvements, ultimately leading to a more seamless and satisfying experience for customers in the mobile food delivery app domain, particularly with a focus on cloud kitchens.

Table 4: Sample Adequacy Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.818
Bartlett's Test of Sphericity	Approx. Chi-Square	703.588
	Df	45
	Sig.	.000

The Sample adequacy table depicts the result through the KMO and Bartlett's test. The test result indicated that 0.818 > 0.7. The P value was also found to be significant. Hence, the study observed that the sample is adequate to run the exploratory factor analysis for addressing the challenges encountered by customers when using mobile food delivery apps.

Table: Component Matrix Table on Addressing challenges faced by Customers

	Component	
	1	2
Order Accuracy and Completeness	.719	
Delivery Time Delays	.827	
Technical Glitches	.846	
Customer Support Accessibility	.041	
Menu Clarity	.735	
Food Quality and Packaging		.814
Delivery Fees and Minimum Order Amounts		.752
Limited Restaurant Selection		.127
Order Customization Constraints		.875
Food Allergen and Dietary Information:		.854

The Component Matrix resulting from the exploratory factor analysis provides insights into the challenges encountered by customers when using mobile food delivery apps.

Component 1: Challenges are those that exhibit high loading factors, which are values greater than 0.05, indicating their significance in the customer experience. Notably, challenges related to Order Accuracy and Completeness (0.719), Delivery Time Delays (0.827), Technical Glitches (0.846), and Menu Clarity (0.735) are identified as critical issues faced by users. The factors represent the key points that customers encounter when using mobile food delivery apps. Addressing these challenges should be a priority for improving the overall user experience and enhancing customer satisfaction. It is important to focus on resolving issues related to order accuracy, delivery time delays, technical glitches, and menu clarity to ensure a smoother and more satisfactory mobile food delivery app experience for customers.

Component 2: Primarily encompasses challenges related to"Delivery Fees and Minimum Order Amounts" (0.752), indicating that this factor significantly contributes to the challenges faced by customers. Additionally, "Food Quality and Packaging" (0.814), "Order Customization Constraints" (0.875), and "Food Allergen and Dietary Information" (0.854) are also high-loading factors. The study results indicate that addressing issues surrounding delivery fees, minimum order amounts, food quality, packaging, order customization constraints, and dietary information is crucial

for improving the overall customer experience with mobile food delivery apps. *Therefore, the study helps prioritize areas of improvement for mobile food delivery apps, with a focus on addressing challenges with high loading factors for each component.*

5. Findings/ Discussion

The regression analysis conducted to assess the influence of various service quality dimensions on customer satisfaction within mobile food delivery apps has yielded noteworthy findings. Firstly, within the "Reliability" dimension, factors such as "Satisfaction with Delivery Time Accuracy," "Experience of Recent Order Delays or Discrepancies," and "Frequency of Receiving Orders as Described" have demonstrated statistically significant positive impacts on customer satisfaction. This underscores the importance of accurate delivery time predictions and consistent order fulfillment in enhancing customer contentment. Secondly, the "Responsiveness" dimension has emerged as a critical determinant of customer satisfaction. Factors such as "App Response Time," "Prompt Order Status Notifications," and "Easy Customer Support Access" have all shown significant positive effects on satisfaction. Timely app responses, informative order status updates, and accessible customer support options play pivotal roles in elevating the overall user experience.

Thirdly, the "Empathy" dimension, encompassing factors like "Understands Food Preferences," "Provides Personalized Recommendations," and "Caters to Dietary Requirements," has been identified as a significant driver of customer satisfaction. Mobile food delivery apps that exhibit an understanding of user preferences, offer tailored recommendations, and accommodate diverse dietary needs tend to elicit higher levels of customer satisfaction. Furthermore, the "Tangibility" dimension has highlighted the significance of factors such as user-friendly interface navigation, transparent menu details and pricing, and order customization options. These factors have displayed statistically significant positive influences on customer satisfaction, emphasizing the need to improve aspects related to user interface design and information clarity. Lastly, the "Accessibility" dimension, assessed through factors like "Accessibility and Compatibility of the app," "Encountering Technical Issues," and "Convenience of App Features," has revealed that perceived accessibility and compatibility, as well as the efficient resolution of technical issues, contribute positively to customer satisfaction. Additionally, the convenience of app features has been associated with higher satisfaction levels.

The regression analysis underscores the multifaceted nature of customer satisfaction within mobile food delivery apps. Customers place high value on factors such as accurate delivery, responsiveness, empathy-driven features, user-friendly interfaces, and accessibility. These findings reject the null hypothesis and confirm a significant level of customer satisfaction with a specific focus on cloud kitchens. Consequently, mobile food delivery app providers are encouraged to prioritize enhancements in these dimensions to create a fulfilling and competitive user experience. Such efforts can lead to increased customer

loyalty and overall success in the competitive landscape of mobile food delivery apps.

The exploratory analysis identified two pivotal challenge components emerged. The first component brought to light issues encompassing "Order Accuracy and Completeness," "Delivery Time Delays," "Technical Glitches," and "Menu Clarity," all of which displayed high-loading factors (>0.05). This underscores the substantial impact of these challenges on the customer experience. The second component identified key challenges associated with "Delivery Fees and Minimum Order Amounts," "Food Quality and Packaging," "Order Customization Constraints," and "Food Allergen and Dietary Information," each demonstrating significant loading factors. Effectively addressing these challenges becomes imperative to enhance the overall user experience with mobile food delivery apps, ensuring their competitiveness and customer-centricity within the evolving landscape of cloud kitchens and food delivery services.

6. Conclusion

In conclusion, the study focused on optimizing mobile food delivery apps, with a specific emphasis on cloud kitchens, and achieved its objectives effectively. The analysis demonstrated a strong positive correlation between service quality and customer satisfaction within the mobile food delivery app industry, underscoring the importance of enhancing service quality dimensions such as reliability, responsiveness, and empathy. Additionally, tangible elements like user interface design and menu clarity, along with prompt resolution of technical issues, significantly contributed to an improved overall user experience and heightened customer satisfaction. Simultaneously, an exploratory factor analysis identified and categorized critical challenges faced by users, ranging from order accuracy and delivery delays to concerns about delivery fees, food quality, and customization options. Recognizing and addressing these challenges is essential for enhancing the user experience and competitiveness of mobile food delivery apps, making them more customer-centric in the evolving concept of cloud kitchens and food delivery services.

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