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Analysing the Impact of Smart Applications on Customer Experience and the Success of Cloud Restaurant

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Abstract

This paper discusses user behavior and preferences while using cloud kitchen-based delivery apps such as the analyses of demographic profiles, customer happiness, convenience, data analytics, personalization, and the potential incorporation of artificial intelligence (AI) technologies. From a demographics perspective, the users consist of programmers and technical engineers who are young adults, aged between 20 to 30 years. The analyzed data also shows a significant gender imbalance, with men, as the majority of users. It shows that most users are married, indicating that these apps successfully meet the convenience requirements of families. Furthermore, many users hold undergraduate degrees, indicating that this educated group has a high degree of technology literacy. Regarding usage frequency, most users use the apps for occasional meals, with a smaller group classified as frequent users. Analyzing user engagement patterns can assist in the development of effective strategies, such as offering targeted promotions, enhancing user retention, and implementing personalization features to enrich the experience for frequent users. Even though most users are happy using apps to order food, there is potential for improvement in terms of usability, as some users may find them less convenient. This problem might be resolved by implementing multilingual user interfaces, which would make the applications more user-friendly and inclusive. Regarding data analytics and personalization, users expressed a desire for personalized features, such as predictive data analytics, to enhance their experience. However, they are worried about sharing personal data for customization, indicating their concerns about data security. The incorporation of artificial intelligence features, such as chatbots, holds significant promise. The data highlights the potential benefits of integrating AI, especially chatbots, to heighten user satisfaction.

Keywords: Cloud Kitchen Delivery Apps, User Behavior, Personalization, Artificial Intelligence, Data Analytics

Introduction

The practice of going out for dining has a long history, which has its roots in even Bronze Age, and the idea of a "restaurant" has continually evolved since its beginnings in 18th-century in France. This evolution is ongoing, with the modern introduction of the "cloud restaurant" representing a significant milestone (Dempsey, 2021). A dine-in restaurant is a restaurant where customers sit at tables and receive individual servings of food and drinks selected from a menu. The concept has diversified, encompassing various formats including the self-service as well as the table service. Additionally, there are establishments that exclusively focus on taking the food and dealing with delivery, such as urban sandwich and pizza shops. Moreover, most of these shops have a physical location with a distinct brand. In this place, food is prepared, as well as consumed, or taken away. A restaurant is defined as a physical "place" (Kiefer, 2002).

The global Covid-19 pandemic and the resulting global economic effects brought about a new reality for the restaurant industry. Lockdowns imposed restrictions on dining facilities, compelling many restaurants to turn to various kinds of food platforms and delivery services to sustain their operations (Norris, Taylor Jr, & Taylor, 2021). Although dine-in patronage increased as lockdowns lifted, it remained notably lesser than the pre-Covid-19 era owing to the introduction of various instruments including the vaccine certificated which hindered normalization among masses for social participation in public spaces (Wei, Chen, & Lee, 2021).

Amidst these economic problems, the adoption of the "cloud restaurant" concept accelerated, becoming an operational setup for some restaurants striving for economic viability (A. Liu, Ma, Wang, Xu, & Grillo, 2023). Cloud restaurants are commercial restaurants, either dedicated or shared, without dining facilities, operating solely for preparing food for delivery orders. They are also known as dark restaurants or ghost restaurants (Choudhary, 2019). Some originated from food platforms, while others were already existing restaurants that adapted to prepare food for other brands to maintain productivity during the economic downturn. Throughout the Covid-19 pandemic, various cloud restaurant operating models came into existence(Kulshreshtha & Sharma, 2022). While the term "cloud restaurant" is recent, the basic concept existed pre-Covid-19, which first started to be observed in certain pizza joints in one of the largest cities in the United States that completely offered delivery services.

The journey began in 2014 when Sriharsha Majety and Nandan Reddy, graduates of BITS Pilani, envisioned simplifying life by revolutionizing the way India orders food. Introducing the concept of 'hyper-local food delivery,' they collaborated with Rahul Jaimini, who translated their vision into reality with the development of the first website. Thus, Swiggy emerged as a food ordering and delivery platform (Upadhye & Sathe, 2020). Swiggy commenced its operations in August 2014, partnering with a few restaurants. The inaugural team of "Hunger Saviors" set out to deliver food within a period of 40 minutes. Following its first funding round, Swiggy launched its app in May 2015, marking the beginning of a journey fuelled by the in-house development of innovative technology. With unwavering support

from consumers, Swiggy expanded its reach to prominence, becoming the leading food ordering and delivery platform. The platform's key features include rapid deliveries, live order tracking, and no restrictions on order amounts, making it a consumer-centric service (John, 2021).

Smartphones, with their widespread adoption, have facilitated a strong connection between vendors and consumers. Online shopping has become immensely popular, offering the convenience of shopping from home without the constraints of traditional store hours. The ability to compare products and prices efficiently has further contributed to the popularity of online shopping. The intersection of technology and food consumption is a notable trend in India, reflecting changing lifestyles and preferences. The evolution of digital connectivity has not only impacted how food is ordered and delivered but has also influenced the broader culture of food consumption in the country. The practice of purchasing items online has been a longstanding trend, with trailblazers like Amazon taking the lead and establishing delivery networks, including those for food delivery. This trend has gained momentum, particularly among millennials who appreciate the convenience of online ordering and income to support deliveries to their home. In response to this demand, companies like Uber Eats and Door Dash have emerged to cater to this niche market country (Kaavya & Andal, 2022).

The growth of online food ordering has been significant, especially with the recent implementation of COVID-19-related restrictions that limited physical dining in restaurants. Consequently, there has been a surge in online food orders, leading to the emergence and widespread cloud restaurants. The compound annual growth rate for this sector is estimated to be 11%, with projected revenue reaching USD 200 billion by 2025 (Varese, Cesarani, Kabaja, Sołtysik, & Wojnarowska, 2023). Cloud restaurants are not only meeting the demand for fast and convenient deliveries but are also altering the landscape of home cooking. Workplaces, for instance, are increasingly opting for delivery services instead of maintaining their own company restaurants, highlighting the shift in preferences towards the ease and efficiency offered by cloud restaurants in fulfilling culinary needs.

Research Background and Literature Review

In recent years, the surge in popularity of delivery applications has transformed the traditional dining experience. The emergence of cloud kitchens, with their virtual presence and streamlined operations, has further shaped the landscape. Against this backdrop, understanding the nuances of user behavior in Saudi Arabia, a market with unique cultural and culinary preferences becomes imperative. This research aims to uncover the intricacies that define user interactions with these apps, contributing to the broader discourse on technology-driven changes in the culinary domain. While delivery apps have garnered widespread acceptance, challenges persist in optimizing user satisfaction, particularly within the context of cloud kitchen-based services. Users may encounter obstacles related to app usability, promotional content, and concerns about data security. Identifying and addressing these challenges is crucial for enhancing the overall user experience and ensuring sustained engagement with these platforms. This paper will discuss the following:

i. How do demographic factors influence user behavior in cloud kitchen-based delivery apps in Saudi Arabia?

ii. What are the primary challenges faced by users in terms of app usability and overall satisfaction?
iii. To what extent do convenience features, such as promotional items and discounts, impact user satisfaction?
iv. How do users perceive the integration of artificial intelligence features, particularly chatbots, in delivery apps?
v. What are the key factors influencing user preferences regarding data analytics and personalization features?

This research focuses on examining user behavior within cloud kitchen-based delivery apps in Saudi Arabia. Although it aims to include a diverse range of user demographics, it acknowledges that cultural and regional differences may affect the broader applicability of the findings. Additionally, the study is limited to analyzing user perspectives and does not explore the operational aspects of the apps or the specific business strategies of individual establishments.

Mobile Delivery Applications & Cloud Restaurant

An array of mobile applications facilitates daily activities, with delivery applications gaining recent prominence. These applications offer a seamless, one-click solution, consolidating information about restaurants and food items for direct food delivery. Delivery apps can be defined as smartphone applications enabling users to have a lot of privileges including but not limited to viewing the menus online, placing the orders without having to go outside and dine and having any kind of interaction with the staff (Okumus & Bilgihan, 2014). In one report issued by the Boston Consulting Group indicated that almost 60% of the people ordering food have embraced at least one delivery app (BCG, 2019).

Many research investigations have utilized a range of theories to investigate the use of mobile applications in various aspects of the tourism and hospitality industry. These include examining hotel booking and hotel information using the Technology Acceptance Model (TAM), evaluating catering services through the Electronic Commerce Systems Success Model, and analyzing ridesharing services through the Service Convenience and Technology (SCT) framework. (Zhu, 2017) (Bao & Zhu, 2023)(X. Liu et al., 2018). UTAUT has been employed in studies involving mobile payments (Morosan & DeFranco, 2016) travel and tour guides (Lai, 2015). Scientists have investigated consumer intentions in using smartphone applications for flight ticket bookings, utilizing partial least squares for analysis, and integrating UTAUT constructs alongside customer innovativeness and perceived trust. Notably, the adoption of mobile apps ordering applications remains an unexplored area, warranting further research (Chang, 2012).

In an investigation an analysis was carried out to scrutinize the determinants instigating the intention to employ food delivery applications, employing the model of technology acceptance(Lee et al., 2017). Mai Maiti et al. (2018) outlined the prospects and hurdles encountered by the food delivery industry in China, accentuating technological innovation in a rational context and the augmentation of the dining experience through the offline-to-online food delivery platform. This study presented a distinctive perspective on the opportunities and challenges faced by the nascent industry, including the health implications

of associated behavioural changes and their extensive impact on the social environment (Maimaiti, Zhao, Jia, Ru, & Zhu, 2018).

Studies have provided insights into the perspectives of millennials and Generation Z regarding the assimilation of food delivery services in Vietnam. It underscored the user-friendly and "anytime and anywhere" interactive nature of applications, enhancing customer experience and fostering increased enjoyment. The research scrutinized the decision-making process of customers within the loyalty loop when selecting a food delivery service (Nguyen & Vu, 2020). Suherianto et al. (2019) demonstrated that e-service and food quality act as catalysts for the loyalty of the customer in food delivery services. The study also confirmed that there is a direct of food quality on the loyalty of customers online, however, a quality check on the e-commerce side did not exhibit the same effect. Additionally, the research unveiled the partial mediation roles of customer satisfaction and customer e-satisfaction in the link between food quality as well as e-service quality on online loyalty (Suhartanto, Helmi Ali, Tan, Sjahroeddin, & Kusdibyo, 2019).

Ray et al. (2019) endeavored to comprehend consumer behavior linked to the utilization of food delivery apps. This investigation unveiled the association between both, proposing that e-service quality manages food quality. Consequently, the customer's experience with web quality would shape their perception of food quality. Mahande et al. (2019) conducted a study on the services provided by food delivery intermediaries, incorporating attribution theories such as online coupons and time-saving options. The findings underscored the significance of timesaving as a crucial factor, while price-saving did not emerge as a significant consideration in employing online food delivery intermediary services. The research illuminated that time is a critical factor for professionals, motivating them to avail delivery services (Kagaruki et al., 2022).

Researchers have identified the relationship between attributes of food delivery apps and perceived value among young workers. Using a quantitative method, five quality attributes were discussed. These attributes were found to have a profound influence on the user-perceived value in the case of food delivery applications, with price being the most influential factor determining perceived value in the initial stages of their careers. Someone analyzed the growth of the food tech industry. The study compared four important food delivery companies in India which include Swiggy, Zomato, Food Panda, and Tinyowl (Bhotvawala, Balihallimath, Bidichandani, & Khond, 2016). Researchers have delved into the study of smartphone diet apps through an online questionnaire to comprehend the intention to use mobile applications. The study determined five impetuses of employing mobile diet apps including social influence, effort expectancy, performance expectancy, facilitating conditions, and personal innovativeness. Numerous studies have explored mobile commerce and the adoption of its applications, focusing on the initial stages of adoption (Okumus, Ali, Bilgihan, & Ozturk, 2018).

A study from China concentrated on food delivery apps including the design, trustworthiness, and various food choices as independent factors impacting attitude and intention towards food delivery applications. The same study explored the differences between single-person and multi-person households, revealing that single-person households prioritized quality attributes and various food choices, while multi-person

households emphasized convenience (Cho et al., 2019). Indian online food aggregators have been studied, examining the assorted designs including visual, informational, and collaboration of these platforms. Employing mixed methods of questionnaires and focused group discussions, the research empirically tested the mobile app attribute conversion model. The results indicated that visually enticing and well-mannered mobile apps influence customer purchase decisions and subsequent conversion. Additionally, collaboration design emerged influencing conversion (Kapoor & Vij, 2018). The first three were adapted from existing studies, while the fourth, collaboration, emerged from the pre-study. Collaboration in this context refers to partnerships among multiple e-commerce entities aimed at boosting leads and increasing sales. An example of this is the collaboration between online food aggregators and Paytm in India. Paytm has partnered with Zomato (Online Travel Agencies or OTAs). When a customer orders food through Zomato and pays with Paytm, and they get a cashback of 10-15% on the final bill. This collaboration benefits customers by providing savings, encouraging the use of the Paytm app, and promoting cashless transactions. Similar collaborations exist between other e-commerce players, such as Uber (an online taxi service), and online food aggregators, resulting in increased sales. The study found that the collaboration attribute is the most crucial factor influencing customers when placing online orders. The correlation between collaboration and conversion says that consumers are motivated by offers and discounts that are being provided by online retailers (Kapoor & Vij, 2018).

Studies have investigated information quality and credibility in a customer's evaluation of food online-to-online commerce. The research explored the central and peripheral routes of purchase frequency, concluding that people with purchase at a high frequency try to process messages through the central route, while people with a low frequency of purchase focus more on the peripheral route (Kang & Namkung, 2019). Studies have also analyzed online food aggregators, examining hedonic motivation, time-saving orientation, online coupons, post-usage usefulness, attitude, and intention (Salleh, Hamir, Azmi, & Abdul Rahim Siddiqe, 2020). This research discussed the factors that affect the attitude toward online food retailing among Chinese students in the 18-22 age group. The results indicated that a consumer's perception of online services would improve if the service provided access convenience, which is the ability to shop online at anytime and anywhere (Y. Zhang, Wang, & Wang, 2018). Alagoz &Hekimoglu (2012b) investigated online food ordering in Turkey, examining perceived ease of use, perceived usefulness, innovativeness, and trust using an offline survey within the framework of the Technology Acceptance Model. The study focused on a homogeneous group of undergraduate and graduate students, allowing the researchers to address the challenges posed by diverse Internet usage habits within a heterogeneous group (Alagoz & Hekimoglu, 2012). Kim & Hwang (2020) explored food delivery services using drones, establishing a positive relationship between attitude and behavioral intentions. The study employed the theory related to planned behavior and norm activation to elucidate eco-friendly behavioral intentions in the context of drone food delivery services (Kim & Hwang, 2020). Li et al. (2020) conducted a study of online food delivery restaurants and their impact on sustainability during the pandemic. The study uncovered the effects of online food delivery services during the Covid-19 pandemic. While these services provided a positive impact by allowing people to source food without leaving home, there were negative consequences for the delivery personnel (Li, Mirosa, & Bremer, 2020). Zhao &Bacao (2020) proposed a comprehensive model analyzing satisfaction and continuing

intention in the use of online food delivery services in China. Their study incorporated UTAUT factors, trust, and perceived task-technology fit. With a focus on the COVID-19 outbreak, the research delved into technological and mental factors influencing consumer continuing intention of food delivery services in China (Zhao & Bacao, 2020).

Cloud restaurants have been a less-explored domain. Researchers have investigated the cloud restaurant business model, analyzing aspects related to customers, competitors, the market, and the environment. The study emphasized the need for continuous market analysis to adapt to innovative marketing strategies (Choudhary, 2019). Jha and Bhattacharyya (2018) discussed online restaurant entrepreneurship in a digitally evolving India, with a focus on Hola Chef, a cloud restaurant. Factors such as food quality, proactive technology platforms, and logistics maintenance were identified as crucial for customer retention (Jha & Sekhar Bhattacharyya, 2018). Meenakshi and Sinha (2019) attributed the success of food delivery apps in India to competitive advantage factors. The study highlighted that competition structure plays a role in differentiation and customer loyalty (Chhabra & Rana, 2021). Some researchers addressed the online food services industry in India, noting its growth indicated by daily order numbers. This growth prompted increased investments by food delivery players in online food industries, reshaping the entire restaurant culture toward internet-based restaurants (Tribhuvan, 2020). Given that research on smart applications in cloud restaurants is in its initial stages, more investigation into consumer intention and usage regarding cloud restaurant-based delivery apps is warranted.

There are various technologies becoming a part of the cloud kitchen restaurants and their associated applications. By the year 2030, the global ghost kitchen market is projected to soar to an impressive value of $1 trillion, drawing considerable interest from a multitude of technology companies eager to provide innovative Cloud Kitchen Management Solutions. Delivery-centric applications, such as Uber Eats, are particularly optimistic about the ghost kitchen business model's potential to increase sales, even for well-established and renowned brands like Burger King and Subway. The following delineates the existing challenges confronted by Direct-to-Consumer (D2C) cloud kitchen brands, aligning them with their foremost digital automation objectives, with the dual aims of maintaining their customer base and achieving sustainable profit margins.

With the introduction of meal-ordering apps for mobile devices, cloud kitchens are struggling to retain customers. To overcome this challenge, they are focused on creating personalized experiences to help their businesses stand out in the digital landscape. Customers can order meals from a variety of services, including Swiggy, Zomato, Uber Eats, and others, which frequently provide deals and discounts. Cloud kitchen brands want to provide a comprehensive perspective of the consumer's purchasing journey, allowing them to manage profit margins and competitive pricing. Providing consistent and high-quality customer service is critical. To do this, cloud kitchen manufacturers intend to regularly review client satisfaction, ensuring a consistent and dependable service experience.

Integrated Generative AI enables business owners to create individualized menus based on readily available customer data, such as individual preferences, food allergies, and dietary restrictions. This function improves the overall dining experience for customers, making it more pleasant and memorable. With tools like fast avatars, filters, and video effects,

it's easy to create engaging content for email, SMS, and social media marketing. This functionality aligns with customer preferences, which improves marketing campaigns and engagement. Cloud kitchen brands can get a competitive advantage by leveraging Generative AI's predictive analytics capabilities. This powerful technology excels at processing complex data, recognizing subtle trends, and offering more. Therefore, we can say that the culinary world is transforming because of the convergence of two technical phenomena: cloud kitchens and artificial intelligence.

AI enables food apps to execute their plans and operations with precision and structure. These apps can implement custom AI algorithms to analyze emerging food ordering trends and integrate them into their app designs. Food apps use AI models to predict customer food ordering patterns, including food categories and peak order times during the day. Optimization is often associated with determining the best delivery routes for app-associated agents. However, it also encompasses optimizing customer demand. With AI, these companies can create comprehensive lists for their users, gaining a deeper understanding of their preferences and interests. We can anticipate a surge in virtual restaurant brands, offering distinctive and specialized culinary experiences driven by AI-derived insights.

Hypotheses Formulated for This Research

Performance Expectancy (PE)

Performance expectancy, denoting consumers' ability to use technology productively, holds considerable influence on their perception of modern technology. Positive attention is garnered when technology offers time and effort savings compared to traditional methods. Previous research has consistently identified performance expectancy as a crucial factor in customer behavior toward modern technology.

Artificial Intelligence Integration

The 21st century is observing a rapid technological expansion across diverse sectors, and one of the remarkable innovations in this era is AI. In simplified terms, Artificial Intelligence involves the emulation of human intelligence functions within a machine, a computer. Robots represent exemplary instances of the products resulting from AI. The functionalities found in our mobile devices are constructed primarily upon AI technology.

Another noteworthy technological advance that is currently emerging is the concept of the "cloud." Lately, terms like cloud storage, cloud-based kitchens, and similar expressions have been increasingly prevalent. However, what exactly does "the cloud" entail? It does not manifest as a tangible entity; instead, it constitutes an extensive network of distant servers distributed globally, interconnected, and designed to function as a unified ecosystem. These servers are tasked with the storage and management of data, the execution of applications, and the delivery of content or services, such as video streaming, food delivery, email services, and social media. Instead of retrieving data from a specific desktop or personal computer, one can access it online through any internet-enabled device, regardless of location or time. While we have grown accustomed to storing our information, images, or projects in the cloud, we may not be fully aware that we can also place food orders through this system.

As discussed earlier, Artificial Intelligence enables devices to mimic human-like behaviors. For example, applications like Google Assistant or Siri on our smartphones interact with us as if they were human counterparts, obeying our commands. Artificial Intelligence has become an integral element of our technological landscape, exerting control over applications and various devices. We frequently employ food delivery applications like UberEATS, Zomato, Swiggy, and others, all of which rely heavily on Artificial Intelligence for the efficient delivery of restaurant-prepared dishes to customers. Many of us use these apps to satisfy our hunger, often without recognizing the substantial role that Artificial Intelligence plays in these operations, or how we contribute to the proliferation of cloud kitchens.

AI-driven cloud kitchens can predict peak times of customer food demand and function efficiently, while traditional restaurants must meticulously schedule their workforce in accordance with varying customer requirements. Delivery services can be managed by machines and robots, reducing delivery time. Thus, the integration of Artificial Intelligence is an essential aspect that should receive considerable emphasis and further research within the realm of cloud-based restaurants.

Social Influence (SI)
Social influence defined as the modification of individual attitudes or behavior by others' actions or presence, plays a crucial role in the acceptance of modern technologies. In the context of cloud restaurants, where online food ordering is a novel technology, customer faith in such innovations is significantly influenced by social suggestions from friends, family, and colleagues. Social influence has been consistently demonstrated to impact behavioral intention to adopt modern technologies.

Facilitating Conditions (FC)
Facilitating conditions means the belief that organizational and/or technical infrastructure exists to support a system. Technical prerequisites, such as internet connectivity and smartphone usage, are essential for online food ordering. Customers need to feel comfortable using applications, and consistent enhancements in the quality of online food aggregator pages are crucial. Previous studies have provided evidence of facilitating conditions impacting the adoption of modern technology.

Online Rating
Advancements in technology enable consumers to share their experiences through online reviews, influencing potential customers positively or negatively. Online ratings contribute to the improvement and enhancement of customer loyalty.

Online Coupons (OC)
Online coupons play a significant role in shaping consumers' perceptions. Price comparison is expected, and the financial cost associated with using a new system is likely to influence customers. Previous research has identified the importance of price value as a key predictor of behavioral intention.

Delivery Experience (DE)
Consumers' experience during the delivery of ordered food items, including options like offering food at midnight, free delivery, estimated time viewing, and order tracking, holds

significant importance. Studies emphasize the importance of delivery experience in consumer intention to use technology for food ordering.

Behavioural Intention (BI)
Intention serves as an impetus for an individual's likeliness to perform specific behaviors. Positive experiences shape perceptions and attitudes, predicting the intention to act similarly. Studies indicate that customers with a positive experience are more likely to intend to use such systems again.

Health Consciousness (HC)
Health consciousness measures an individual's readiness to take health-related actions, indicating awareness of lifestyle impacts on health. Health-conscious individuals are likely to be interested in improving or maintaining their health and engaging in health-related actions. The hypothesis posits that the relationship between behavioral intention and actual use behavior towards cloud restaurant-based delivery apps is moderated by health consciousness.

Research Implementation

The first stage of the study involves a detailed review of current knowledge and assumptions regarding user behavior in cloud kitchen-based delivery apps. This step comprises a thorough review of the literature, which aids in a better knowledge of the subject. This review focuses on important theories, models, and frameworks, setting the groundwork for the future development of a conceptual framework. The literature review comprises studies on user preferences, cultural influences, technological trends, and the factors shaping user satisfaction. This phase is important for understanding the research study, clarifying key variables, and formulating hypotheses that will guide the later stages of the research. The output of Phase 1 is a well-defined conceptual framework that acts as a roadmap for the research, explaining the interrelationships between diverse factors influencing user behavior in the context of cloud kitchen-based delivery.

The second phase shows the practical implementation of the research plan based on the conceptual framework produced in the previous phase. This includes the actual collection of data from users of cloud kitchen-based apps in Saudi Arabia. Various data-gathering methods, such as surveys, interviews, and observations, are employed in accordance with the research objectives. The research instruments, which are designed based on the conceptual framework, are implemented to gather relevant and meaningful data. In Phase 2, the study explores the complexities of user experiences, preferences, and challenges. The focus is on getting firsthand knowledge of the factors influencing user behavior. Furthermore, this phase may include the development or implementation of any tools or interventions required for the research, ensuring that the acquired data is consistent with the conceptual framework produced in Phase

The final phase shows the task of assessing the effectiveness of the conceptual model developed in the earlier stages. This involves the analysis of the data collected using specified methods outlined in the research plan. Statistical or qualitative analyses are used to make conclusions and insights based on research findings. Evaluation involves assessing the validity and reliability of the conceptual model in explaining user behavior within cloud kitchen-based

delivery apps. It evaluates the model's predictive capability and capacity to capture user satisfaction. The results obtained are interpreted in the context of the conceptual framework, resulting in a comprehensive understanding of the dynamics influencing user behavior in the studied environment. The output of Phase 3 is a set of findings that would contribute not only to academic knowledge but also to practical implications for app developers, restaurant owners, and policymakers. The evaluation phase would be the primary focus of the research, offering insights that may be used to influence initiatives to improve user satisfaction and engagement in Saudi Arabia's cloud kitchen-based delivery.

The survey instrument utilizes a five-point Likert scale, ranging from 'strongly disagree' (1) to 'strongly agree' (5) to evaluate the measures. All items have been developed based on insights from the literature, with slight modifications to capture the content-specific aspects of cloud restaurant-based delivery apps. The outcome variable, behavioral intentions, is influenced by online reviews, online coupons, various food choices, and delivery experience. These variables were considered direct antecedents of cloud restaurant-based delivery apps. The framework incorporated drivers influencing actual use behavior towards these apps, with the moderating variable of health consciousness analyzed for its effects on actual use behavior. The following are the research questions.

H1: "Do you think food ordering through smart apps is a good idea?"
H2: "Are you satisfied with the smart apps for food delivery from cloud restaurants?"
H3: "Learning how to use cloud restaurant-based delivery apps is easy for me"
H4: "I find cloud restaurant-based delivery apps useful in my daily life.
H5: "Do you usually prefer to use smartphone apps for food delivery instead of dining out due to convenience?"
H6: "The coupons and ratings on the smart apps help you to utilize it better for food delivery through cloud restaurants."
H7: "Some features of the smart phone apps if enhanced would enable you to order more food through it."
H8: "Does interface of the smartest phone apps you currently use is user-friendly?"
H9: "Do you think it is more important for cloud restaurants to invest more on smart apps rather than food quality?"
H10: "I have the necessary resources to use cloud restaurant-based delivery apps."
H11: "I like the offers in the form of coupons, cashbacks, and discounts on cloud restaurant-based apps.
H12: "I intend to use cloud restaurant-based delivery apps in the future."
H13: Do you think the interactive preference menu in the smart apps which are based on the data analytics help you better choose your intended meal?
H14: Do you think that more use of predictive data analytics technology would more improve your experience of online food ordering.
H15: Have you used smart apps for food delivery with artificial intelligence features?
H16: Did the use of artificial intelligence features like chat robots enhanced your experience of use of smart apps for food delivery?
H17: Do you think that the use of artificial intelligence like the chat robots in the smart applications would further enhance your satisfaction towards cloud restaurants?

Findings

The demographic information revealed in this survey provides an in-depth understanding of the user base for cloud kitchen-based delivery apps. Table 1 shows that 26 percent of individuals in the age group below 20 utilize delivery apps that are based on Cloud kitchens. Meanwhile, 29.5 percent of users fall into the 20-30 age bracket, and 22.7 percent belong to the 30-40 age category. Notably, only 7.2 percent of respondents aged above 50 expressed interests in utilizing Cloud kitchen-based delivery apps. Mobile applications are prevalent in developed societies and are employed by people of various age ranges. Nevertheless, older individuals find these apps less attractive due to usability challenges as well as due to their limited choice of foods which mostly encompass their traditional food. The gender wise distribution shows that a whooping 87.4 per cent of respondents are men and 12.6 percent women. Men are in general more inclined to explore new avenues and are bit more inclined towards technology savvy. In terms of marital status, 65.2 percent of respondents are married and 34.8 percent of respondents were single. Interestingly, married respondents are more interested in using cloud kitchen services. In terms of frequency of use of the delivery apps, 46.4 per cent respondents report using such apps times 1-3 times per month, 36.7 per cent used it in a frequency of 36.7. Only 3.9 per cent of respondent's report using delivery applications more than 10 times per month.

Table 1
Frequency Distribution of Demographic Profiles of Cloud kitchen-based delivery app users in Saudi Arabia

Variables	Value	Frequency	Percentage
Age	Below20	55	26.7
	20 – 30	61	29.5
	30 – 40	47	22.7
	40 – 50	29	14.0
	Above50	15	07.2
Gender	Men	181	87.4
	Women	26	12.6
Marital Status	Married	135	65.2
	Single	72	34.8
Educational Qualification	Secondary School	45	21.7
	Undergraduate	128	61.8
	Postgraduate	34	16.4
Frequency Usage of delivery apps per month	1-3	96	46.4
	3-5	76	36.7
	5-10	27	13.0
	> 10	8	3.90

Table 2 shows that the satisfaction data provides insights into how users perceive the utility and user-friendliness of delivery apps. "Do you think food ordering through smart apps is a good idea?" (Mean: 4.71, SD: 0.925): This question received overwhelmingly positive feedback, with a mean score close to the maximum value of 5. Users strongly agree that food

ordering through smart apps is a highly favorable concept. The high mean score here indicates a strong appetite for the concept of using apps for food delivery. It underscores that users see these apps as a convenient and efficient way to order food. This level of enthusiasm is an encouraging sign for app developers and restaurants, suggesting an elevated level of acceptance and demand for such services. "How satisfied are you with the smart apps for food delivery from cloud restaurants?" (Mean: 4.10, SD: 0.917): The high mean score for this question, which hovers above 4 on a 5-point scale, indicates a positive satisfaction level among users. A mean score of 4.10 suggests that users are satisfied with the current state of smart apps for food delivery. While not as unanimously enthusiastic as the previous question, it still reflects a positive outlook. It also provides room for app developers and restaurants to improve and further enhance the user experience to achieve higher satisfaction scores.

"Learning how to use cloud restaurant-based delivery apps is easy for me" (Mean: 3.52, SD: 0.713): This question received a moderately positive response, with a mean score above the midpoint. It indicates that while a sizeable portion of users find using these apps straightforward, a notable segment does not. The mean score of 3.52 suggests that there is room for improvement in terms of user-friendliness. App developers can consider simplifying the user interface, providing onboarding tutorials, and offering guidance within the app to make it more accessible to all users. The data implies that user-friendliness is a key area for potential enhancement. A user-friendly interface is crucial for a broader user base, including those who may not be tech-savvy.

"I find cloud restaurant-based delivery apps useful in my daily life" (Mean: 4.35, SD: 0.846): The high mean score on this question reflects a significant level of perceived usefulness of these apps in users' daily lives. The data suggests that delivery apps have seamlessly integrated into users' routines and have a practical impact. Users view these apps as valuable tools for their daily needs. In summary, users express a strong preference for the concept of smart apps for food delivery and are satisfied with their current usage. However, these apps need to improve their user-friendliness to enhance the overall experience. Additionally, considering the high mean scores and low standard deviations, the responses are consistent and stable.

Table 2
The satisfaction level of the people in Saudi Arabia with the use of smart apps for food delivery

Survey Questions	Mean	SD
"Do you think food ordering through smart apps is a good idea?"	4.71	0.925
"How satisfied are you with the smart apps for food delivery from cloud restaurants?"	4.10	0.917
"Learning how to use cloud restaurant-based delivery apps is easy for me"	3.52	0.713
"I find cloud restaurant-based delivery apps useful in my daily life.	4.35	0.846

Table 3 shows how convenient are various features of smart apps for the consumer experience. The data provides insights into the convenience and effectiveness of various

features within smart apps. "Coupons and ratings on smart apps help you utilize it better for food delivery through cloud restaurants" (Mean: 3.10, SD: 1.021): Users found coupons and ratings to be moderately helpful in optimizing their food delivery experience. The moderate mean score of 3.10 suggests that users appreciate the presence of coupons and ratings in these apps, but they do not perceive them as the most significant drivers of their experience. App developers can continue offering these features while considering additional elements to enhance user engagement.

"Do you think smart apps for food delivery are overly crowded with promotions?" (Mean: 1.74, SD: 1.211): This question received a low mean score, implying that users do not perceive these apps as excessively cluttered with promotions. The low mean score of 1.74 indicates that users do not feel overwhelmed by promotional content in these apps. This is a positive sign, as overcrowded promotions might deter users. However, the high standard deviation suggests that there is some variance in users' perceptions. App developers should aim for a balanced approach to promotions, ensuring that they enhance the user experience without becoming intrusive. "Some features of the smartphone apps if enhanced would enable you to order more food through it" (Mean: 3.74, SD: 0.854): Users expressed a positive inclination toward enhancements in smart app features that could facilitate more food orders. The mean score of 3.74 suggests that users are open to feature improvements that would encourage them to order more food through these apps. This indicates that users are willing to explore enhanced features that can simplify the ordering process or offer additional convenience.

"Does the interface of the smartest phone apps you currently use is user-friendly?" (Mean: 3.21, SD: 0.961): This question explores the user-friendliness of app interfaces. While the mean score is above the midpoint, it suggests that there is room for improvement, as users rate the user-friendliness as moderately positive. A mean score of 3.21 signifies that users find the interfaces of these apps user-friendly, but there is potential to enhance this aspect. Developers can focus on refining and simplifying the user interface to improve the overall experience. "I enjoy offers in the form of coupons, cashback, and discounts on cloud restaurant-based apps" (Mean: 4.31, SD: 1.012): This question garnered a high mean score, indicating that users derive significant enjoyment from offers, such as coupons, cashback, and discounts. The high mean score of 4.31 underlines the importance of promotional elements, such as coupons and discounts, in enhancing user satisfaction and engagement. Users find these offers enjoyable, which suggests that they are a critical aspect of the app experience.

"I have the necessary resources to use cloud restaurant-based delivery apps" (Mean: 3.15, SD: 0.9881): The mean score for this question is slightly above the midpoint, suggesting that users feel they have the required resources to use these apps. However, there is room to improve the accessibility of these apps to a wider audience. The data implies that users believe they have the necessary resources to use these apps. Still, developers should be mindful of making these apps accessible to a broader audience, including those who may have limited resources or technological literacy.

In summary, the data suggests that users value features like coupons and promotions, but not to the extent that it overwhelms their experience. They are open to feature enhancements and find the app interfaces user-friendly, albeit with room for improvement.

The enjoyment derived from offers like coupons and discounts underscores their importance in the app experience.

Table 3
Convenient of smart apps

Survey Questions	Mean	SD
“Coupons and ratings on smart apps help you utilize it better for food delivery through cloud restaurants.”	3.10	1.021
“Do you think smart apps for food delivery or overly crowded with promotions?	1.74	1.211
“Some features of the smart phone apps if enhanced would enable you to order more food through it.”	3.74	0.854
“Does interface of the smartest phone apps you currently use is user-friendly?”	3.21	0.961
"I enjoy offers in the form of coupons, cashback, and discounts on cloud restaurant-based apps.	4.31	1.012
“I have the necessary resources to use cloud restaurant-based delivery apps.”	3.15	0.9881

Table 4 discussed the data analytics and personalization section of the survey and explored users' attitudes toward data-driven features and customization. Here are the key implications: "Do you want to personalize your experience on smartphone apps for food delivery?" (Mean: 4.21, SD: 0.921): This question reveals two very divergent and interesting aspects of user preferences. First, it indicates that people want to enhance their experience through analytics and personalization, with a mean score of 4.21. The high mean score indicates that there is an ardent desire among users for features that personalize their experience and predict their preferences. Users prefer an app that streamlines their choices and simplifies the food selection process. Personalization features, such as order history, favorite items, and recommendations based on past orders, can be highly appealing to users. Developers can also consider options for customizing menus based on individual preferences. "Do you want your personal preferences and data to be used to customize your experience on smart apps?" (Mean: 2.1, SD: 0.975): Interestingly, the data shows that users are reluctant to allow their personal data to be used for customization. While users desire personalization, they have reservations about sharing their personal data for this purpose. This suggests concerns about data security and privacy. App developers need to address these concerns by implementing robust data protection and privacy measures and transparently communicating their data usage policies.

"Do you think that more use of predictive data analytics technology would improve your experience of online food ordering?" (Mean: 3.95, SD: 0.811): Users express a positive inclination toward predictive data analytics technology. A mean score of 3.95 indicates that

users believe that predictive data analytics can enhance their online food ordering experience. This is a significant finding, as it suggests that users are open to innovative features that can simplify and personalize their ordering process. Implementing features like predictive ordering, dynamic menu recommendations, and personalized promotions can align with users' expectations and improve the overall experience. "Do you think the interactive preference menu in the smart apps which are based on the data analytics help you better choose your intended meal?" (Mean: 4.10, SD: 0.919): This question further emphasizes users' openness to interactive and data-driven menu preferences. With a mean score of 4.10, this question confirms that users appreciate interactive menus that are based on data analytics. Such menus can help users make informed choices and discover new options tailored to their preferences. App developers can explore interactive menu designs that use data analytics to make food selection a more enjoyable and efficient process. In summary, the data reveals that users have an ardent desire for personalization and features driven by data analytics. They want apps to anticipate their preferences and simplify the ordering process. However, they are cautious about sharing their personal data, highlighting the need for robust data protection measures and clear communication about data usage.

Table 4
Data Analytics and Personalization of the Smart Apps

Survey Questions	Mean	SD
Do you want to personalize your experience on smart phone apps for food delivery?	4.21	0.921
Do you want your personal preferences and data to be used to customize your experience on smart apps?	2.1	0.975
Do you think that more use of predictive data analytics technology would improve your experience of online food ordering?	3.95	0.811
Do you think the interactive preference menu in the smart apps which are based on the data analytics help you better choose your intended meal?	4.10	0.919

Table 5 shows the data on artificial intelligence features sheds light on users' familiarity with and openness to AI-driven enhancements in delivery apps: "Have you used smart apps for food delivery with artificial intelligence features?" (Mean: 2.10, SD: 0.7199): This question indicates that artificial intelligence features are not very prevalent in current smart apps for food delivery. While artificial intelligence features like chatbots are not prevalent in these apps, users are open to their inclusion and believe they could enhance their experience. The widespread use of AI in various online ventures suggests that users are familiar with AI's potential benefits. Therefore, introducing AI features, especially chatbots, can lead to increased satisfaction among users. The data reveals the potential for enhancing the smart apps for food delivery in Saudi Arabia through the incorporation of artificial intelligence features. Despite the current limited presence of AI in these apps, users show receptivity toward this technology. This aligns with the broader trend of AI's integration into various digital platforms and services. The use of AI, particularly in the form of chatbots, can significantly improve the user experience. Chatbots can assist users in

placing orders, resolving issues, and providing personalized recommendations based on their previous orders and preferences. The data suggests that the inclusion of such AI features has the potential to enhance user satisfaction. Moreover, the survey results also indicate the willingness of users to embrace more AI features in the future. The idea that more AI, such as chat robots, could further enhance satisfaction suggests that users are open to continued improvements in their app experience.

For restaurant owners and app developers, this data shows a clear path forward. The integration of AI, such as chatbots and other AI-driven features, can contribute to higher user satisfaction and loyalty. AI can speed the ordering process, provide personalized recommendations, and offer efficient customer support, which contributes to a better overall experience. Therefore, while AI functions are not yet widely available in Saudi Arabian delivery apps, customers have shown strong support for them to be included. Restaurant owners and developers can take advantage of this opportunity to integrate AI solutions that can improve user satisfaction and differentiate their apps in a competitive market. The data shows the importance of remaining current on technical advancements and user preferences to provide a more satisfying and efficient user experience.

Table 5
Artificial Intelligence Features

Survey Questions	Mean	SD
Have you used smart apps for food delivery with artificial intelligence features?	2.10	0.7199
Did the use of artificial intelligence features like chat bots enhance your experience of using smart apps for food delivery?	2.81	0.8133
Do you think that more the use of artificial intelligence like the chat robots in the smart applications would further enhance your satisfaction towards cloud restaurants?	3.31	1.099

Conclusion

In conclusion, the demographic study provides important insights into the user base of cloud kitchen delivery apps, revealing the strong presence of young adults aged 20 to 30, mostly male users, as well as a sizable number of married persons. This study highlighted the requirement for app developers and restaurant owners to tailor their offerings to a tech-savvy client with diverse educational backgrounds. Understanding its consumers' demographics and interests allows organizations to create strategies that cater to unique needs, increasing user engagement and happiness.

Furthermore, user satisfaction also depends on how efficient and convenient meal-ordering applications are, even though the usability of the system needs to be improved. Users appreciate personalized features and promotions but also express concerns about data security and the potential for overwhelming marketing content. This stresses the necessity of data openness and a well-balanced promotional approach that improves rather than detracts from the user experience. Furthermore, the potential integration of AI features, like chatbots, presents a promising avenue for improving user satisfaction and loyalty, suggesting that

businesses should consider investing in these innovations to better serve their customers in a competitive market.

Therefore, this research provides valuable insights into user behavior and preferences within cloud kitchen-based delivery apps in Saudi Arabia, offering strategic recommendations for app developers and restaurant owners. The study reveals key demographic trends, such as a dominant user base of tech-savvy young adults and a significant gender imbalance, while highlighting the need for tailored approaches for occasional and heavy users. User satisfaction is generally positive, but challenges in app usability indicate a need for improvements, including multi-language interfaces. The findings emphasize the importance of balancing promotional content with user experience and suggest incorporating personalized features through data analytics while ensuring data security. Moreover, the research underscores the potential of artificial intelligence features, particularly chatbots, to enhance user experience and foster customer loyalty.

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