E-service Quality and Customer Loyalty in Food Delivery Mobile Applications: The Role of Satisfaction and Perceived Value

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Abstract

This study investigates the impact of e-service quality on customer satisfaction and loyalty in food delivery mobile applications in Saudi Arabia, emphasizing the roles of information quality, application design, payment methods, and security and privacy. Utilizing a sample of 368 participants, the research employs a quantitative approach through structured questionnaires and structural equation modeling. Findings reveal significant positive relationships between information quality, application design, and security and privacy on customer satisfaction. Notably, customer satisfaction strongly influences loyalty, highlighting its critical role in retaining customers. Conversely, payment methods did not significantly affect customer satisfaction, indicating a shift in consumer confidence towards digital payments. Additionally, the moderating role of perceived value between customer satisfaction and loyalty was not supported, suggesting that consumers prioritize immediate satisfaction over perceived long-term benefits. These insights provide valuable implications for food delivery service providers, emphasizing the need to enhance e-service quality to foster customer satisfaction and loyalty in a competitive market. Future research should explore broader geographical contexts and additional moderating Factors to deepen the understanding of consumer behavior in the food delivery sector.

Keywords: E-service quality, Customer satisfaction, Loyalty, Food delivery applications, and Perceived value

1.   Introduction:

Due to the increasing use of smart devices and emerging mobile technologies, many organizations have developed mobile applications to engage with their consumers digitally (Rao & Troshani, 2007; Sia et al., 2022). Mobile applications are software designed for mobile operating systems on smart devices, providing enhanced computing capabilities and diverse functionalities (Nah & Sheng, 2005). They enable consumers to interact with businesses in real-time, leading to a flexible, mobile, and efficient buying experience (Weichbroth, 2020). The online food delivery sector is one of the fastest-growing segments within mobile applications (Hakim et al., 2022). Unlike conventional online food delivery methods that typically require users to place orders through a website or by phone, food delivery applications (FDAs) have overcome previous technical constraints (e.g., busy phone lines or fixed locations), allowing consumers to choose their favorite cuisine from various restaurants, process payments online via smart devices, and receive food orders at any location and time (Alalwan, 2019). Generally, FDAs fall into two categories: (1) applications operated by catering companies, like McDonald's, Domino's, or Pizza Hut, which are used to take online orders and deliver food using their delivery staff, and (2) third-party FDAs, which act as intermediaries between food suppliers and customers. Third-party FDAs provide services that connect food suppliers, delivery staff, and customers rather than selling food directly (Liu et al., 2024). This research focuses on the second type: third-party FDAs. According to Asfoura et al. (2021), third-party FDAs compete to capture the maximum share of this profitable sector. They compete on delivery costs, the variety of restaurants available through each application, and application quality to enhance the overall user experience and satisfaction.

Food delivery applications have revolutionized food consumption experiences worldwide, and their usage has grown significantly in recent years. The global food delivery market is projected to expand at a compound annual growth rate (CAGR) of 6.5%, rising from an estimated $ 151.5 billion in 2021 to $ 223.7 billion by 2027, according to "The Rise of Food Delivery Apps in Saudi Arabia: Growth, Challenges, and Future Trends" (2024). The food delivery industry has experienced remarkable growth in Saudi Arabia, where the market was valued at approximately $1.2 billion in 2022. Forecasts suggest an increase to $1.7 billion by 2025, capturing over 69% of the market due to the rising usage of smartphones and improved internet accessibility (Online Food Delivery – Saudi Arabia, 2023). Local platforms like Jahez and HungerStation, along with global entities such as Uber Eats, play significant roles in the Saudi market. These technologies have transformed the food service industry by improving dining accessibility and efficiency. The rapid expansion and fierce competition among food delivery applications underline the importance of understanding the factors that influence customer satisfaction and loyalty.

E-service quality is crucial in shaping consumer experiences in digital contexts. Parasuraman et al. (2005) characterize e-service quality as how effectively and efficiently a website enables the buying and purchasing procedure. In the realm of food delivery applications, this includes multiple aspects such as user interface design, payment options, information quality, and security measures. Many research investigations highlight the significance of these factors in enhancing consumer satisfaction. Yoo and Donthu (2001) identified usability and aesthetic design as critical determinants of perceived quality in online purchasing environments. Fauzi (2018)

emphasized the importance of application design and functionality in affecting user satisfaction in mobile applications. Moreover, studies indicate a substantial correlation between service quality and customer satisfaction, influencing loyalty (Dabholkar et al., 2000; Anderson & Srinivasan, 2003). In other words, customer satisfaction is essential for loyalty, as satisfied customers are more likely to make repeat purchases. Therefore, understanding the factors that drive satisfaction in food delivery services can provide crucial insights for businesses in the Saudi context. Research indicates that people are more inclined to maintain loyalty to services that continuously fulfill or surpass their expectations (Liu et al., 2008).

Additionally, perceived value significantly influences consumer loyalty. Zeithaml (1988) defines perceived value as the consumer's overall assessment of a product's usefulness, determined by the benefits received relative to the costs incurred. In a competitive market, where numerous food delivery services compete for consumer attention, perceived value can significantly affect a customer's decision-making process. Research shows that higher perceived value increases customer satisfaction and loyalty (Kotler, 2003; Khalifa, 2004). Therefore, the widespread use of food delivery applications in Saudi Arabia calls for an analysis of the impact of perceived value on customer retention.

This study investigates the relationships between e-service quality, consumer satisfaction, perceived value, and loyalty in the context of food delivery applications in Saudi Arabia. By exploring these interrelated variables, it examines the critical factors that affect consumer retention in this dynamic sector. The findings will enhance academic understanding of consumer behavior in e-commerce and provide actionable insights for food delivery service providers, enabling them to tailor their offerings to meet consumer needs.

2. Literature Review and Hypothesis Development:

2.1 E-service Quality and Customer Satisfaction:

Over the past decade, research has been conducted to understand, assess, and control service quality and its impacts in electronic environments (Carlson & O'Cass, 2011). With the rapid growth of the internet, the concept of "e-service" emerged (Loonam & O'Loughlin, 2008). Additionally, with the rise of e-commerce, "e-service" has gained popularity as a research topic, and several published studies have provided a range of conceptual definitions (Rolland & Freeman, 2010). E-services are increasingly recognized as one of the primary factors determining the success of e-business (Carlson & O'Cass, 2010). As e-service usage in the corporate sector has increased, measuring and monitoring e-service quality in the virtual world has become vital (Askari, 2016).

Parasuraman et al. (2005) define e-service quality as the extent to which a website facilitates shopping, purchasing, and receiving goods and services more efficiently and effectively. E-service quality encompasses the overall consumer evaluation and assessment of the excellence and quality of e-service delivery in the virtual marketplace (Santos, 2003). E-service quality provides all interactive services through the Internet, utilizing advanced information, multimedia, and telecommunications technologies (Boyer et al., 2002). According to Noorshella et al. (2015), e-service quality is increasingly recognized as a vital element for establishing a competitive advantage and plays a significant role in the long-term retention of Internet businesses. A company cannot deliver adequate service quality to satisfy its customers' needs without a quality management strategy that ensures quality from its systems, employees, and suppliers. Internet service quality is especially critical as it serves as the customer's interface with the Internet (Cox & Dale, 2001).

Given the importance of service quality in the electronic arena, researchers developed a scale to evaluate the quality of electronic services on websites (Fauzi, 2018). Most studies on the concept and assessment of e-service quality have identified the construct's dimensions from the perspectives of either the provider or the consumer (Heim & Field, 2006). A review of the research on e-service quality uncovers various dimensions relevant to different study contexts (Askari, 2016). For instance, Yoo and Donthu (2014) developed a model to measure the perceived quality of an Internet shopping site using four dimensions: ease of use, aesthetic design, processing speed, and security. Researchers asked participants to visit and interact with several shopping websites without engaging in transactional activities. Consequently, the researchers did not provide empirical findings about how respondents navigated the websites or completed any transactions; instead, they focused solely on examining the websites as interface media. Barnes and Vidgen (2001) employed the SERVQUAL methodology to create a set of quality items. The researchers identified five essential dimensions: assurance (security, credibility), responsiveness (access, responsiveness), empathy (communication, understanding the individual), and tangibles (aesthetics, navigation). Moreover, the WebQual 4.0 model was proposed by Barnes and Vidgen (2002) to measure the quality of electronic services at online bookstores across three dimensions: usability, information quality, and service interaction. The constructed WebQual 4.0 scale is more beneficial for interface design than comprehensive quality measurement because it emphasizes technical quality factors like usability (Bauer et al., 2006). Unfortunately, because respondents could complete the designed instruments without engaging in the entire purchasing process, the WebQual 4.0 model did not thoroughly examine how respondents engaged in transaction activities such as website navigation, product or service selection, ordering, payment, delivery, and customer service (Fauzi, 2018). Due to its lack of consideration for transactional activities, the WebQual 4.0

model cannot be classified as an optimal scale for measuring the quality of electronic services (Parasuraman et al., 2005; Bressolles & Nantel, 2008).

On the other hand, measuring e-service quality (Bauer et al., 2006; Guo et al., 2012; Noorshella et al., 2015) focuses on the user interface of the website and the entire transaction process completed by the respondents. Bauer et al. (2006) developed a scale for evaluating service quality based on transaction processes (eTransQual), which includes five dimensions: functionality/design, enjoyment, process, reliability, and responsiveness. Additionally, Guo et al. (2012) considered eight factors related to e-service quality: design, security, information quality, payment method, e-service quality, product quality, product variety, and delivery service. Noorshella et al. (2015) measure service quality across five dimensions: information quality, website design, security and privacy, transaction capability, payment, and expected service delivery to identify the main factors that influence e-service quality in Malaysian small online clothing enterprises.

According to Wolfinbarger and Gilly (2003), it is vital to examine customers who have completed transactions, as they encompass everything from seeking information and assessing products or services to making choices, finalizing transactions, receiving and returning items, and offering customer support. To address the limitations of earlier scales, Fauzi (2018) conducted a study to measure the quality of electronic services within mobile applications for online transportation services, which include the user interface and the entire customer transaction process. This study captured the complete customer transaction process by integrating four dimensions: information quality, application design, payment methods, and security and privacy.

A literature review indicates a widely accepted set of dimensions for e-service quality, as various studies have proposed different criteria. These criteria may vary depending on the specific environment and research topic. Therefore, to evaluate e-service quality in food delivery applications, this research will utilize Fauzi's (2018) measurement of e-service quality in transportation services, which comprises four dimensions: information quality, application design, payment methods, and security and privacy.

2.1.1 Information Quality:

Information quality refers to providing information that benefits users through accuracy, completeness, and relevance (Ding & Straub, 2008). It also evaluates how well recipients understand the information (Amarin & Wijaksana, 2021). From another perspective, information quality arises from system processing that users find acceptable. Users are more likely to respond positively to high-quality content (Fendini, 2020). Information accuracy pertains to the reliability of website content (Guo et al., 2012). Katerattanakul (2002) suggests that the reliability of website content influences consumer satisfaction and intentions to make online purchases, enabling users to perceive reduced risks, make more rational choices, and easily identify the best options. This idea aligns with media richness theory, which emphasizes the importance of quality, clarity, and reliability in the information conveyed through a medium (Daft & Lengel, 1986). In the realm of mobile service applications, the quality of information within the mobile application is essential for customers to understand the services offered by the online transportation firm and to make informed decisions (Fauzi, 2018).

According to Barnes and Vidgen (2002), the most crucial component of the WebQual 4.0 instrument is accurate information. Liu et al. (2008) found that information quality significantly influences consumer satisfaction and that higher information quality enhances customer satisfaction during online purchases. The research conducted by Guo et al. (2012) indicated that information quality positively relates to consumer satisfaction with online shopping in China. For mobile applications, customer satisfaction with online transportation services is significantly predicted by information quality (Fauzi, 2018). Recently, a study on Mexican transportation service applications revealed that information quality is an essential indicator of satisfaction and the intention to continue using the app (Preciado-Ortiz, 2021).

Huma et al. (2024) also conducted a study investigating the effect of mobile application service quality on satisfaction and the retention of young consumers toward mobile applications. The study reveals that information quality is essential to mobile application service quality, significantly affecting customer satisfaction and retention. Lastly, a study in Indonesia found that information quality enhances user satisfaction with Gojek, a transportation application. Users are more satisfied when Gojek provides accurate, current, and relevant service information because it instills confidence (Amelia & Siregar, 2023). Based on the above literature, a positive relationship is expected. Therefore, it is hypothesized that:

H1: Information quality has a statistically significant positive effect on customer satisfaction in food delivery mobile applications.

2.1.2 Application Design:

The fundamental elements of mobile application design include a combination of color, layout, imagery, typeface, user-friendliness, and presentation on the application page. Creating a visually appealing mobile application can influence users' preferences and enhance their enjoyment of the application (Fauzi, 2018). Ease of navigation and aesthetic appeal are critical components of effective design (Cyr, 2008).

In e-commerce, customer satisfaction correlates with design quality (Cho & Park, 2001). A poorly designed interface can negatively impact customer usage and satisfaction (Lee & Chung, 2009; Olubusola, 2015; Yang et al., 2020). In the context of websites, an empirical study by Wolfinbarger and Gilly (2003) shows that website design strongly predicts consumer satisfaction, loyalty, and quality assessments for online shops. This aligns with Lee and Lin's (2005) finding that website design positively affects customer satisfaction and overall service quality. Additionally, Guo et al. (2012) found that website design positively influences consumer satisfaction in Chinese Internet commerce.

This relationship also exists in the context of the application. Fauzi (2018) conducted an empirical study that found various application features, such as layout, creativity, navigation, ease of use, color scheme, loading speed, and the simplicity of placing an order or completing a transaction, significantly influence customer satisfaction with mobile applications. Furthermore, Preciado-Ortiz (2021) discovered that design quality plays a crucial role in determining customer satisfaction with mobile applications for transportation services. A recent study by Huma et al. (2024) revealed that user interface design's layout and visual elements significantly impact consumer satisfaction with mobile service applications. Ease of use, efficiency, and intuitive navigation are vital for creating quality designs that positively correlate with consumer satisfaction. Applications with an intuitive user interface that function quickly and reliably enhance customer satisfaction and loyalty (PK, 2024).

In the study of food delivery applications, it can be assumed that customers will feel more satisfied when an application is designed with high quality. It is thus hypothesized that:

H2: Application design has a statistically significant positive effect on customer satisfaction in food delivery mobile applications.

2.1.3 Payment Method:

A payment method involves the exchange of value for goods or services between two parties. This can be accomplished using cash, credit cards, checks, or other forms of payment (Hirschman, 1979). With the rise of online shopping, customers can now use their mobile devices to make purchases, with two distinct payment options available: advance and immediate. Cash on delivery signifies immediate payment, as it involves the exchange of value upon receipt of the product; online payment, where value is paid for the product before its receipt, indicates advance payment (Shavell, 1976; Hussain et al., 2007). Cash on delivery, an immediate delivery method, can reduce the risk of delays, quality damage, and concerns about user account security. However, customers face limitations regarding payment convenience since they must prepare payments for related products and other items ahead of time, as well as time flexibility, as they need to be present for deliveries or rely on others (Soman, 2003). Consequently, consumers may avoid cash on delivery (Shavell, 1976) when they perceive a greater risk of not being available or failing to make payments on time. According to Guo et al. (2012), most online businesses offer a variety of payment methods, including credit cards, cash, and telegraphic payments. However, buyers sometimes weigh the convenience of payment methods against concerns about payment security when making payment decisions.

The rise of electronic transactions has become increasingly innovative, reducing the need for physical cash and enabling cashless transactions via mobile phones. This trend has led major companies to adopt e-payment as a payment method, particularly in the food industry, as it offers flexibility and eliminates the need for physical cards (Wahid et al., 2023). Moreover, Fauzi (2018) indicates that as the nature of services shifts from traditional to digital, particularly in how customers pay for them, online transportation services, for example, provide a wider range of payment methods, including cash, virtual payments, and credit cards. These payment methods enhance consumer access to the services.

Payment is a critical factor for consumers making online purchases. In B2C transactions, credit cards account for about 60% of transactions, while electronic funds transfers follow at approximately 30% (Turban et al., 2008). The payment method is a key consideration for customers when evaluating whether a website is helpful and user-friendly for easy online consumption (Lin & Sun, 2009). A study by Noorshella et al. (2015) aimed to determine the primary factors influencing the quality of e-services provided by small online clothing businesses in Malaysia. It found that payment and transaction capabilities are crucial aspects, with users feeling more comfortable on websites that offer a variety of payment methods. Furthermore, Guo et al. (2012) confirmed that payment methods positively impact consumer satisfaction in China's online shopping environment. This aligns with Liu et al. (2008), who concluded that convenient payment methods increase consumer satisfaction. Lin & Sun (2009) found that when customers encounter complex or time-consuming payment procedures, they may experience frustration and uncertainty, leading to increased holdup costs—intangible costs such as time, cognitive effort, and potential lost opportunities. These costs can negatively affect customer satisfaction and loyalty. Fauzi (2018) also investigated the relationship between electronic service quality and customer satisfaction. The results indicate that customers are satisfied and comfortable when payment alternatives are available and convenient on the mobile applications of online transportation providers. Recently, Sanyala and Hisamb (2019) empirically analyzed the factors affecting customer satisfaction in Oman with e-commerce firms and online purchases. The study identified four variables: access, ease of use, multiple payment options, and

safety and security, along with price as antecedents. The availability of payment alternatives such as credit cards, debit cards, and cash on delivery enhances customer convenience. Thus, it can be hypothesized that:

H3: Payment method has a statistically significant positive effect on customer satisfaction in food delivery mobile applications.

2.1.4 Security and Privacy:

Security and privacy safeguard systems, network resources, and consumers' personal information from internal and external threats. Security refers to how protected customers feel regarding their personal information and the website's safety from intrusions (Zeithaml et al., 2002). Cheung and Lee (2015) defined security as the website's ability to prevent unauthorized use or disclosure of customers' personal information collected from electronic interactions.

Stiakakis and Petridis (2014) assert that privacy and security significantly affect the quality of mobile services. Customers are concerned about online websites' privacy, liability, and security (Gefen, 2000). Generally, user authentication and the security of data and transactions are the two primary issues regarding security in electronic commerce (Ratnasingham, 1998; Rowley, 1996). Sharing personal information heightens customers' concerns about the risks of misuse and the protection of their private information on websites. Therefore, security and privacy are key factors influencing the quality of e-services (Rita et al., 2019). Mobile application services enhance customer confidence by providing high-quality security and privacy systems (Fauzi, 2018). Noorshella et al. (2015) emphasized that security and privacy are essential factors affecting the quality of electronic services in small online apparel businesses in Malaysia.

Customers' satisfaction with the quality of mobile services may be influenced by security (Egala et al., 2021). Customer satisfaction with online retailers' information services is expected to increase as the perception of security risks diminishes (Elliot & Fowell, 2000; Szymanski & Hise, 2000). Wolfinbarger and Gilly (2003) and Collier and Bienstock (2006) also found that privacy and security are critical components of e-service quality that enhance customer satisfaction. According to Guo et al. (2012), consumers are more satisfied when they believe a website offers sufficient security features, fostering customer trust and a safe transaction environment. Earlier research in Pakistan indicates that concerns about security and privacy in online transactions are among the main factors affecting consumers' satisfaction and intent to use e-commerce websites (Ahmed & Lodhi, 2015; Rahman et al., 2018; Bhatti et al., 2018).

In the context of mobile applications, Fauzi (2018) indicates that customers of transportation service applications are satisfied due to the secure features of these mobile applications, which enhance their confidence in using them because they make them feel safe during transactions. Recently, a study examined how the quality of mobile application services impacts young consumers' satisfaction and retention. The most crucial features of mobile applications include availability, security and privacy, application graphics, information quality, and efficiency (Huma et al., 2024). In mobile social media, Yum and Yoo (2023) empirically indicated that privacy and security are core dimensions of service quality that positively correlate with consumer satisfaction. Based on this body of literature, a positive relationship is expected. It is thus hypothesized that:

H4: Security and privacy have a statistically significant positive effect on customer satisfaction in food delivery mobile applications.

2.2   Customer Satisfaction and Customer Loyalty:

Satisfaction is an emotional state arising from a transaction's affective and cognitive appraisal process (Jameel et al., 2021). In e-commerce, satisfaction pertains to the customer's pleasure derived from past purchasing experiences with a specific electronic commerce firm (Anderson & Srinivasan, 2003). Consumer satisfaction is influenced by how effectively a company's product meets customer expectations (Kotler, 2003). Customer satisfaction occurs when products fulfill customers' expectations. If product quality surpasses customer expectations, satisfaction is achieved. Therefore, companies prioritize customer satisfaction when delivering products or services (Fauzi, 2018). Customer satisfaction can motivate businesses to improve customer retention, expand market share, and increase profitability (Rust & Zahorik, 1993).

Brand loyalty refers to a consumer's preferred, attitudinal, and behavioral responses to one or more brands within a product category over time (Engel et al., 1982). Jacoby (1971) argued that loyalty represents a biased behavioral purchasing process stemming from a psychological mechanism. According to Keller (1993), loyalty is evident when positive feelings toward the brand lead to consistent purchasing behavior. Gremler (1995) suggested that attitudinal and behavioral dimensions should be considered when measuring loyalty. Therefore, this research will adopt Anderson and Srinivasan's (2003) definition of loyalty as customers' favorable attitudes toward an electronic business, resulting in repeat purchasing behavior.

Previous research utilized satisfaction and service quality to explain customer loyalty, but their correlations are complex (Chang & Wang, 2011). Most marketing research adopts the theoretical framework where quality leads to satisfaction (Dabholkar et al., 2000; Parasuraman et al., 1985, 1988), which in turn influences loyalty (Johnson &

Gustafsson, 2001; Oliver, 1999; G. T. Lin & Sun, 2009b). According to Castañeda et al. (2009), satisfaction is the most significant factor in consumer loyalty research. In the online environment, researchers have found that satisfied customers are less likely to switch service providers as the perceived benefits of switching decline, leading to more assertive repurchase behavior (Szymanski & Hise, 2000b; Devaraj et al., 2002; Anderson & Srinivasan, 2003; Chiou, 2004; Tsai et al., 2006; Lin, 2007; Castañeda et al., 2009; Lin & Sun, 2009b). Anderson and Srinivasan (2003) note that an unsatisfied consumer is more likely to seek information from alternatives and respond to competitive advances than a satisfied customer.

Moreover, numerous studies and research findings indicate that customer satisfaction significantly affects loyalty. Satisfied customers are more likely to remain loyal to a product or service and make repeat purchases rather than turning to competitors (Tufahati et al., 2021; Afinia & Tjahjaningsih, 2024; Lau et al., 2020). These customers develop a stronger emotional connection to a brand, which enhances loyalty and reduces the likelihood of exploring alternatives. This trend is consistent across various industries, including traditional retail and e-commerce platforms (Afinia & Tjahjaningsih, 2024; Khan et al., 2012). In a study examining the impact of e-service quality and customer satisfaction on loyalty in online shopping, Chang and Wang (2011) found that customer satisfaction is the most critical factor influencing loyalty. The results align with self-regulatory mechanisms (Bagozzi, 1992), suggesting that the appraisal process (e-service quality and perceived customer value) influences emotional reactions (customer satisfaction), which subsequently affect coping behaviors (customer loyalty). Therefore, it can be hypothesized that:

H5: Customer satisfaction has a statistically significant positive effect on Customer Loyalty in food delivery mobile applications.

2.3   The Moderating Role of Perceived Value:

Zeithaml (1988) defines perceived value as the consumer's overall assessment of a product's usefulness based on perceptions of what is provided and received. The concept of customer-perceived value has been a topic of discussion in marketing research for an extended period. Understanding and delivering customer value is fundamental to marketing and competitive strategy (Khalifa, 2004; Lindgreen & Wynstra, 2005). Perceived value stems from equity theory, which illustrates the balance between the quality or benefits received by the customer and the costs incurred, including financial, energy, time, and cognitive transaction costs associated with evaluating, acquiring, and using a product (Oliver & DeSarbo, 1988; Kotler, 2003; Komulainen et al., 2007). In the online environment, perceived value is more significant than in traditional settings, as comparing product features and costs online is easier (Anderson & Srinivasan, 2003). Bakos (1991) asserts that search costs in electronic marketplaces are reduced, leading to more competitive consumer prices. Lowering search costs increases the likelihood that consumers will compare prices and enables them to assess the range of benefits associated with the items and services they purchase (Anderson & Srinivasan, 2003).

Regarding satisfaction and loyalty, using consumer satisfaction as a mediator, perceived value significantly enhances customer loyalty in the hotel industry (El-Adly, 2018). Anderson and Srinivasan (2003) argued that perceived value affects electronic business loyalty by decreasing the necessity for alternative service providers. Low perceived value prompts customers to switch to competitors, thereby diminishing loyalty. E-satisfaction and loyalty are robust when the current e-business vendor delivers greater overall value than rivals. Furthermore, Chang and Wang (2011) suggested that since search costs are lower in electronic commerce (Bakos, 1991), even if consumers have previously been satisfied with a specific website, they are more inclined to transition to other businesses that offer higher perceived value. In their study, Chang and Wang (2011) discovered that consumers with high perceived value exhibit a stronger correlation between satisfaction and loyalty than those with low perceived value. This finding aligns with Anderson and Srinivasan's (2003) conclusion that even satisfied customers will likely switch to an e-business providing superior value. Thus, perceived value enhances e-business loyalty by reducing an individual's inclination to seek alternative service providers. Additionally, when examining guest loyalty in the Indian hotel industry, Paulose and Shakeel (2021) found that guests perceiving high service value exhibit stronger satisfaction and loyalty.

Based on the existing body of literature, this study explores the factors influencing loyalty in food delivery services. It assumes that individuals who perceive high value are more likely to experience strong satisfaction and loyalty toward these services. Therefore, this hypothesis is proposed.

H6: Perceived value moderates the relationship between customer satisfaction and Customer Loyalty in food delivery mobile applications.

3. Conceptual model:

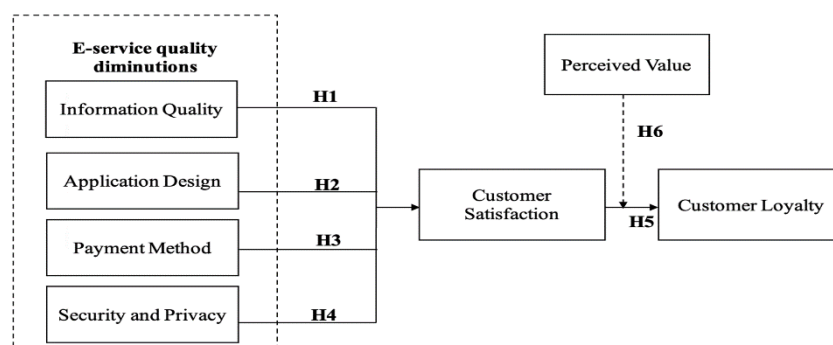Figure 1. displays the study's constructs along with their hypothesized relationships.

Figure 1 Research Model

4. Research methodology:

4.1 Measures:

The research questionnaire begins with a filter question asking whether the respondent uses a food delivery mobile application. Respondents can proceed only if they have used a food delivery mobile application. Then, the participants are asked to answer the following question: What is the name of the food delivery app they use and will be the focus of evaluation in the survey? This approach ensures that the respondent remains focused on one specific app throughout the survey, enhancing the accuracy of their responses. The questionnaire consists of two parts. The first part includes 34 items for the six constructs, which are measured on a 7-point Likert scale ranging from strongly disagree to strongly agree. The second section requests respondents' demographic information.

All the measures for the constructs are adopted from prior studies and adapted to the study context. The scale of information quality, application design, payment method, and security and privacy are adopted from two studies: Guo et al. (2012) and Fauzi (2018). The scale for customer satisfaction was adopted by Oliver (1980) and Anderson and Srinivasan (2003). The scale of consumer loyalty is adopted from Gremler (1995), Zeithaml et al. (1996), and Anderson & Srinivasan (2003). Lastly, the scale for perceived value is adopted from Dodds et al. (1991) and Anderson & Srinivasan (2003).

4.2 Sampling method:

The population for this study comprises all third-party food delivery mobile application users in the Kingdom of Saudi Arabia. The sample is taken from individuals who use food delivery mobile applications to order food for delivery. This study employs the snowball sampling method. The responses were recorded using online questionnaires. After giving their responses, the respondents were encouraged to forward the link to the questionnaire to other food delivery mobile application users. A total of 368 complete responses were collected.

4.3 Statistical analysis:

This study analyzed the collected data using SPSS and SmartPLS software. The statistical analysis began by reporting the sample characteristics and descriptive statistics using SPSS statistical software. To evaluate the measurement model, the constructs' reliability and validity were thoroughly investigated. Cronbach's alpha and Composite Reliability (CR) were employed to assess reliability. Convergent Validity was examined through the Average Variance Extraction (AVE). Discriminant Validity was assessed by cross-loading and the Fornell and Larker criteria.

Using SmartPLS software, Structural Equation Modeling (SEM) was conducted to test the study's hypotheses, including the moderating hypothesis.

5. Findings:

5.1 Sample Characteristics:

The study sample comprises 368 respondents in Saudi Arabia. All of the 368 respondents were food delivery application users. Table 1 summarizes demographic data from the sample group, including gender, age, education level, and nationality.

The sample comprises 368 participants, 63.9% female (235) and 36.1% male (133). The majority of participants are between 31 and 40 years old (41.6%), followed by those aged 20–30 years (38.9%), 41–50 years (13.9%), and those 50 and above (5.7%). Regarding education levels, most participants hold a bachelor's degree (64.1%), followed by master's degree holders (12.0%), diploma holders (9.5%), high school graduates (9.0%), Ph.D. holders (3.5%), and a small proportion with less than high school education (1.9%). Lastly, most respondents are Saudi (95.4%), while 4.6% are non-Saudi.

Table1. Sample Characteristics

	Frequency	Percent	Cumulative Percent
Gender			
Male	133	36.1	36.1
Female	235	63.9	100.0
Age			
20 – 30	143	38.9	38.9
31 – 40	153	41.6	80.4
41 – 50	51	13.9	94.3
50 and more	21	5.7	100.0
Education level			
Less tha High school	7	1.9	1.9
High school	33	9.0	10.9
diploma	35	9.5	20.4
Bachelor's	236	64.1	84.5
Master's	44	12.0	96.5
Ph.D.	13	3.5	100.0
Natonality			
Saudi	351	95.4	95.4
Not Saudi	17	4.6	100.0

5.2   Reliability and Validity:

The reliability of variables was tested using Cronbach's alpha and composite reliability (CR). Initially, some items with factor loadings smaller than 0.60 were discarded Guadagnoli & Velicer (1988). Table 2 presents the results for reliability and validity, along with the factor loadings for the remaining items. All the Alpha values and CRs were higher than the recommended value of 0.6. An item is considered reliable if its Cronbach's alpha score is greater than 0.60 (Raharjanti et al., 2022). All the average variance extracted (AVE) scores exceeded 0.50 (Fornell & Larcker, 1981), indicating convergent validity. Discriminant validity was assessed through cross-loadings. Multicollinearity was also assessed, ensuring that each indicator's variance inflation factor (VIF) value was less than 5 (James et al., 2023). Table 3 reports on the cross-factor loadings of all the items. All the factor loadings surpass their cross-loadings 0.6 cutoff (MacCallum et al., 2001), indicating discriminant validity. Discriminant validity was also tested using the criterion proposed by Fornell and Larcker. This criterion requires the construct's square root of the average variance extracted to exceed the correlation with any other construct revealed for all constructs (Hair et al., 2014). shown in Table 4.

Table 2. Item loadings, reliability, validity, and multicollinearity.

Item	Loadings	Alpha	CR (rho_a)	CR (rho_c)	AVE	VIF
IQ1	0.813					1.878

Item						
IQ2	0.843	0.816	0.821	0.879	0.644	1.965
IQ3	0.768					1.589
IQ4	0.785					1.58
AD1	0.749	0.874	0.878	0.903	0.570	2.097
AD2	0.715					2.094
AD3	0.774					2.015
AD4	0.805					2.183
AD5	0.734					1.823
AD6	0.713					1.809
AD7	0.788					2.153
PM1	0.785	0.772	1.42	0.877	0.784	1.653
PM2	0.975					1.653
SP1	0.745	0.823	0.827	0.884	0.656	1.657
SP2	0.881					2.469
SP3	0.776					1.664
SP4	0.831					2.029
CS1	0.882	0.909	0.910	0.936	0.785	2.633
CS2	0.882					2.663
CS3	0.914					3.413
CS5	0.866					2.485
CL3	0.793	0.934	0.942	0.950	0.793	2.133
CL4	0.910					3.967
CL5	0.918					4.017
CL6	0.915					4.927
CL7	0.909					4.605
PV1	0.845	0.869	0.871	0.911	0.718	2.522
PV2	0.862					2.229
PV3	0.824					1.945
PV4	0.859					2.621

Source: Outputs of statistical analysis using Smart PLS software. Note that some items were excluded from the scales because they did not meet the required standards.

Table 3. Discriminant validity – cross-loadings

Item	IQ	AD	PM	SP	CS	CL	PV
IQ1	0.813	0.393	0.196	0.395	0.444	0.361	0.404
IQ2	0.843	0.454	0.154	0.465	0.522	0.376	0.459
IQ3	0.768	0.514	0.133	0.395	0.429	0.351	0.387
IQ4	0.785	0.435	0.14	0.411	0.484	0.449	0.47
AD1	0.45	0.749	0.098	0.409	0.518	0.506	0.425
AD2	0.392	0.715	0.107	0.347	0.375	0.368	0.362
AD3	0.459	0.774	0.136	0.43	0.481	0.366	0.39

	IQ	AD	PM	SP	CS	CL	PV
AD4	0.407	0.805	0.154	0.485	0.527	0.419	0.413
AD5	0.362	0.734	0.102	0.383	0.464	0.381	0.405
AD6	0.384	0.713	0.222	0.526	0.493	0.377	0.365
AD7	0.486	0.788	0.268	0.565	0.532	0.456	0.471
PM1	0.135	0.157	0.785	0.265	0.125	0.147	0.097
PM2	0.195	0.207	0.975	0.406	0.352	0.32	0.282
SP1	0.313	0.422	0.541	0.745	0.538	0.47	0.442
SP2	0.465	0.509	0.347	0.881	0.601	0.498	0.478
SP3	0.455	0.519	0.214	0.776	0.565	0.464	0.478
SP4	0.446	0.495	0.198	0.831	0.559	0.486	0.494
CS1	0.557	0.574	0.377	0.669	0.882	0.65	0.617
CS2	0.501	0.582	0.227	0.583	0.882	0.761	0.637
CS3	0.546	0.606	0.275	0.635	0.914	0.688	0.668
CS5	0.477	0.529	0.24	0.594	0.866	0.663	0.663
CL3	0.371	0.401	0.275	0.43	0.582	0.79	0.506
CL4	0.397	0.476	0.266	0.521	0.665	0.911	0.658
CL5	0.447	0.52	0.273	0.566	0.753	0.917	0.686
CL6	0.454	0.522	0.254	0.549	0.728	0.916	0.706
CL7	0.457	0.504	0.262	0.555	0.727	0.911	0.705
PV1	0.471	0.449	0.203	0.446	0.592	0.602	0.845
PV2	0.447	0.487	0.275	0.546	0.666	0.657	0.862
PV3	0.452	0.483	0.237	0.549	0.639	0.661	0.824
PV4	0.453	0.394	0.128	0.425	0.563	0.57	0.859

Source: Outputs of statistical analysis using Smart PLS software

Table 4. Fornell & Larker Criterion

	IQ	AD	PM	SP	CS	CL	PV
IQ	0.803						
AD	0.558	0.755					
PM	0.194	0.209	0.885				
SP	0.521	0.601	0.399	0.81			
CS	0.588	0.647	0.316	0.7	0.886		
CL	0.48	0.547	0.297	0.592	0.78	0.89	
PV	0.538	0.538	0.252	0.584	0.738	0.738	0.847

Source: Outputs of statistical analysis using Smart PLS software

5.3 Structural model:

The next step in the analysis was to assess the hypothesized relationships. First, direct relationships were tested. The study's structural model displays path coefficient values such as beta value, t-value, p-value, standard error, ULCI, and LICI. Bootstrapping offers the significance level of p-value, which states acceptance or rejection of the hypothesis. Based on these study criteria, all hypotheses were accepted and supported as p-values are significant (p = <0.05) and t-values are greater than 1.96, except for **H3**, which is not supported. Table 5 show that IQ -> CS (β = 0.215 t = 3.653, p = 0.000), AD -> CS (β = 0.275 t = 4.12, p = 0.000), and SP -> CS (β = 0.399 t = 7.259,

p = 0.000). Thus, hypotheses **H1, H2, and H4 are supported.** Therefore, information quality, application design, security and privacy have a statistically significant positive effect on customer satisfaction. Additionally, CS -> CL (β = 0.528, t = 8.64, p = 0.000) means a statistically significant positive relationship exists between customer satisfaction and customer loyalty. Thus, hypothesis **H5 is supported.** Lastly, PM -> CS (β = 0.057, t = 1.696, p = 0.09). In addition, the confidence interval contains zero, which indicates a statistically insignificant positive effect of payment method on customer satisfaction. Therefore, **H3 is rejected.**

Table 5. Direct relationships (Hypotheses H1 to H5)

Hypo	Relationship	Std.Beta	Std.Error	t-value	p-value	Decision	ULCI	LICI
H1	IQ -> CS	0.215	0.059	3.653	0.000	Supported	0.104	0.339
H2	AD -> CS	0.275	0.067	4.12	0.000	Supported	0.146	0.406
H3	PM -> CS	0.057	0.034	1.696	0.09	Not Supported	–0.009	0.124
H4	SP -> CS	0.399	0.055	7.259	0.000	Supported	0.287	0.502
H5	CS -> CL	0.528	0.061	8.64	0.000	Supported	0.406	0.647

Significant at p = <0.05. Source: Outputs of statistical analysis using Smart PLS software.

Table 6 presents the results of the moderation analysis of perceived value on the relationship between customer satisfaction and loyalty towards the food delivery mobile application. The results revealed that the moderating role of perceived value was PV x CS -> CL (β = 0.018, t = 0.903, p = 0.367). In addition, the confidence interval contains zero, which indicates the relationship is insignificant. Therefore, perceived value is not statistically significant in moderating the relationship between customer satisfaction and customer loyalty. Thus, H6 is rejected.

Table 6. Moderation analysis (Hypothesis H6).

Hypo	Relationship	Std.Beta	Std.Error	t-value	p-value	Decision	ULCI	LICI
H6	PV x CS -> CL	0.018	0.02	0.903	0.367	Not Supported	–0.024	0.056

Significant at p = <0.05. Source: Outputs of statistical analysis using Smart PLS software.
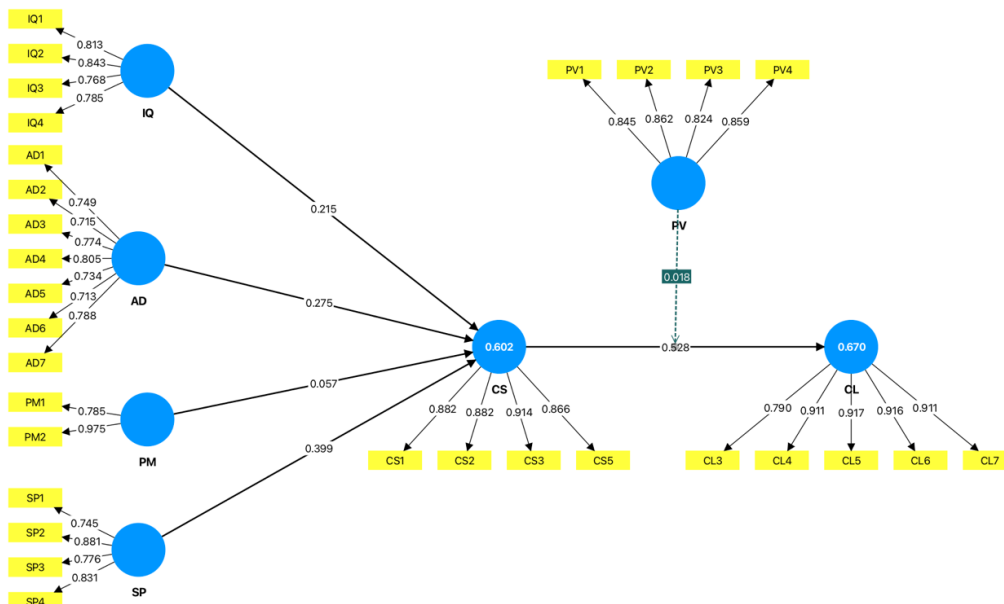

Figure 2. SmartPLS Results of Measurement and Structural Models

6.   Discussion and Conclusion:

This study explores the relationships among e-service quality dimensions—namely, information quality, application design, payment methods, and security and privacy—and their impacts on customer satisfaction and loyalty within the context of food delivery mobile applications in Saudi Arabia. Additionally, the study investigates

the moderating effect of perceived value on the relationship between customer satisfaction and loyalty. This research seeks insights into consumer behavior in the growing food delivery industry and provides practical recommendations for service providers by analyzing these elements.

The results indicate the substantial influence of information quality (H1), application design (H2), and security and privacy (H4) on customer satisfaction. Specifically, information quality positively influenced customer satisfaction, supporting previous research (Liu et al., 2008; Guo et al., 2012) and highlighting the importance of accurate and relevant information in enhancing user experiences. Katerattanakul (2002) observed that high-quality content can mitigate perceived risks, leading to more rational consumer decisions and greater satisfaction. This corresponds with the study results, showing that superior information quality builds consumer trust and affects their satisfaction. Application design (H2) also emerged as a crucial factor influencing customer satisfaction. The significant correlation found in this study aligns with prior research that has consistently connected design quality with increased user satisfaction (Guo et al., 2012; Huma et al., 2024). A visually appealing and user-friendly interface facilitates more straightforward navigation and transaction processes, which are vital in a competitive market where first impressions matter. This finding underscores the need for food delivery mobile applications to focus on design features that enhance usability and consumer interaction. Additionally, customer satisfaction was shown to be significantly impacted by security and privacy (H4), supporting findings from Wolfinbarger & Gilly (2003) and Guo et al. (2012). Ensuring a safe environment for transactions is crucial in a time of widespread data breaches. Consumers' reluctance to interact with online platforms may be influenced by concerns about the security of their personal information. Therefore, this study emphasizes that food delivery businesses must invest significantly in security measures to build customer satisfaction and confidence.

Conversely, the hypothesis regarding payment methods (H3) was not supported, indicating a statistically insignificant relationship with consumer satisfaction. This finding contrasts with previous research suggesting that varied payment methods enhance user convenience (Guo et al., 2012; Liu et al., 2008). A possible explanation for this discrepancy may be consumers' increasing knowledge and confidence in digital payment systems, reducing the importance of diverse payment methods compared to factors like security and design. This is further supported by the fact that a majority of the study's sample was aged 20–40 (80.4%), reflecting their greater comfort with online payment systems and a decreased concern for having multiple payment methods. Furthermore, the study confirmed a strong positive relationship between customer satisfaction and loyalty (H5). This aligns with the findings of Anderson and Srinivasan (2003), who contended that satisfied customers are more inclined to exhibit loyalty through repeat purchases. Afinia and Tjahjaningsih (2024) and Khan et al. (2012) indicate that satisfied customers establish a deeper emotional bond with a brand, enhancing loyalty and reducing the likelihood of considering alternatives. The emotional bond formed through favorable encounters fosters loyalty, suggesting that food delivery applications must continually strive to meet or exceed customer expectations to maintain a loyal customer base.

Nonetheless, the study findings did not support the moderating effect of perceived value (H6), indicating that although perceived value is crucial in consumer assessments, it does not substantially affect the relationship between consumer satisfaction and loyalty. This outcome contrasts with the findings of Chang & Wang (2011), who determined that perceived value enhances the relationship between satisfaction and loyalty. One explanation is that in a competitive market such as food delivery, consumers may favor instant satisfaction over perceived long-term value, reflecting a shift in consumer behavior driven by the availability of alternatives. Food delivery applications are also frequently used for convenience, expediency, and efficacy. In such instances, satisfaction may directly correlate with loyalty, regardless of perceived value. Moreover, this contrast in the findings might also be due to the study's sample characteristics. For instance, the sample is highly educated, with 64.1% holding bachelor's degrees, suggesting a tendency for more rational decision-making. These users may prioritize loyalty based on service reliability and satisfaction rather than perceived value. Additionally, the majority are between 31 and 40 years old. This demographic may favor efficiency and reliability over cost-effectiveness, especially in necessary services such as food delivery. Lastly, given that 63.9% of respondents are female, gender differences in value perception and loyalty development may have influenced the results.

This study illustrates key determinants affecting consumer satisfaction and loyalty in the food delivery mobile applications in Saudi Arabia. The positive impacts of information quality, application design, and security and privacy on customer satisfaction emphasize the necessity for food delivery mobile applications to prioritize these aspects to enhance user experiences. The negligible correlation of payment methods indicates a transformation in consumer expectations and trust in digital payments, highlighting the need for further exploration into the actual concerns of consumers while utilizing these services.

The substantial connection between consumer satisfaction and loyalty underscores the need for organizations to prioritize customer satisfaction to foster loyalty and retention. The lack of supporting evidence for the moderating effect of perceived value necessitates further research to explore this relationship, including additional moderating variables or contextual elements that may influence customer behavior.

7.   Managerial Implications:

This study's findings offer significant insights for managers in the food delivery service industry. First, enhancing e-service quality is crucial; firms must prioritize information quality, application design, and safety procedures to boost customer satisfaction. Providing informative and relevant information builds trust and aids informed consumer decisions, which may elevate satisfaction. Furthermore, investing in intuitive application design is crucial. A visually appealing and user-friendly interface can significantly enhance the user experience and encourage repeat usage. Managers must optimize navigation and transaction processes to meet customer expectations. Security and privacy are essential in customer evaluations of service quality. Given the rising concerns about data breaches, implementing strong security standards can enhance customer trust and satisfaction. Organizations must communicate these security protocols effectively to their users. Interestingly, the study revealed that payment methods did not significantly influence satisfaction, indicating a shift in consumer confidence towards digital payments. Consequently, while providing several payment options is essential, the focus should shift towards enhancing the overall user experience and satisfaction. Finally, fostering customer satisfaction is essential for building loyalty and encouraging repeat purchases, which requires managers to continuously evaluate and refine their strategies to respond to changing customer needs.

8.   Limitations and future research:

This study has several limitations that should be acknowledged. First, the research was conducted in a specific geographic context—Saudi Arabia—potentially restricting the generalizability of the findings to other regions or cultures with distinct consumer behaviors and market dynamics. Future research may broaden this study to encompass multiple geographical regions to analyze the differences in e-service quality, client satisfaction, and loyalty across various cultural contexts. Second, relying on self-reported data may introduce biases, such as social desirability bias, where respondents may present themselves positively. Future research could incorporate mixed methods, combining quantitative surveys with qualitative interviews, to gain deeper insights into customer perceptions and experiences. Another limitation is the focus on third-party food delivery applications, which may not represent the entire food delivery sector. Research could explore various delivery services, including those managed directly by restaurants, to improve the understanding of consumer behavior in this industry.

Additionally, while this study investigated the moderating influence of perceived value, it did not consider other potential moderating factors, such as demographics or brand loyalty. Future research may examine how these factors affect the interconnections among e-service quality, customer satisfaction, and loyalty. Finally, this study primarily focused on the immediate effects of e-service quality on customer satisfaction and loyalty. Future research could explore additional variables, such as the roles of social influence and peer recommendations in consumer satisfaction and loyalty. Understanding the impact of social elements, including word-of-mouth and internet reviews, on consumer perceptions can provide profound insights into decision-making.

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