

Understanding User Satisfaction and Its Impact on Food Delivery Apps Dependency Among University Students

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ABSTRACT

Food delivery applications (FDAs) have become an essential part of modern student life, providing convenience and accessibility in daily consumption patterns. This study aims to examine the factors influencing user satisfaction and how they contribute to students' dependence on FDAs. Five key variables were analyzed: time saving, price saving, information quality, security system, and safe packaging. Using a quantitative approach, data were collected through structured questionnaires from 244 active student users and analyzed using regression analysis. The results reveal that all five factors positively affect user satisfaction, with time saving ($\beta = 0.313$) showing the strongest influence, followed by price saving ($\beta = 0.245$), security system ($\beta = 0.211$), safe packaging ($\beta = 0.151$), and information quality ($\beta = 0.074$). These findings suggest that practical efficiency and economic benefits play a more significant role in shaping satisfaction than informational aspects. The study provides valuable implications for FDA providers and app developers to improve service efficiency, enhance user satisfaction, and foster long-term app engagement.

Keywords: Customer Satisfaction; Food Delivery Applications; Price Saving; Service Quality; Time Saving

INTRODUCTION

In today's digital age, food delivery applications (FDAs) such as Meituan, Ele.me, GrabFood, and Uber Eats have dramatically transformed the way people, especially university students, interact with food (Su et al., 2022). The convenience of food delivery services has become an essential part of urban lifestyles (Belanche et al., 2020). The processes of shopping, cooking, or dining out in the past have now been replaced by swiping cards, clicking, and waiting for delivery. Among college students, food and medicine have become a part of daily life, enabling them to obtain meals, snacks, and beverages effortlessly and immediately (Sogari et al., 2018). For students who must deal with academic deadlines, part-time jobs, and social obligations, these platforms not only offer convenience but also comfort. However, as the use of such applications increases, people have raised questions about their psychological impact, especially the possibility of becoming dependent on them.

Mehrabian and Russel (1974) propose the Pleasure–Arousal–Dominance (PAD) theory from an environmental psychology perspective to understand the emotions of people, which affect their assessment and consequently, their responses. They describe pleasure, arousal, and dominance as the three fundamental emotions which get generated when consumers encounter any stimuli (Xu et al., 2025). Pleasure is defined as the extent to which consumers feel satisfied, happy, good, or joyful (Chen et al., 2023). Arousal is the extent to which consumers feel stimulated or excited (Ryu & Ryu, 2021). The lifestyle of modern university students fosters reliance on FDAs. Constrained by limited time, financial resources, and social influences from peers, students increasingly turn to these platforms. FDAs provide more than just meals; they offer rapid solutions for stress, hunger, and even emotional loneliness. These applications are meticulously designed with features such as personalized recommendations, gamified discounts, and targeted advertisements that promote habitual usage. Push notifications, time-limited coupons, and social sharing functions have transformed ordering food into an almost instinctual behavior. As this behavior becomes increasingly normalized, the line between convenience and psychological dependency begins to blur (Ismail et al., 2024).

Most existing research on food delivery platforms centers on logistics efficiency, user satisfaction, or market growth (Joshi & Bhatt, 2021). While these topics are undeniably significant, they often neglect the human dimension of the story, particularly the psychological mechanisms underlying frequent usage. Consumption values have unique patterns of manifestation among consumers from different cultural and ethnic backgrounds (Tse et al., 1988), although some studies in consumer psychology have examined the addictive nature of digital applications and platforms, few have specifically addressed FDAs and their emotional and psychological impacts on college students. This lack of focus on the "why" behind this reliance on applications has created a notable gap in our understanding of students' digital consumption patterns.

In recent years, the excessive use of digital services such as FDAs has often been characterized as a form of behavioral addiction (Yang et al., 2025). However, such interpretations can be overly simplistic. It is important to question whether students are genuinely exhibiting addictive behaviors or merely responding to specific emotional or situational factors. For instance, students may be more likely to order food when experiencing anxiety, stress, or loneliness. The convenience of these applications may also facilitate impulsive decisions or emotionally driven eating behaviors (Huang et al., 2025). Without exploring these underlying motivations, researchers risk overlooking the complex interplay between technology use, mental health, and everyday habits,

particularly during university life, a critical period when individuals are still developing stable routines and decision-making patterns.

This study aims to provide a deeper understanding of the psychological and behavioral factors underlying university students' frequent use of FDAs. Drawing upon theories from psychology, digital consumer behavior, and emotional regulation, the research investigates what drives students to repeatedly engage with these platforms. Specifically, it examines how five key determinants: time saving, price saving, information quality, security systems, and safe packaging, shape user satisfaction and subsequently influence dependency on FDAs. It considers both internal factors, such as stress, loneliness, or low self-control, and external factors, including peer influence and persuasive app design that captures user attention (Brailovskaia et al., 2023). By integrating these perspectives, the study provides a more comprehensive understanding of students' motivations for using FDAs.

What distinguishes this study is its focus not merely on usage frequency or expenditure but on the underlying emotions, thoughts, and meanings associated with students' interactions with these applications. Rather than treating FDA use as a purely behavioral phenomenon, it explores the psychological experiences, such as emotional eating, impulsive decision-making, and digital coping strategies, that accompany it (Garg et al., 2025). Through this lens, the study explains how FDAs become embedded in students' daily lives and emotional routines, influenced by the perceived benefits of efficiency, affordability, safety, and reliability.

Focusing on university students is particularly significant, as this developmental stage involves high emotional variability and the formation of lifelong habits (Arnett, 2023). Understanding how digital technologies influence coping mechanisms and lifestyle choices during this period can help educators, policymakers, and app designers promote healthier and more balanced digital environments. Ultimately, this research bridges the gap between technology use, mental health, and emotional well-being, offering both theoretical insights and practical implications for fostering mindful digital engagement among young adults (Brailovskaia et al., 2021).

LITERATURE REVIEW

Time-Saving Orientation

Time-saving orientation usually means the design target/function or using effect can help users decrease the assignment time. Time-saving orientation software has four design principles: Consumers constrained by busy schedules especially value food-delivery apps that reduce ordering and waiting time. Odell (2023) found that "busy individuals, constrained by time, favor food-delivery applications to bypass long queues and save time," a tendency especially pronounced among students with demanding timetables. Pitchay et al. (2022) further confirmed that perceived delivery speed strongly predicts overall satisfaction with mobile food-delivery services. On the other hand, the effects of time-saving orientation will separate the two aspects.

In positive, first, improved time management. Time-saving orientation allows students and working professionals to reallocate time to study, work, or leisure. Zhang et al. (2023) found that college students using food delivery apps spent 25% more time on academic tasks compared to those who cook meals, which helps them have more time to make progress in academics. In other words, a time-saving orientation FDA helps students easily approach the work-life balance; they do not worry that too much time will be occupied by housework. Second, enhanced convenience and satisfaction, quick food

access reduces stress and increases user satisfaction, especially during time-sensitive situations. During COVID-19 lockdowns, users in South Korea rated speed as the number one satisfaction factor when ordering meals from apps like Baedal Minjok (Chung, 2024).

In negative impacts, continuous reliance on FDAs has led to several negative consequences, including dependency, health issues, financial burdens, and digital fatigue. Frequent use of these apps reduces users' motivation and ability to cook, especially among younger generations, a phenomenon referred to as the "convenience trap" observed among Danish students (Braw, 2022). This dependency also contributes to unhealthy eating patterns, as Livingstone et al. (2022) found that frequent users in Australia consumed more high-fat and sugary foods, particularly those aged 18–24. Moreover, Liu and Chen (2021) revealed that users in urban China spent 30–50% more on meals each month compared to those who cooked at home, highlighting the hidden financial costs of convenience. Finally, de Lima Nardin (2025) reported that constant exposure to app interfaces and promotional notifications can cause digital overload and burnout, leading to fatigue and dissatisfaction.

H1: Time-saving orientation positively influences college students' satisfaction with FDAs.

Price-Saving Orientation

Price-saving orientation reflects users' sensitivity to financial costs and their perceived value for money when using FDAs. This includes factors such as discounts, coupons, free delivery thresholds, loyalty rewards, and transparent pricing features (Belanche et al., 2020; Suhartanto et al., 2019). College students, often living on limited budgets, prioritize affordability in meal choices; thus, FDAs integrating cost-saving functions can significantly influence satisfaction and continued use (Alalwan, 2020). Positively, such mechanisms enhance perceived value and satisfaction, as users experience greater utility and emotional reward when obtaining financial benefits. Alalwan (2020) found that perceived value for money strongly predicts e-satisfaction and reuse intention in mobile food ordering. Price-saving options also reduce financial anxiety, especially among young adults facing budget constraints, by providing spending control and psychological comfort (Arnett, 2023; Ismail et al., 2024). Furthermore, behavioral reinforcement through gamified rewards, such as coupons or cashback systems, fosters habit formation and long-term engagement (Ryu & Ryu, 2021; Chen et al., 2023).

Conversely, there are notable negative impacts. Constant discounts and free delivery campaigns can reduce profitability for restaurants and couriers, as smaller vendors often absorb the cost to stay competitive (Yang et al., 2025). Users may also develop promotion dependence, where the absence of discounts diminishes perceived value and weakens brand loyalty (Joshi & Bhatt, 2021). Moreover, price-driven incentives can encourage overconsumption, prompting users to order unnecessary or unhealthy foods (Garg et al., 2025). Thus, while price-saving orientation enhances perceived benefits and satisfaction, it may also create unsustainable behaviors and inequitable cost burdens across the food delivery ecosystem.

The design of price-saving features in FDAs can significantly impact student satisfaction and behavioral patterns. While affordability and value generation enhance satisfaction, there are ethical, financial, and psychological risks associated with overdependence on such systems. Apps must balance cost-efficiency with transparency and sustainability to serve this price-sensitive demographic without exploitation.

H2: Price-saving orientation positively influences college students' satisfaction with FDAs.

Information Quality

Information quality in FDAs encompasses the accuracy, completeness, timeliness, and relevance of information presented to users. This includes essential details such as menu descriptions, price transparency, delivery time estimates, restaurant ratings, dietary labels (e.g., halal, vegetarian), promotional terms, and order tracking updates (Su et al., 2022). High information quality enables users, particularly college students, who often face financial and time constraints, to make well-informed decisions with minimal uncertainty. Accurate and comprehensive data enhance users' decision-making confidence, helping them choose food options that align with their budget, dietary preferences, and delivery expectations. Su et al. (2022) found that information accuracy and personalization strongly influence users' trust and continued engagement with FDAs, while Alalwan (2020) demonstrated that perceived information clarity and usefulness significantly increase e-satisfaction and intention to reuse. Likewise, Belanche et al. (2020) emphasized that clarity and transparency in mobile app information foster positive attitudes and user satisfaction, and Ismail et al. (2024) showed that accessible, well-structured nutritional information enhances platform credibility and satisfaction among students.

From a broader perspective, high information quality reduces cognitive load and accelerates decision-making by simplifying choices through structured menus, filter features, and curated recommendations. Such design strategies minimize "choice overload," encourage efficient order behavior, and improve overall user experience. Furthermore, clear customization instructions, such as "no onions" or "extra sauce," minimize miscommunication, order errors, and service recovery costs for vendors. Conversely, poor information quality can lead to negative outcomes, including inaccurate orders, miscommunication about dietary preferences, and reduced user trust (Yang et al., 2025). Inconsistencies between advertised promotions and actual offers also create perceived unfairness and dissatisfaction. Zhao and Bacao (2020) noted that misleading or unclear promotional information erodes users' confidence and decreases loyalty toward FDAs. Hence, maintaining high standards of information quality is essential not only for enhancing decision-making and satisfaction but also for building long-term trust, loyalty, and sustainability within the increasingly competitive digital food delivery ecosystem.

Information quality is a crucial psychological and functional factor influencing user satisfaction with FDAs. College students, with their need for speed, accuracy, and relevance, are especially sensitive to how information is delivered. While good information quality builds confidence, bad information not only leads to dissatisfaction but also undermines trust and brand equity.

H3: Higher perceived information quality positively influences college students' satisfaction with FDAs.

Safety System

The safety system in FDAs encompasses technological and procedural mechanisms designed to protect users' physical health, privacy, and emotional well-being during the ordering and delivery process. In the post-pandemic environment, the perception of safety has become a decisive factor influencing users' trust and loyalty, particularly among students living away from home. Core safety components include contactless delivery, hygiene certifications, secure digital payment gateways, real-time tracking, and

verified driver identification (Kasmani et al., 2022; Pitchay et al., 2022). These features contribute to enhanced trust and user confidence, as they signal reliability and platform accountability. Pitchay et al. (2022) found that perceived safety and hygiene assurance significantly affect customers' intention to use FDAs in Malaysia. Similarly, Kasmani et al. (2022) reported that clear food safety information and transparent sanitation measures increase users' confidence in online food delivery services. Safety systems also alleviate health-related anxiety, as users feel reassured when visible hygiene practices, such as sealed packaging or temperature monitoring, are implemented. Furthermore, integrated customer support and real-time tracking functions strengthen dispute resolution and improve overall service quality, contributing to sustained satisfaction and continuous usage.

Nevertheless, several limitations and negative outcomes are associated with safety systems. A major concern is the emergence of a false sense of security, where users overly depend on app-based assurances without verifying actual compliance or hygiene standards. Yang et al. (2025) emphasized that inconsistent safety information or unverified badges can rapidly erode user trust and increase skepticism toward the platform. Privacy concerns also persist, as expanded safety monitoring, such as continuous GPS tracking or data retention, can create perceptions of over-surveillance, undermining users' sense of autonomy and digital well-being (Brailovskaia et al., 2023). Moreover, the integration of safety-scoring algorithms based on user feedback introduces potential algorithmic bias and discrimination, particularly toward couriers or restaurants with fewer ratings or lower visibility. Such systemic bias may lead to reputational harm and economic disadvantage for small vendors. Lastly, excessive exposure to digital safety alerts or notifications can contribute to psychological fatigue and stress, diminishing the intended sense of comfort (Huang et al., 2025). Therefore, while robust safety systems are critical for fostering trust and satisfaction, balancing technological surveillance, fairness, and mental well-being remains an essential challenge for sustainable FDA management.

A comprehensive safety system in food delivery apps significantly enhances college students' satisfaction by providing physical safety, financial security, and peace of mind. While most effects are positive, concerns around system reliability, data privacy, and algorithmic fairness should not be ignored.

H4: Perceived robustness of the safety system positively influences college students' satisfaction with FDAs.

Safe Packaging

Safe packaging in the context of the FDA refers to the use of hygienic, tamper-proof, durable, and often environmentally responsible packaging materials and designs to preserve food integrity during transit. For college students, especially those who order frequently, live in shared dorms, or have limited access to kitchen facilities, safe packaging is a key element of both physical health and perceived service quality.

Positive Effects of Safe Packaging

Safe and high-quality food packaging plays a crucial role in enhancing user satisfaction, perceived hygiene, and brand differentiation in FDAs. Packaging quality directly influences users' overall dining experience and their intention to reorder. Jain and Adhikari (2024) found that 72% of young adults considered packaging quality "important" or "very important" when deciding whether to reorder from the same restaurant, indicating that intact and visually appealing packaging can compensate for minor delivery delays by elevating user satisfaction. Furthermore, safe packaging significantly improves

hygiene perception. Visible safety seals, tamper-proof stickers, and organized presentation foster a sense of cleanliness and trust, particularly in post-pandemic contexts where hygiene assurance is paramount. [Nilsen-Nygaard et al. \(2021\)](#) demonstrated that packaging quality exerted a stronger influence on users' perception of hygiene than the delivery personnel's appearance, underscoring its central role in user confidence.

Beyond functional benefits, safe packaging also supports brand differentiation and emotional engagement. Aesthetic, sustainable, or uniquely designed packaging enhances the "unboxing experience," evoking emotional satisfaction and brand attachment. According to [Deloitte \(2022\)](#), nearly 30% of Gen Z users' intention to reorder was influenced by their enjoyment of this unboxing process. Collectively, these findings highlight that safe packaging not only ensures food protection and hygiene but also acts as a strategic tool for building trust, emotional connection, and long-term customer loyalty within the food delivery ecosystem.

Negative Effects and Limitations

Although safe packaging improves food protection and user satisfaction, it also brings notable economic and environmental drawbacks within the food delivery ecosystem. The use of high-quality or innovative packaging materials, such as biodegradable polymers or thermal-insulated containers, significantly increases production and operational costs for vendors. [Nilsen-Nygaard et al. \(2021\)](#) highlighted that while biobased and biodegradable materials enhance food safety, they remain more expensive and require specialized processing technologies, limiting large-scale adoption. Consequently, many food delivery platforms transfer these expenses to customers through higher delivery charges or sustainability-related surcharges, which can discourage cost-sensitive users such as college students ([Suhartanto et al., 2019](#)).

Moreover, the environmental implications of packaging remain a critical concern. Despite growing efforts toward eco-friendly solutions, a large proportion of food delivery packaging still contributes to landfill accumulation due to low recyclability and limited consumer disposal awareness. [Liu and Chen \(2021\)](#) noted that the convenience-driven lifestyle of urban consumers in China leads to increased packaging waste and environmental strain. Similarly, [Yang et al. \(2025\)](#) observed that excessive reliance on delivery services exacerbates unsustainable consumption patterns and food waste behaviors. These findings underscore the dual challenge facing the food delivery industry: balancing hygiene and safety expectations with affordability and environmental responsibility. Therefore, the pursuit of scalable, cost-efficient, and environmentally sustainable packaging innovations remains essential to achieving long-term equilibrium between consumer satisfaction and ecological preservation.

Safe packaging is a physical extension of digital service quality in the FDA. For college students, it fulfills both practical and emotional roles, protecting the food, ensuring hygiene, and enhancing brand image. While it adds value to the user experience, cost and sustainability concerns must be managed to avoid negative perceptions.

H5: Higher perceived quality of packaging positively influences college students' satisfaction with FDAs.

Research Gap

Although numerous studies have examined service quality and customer satisfaction in FDAs, several important gaps remain, particularly concerning college students and the interaction of multiple satisfaction drivers. Existing research often isolates one or two

variables, such as price or delivery time, without integrating technological, psychological, and physical dimensions into a unified framework. Studies by Alalwan (2020) and Suhartanto et al. (2019) emphasize e-service quality and reuse intention but lack a holistic approach combining factors such as information quality, trust, and packaging. Moreover, packaging has rarely been treated as a primary satisfaction driver despite its potential symbolic role in hygiene perception and emotional response. Jain and Adhikari (2024) and Nilsen-Nygaard et al. (2021) highlighted that packaging quality and sustainability influence food safety and user experience, yet empirical evidence on this aspect, especially among students, remains limited.

Contextual and behavioral gaps also persist. Research is heavily concentrated in developed markets, leaving Southeast Asian contexts underexplored. Studies from Malaysia and the United Arab Emirates (Ismail et al., 2024; Pitchay et al., 2022) revealed that affordability and hygiene strongly shape user trust, suggesting potential regional variations. Furthermore, post-pandemic shifts such as heightened safety awareness and contactless delivery preferences (Yang et al., 2025; Zhao & Bacao, 2020) have not been examined longitudinally to determine their persistence among students returning to on-campus routines. Finally, the interaction between independent variables remains poorly understood; for instance, whether high information quality amplifies time-saving satisfaction or whether price sensitivity moderates the impact of premium packaging. As Xu et al. (2025) argued, user perceptions in digital platforms are shaped by dynamic emotional and cognitive interactions, an area that warrants deeper empirical exploration.

Conceptual Framework

The study framework model is depicted in Figure 1.

Figure 1. Research Framework



RESEARCH METHOD

This study employs a quantitative research methodology that uses numerical data and statistical analysis to investigate how time-saving orientation, price-saving motivation, information quality, security systems, and safe packaging influence dependent users' satisfaction with FDAs among university students.

Population and Sample of the Study

The term "population" refers to the entire group of subjects (people, objects, or phenomena) that meet certain criteria and are studied by researchers to conclude (Sugiyono, 2013). In this study, the population consists of active users of online FDAs from ViTrox College, Universiti Sains Malaysia, and STIE Malangkecewara. A sample is a small part of the research population that is selected to represent the entire population. The sample for this study was derived from a segment of the population, specifically students at the four universities who regularly use FDAs (e.g., GrabFood, GoFood, Zomato, or Swiggy).

Primary data was collected through surveys administered to the intended respondents. Students from ViTrox College, Universiti Sains Malaysia, and STIE Malangkecewara participated in the survey. 200 is the minimum sample size required. The study met the minimum sample size criterion because 244 students who use online FDAs participated in the survey.

A survey questionnaire was distributed via Google Forms to a total of 244 respondents. Participants were asked to indicate their level of agreement with various statements using a five-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The scale is outlined in Table 1.

Table 1. Five-point Likert scale

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Method of Data Collection

Data collection techniques are the most important step in research because the main purpose of research is to get data. The purpose of data collection methods is to ensure that the research findings are unquestionably valid, accurate, and trustworthy. In this study, a hybrid distribution was used as the data collection method. The link to the online survey form was shared with students in a series of online group conversations. A standardized questionnaire measuring five independent variables - time saving orientation, price saving motivation, information quality, security systems, and safe packaging on user satisfaction with FDAs among university students - was given to potential respondents once they had been selected. Each participant gives informed consent, and their responses are kept private.

RESULTS

Table 2. Summary of Respondents' Demographic Information (N=240)

Response	Frequency	Percentage (%)
Are you a university Student?		
Yes	240	98.4
No	4	1.6
Gender		
Male	123	50.4
Female	117	48.0
Age		
Below 20	113	46.3
21-30	127	52.0
Ethnicity		

Malay	89	36.5
Java (Indonesia)	5	2
Indonesia	14	5.6
Indian	59	24.2
Chinese	73	29.9
User Status		

Table 2 shows that most respondents (N=240, 98.4%) are university students, while only a small number (N=4, 1.6%) are not. In terms of gender, the sample is nearly evenly split, with 123 male respondents (50.4%) and 117 female respondents (48.0%). The largest age group consists of respondents aged 21–30 (N=127, 52.0%), while those below 20 years old account for 46.3% (N=113). Regarding ethnicity, most respondents are Malay (N=89, 36.5%) and Chinese (N=73, 29.9%), followed by Indian (N=59, 24.2%). The smallest ethnic groups represented are Indonesia (N=14, 5.6%) and Java, Indonesia (N=5, 2.0%). The non-students are not directed to the survey.

Table 3. Descriptive Statistics, Cronbach's Coefficient Alpha, and Zero-order Correlations for All Study Variables

Variable		1	2	3	4	5	6
1	Time Saving	0.885					
2	Price Saving	0.714**	0.849				
3	Information Quality	0.740**	0.809**	0.879			
4	Security System	0.835**	0.794**	0.797**	0.875		
5	Safe Packaging	0.773**	0.771**	0.787**	0.835**	0.846	
6	Users' Satisfaction	0.834**	0.816**	0.796**	0.857**	0.823**	0.879
Number of items		5	5	5	5	5	5
Mean		1.6603	1.6792	1.6979	1.6644	1.7061	1.6544
Standard Deviation		0.67765	0.68375	0.64739	0.69284	0.66670	0.66552

Note. N = 244; *p < 0.1, **p < 0.05, ***p < 0.01. The diagonal entries represent Cronbach's Coefficient Alpha.

Table 3 presents descriptive statistics, measures of reliability, and zero-order correlations among the study variables. All tested variables demonstrate high levels of reliability, with Cronbach's alpha coefficients ranging from 0.885 to 0.879.

Table 4. Regression Analysis

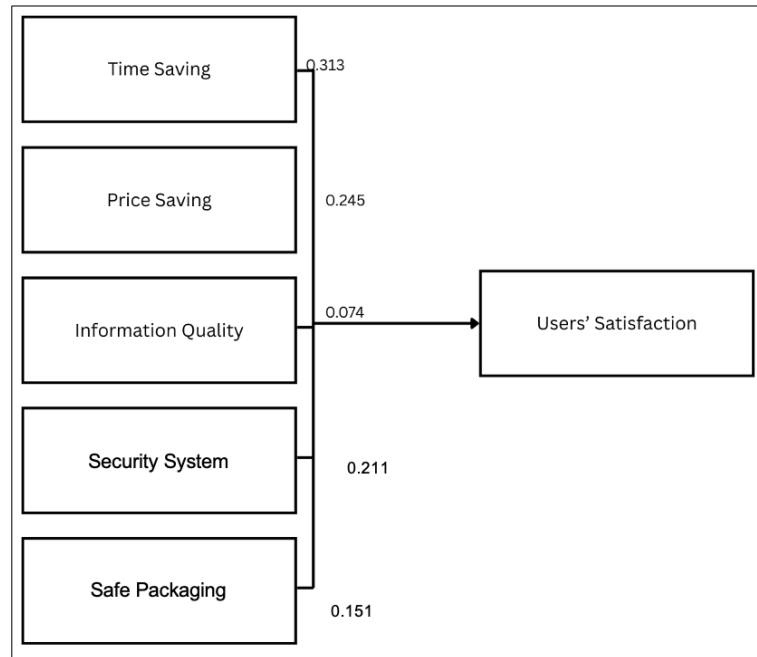
Variable	Beta
Time Saving	0.313
Price Saving	0.245
Information Quality	0.074
Security System	0.211
Safe Packaging	0.151

Note: N = 244; **p < 0.1, **p < 0.05, ***p < 0.01

Table 4 presents the results of the regression analysis examining the effects of time saving, price saving, information quality, security system, and safe packaging on college students' satisfaction with food delivery apps. The findings indicate that all variables positively influence user satisfaction, supporting hypotheses H1, H2, H4, and H5, while H3 receives weaker support due to its relatively low coefficient value. Among the predictors, time saving ($\beta = 0.313$, $p < 0.1$) shows the strongest positive effect, followed by price saving ($\beta = 0.245$, $p < 0.1$) and security system ($\beta = 0.211$, $p < 0.1$). Safe

packaging ($\beta = 0.151$) also contributes positively, though to a lesser extent. In contrast, information quality ($\beta = 0.074$) has only a minor influence on satisfaction, suggesting that practical efficiency and cost benefits are more decisive factors in shaping user satisfaction than informational aspects. Overall, the results emphasize that improving time efficiency and affordability can substantially enhance user satisfaction with food delivery services. The summarized output of the hypothesized model is provided in Figure 2.

Figure 2. Hypothesized Model



DISCUSSION

The primary objective of this study was to investigate how user satisfaction influences dependency on FDAs, particularly among university students, by examining the key determinants of satisfaction that include time saving, price saving, information quality, security systems, and safe packaging. The findings reveal that user satisfaction not only mediates the relationship between these factors and FDA dependency but also acts as a behavioral catalyst that encourages continuous and habitual use among students.

Among the five predictors, time saving emerged as the most significant determinant of user satisfaction. The convenience offered by FDAs, allowing users to browse menus, place orders, and track delivery progress in real time, substantially reduces the effort and time traditionally required to obtain food. This aligns with [Liu and Chen \(2021\)](#), who found that the convenience of takeaway services was central to the urban lifestyle of young consumers in China, reinforcing their reliance on mobile platforms. Similarly, [Zhao and Bacao \(2020\)](#) reported that users who perceive higher time efficiency in food ordering are more likely to remain loyal to a particular app. The seamless transaction process, real-time tracking, and automated payment confirmation collectively strengthen user trust and satisfaction, thereby increasing app dependency among students with limited time resources.

The study also identified price saving as a vital contributor to satisfaction. College students are typically price-sensitive, and promotional mechanisms, such as discount vouchers, reward points, and tiered memberships, are key motivators for their continued

use of FDAs. Alalwan (2020) demonstrated that perceived value for money strongly predicts e-satisfaction and continued intention to reuse mobile food apps, while Pitchay et al. (2022) confirmed that affordability and reward systems enhance consumers' trust and purchase intention. However, Liu and Chen (2021) noted that while cost-saving features attract users, the overall expenses of frequent delivery usage often exceed home-cooked alternatives. Thus, while promotional pricing fosters satisfaction and short-term loyalty, its long-term impact on sustained dependency may vary depending on users' financial constraints and perceived value balance.

Another essential factor is the security system, which significantly influences both satisfaction and trust. As users increasingly share personal and financial data through FDAs, data protection and transaction safety become crucial determinants of satisfaction. Su et al. (2022) highlighted that perceived security strongly affects consumers' trust and reuse intentions in mobile delivery platforms. Similarly, Yang et al. (2025) observed that privacy and security concerns directly shape behavioral intentions and responsible usage patterns. When users perceive the app as secure, supported by transparent privacy policies, encryption, and verification mechanisms, they are more likely to maintain engagement, demonstrating that strong cybersecurity frameworks can transform trust into habitual dependency.

Safe packaging also plays a growing role in shaping satisfaction and behavioral loyalty. Packaging quality communicates not only product safety but also brand credibility. Nilsen-Nygaard et al. (2021) noted that safe and biodegradable packaging materials enhance perceived hygiene and food quality. Furthermore, Kasmani et al. (2022) emphasized that hygiene protocols and sealed packaging are vital to user trust, particularly during and after the COVID-19 pandemic. For students, visible hygiene assurance provides emotional comfort and reinforces confidence in the service, contributing to repeat usage and dependency. This finding supports the view that physical quality cues in digital services, such as packaging, can symbolically convey safety and professionalism, thereby enhancing psychological trust in intangible online transactions.

Finally, information quality, though statistically the weakest predictor, still contributes positively by enhancing decision-making and reducing uncertainty. High-quality, accurate, and relevant information enables efficient decision-making and reduces uncertainty. Suhartanto et al. (2019) found that e-service quality and perceived value directly influence customer satisfaction and loyalty in online food delivery contexts. Similarly, Alalwan (2020) emphasized that clarity, completeness, and responsiveness in app-based information contribute to e-satisfaction and reuse intention. Inaccurate or incomplete details, on the other hand, can disrupt the consumer experience and erode trust (Yang et al., 2025). Therefore, maintaining high information quality supports both satisfaction and sustained app usage, particularly among students seeking efficiency and reliability.

Overall, this study supports the broader hypothesis that user satisfaction serves as a gateway to dependency on FDAs. As the platform ecosystem leverages behavioral design through convenience, personalization, and engagement features, users increasingly transition from functional reliance to habitual usage. This finding resonates with the psychological frameworks of operant conditioning and digital reinforcement, in which positive experiences such as convenience, safety, and perceived value reinforce repetitive behavior (Brailovskaia et al., 2023; Xu et al., 2025). The combination of technological efficiency, emotional assurance, and perceived trustworthiness collectively

drives continuous engagement among student users, illustrating how satisfaction evolves into digital dependency within the FDA ecosystem.

CONCLUSION

This study aimed to identify the key factors influencing university students' satisfaction with FDAs and to understand how satisfaction contributes to their dependency on these platforms. The regression results reveal that all examined variables (time saving, price saving, information quality, security system, and safe packaging) positively affect user satisfaction, confirming the overall model's validity. Among these predictors, time saving ($\beta = 0.313$, $p < 0.1$) exerts the strongest effect, followed by price saving ($\beta = 0.245$, $p < 0.1$) and security system ($\beta = 0.211$, $p < 0.1$). Safe packaging also contributes positively, while information quality ($\beta = 0.074$) plays a comparatively smaller role. These findings suggest that students' satisfaction is primarily shaped by the practical benefits of efficiency, affordability, and safety rather than informational attributes alone.

The results highlight that user satisfaction functions as a key behavioral mechanism that fosters habitual and dependent use of FDAs among students. Beyond practical convenience, such dependency may also reflect emotional coping patterns linked to stress, social pressure, or lifestyle adaptation. Future studies should therefore combine quantitative and qualitative approaches to examine these psychological aspects more deeply. From a practical standpoint, app developers, universities, and policymakers should collaborate to enhance service quality while encouraging balanced and responsible use. Features like transparent security systems, efficient ordering interfaces, and promotional fairness can sustain satisfaction and loyalty, whereas usage reminders or self-regulation tools may help mitigate overdependence. Overall, this research contributes to a deeper understanding of how functional and psychological dimensions jointly shape students' sustained engagement with food delivery platforms.

LIMITATION

One limitation of this study is its cross-sectional nature, which limits causal inferences. The sample is also confined to students from selected institutions, which may not generalize across broader demographics. Future research could adopt a longitudinal approach or include qualitative methods such as interviews to explore deeper emotional and cognitive dimensions of FDA dependency.

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DECLARATION OF CONFLICTING INTERESTS

The authors have declared no potential conflicts of interest concerning the study, authorship, and/or publication of this article.

REFERENCES

- Alalwan, A. A. (2020). Mobile food ordering apps: An empirical study of the factors affecting customer e-satisfaction and continued intention to reuse. *International Journal of Information Management*, 50, 28–44.
<https://doi.org/10.1016/j.ijinfomgt.2019.04.008>
- Arnett, J. J. (2023). *Emerging Adulthood: The Winding Road From the Late Teens Through the Twenties*. Oxford University Press.

- Belanche, D., Flavián, M., & Pérez-Rueda, A. (2020). Mobile apps use and WOM in the food delivery sector: The role of planned behavior, perceived security and customer lifestyle compatibility. *Sustainability*, 12(10), 4275. <https://doi.org/10.3390/su12104275>
- Brailovskaia, J., Margraf, J., & Teismann, T. (2023). Repetitive negative thinking mediates the relationship between addictive Facebook use and suicide-related outcomes: A longitudinal study. *Current Psychology*, 42(8), 6791-6799. <https://doi.org/10.1007/s12144-021-02025-7>
- Braw, E. (2022). *The Case for National Resilience Training for Teenagers*. Royal United Services Institute (RUSI).
- Chen, S. H., Chen, Y. J., & Xu, X. Y. (2023). An empirical analysis of the joy of purchasing Gashapon and customer satisfaction survey. *International Journal of Business Management and Economic Review*, 6(04), 80-92. <http://doi.org/10.35409/IJBMER.2023.3507>
- Chung, N. (2024). *The smart city in motion: Food delivery apps as mobile infrastructure in Seoul* [Doctoral dissertation, University of Cambridge]. University of Cambridge. <https://www.repository.cam.ac.uk/handle/1810/377954>
- de Lima Nardin, K. (2025). Digital burnout: The effect of screen workloads on mental health and quality of life. *EC Psychology and Psychiatry*, 14, 01-14. <https://doi.org/10.31080/ECPP.2025.14.01149>
- Deloitte, S. L. (2022). *Deloitte*. Deloitte.
- Garg, D., Smith, E., & Attuquayefio, T. (2025). Watching television while eating increases food intake: a systematic review and meta-analysis of experimental studies. *Nutrients*, 17(1), 166. <https://doi.org/10.3390/nu17010166>
- Huang, W., Chen, B., & Hu, C. (2025). The latent profile structure of negative emotion in female college students and its impact on eating behavior: The mediating role of physical exercise. *Frontiers in Public Health*, 13, 1663474. <https://doi.org/10.3389/fpubh.2025.1663474>
- Ismail, L. C., Osaili, T. M., Shanan, B., Rashwan, D., Merie, H., Rishan, L., ... & Al Dhahei, A. S. (2024). A cross-sectional study on online food delivery applications (OFDAs) in the United Arab Emirates: use and perceptions of healthy food availability among university students. *Journal of Nutritional Science*, 13, e62. <https://doi.org/10.1017/jns.2024.21>
- Jain, K., & Adhikari, K. (2024). *Understand the impact of packaging in food delivery on consumer buying behaviour* [Unpublished doctoral dissertation].
- Joshi, D., & Bhatt, V. (2021). Does the advertisement and sales promotion have impact on behavioral intentions of online food delivery application users?. *PalArch's Journal of Archaeology of Egypt/Egyptology*, 18(7), 1398-1418.
- Kasmani, N., Zulfakar, S. S., & Shafie, F. (2022). Consumer perception on food safety of online food delivery services in Malaysia. *Malaysian Journal of Consumer and Family Economics*, 29(1), 108–134.
- Liu, C., & Chen, J. (2021). Consuming takeaway food: Convenience, waste and Chinese young people's urban lifestyle. *Journal of Consumer Culture*, 21(4), 848-866. <https://doi.org/10.1177/1469540519882487>
- Livingstone, K. M., Sexton-Dhamu, M. J., Pendergast, F. J., Worsley, A., Brayner, B., & McNaughton, S. A. (2022). Energy-dense dietary patterns high in free sugars and saturated fat and associations with obesity in young adults. *European Journal of Nutrition*, 61(3), 1595-1607. <https://doi.org/10.1007/s00394-021-02758-y>
- Mehrabian, A., & Russell, J. A. (1974). The basic emotional impact of environments. *Perceptual and Motor Skills*, 38(1), 283-301. <https://doi.org/10.2466/pms.1974.38.1.283>
- Nilsen-Nygaard, J., Fernández, E. N., Radusin, T., Rotabakk, B. T., Sarfraz, J., Sharmin, N., ... & Pettersen, M. K. (2021). Current status of biobased and biodegradable

- food packaging materials: Impact on food quality and effect of innovative processing technologies. *Comprehensive Reviews in Food Science and Food Safety*, 20(2), 1333-1380. <https://doi.org/10.1111/1541-4337.12715>
- Odell, J. (2023). *Saving Time: The New York Times Bestseller*. Random House.
- Pitchay, A. A., Ganesan, Y., Zulkifli, N. S., & Khaliq, A. (2022). Determinants of customers' intention to use online food delivery applications through smartphone in Malaysia. *British Food Journal*, 124(3), 732-753. <https://doi.org/10.1108/BFJ-01-2021-0075>
- Ryu, S., & Ryu, S. (2021). Feeling excited and fluent: how consumers respond to the visual appeals of products in an online shopping environment. *Behaviour & Information Technology*, 40(11), 1219-1233. <https://doi.org/10.1080/0144929X.2021.1942989>
- Sogari, G., Velez-Argumedo, C., Gómez, M. I., & Mora, C. (2018). College students and eating habits: A study using an ecological model for healthy behavior. *Nutrients*, 10(12), 1823. <https://doi.org/10.3390/nu10121823>
- Su, D. N., Nguyen, N. A. N., Nguyen, L. N. T., Luu, T. T., & Nguyen-Phuoc, D. Q. (2022). Modeling consumers' trust in mobile food delivery apps: Perspectives of technology acceptance model, mobile service quality and personalization-privacy theory. *Journal of Hospitality Marketing & Management*, 31(5), 535-569. <https://doi.org/10.1080/19368623.2022.2020199>
- Sugiyono, S. (2013). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Alfabeta.
- Suhartanto, D., Ali, M. H., Tan, K. H., Sjahroeddin, F., & Kusdibyo, L. (2019). Loyalty toward online food delivery service: The role of e-service quality and food quality. *Journal of Foodservice Business Research*, 22(1), 81–97. <https://doi.org/10.1080/15378020.2018.1546076>
- Tse, D. K., Wong, J. K., & Tan, C. T. (1988). Towards some standardized cross-cultural consumption values. *Advances in Consumer Research*, 15, 387.
- Xu, W., Yao, Z., He, D., & Cao, L. (2025). Understanding online review helpfulness: a pleasure-arousal-dominance (PAD) model perspective. *Aslib Journal of Information Management*, 77(2), 391-412. <https://doi.org/10.1108/AJIM-04-2023-0121>
- Yang, R., Wibowo, S., & O'Connor, P. (2025). The dark side of applying Unified Theory of Acceptance and Use of Technology: behavioral intentions toward food addiction and food waste among food delivery applications' users in China. *Journal of Sustainable Tourism*, 33(1), 63-84. <https://doi.org/10.1080/09669582.2024.2312902>
- Zhang, G., Chong, L., Kotovsky, K., & Cagan, J. (2023). Trust in an AI versus a Human teammate: The effects of teammate identity and performance on Human-AI cooperation. *Computers in Human Behavior*, 139, 107536. <https://doi.org/10.1016/j.chb.2022.107536>
- Zhao, Y., & Bacao, F. (2020). What factors determine customer continuingly using food delivery apps during 2019 novel coronavirus pandemic period? *International Journal of Hospitality Management*, 91, 102683. <https://doi.org/10.1016/j.ijhm.2020.102683>

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