Received: 29 March 2024 | Revised: 23 October 2024 | Accepted: 27 October 2024

DOI: 10.1002/csr.3041

RESEARCH ARTICLE

Corporate Social Responsibility and Environmental Management

WILEY

Exploring food delivery app adoption: Corporate social responsibility and perceived product risk's influence

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Abstract

This study examines factors influencing consumer adoption of food delivery apps during and after the COVID-19 pandemic, focusing on the role of perceived product risk and sustainability alongside traditional behavioral predictors. Using the Theory of Planned Behavior extended with perceived product risk and sustainability components, the study employs a quantitative survey approach to assess consumer attitudes and intentions regarding food delivery app usage via PLS-SEM. Subjective norms strongly predict the intention to use food delivery apps, while perceived product risk and sustainability concerns negatively influence adoption. This indicates that consumers valuing social and environmental issues are less likely to use these apps. This research offers a novel perspective by integrating perceived product risk and sustainability into the study of food delivery app adoption, enriching the existing literature, and providing insights on consumer behavior in the digital marketplace.

KEYWORDS
consumer behavior, FDA, food consumption, sustainability, TPB

1 | INTRODUCTION

The global landscape of food delivery has undergone a transformative shift with the rise of Food Delivery Apps (FDAs), reshaping how consumers interact with the food industry. These apps, which enable customers to order from local restaurants without direct interaction, have become a cornerstone of modern consumer behavior (Cho et al., 2019; Ray et al., 2019). The Online Food Delivery market in Italy is projected to reach US$6.64 billion in 2024, with an annual growth rate (CAGR 2024–2029) of 7.49%, leading to a market volume of US$9.53 billion by 2029 (Statista, 2024). The surge in Italy's online food delivery demand is driven by the need for convenient and contactless options during the COVID-19 pandemic (Coppola, 2024). This trend is global, with the food delivery sector, including online groceries and meal deliveries, expected to approach $500 billion by 2027 (Coppola, 2023). The expansion of FDAs has been remarkable, extending beyond traditional takeout and adding billions to the global economy. In 2021, China led food delivery revenue with $27.3 billion, largely due to Meituan, the world's largest meal delivery app by revenue and usage (Aman et al., 2022). The industry is projected to reach about $320 billion by 2029 (Lempert, 2023). Its fastest growth occurred in 2020, driven by the COVID-19 pandemic, which also increased competition and challenges like low customer retention and high churn rates (Aman et al., 2022). This competitive environment underscores the need for strategic understanding to enhance continuous use and repurchase intent within FDAs (Alalwan, 2020; Dsouza & Sharma, 2021; Gunden et al., 2020). Additionally, COVID-19 heightened consumer attention to corporate social responsibility (CSR) practices (Gafni, 2020; He & Harris, 2020). The significance of Corporate Social Responsibility (CSR) in shaping consumer behavior has been highlighted by the global Edelman Trust Barometer report (2020), which revealed that 81% of consumers considered a firm's CSR activities when making purchases during the COVID-19 pandemic. This trend indicates that consumers demand responsible actions from organizations. CSR represents a business's commitment to societal needs, providing benefits from socially responsible actions (Jamali & Sidani, 2008). Thus, CSR has become crucial for fostering customer loyalty, securing competitive advantages, and driving business success (Martinez-Conesa et al., 2017).

Food Delivery Apps (FDAs) allow ordering food and processing payments without direct contact with restaurant staff, changing

traditional food buying behaviors (Alalwan, 2020). Food products carry additional health-related risks, creating a unique landscape for FDAs (Maimaiti et al., 2018). Previous studies have investigated the perceived risk associated with the technology used by FDAs (Poon & Tung, 2024) or sharing personal information via FDAs (Paalimäki, 2022). Globally, the rise of online food delivery has transformed interactions between consumers and food suppliers, affecting sustainability impacts (Li et al., 2020). Service-based organizations, unlike product-based ones, rely heavily on satisfying customer demand, making CSR initiatives more crucial (Choi & La, 2013). With sustainable strategic management gaining importance, further research is needed to explore these factors (Raza et al., 2023). Prior studies have shown CSR's positive impact on consumer behavior (Khan et al., 2021; Martínez & Del Bosque, 2013). Moreover, previous studies investigated environmental sustainability in terms of food produced and delivered via FDAs (Hasan et al., 2024; Nosi et al., 2020), the impact of FDAs on global sustainability (Jia et al., 2022), and food waste and sustainability goals in FDAs (Shankar et al., 2022). However, there is a notable gap in the literature regarding the investigation of perceived product risk and sustainability practices in the context of FDAs. This gap needs to be explored because perceived product risk and sustainability practices significantly influence consumer behavior in online food delivery. Integrating sustainability meets growing consumer demand for responsible practices and contributes to environmental and social well-being. The integration of CSR into the TPB framework is increasingly recognized as a significant factor influencing consumer intentions. CSR initiatives can enhance consumer perceptions of a company's ethical stance, thereby affecting subjective norms and perceived behavioral control, which are critical components of the TPB. Research indicates that consumers' expectations regarding CSR can shape their perceptions and motivations, leading to more favorable evaluations of companies that engage in socially responsible practices (Kim et al., 2019). This aligns with the notion that consumers are more likely to support brands that reflect their values, particularly in contexts where CSR is perceived as authentic and aligned with consumer expectations (Yoo & Lee, 2018). Moreover, the role of CSR in mitigating perceived product risk is crucial in the context of online food delivery services. As consumers navigate the complexities of online purchasing, their concerns regarding product safety and ethical sourcing can be alleviated by a company's demonstrated commitment to CSR. This is supported by findings that suggest perceived CSR can enhance consumer trust and reduce perceived risks associated with purchasing decisions (Wang et al., 2011). Additionally, the subjective norms surrounding CSR can influence consumer behavior, as social pressures and expectations for sustainable practices increasingly shape consumer intentions (Dawkins et al., 2014). The purpose of this study is to investigate how CSR, perceived product risk, and sustainability practices interact to influence consumer behavior specifically within the online food delivery sector. By extending Ajzen's TPB, this research will provide insights into how CSR initiatives can serve as a mechanism for enhancing consumer intentions and behaviors, particularly in an era where ethical considerations are paramount in consumer decision-making processes (Pradhan, 2018).

The study enhances understanding of consumer behavior and FDA platform management by integrating CSR and perceived product risk into the TPB framework. Theoretically, it extends Ajzen's Theory of Planned Behavior by incorporating sustainability and perceived product risk, and explores CSR's impact in service industries, especially digital platforms, and the perceived risks of online food delivery. The extension of the Theory of Planned Behavior (TPB) within the context of Corporate Social Responsibility (CSR) highlights the growing importance of socially responsible behavior in shaping consumer decisions. This evolution shows how individual intentions increasingly align with societal values, reflecting a shift in consumer expectations. Integrating CSR into TPB explains how personal beliefs, social norms, and perceived control influence choices in an ethically driven marketplace. As consumers become more conscious of the social and environmental impacts of their purchases, societal expectations and peer behavior significantly shape their decisions. This shift pushes businesses to adopt sustainable practices in response to ethical consumer demand. The inclusion of CSR in TPB emphasizes the role of ethics as a key driver of consumer behavior, urging companies to align their practices with societal values. This theoretical extension is offering insights into consumer engagement with CSR initiatives and their implications for corporate strategy in a socially conscious market. Practically, the findings offer strategic guidance for FDA companies, emphasizing CSR and risk management as key differentiators. Overall, this study bridges academic research and practical applications, providing valuable insights for businesses and policymakers in the digital marketplace. The following sections will detail the theoretical framework, research methodology, and empirical findings, concluding with a discussion of implications for both theory and practice.

2 | LITERATURE REVIEW

2.1 | Using traditional theory of planned behavior for understanding online food delivery apps

2.1.1 | The theory of planned behavior and online food delivery apps

The current research builds upon the Theory of Planned Behavior (TPB), initially introduced by Ajzen in 1991 as an evolution of the Theory of Reasoned Action. Central to TPB is the notion that an individual's perceived ability to control a behavior significantly influences their intention to perform it. TPB has been extensively applied across various domains, including environmental product choices, food consumption, and more recently, Food Delivery Apps (FDAs). In the context of FDAs, numerous studies have leveraged TPB to understand consumer behavior. For instance, Pillai et al. (2022) integrated TPB with the theory of perceived risks and the elaboration likelihood model to examine how perceived benefits and risks, along with online persuasion, influence consumer attitudes and purchase intentions. Al Amin et al. (2021) focused on the impact of social isolation, food safety, and other TPB elements on FDA usage intentions. Similarly,

Belanche et al. (2020) explored how TPB variables like attitude and subjective norms influence customer usage and word-of-mouth intentions. Yan et al. (2022) combined TPB with the technology acceptance model to investigate factors affecting consumers' intentions to continue using FDAs, considering demographic differences and behavior changes during the Covid-19 pandemic. Hamid and Azhar (2023) expanded the TPB framework by incorporating trust to analyze consumer behavior towards ordering food and beverage items via e-commerce during the pandemic.

The current research extends the application of TPB in the FDA domain by including perceived product risk and sustainability practices as influential factors. This extension is vital given the evolving nature of consumer behavior in the context of online food delivery services. In addition to TPB, other scholars have explored various consumer factors driving FDA adoption. Studies by Pigatto et al. (2017) and Ray et al. (2019) delved into app characteristics like content, usability, and functionality. Suhartanto et al. (2019) focused on determinants of customer loyalty towards online food delivery, while others like Yeo et al. (2017), Lee et al. (2019), and Alalwan (2020) highlighted the role of hedonic motivations related to the buying experience. Trust has also been identified as a crucial driver in using FDAs, as evidenced by research from Alagoz and Hekimoglu (2012), Cho et al. (2019), and Troise et al. (2020). Chakraborty et al. (2022) relied upon the theory of consumption values (TCV) to study consumer adoption behavior towards FDAs usage.

Additionally, factors such as customer satisfaction, experience, and conversion have been the focus of studies by Kapoor and Vij (2018) and Wang et al. (2019). Pillai et al. (2022), utilizing the elaboration likelihood model, identified that argument quality, design elements, and connectedness significantly influence attitude formation, subsequently affecting behavior. This suggests that when users find the content engaging and the design elements appealing, it fosters a positive attitude and behavior towards FDAs.

According to the Theory of Planned Behavior (TPB), attitude (ATT) is defined as the degree to which an individual holds a favorable or unfavorable evaluation of the behavior in question (Ajzen, 1991, p. 188). It is known to exert a positive influence on behavioral intention (Ajzen, 1991; Davis et al., 1989). Hansen et al. (2004) demonstrated through TPB that consumers' attitudes towards online grocery shopping were a key predictor of their behavioral intentions in this area. Similarly, Yeo et al. (2017) established a positive correlation between attitudes towards online food delivery services and the behavioral intention to use such services, aligning with the Technology Acceptance Model (Davis et al., 1989). Further reinforcing this relationship, studies by Piroth et al. (2020) and Troise et al. (2020) also identified a strong link between consumers' attitudes and their intentions to engage in online food purchasing. For instance, Hwang et al. (2020) found that positive attitudes towards the eco-friendliness of drone food delivery services significantly influenced consumers' behavioral intentions to use these services. Conversely, negative attitudes related to privacy concerns can diminish users' intentions to engage with mobile food delivery applications (Belanche et al., 2020). Similarly, Kim and Hwang (2020) identified that consumers with higher product knowledge and positive attitudes towards the novelty and convenience of drone delivery services were more likely to intend to use such services. Al Amin et al. (2021) highlighted that during the COVID-19 pandemic, attitudes towards safety and convenience positively impacted the intention to use mobile food delivery apps.

Collectively, these studies have consistently highlighted a significant correlation, underscoring the influence of consumer attitudes in shaping their behavioral intentions within the FDA context. This accentuates the criticality of comprehending and examining consumer attitudes as key determinants in their decision-making processes, especially in the realm of digital food purchasing (Sun et al., 2023). Based on these insights, the following hypothesis is proposed:

H1a. Attitude positively influences behavioral intention towards FDAs services.

SN, defined as the perceived social pressure to engage in or refrain from specific behaviors, hold substantial influence in consumer decisions regarding FDAs. This concept, highlighted by research from Troise et al. (2020) and Belanche et al. (2020) emphasize the role of peers, family, and friends in shaping attitudes and intentions towards FDAs. Positive subjective norms, where individuals perceive approval and support from their social circle, are likely to enhance both their attitudes towards and intention to use these services. This interplay between attitude and subjective norms forms a critical component in understanding consumer behavior in the context of FDAs, as well as in other areas like online grocery shopping and health-related decision-making. Given these insights, two hypotheses are posited:

H1b. Subjective norms positively influence intention to use FDAs services.

H1c. Subjective norms positively influence the attitude towards FDAs services.

Several studies suggest focusing on the Perceived behavioral control (PBC)—that is, *the perceived ease or difficulty of performing the behavior and it is assumed to reflect experience as well as anticipated impediments and obstacles* (Ajzen, 1991, p. 188)—to examine online purchase (Hansen, 2005; Shim et al., 2001). Accordingly, PBC encompasses an individual's perceptions and beliefs regarding the factors that may impact their ability to carry out a specific action. Therefore, it is reasonable to infer that a greater sense of control over one's knowledge and skills correlates with a heightened intention to engage in a particular behavior. As also emphasized in past research (Al Amin et al., 2021; Piroth et al., 2020; Troise et al., 2020), in the context of FDA usage, if individuals feel confident in possessing the necessary knowledge, resources, and skills to securely place food orders online, it is plausible to assume that perceived behavioral control (PBC) positively contributes to their behavioral intention. Hence, we posit the following hypothesis:

H1d. Perceived behavioral control positively influences the intention to use FDAs food services.

2.2 | Using the extensions of the traditional theory of planned behavior for understanding online food delivery apps

While the classic TPB framework has been widely used to predict behavioral intentions based on attitudes, social norms, and perceived control, it has certain limitations when applied to more complex or evolving consumer behaviors, such as those associated with online services like FDAs. To better understand these behaviors, researchers have proposed various extensions of TPB that account for additional factors influencing consumer choices. These extensions provide a more comprehensive view by integrating additional constructs that address specific concerns, such as risk and sustainability. In the following sections, we will explore these key extensions, which enhance the TPB's predictive power in the context of FDAs.

2.2.1 | Perceived product risk and FDAs

Ajzen (1991), and several other scholars as well (Hansen et al., 2004; Piroth et al., 2020; Troise et al., 2020) highlight the importance of extending the TPB model with new constructs to improve its predictive power in specific contexts. Specifically, previous studies underline the importance of perceived product risk in food consumption studies (Huy Tuu et al., 2011; Sadiq et al., 2023). Perceived product risk (PPR) is often described as the sensed uncertainty related to potential adverse/negative consequences associated with the utilization of a product or service (Featherman & Pavlou, 2003). In the FDA context, PPR is one of the most important factors influencing the use of FDAs as it encompasses concerns related to food quality, safety, and reliability (Suhartanto et al., 2019). Consumers' attitudes towards using FDA services are profoundly influenced by how they perceive and manage these product risks. Higher levels of perceived risk may lead to a more cautious or skeptical attitude, affecting the overall willingness to engage with such platforms (Gupta et al., 2018; Maimaiti et al., 2018; Yeung et al., 2010). On this basis, the following hypothesis has been derived:

H2a. Perceived product risk negatively influences the attitude to use FDAs services.

When there is an elevated perception of product risk, it tends to undermine individuals' confidence in their ability to control and navigate the process of using FDAs effectively. Concerns related to food safety, order accuracy, or delivery reliability may create a sense of uncertainty and reduce PBC. As a result, consumers may experience a decline in their intention to use FDAs due to perceived challenges and risks associated with the services (Gupta & Duggal, 2021; Hansen, 2005; Kazancoglu & Kursunluoglu Yarimoglu, 2018; Nguyen et al., 2023). Moreover, Cai and Leung (2020) established during the COVID-19 pandemic that risk propensity influences the connection between consumers' attitudes and their online food delivery orders. Conversely, Permatasari and Kartikowati (2018) found that higher perceived risk reduces consumer trust in such services. Hence, we posit that:

H2b. Perceived product risk negatively influences perceived behavioral control.

2.2.2 | Sustainability and FDAs

Amidst the rapid growth and widespread adoption of FDAs, emerging sustainability issues warrant attention. Research indicates that food delivery contributes to increased waste production and adverse environmental impacts (Maimaiti et al., 2018; Song et al., 2018; Verma et al., 2016). Concurrently, studies have highlighted the positive influence of green practices in restaurants on consumer attitudes and behavioral intentions (Kim & Hall, 2020; Line et al., 2016; Xu & Jeong, 2019). From a social standpoint, FDAs embody the gig economy paradigm, altering traditional employment relationships. Workers, often providing their own resources (like bikes or scooters) and paid per delivery, face challenges orchestrated by the platform-centric work structure (Stewart & Stanford, 2017). The gig economy, as recent research points out, is rife with job insecurity and exploitative practices (Aroles et al., 2019; Stanford, 2017). Specifically, Aroles et al. (2019) identified time pressure to increase wages as a significant risk factor affecting working conditions for delivery personnel.

Moreover, numerous studies underscore that a firm's commitment to sustainable practices can profoundly influence consumer behavior (Lombart & Louis, 2014), while unethical behaviors often elicit negative responses from consumers (Delistavrou et al., 2020; Folkes & Kamins, 1999). In the context of FDAs, environmental concerns such as increased packaging waste and the carbon footprint of transportation are becoming increasingly salient among users, potentially leading to negative attitudes, especially among those who prioritize sustainability (Sciarelli et al., 2022). Similar to the environmental sustainability issues, also the social ones, including fair labor practices and workers' rights, are gaining prominence. Reports of substandard wages, precarious working conditions, and a lack of benefits for delivery drivers are likely to trigger adverse reactions among socially conscious consumers (Buerke et al., 2017). The convergence of these environmental and social sustainability challenges presents a considerable barrier for users in developing or maintaining a positive view of FDAs. As such, consumers who are cognizant of environmental and social issues may perceive these services as contributing to broader sustainability challenges, thereby affecting their overall perception of the industry. Considering these insights, we posit that sustainability concerns, encompassing both environmental and social aspects, may negatively influence attitudes towards FDA services.

H3. Sustainability negatively influences the attitude towards FDAs services.

The hypotheses are represented in Figure 1.

3 | METHODS

3.1 | Measures development and data collection

The study employed a quantitative research design using a survey questionnaire method. built on pre-validated scales. All the scales were measured using a Likert scale going from "Strongly Disagree" (1) to "Strongly Agree" (7). The items used in this survey are reported in the following Table 1.

The first version of the scales used in the questionnaire was assessed using a pilot study (Aithal & Aithal, 2020) administered to a sample of 25 Italian students in September 2022, after this pilot study, we got a Cronbach's alpha value, for each scale, that exceeded the acceptable value of 0.6. After the pilot study, we made some minor revisions to items' spelling before finalizing our questionnaire. Furthermore, to reduce retrieval bias (Kline et al., 2000; Podsakoff et al., 2003), we intermixed the items from different constructs in the various scale grids, and, to reduce social desirability bias (Chidlow et al., 2015), we added guidelines before the survey to explain its scope, and to provide contacts for further information. After these steps, at the end of September 2022 we started collecting data and stopped the data collection process at the start of November, after 6 weeks. We collected 449 complete responses.

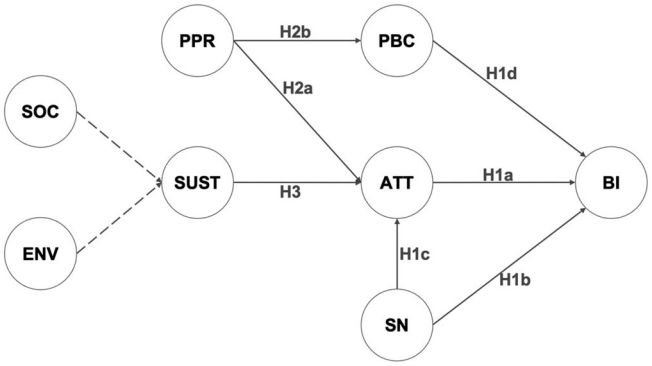

FIGURE 1 Theoretical model.

3.2 | Sample demographics

The demographic composition of the participants in this study provides insightful data on gender, age, education, and geographic distribution. Gender-wise, the split was nearly equal, with males constituting 50.57% of the respondents and females 49.43%. Age-wise, most of the respondents fell within the 19–30 years age group, representing

TABLE 1 Questionnaire items and related sources.

Variable		Items	Source
Attitude	ATT1	I think that using food delivery app would be a wise idea	Lee (2009); Troise et al. (2020)
	ATT2	I think that using food delivery app is a good idea	
	ATT3	I think that using food delivery app is pleasant	
	ATT4	In my opinion, it is desirable to use food delivery app	
Behavioral intention	BI1	I intend to use the food delivery app	Lee (2009); Troise et al. (2020)
	BI2	If I have an opportunity, I will order food through the delivery app	
	BI3	I intend to keep ordering food through the delivery app	
Environmental sustainability	ENV1	I prefer not to use FDA due to the excessive waste of packaging	Buerke et al. (2017)
	ENV2	I prefer not to use FDA due to the increase in CO_2 emissions due to fuel consumption resulting from the circulation of riders	
Perceived behavioral control	PBC1	I think that I would be able to use food delivery app to buy food well	Lee (2009); Troise et al. (2020)
	PBC2	I think that using food delivery app would be entirely within my control	
	PBC3	I think that I have the resources, knowledge, and ability to use food delivery app	
Perceived product risk	PPR1	I prefer not to use food delivery app as I fear the ingredients are not fresh	Featherman and Pavlou (2003)
	PPR2	I prefer not to use food delivery app as I fear that during the transport the food is not packaged adequately	
	PPR3	I prefer not to use food delivery app as I fear this food may not have been prepared following the adequate hygienic norms	
Subjective norm	SN1	People who are important to me would think that I should use food delivery app	Lee (2009); Troise et al. (2020)
	SN2	People who influence me would think that I should use food delivery app	
	SN3	People whose opinions are valued to me would prefer that I should use food delivery app	
Social sustainability	SOC1	I prefer not to use food delivery app for the working conditions of the riders	Sciarelli et al. (2022)
	SOC2	I prefer not to use food delivery app due to the lack of protection that riders receive	

45.45% of the total. This was followed by those aged 31–40 years at 25.64%, 41–50 years at 12.82%, over 55 years at 11.89%, and the least represented group was under 18 years, making up 4.20% of the participants. In terms of educational qualifications, a significant proportion of the participants, 36.08%, held a master's degree. Geographically, the respondents were predominantly from Southern Italy, accounting for 57.48%, with 23.36% from Central Italy and 19.16% from Northern Italy. This distribution indicates a varied representation across different demographics, offering a broad perspective for the study.

4 | RESULTS

4.1 | Model testing approach

For data analysis, we adopted the Partial Least Squares approach to Structural Equation Modeling (PLS-SEM) conducted using SmartPLS 3.0 software (Ringle et al., 2015). This methodology offers numerous advantages, including its appropriateness for conducting exploratory research and predicting targets. Furthermore, it demonstrates flexibility in effectively accommodating non-normally distributed data and coping with situations characterized by limited sample sizes. PLS-SEM has previously been applied in studies concerning the food delivery industry (Troise et al., 2020) and consumer behavior in food purchasing (Sciarelli et al., 2021) or consumer behavior in general (Munerah et al., 2021). According to the most widespread approach to model-testing, testing a PLS-SEM involves a two-step process (Hair et al., 2016). In the beginning we evaluate that the measurement model's quality is good enough to be used in testing; then, in the second step, the structural model is tested to assess its ability to describe the hypothesized relationships (Hair et al., 2016).

4.2 | Measurement model test

As in our model we have not used any formative indicators multicollinearity should not be a real concern (Rigdon, 2012) in any case we tested common method bias using the full-collinearity approach (Kock, 2015), it was found that the highest Internal VIF was 3.3, which falls below the recommended threshold of 5, confirming, at the same time, the lack of problematic multicollinearity. Our indicators exhibit reliability, with loadings exceeding 0.6 (Henseler et al., 2009). Both Cronbach's alpha and Composite reliability (CR) surpass 0.7, establishing the constructs as reliable (Hair et al., 2016), and we used the cross-loading approach to successfully assess discriminant validity (Hair et al., 2016). The measurement model meets the criteria for convergent validity, with each block achieving an average variance extracted (AVE) greater than 0.50 (Hair et al., 2016). Therefore, the measurement model can be deemed valid (Hair et al., 2016). Detailed analysis results can be found in Tables 2 and 3.

4.3 | Structural model and hypothesis testing

In the assessment of the structural model, we examined R^2 values and the significance of path coefficients. The R^2 for all constructs

TABLE 2 Indicator reliability, construct reliability, convergent validity, and construct's R^2.

Variable	Item	Loading	CR alpha	CR	AVE	R^2
Attitude	ATT1	0.888	0.906	0.934	0.78	0.529
	ATT2	0.892				
	ATT3	0.917				
	ATT4	0.833				
Behavioral intention	BI1	0.96	0.937	0.96	0.888	0.874
	BI2	0.957				
	BI3	0.909				
Environmental sustainability	ENV1	0.883	0.706	0.872	0.773	
	ENV2	0.875				
Perceived behavioral control	PBC1	0.941	0.901	0.937	0.833	0.255
	PBC2	0.931				
	PBC3	0.865				
Perceived product risk	PPR1	0.915	0.904	0.94	0.839	
	PPR2	0.914				
	PPR3	0.92				
Subjective norm	SN1	0.964	0.947	0.966	0.905	
	SN2	0.935				
	SN3	0.953				
Social sustainability	SOC1	0.925	0.819	0.917	0.847	
	SOC2	0.915				

TABLE 3 Discriminant validity.

	ATT	BI	Env	PC	Risk	SN	SOC
ATT1	0.888	0.711	−0.312	0.695	−0.449	0.691	−0.362
ATT2	0.892	0.683	−0.284	0.641	−0.423	0.66	−0.334
ATT3	0.917	0.669	−0.309	0.681	−0.46	0.646	−0.398
ATT4	0.833	0.574	−0.203	0.588	−0.321	0.514	−0.375
BI1	0.71	0.96	−0.397	0.826	−0.56	0.879	−0.349
BI2	0.731	0.957	−0.394	0.84	−0.57	0.875	−0.371
BI3	0.679	0.909	−0.412	0.741	−0.543	0.815	−0.408
ENV1	−0.365	−0.497	0.883	−0.405	0.778	−0.499	0.19
ENV2	−0.19	−0.246	0.875	−0.251	0.505	−0.257	0.189
PBC1	0.693	0.82	−0.334	0.941	−0.458	0.754	−0.363
PBC2	0.707	0.838	−0.395	0.931	−0.56	0.803	−0.424
PBC3	0.619	0.655	−0.283	0.865	−0.336	0.611	−0.396
PPR1	−0.406	−0.548	0.65	−0.448	0.915	−0.545	0.139
PPR2	−0.455	−0.538	0.661	−0.47	0.914	−0.534	0.167
PPR3	−0.436	−0.541	0.702	−0.469	0.92	−0.535	0.186
SN1	0.692	0.883	−0.448	0.765	−0.577	0.964	−0.35
SN2	0.653	0.833	−0.359	0.755	−0.511	0.935	−0.353
SN3	0.698	0.877	−0.423	0.763	−0.585	0.953	−0.393
SOC1	−0.387	−0.389	0.235	−0.421	0.213	−0.387	0.925
SOC2	−0.375	−0.342	0.16	−0.371	0.114	−0.318	0.915

Abbreviations: ATT, attitude; BI, perceived behavioral intention; Env, environmental sustainability; PC, perceived product risk; SN, subjective norm; SOC, social sustainability.

TABLE 4 Hypotheses testing.

HP	Relationship	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	*T* statistics (|O/STDEV|)	*p* values	Support
1a	ATT → BI	0.099	0.099	0.031	3.194	0.001	Yes
1b	SN → BI	0.596	0.595	0.042	14.113	0	Yes
1c	SN → ATT	0.628	0.627	0.041	15.315	0	Yes
1d	PBC → BI	0.303	0.303	0.04	7.502	0	Yes
2a	PPR → ATT	−0.032	−0.034	0.049	0.654	0.257	No
2b	PPR → PC	−0.505	−0.506	0.039	13.092	0	Yes
3	SUST → ATT	−0.135	−0.136	0.045	2.973	0.001	Yes

Abbreviations: ATT, attitude; BI, perceived behavioral intention; Env, environmental sustainability; PC, perceived product risk; SN, subjective norm; SOC, social sustainability.

exceeded 0.5, with the highest R^2 observed for BI at 0.873, except for PBC, which exhibited a relatively weaker R^2 of 0.253. Subsequently, employing a bootstrap procedure with 5000 resampling (Hair et al., 2016), the hypotheses were tested (refer to Table 3). Support was found for all hypotheses, except for H2a. The results confirm significant influences on BI from ATT (0.099***), SN (0.596***), and PBC (0.303***). In the context of TPB extensions, support was also found for H2b, indicating the negative influence of PPR on PBC (−0.505***), and H3, demonstrating the negative influence of SUST on ATT (−0.135***) (refer to Table 4 and Figure 2).

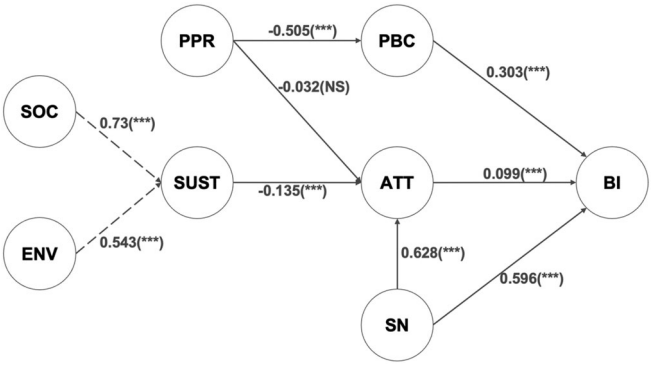

FIGURE 2 Theoretical model with results.

5 | DISCUSSION

The study aimed to understand consumers' behavior with food delivery apps (FDAs) by examining how CSR, perceived product risk, and sustainability practices influence and predict consumer behavior in the online food delivery landscape. It proposed that attitude positively impacts behavioral intentions, corroborating findings by Hansen et al. (2004), Yeo et al. (2017), Piroth et al. (2020), and Sun et al. (2023). The study confirmed that consumer attitudes significantly influence behavioral intentions towards using FDAs. Additionally, subjective norms were found to positively influence the intention to use FDAs and attitudes towards them, aligning with Troise et al.'s (2020) research. These findings suggest that both consumer attitudes and societal norms are crucial in determining purchasing decisions across various sectors. Echoing Rong-Da Liang and Lim (2011) and Sun et al. (2023), perceived behavioral control positively influenced the intention to use FDAs. The perception of control over one's behavior is a significant factor in decision-making processes, likely due to increased consumer autonomy in the digital age, where accessible information enables informed choices (Dholakia et al., 2021). The study's hypothesis regarding the negative influence of perceived product risk on attitudes towards FDAs was not supported, contrasting Quevedo-Silva et al. (2016), who found online purchase risks deter consumption. This discrepancy might be due to the specific context of FDAs, where food delivery is seen as lower risk due to the nature of the product and immediacy of service (Cranfield, 2020). Additionally, customer reviews and ratings on these platforms may mitigate perceived risks by providing transparent, user-generated information about service quality (Munikrishnan et al., 2023).

Traditionally, it is been thought that higher perceived risks lead to more negative attitudes towards using Food Delivery Apps (Pillai et al., 2022). However, the current research uncovers a lack of significative correlation, suggesting that factors other than risk perception may be more influential in shaping consumer attitudes in this area (Gupta et al., 2018; Maimaiti et al., 2018; Yeung et al., 2010). The current findings reveal a unique, contrasting relationship between perceived product risk and behavioral control. As perceived risk increases, individuals feel less able to have control in using these services (Gupta & Duggal, 2021; Hansen, 2005; Kazancoglu & Kursunluoglu Yarimoglu, 2018). This inverse relationship provides insight into the psychological factors affecting consumer decisions in the FDA sector. It indicates that while consumers may not have an overall negative attitude towards FDAs despite perceived risks, they do feel a diminished sense of control in high-risk situations. Additionally, there is a growing trend of consumers valuing social responsibility in their purchases (Stöckigt et al., 2018). Some studies suggest that FDAs can enhance social sustainability by reducing food waste through improved customer communication about portion sizes, without pressuring consumers into over-purchasing (Li et al., 2020). However, our study reveals a negative correlation between social sustainability and attitudes towards FDA services (Buerke et al., 2017; Sciarelli et al., 2022). Specifically, ethical concerns regarding the treatment of delivery drivers are triggering negative consumer reactions, raising questions about the industry's social sustainability. This suggests that as consumers become more aware of issues like low wages, lack of benefits, and poor working conditions for delivery personnel, their attitudes towards FDAs become increasingly negative. Moreover, this trend is part of a broader shift towards sustainability and corporate social responsibility (CSR), consumers are not only looking for products and services that meet their needs but also for companies that align with their values (Bitencourt et al., 2024).

5.1 | Theoretical implications

The current research significantly expands the TPB by incorporating Personal Perceived Risk and Social Sustainability as key constructs, offering a more comprehensive framework for understanding consumer behavior in online food purchases. This extension suggests that traditional behavioral prediction models might be enhanced by including considerations like risk perception and sustainability issues. Notably, the finding that Perceived Product Risk Influences Perceived Behavioral Control indicates that individuals' risk perception shapes their sense of control over behaviors, a dynamic previously underexplored (Hansen et al., 2004; Piroth et al., 2020). This opens new research avenues into how risk perception mediates or moderates relationships within the TPB framework (Dholakia et al., 2021).

The observed negative correlation between social sustainability and attitudes towards FDAs reflects broader trends in corporate social responsibility (CSR) research. This finding highlights the complexity of ethical consumerism, where consumer values and purchasing behaviors may not always align with corporate sustainability initiatives. As CSR practices become more explicit, there is often a disconnect between corporate efforts and consumer perceptions, leading to skepticism about the authenticity of these initiatives (Gatti & Seele, 2013). Furthermore, research in ethical consumerism shows that while consumers may express a desire to support socially responsible practices, their actual behavior often lags behind their intentions (Carrington et al., 2010). This gap can explain why consumers might hold negative attitudes towards FDAs despite an overall concern for sustainability. Fransen (2017) suggests that ethical consumerism can sometimes undermine collective social responsibility, as individuals feel their ethical choices are enough to compensate for broader societal efforts. This dynamic underscores the importance for FDAs to not only promote sustainability initiatives but also to align these efforts more closely with consumer expectations and values.

The research also highlights a shift in consumer behavior regarding sustainability. Individuals prioritizing social and environmental sustainability are less inclined to use food delivery apps (Buerke et al., 2017; Sciarelli et al., 2022). This identifies an underserved market segment interested in sustainable food delivery options, suggesting significant implications for businesses. As consumers increasingly prioritize ethical considerations, incorporating these values into subjective norms can provide deeper insights into how societal values shape behavior (Sun et al., 2023; Troise et al., 2020). Contrary to previous findings (Quevedo-Silva et al., 2016), this study found no

negative correlation between perceived product risk and attitudes towards FDAs, suggesting that factors like the nature of the product and immediacy of service may mitigate perceived risks (Cranfield, 2020). However, the inverse relationship between perceived product risk and perceived behavioral control indicates that higher perceived risk diminishes consumers' sense of control (Gupta & Duggal, 2021). The study also underscores the importance of social responsibility. Ethical concerns about the treatment of delivery drivers negatively impact consumer attitudes towards FDAs. Addressing these concerns by ensuring fair wages and better working conditions can enhance the perceived social sustainability of FDAs (Stöckigt et al., 2018). In conclusion, by integrating perceived product risk and social sustainability into the TPB framework, this research offers a more nuanced understanding of consumer behavior in online food delivery. It highlights the need for FDA platforms to address contemporary consumer concerns, enhancing theoretical models and offering practical strategies for businesses.

5.2 | Practical implications

This article presents significant practical implications based on our study's findings, highlighting the influence of perceived product risk and sustainability on FDA adoption. First, the study underscores the paramount importance of product quality for consumers. It is essential for platforms to not only assure the safety of their processes but also to emphasize and communicate the quality of the food. Addressing the negative correlation between Perceived Product Risk (PPR) and Perceived Behavioral Control (PBC) is critical in fostering positive user intentions and promoting the continuous or initial usage of FDA services. By enhancing the sense of control and empowerment among consumers, service providers can build trust and confidence, thereby elevating the overall user experience. Providing clear, accessible information about food sourcing, preparation, and safety protocols can help consumers feel more in control of their choices, reducing perceived risks and enhancing their confidence in using FDA services. However, our findings also indicate that PBC exhibits a relatively weaker explanatory power. This suggests that while perceived behavioral control plays a role in influencing behavioral intentions, it is not as strong a predictor as other factors, such as subjective norms and attitudes. For practitioners and businesses, this implies that focusing solely on improving consumers' perceived control (e.g., by making the service easier to use or providing more information) might not be enough to significantly drive behavioral intentions. Instead, businesses should adopt a more balanced approach, enhancing social influence and positive attitudes towards the platform alongside perceived control to optimize engagement.

Additionally, the study reveals the growing consumer focus on sustainability. FDA platforms can capitalize on this by providing detailed information about the product's origin, storage conditions, and preparation methods. Such transparency can increase consumers' perceived behavioral control and positively influence their attitudes and behavioral intentions towards the platform. Our findings also indicate that consumers sensitive to sustainability issues tend to be less inclined towards using FDAs. Therefore, it becomes imperative for these platforms to actively engage in sustainable practices. This can include adopting eco-friendly packaging, optimizing delivery routes for reduced environmental impact, and ensuring fair labor practices for delivery personnel. A visible commitment to sustainability can help FDA services counteract negative perceptions and resonate with the values of environmentally and socially conscious consumers, ultimately enhancing the perception of product quality. In the realm of sustainability, improving working conditions for delivery personnel could be a strategic move to attract new customers, demonstrating a holistic approach to responsible business practices. By investing in fair wages, benefits, and safe working environments for drivers, FDA platforms can address ethical concerns and enhance their social sustainability profile. This not only aligns with the growing consumer demand for ethical business practices but also contributes to a positive brand image and customer loyalty. Integrating these sustainability efforts into marketing and communication strategies can further emphasize the platform's commitment to responsible practices, thereby fostering a stronger, trust-based relationship with consumers.

6 | CONCLUSION, LIMITATIONS, AND FUTURE STUDIES

The current study, while offering valuable insights, is not devoid of limitations. Being among the first to explore perceived product risk and integrating the Theory of Planned Behavior (TPB) with socio-environmental sustainability factors in the context of Food Delivery Apps (FDAs), it navigates relatively uncharted territory. The scarcity of preceding studies on these specific topics may pose a constraint, as it limits the ability to compare and validate our findings extensively. Future research could enrich this area by incorporating other theoretical frameworks, such as the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) proposed by Venkatesh et al. (2012), to provide a more comprehensive understanding. Another promising avenue for subsequent research lies in examining innovations within the FDA sector, such as the utilization of drones for delivery, which could significantly reshape consumer experiences and perceptions. Additionally, the focus of our study was confined to the Italian context, which may not fully capture the global nuances of FDA usage. Therefore, expanding future research to include multiple countries would offer a broader, more diverse understanding of how different cultural and economic backgrounds influence the adoption and perception of FDAs. Such cross-cultural studies could provide more generalizable results and identify unique regional trends and consumer preferences in the ever-evolving landscape of food delivery services.

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How to cite this article: Prisco, A., Sepe, F., Nanu, L., & Tani, M. (2024). Exploring food delivery app adoption: Corporate social responsibility and perceived product risk's influence. *Corporate Social Responsibility and Environmental Management*, 1–12. https://doi.org/10.1002/csr.3041