



WHAT REALLY MATTERS? FACTORS INFLUENCING PERCEIVED VALUE ON FOOD DELIVERY APPLICATIONS

O QUE REALMENTE IMPORTA? FATORES QUE INFLUENCIAM O VALOR PERCEBIDO DE APLICATIVOS DE ENTREGA DE COMIDA

¿LO QUE REALMENTE IMPORTA? FACTORES QUE INFLUYEN EN EL VALOR PERCIBIDO EN LAS APLICACIONES DE ENTREGA DE ALIMENTOS

ABSTRACT

Purpose – This article intends to analyze the user's perceived value of food delivery applications (FDAs). The study aims to investigate the dimensions of convenience, usability, trustworthiness, price, and various food choices on user-perceived value in the context of food delivery applications so that the industry can adopt scientifically-founded strategies to increase its reach.

Design/methodology – A survey was conducted with a sample of 348 users of food delivery applications. A Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis was implemented to analyze the dimensions influencing the user's perceived value.

Findings – The results suggested that convenience, trustworthiness, and price positively correlate with the perceived value of food delivery apps. Moreover, it highlights the price dimension by showing a counterintuitive result compared with previous literature.

Research limitations - The characteristics of the sample of participants and the cross-sectional data collection period are limitations of the study. The study focused on the perceived value dimension and did not cover relations with other dimensions of technology's use.

Practical implications – Identifying factors that influence the users' perceived value is essential to developing marketing strategies and expanding technology adoption. Companies may consider it to establish prices, digital marketing content, and sales. Also, the results support product designers' and user experience (UX) researchers' decision-making when prototyping FDAs.

Originality - The study contributes to conceptualizing the perceived value of FDAs, increasing knowledge of the true nature of consumers' perceived value in an emerging market context. Moreover, this study covers the theories developed about the use of m-commerce, extending it as a part of consumer behavior and service marketing.

Keywords: User-perceived value. Food delivery applications. M-commerce. Mobile. Technology use.

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RESUMO

Objetivo – Este artigo pretende analisar o valor percebido pelo usuário dos aplicativos de delivery de comida (ADCs). O estudo objetiva investigar as dimensões de conveniência, usabilidade, confiabilidade, preço e diversas escolhas alimentares no valor percebido pelo usuário no contexto de aplicativos de entrega de alimentos para que a indústria possa adotar estratégias com base científica para aumentar seu alcance.

Desenho/metodologia – Foi realizada uma *survey* com uma amostra de 348 usuários de aplicativos de *delivery* de comida. Uma análise PLS-SEM foi implementada para analisar as dimensões que influenciam o valor percebido do usuário.

Resultados – Os resultados sugeriram que conveniência, confiabilidade e preço se correlacionam positivamente com o valor percebido dos aplicativos de delivery de comida. Além disso, destaca a dimensão do preço, mostrando um resultado contraintuitivo em comparação com a literatura anterior.

Limitações da pesquisa - As características da amostra dos participantes e o período de coleta transversal dos dados são limitações do estudo. O trabalho teve enfoque no estudo da dimensão de percepção de valor, não abrangendo relações com outras dimensões do uso de tecnologia.

Implicações práticas – Identificar os fatores que influenciam o valor percebido pelos usuários é essencial para desenvolver estratégias de marketing e expandir a adoção de tecnologia. As empresas podem considerá-lo para estabelecer preços, conteúdo de marketing digital e vendas. Ainda, os resultados apoiam a tomada de decisão dos *designers* de produto e pesquisadores de experiência do usuário (UX) ao criar protótipos de ADCs.

Originalidade - O estudo contribui para conceituar o valor percebido dos ADCs, aumentando o conhecimento da verdadeira natureza do valor percebido pelos consumidores num contexto de mercado emergente. Além disso, este estudo abrange as teorias desenvolvidas sobre o uso do m-commerce,

ampliando-o como parte do comportamento do consumidor e do marketing de serviços.

Palavras-chave: Valor percebido pelo usuário. Aplicativos de *delivery* de comida. M-commerce, Mobile. Uso de tecnologia.

RESUMEN

Objetivo: este artículo tiene como objetivo analizar el valor percibido por el usuario de las aplicaciones de entrega de alimentos (AEAs). El estudio tiene como objetivo investigar las dimensiones de conveniencia, usabilidad, confiabilidad, precio y diversas opciones de alimentos en el valor percibido por el usuario en el contexto de las aplicaciones de entrega de alimentos para que la industria pueda adoptar estrategias científicamente fundadas para aumentar su alcance.

Diseño/metodología – Se realizó una encuesta con una muestra de 348 usuarios de aplicaciones de entrega de alimentos. Se implementó un análisis PLS-SEM para analizar las dimensiones que influyen en el valor percibido por el usuario.

Resultados: Los resultados sugirieron que la conveniencia, la confiabilidad y el precio se correlacionan positivamente con el valor percibido de las aplicaciones de entrega de alimentos. Además, resalta la dimensión del precio al mostrar un resultado contrario a la intuición en comparación con la literatura anterior.

Limitaciones de la investigación: Las características de la muestra de participantes y el período transversal de recogida de datos son limitaciones del estudio. El estudio se centró en la dimensión del valor percibido y no abarcó las relaciones con otras dimensiones del uso de la tecnología.

Implicaciones prácticas: identificar los factores que influyen en el valor percibido por los usuarios es esencial para desarrollar estrategias de marketing y ampliar la adopción de tecnología. Las empresas pueden considerarlo para establecer precios, contenidos de marketing digital y ventas. Además, los resultados respaldan la toma de decisiones de los diseñadores de productos y de los investigadores de experiencia del usuario (UX) al crear prototipos de FDA.

Originalidad: el estudio contribuye a conceptua-



lizar el valor percibido de los FDA, aumentando el conocimiento de la verdadera naturaleza del valor percibido por los consumidores en un contexto de mercado emergente. Además, este estudio cubre las teorías desarrolladas sobre el uso del comercio móvil, extendiéndolo como parte del comportamiento del consumidor y del marketing de servicios.

Palabras clave: Valor percibido por el usuario. Aplicaciones de comida a domicilio. M-commerce. Mobile. Uso de la tecnología.

INTRODUCTION

Smart devices are increasingly used in modern society. Mobile apps have become a part of daily life, offering help in decision-making (Verma, 2020). The infinity of smartphone application options has attracted people to explore the online market (Natesan & Venkatesalu, 2020). Today almost everything can be purchased through an app: from hotel reservations to ordering food, or even buying a house or car. Food delivery platforms are popular in many parts of the world, and this market is undergoing drastic channel changes. It grows in line with the adoption of smartphones and consumers seeing technology as a suitable means of doing business (Hirschberg et al., 2016).

With the COVID-19 pandemic, digital platforms have gained even more popularity (Zhao & Bacao, 2020; Nguyen et al., 2023). They influence consumers' buying mindsets by delivering marketing messages emphasizing online ordering benefits. Therefore, food delivery app (FDA) providers pass on precautionary procedures to protect the consumer involved in the delivery. Thus, messages were addressed in a way that appealed to protecting family and friends, helping local businesses, saving time, and practicing social distancing (Cai & Leung, 2020).

Delivery platforms are good options as a sale channel. They reduce the value of the delivery fee and have provided other benefits to restaurants since the pandemic. They can be used by restaurants with low budgets as a highly efficient sales and marketing tool (Lee et al., 2019). A study shows that, compared to 2020, Brazilian mobile purchases increased from 26% to 30% in

2021. Globally, mobile purchases increased from 30% in 2020 to 33% in 2021. The priorities for online shopping for Brazilians are fast and reliable delivery, especially for food purchases. New generations tend to buy more online, and one of the items they intend to spend more on is take-out food (PWC, 2021).

The economic activity that has the most active companies in Brazil is the food industry (RFB, 2022). This scenario demonstrates how food supply and production have been outsourced. The concentration of the population in cities, the digitalization of companies caused by the COVID-19 pandemic, and the new consumption habits led to an increase in demand for food delivery app services. Part of this growth can be determined by how users perceive the value of food delivery apps since it is a driver of marketing strategies and operations in the segment (Schneider et al., 2018). Consumer perception of value has been studied for years by marketing scholars, with different methodological and conceptualisation approaches (Zeithaml et al., 2020). In this research, the approach is positivist, and the construct of the perceived value phenomenon is unidimensional, which can be influenced or produced by multiple antecedents.

This article intends to analyze the users' perceived value of food delivery applications (FDAs). The study aims to investigate the dimensions of convenience, usability, trustworthiness, price, and various food choices on user-perceived value in the context of food delivery applications so that the industry can adopt scientifically-founded strategies to increase its reach. Moreover, the research characterized the value perceived and measured factors that influence user perception through a quantitative study using a survey. Previous studies investigated that attributes can be more significantly perceived according to different groups of people (Cho et al., 2019), as well as explored the role of perceived value and service recovery in consumers' continuous intention to use FDAs (Aslam et al., 2021).

The relevance of the study lies in its approach to a contemporary issue of people's eating habits in cities. Habits that can be driven by events such as the pandemic, remote working, traffic difficulties, or the breadth of service offered



by restaurants and apps to win over consumers, consequently leading them to perceive value. The study tests the antecedents of value perception in other samples, to contribute to the validity of research in the field and further reflections on the use of technology, marketing and habits in cities.

The results showed that convenience, price, and trustworthiness positively correlate with the perceived value of food delivery apps. However, it also shows a counterintuitive result in comparison with previous findings posited by Cho et al. (2019) regarding the price dimension. This research is helpful since defining priorities among the dimensions that influence the users' perceived value of FDAs is valuable to developing marketing strategies, pricing, digital content marketing, branding, and sales. It also contributes to theory by increasing knowledge regarding the use of m-commerce, considering user perception and value as drivers of m-commerce adoption.

This paper is divided into the introduction section, followed by a literature review, the material and methods section, as well as the results and discussion topic, and conclusions.

LITERATURE REVIEW

M-commerce

Mobile commerce (m-commerce) has been a frequent topic in theoretical studies in the last decade, following the pace of consumer adherence to mobile application use (Cho et al., 2019). Some key factors contribute to the growth of this market, such as usability, trustworthiness, and convenience of using applications.

The concepts of m-commerce are similar to those of e-commerce (Schneider et al., 2018), and the business-to-consumer (B2C) business model is one of the most popular m-commerce models. According to Liébana-Cabanillas et al. (2017), m-commerce emerges as a form of consumer liberation, as they do not need to be in a physical store environment at the time of purchase or in front of large equipment to carry out purchases. Several factors contribute to the growth of this market, such as usability, reliability, and convenience of using applications (Schneider & Tezza, 2021).

With the growth in internet use in recent years, consumers tend to prefer online commerce platforms as a channel for the advantages of choosing and buying from the comfort of their homes (Yeo et al., 2017). Types of m-commerce services expanding in Brazil include digital banks, digital brokerages, mobility, delivery, marketplaces, supermarkets, music streaming, edutech, health tech, and digital real estate (IBEST, 2022).

Previous studies on mobile platforms focus on specific dimensions such as usability and design (Nielsen & Budiu, 2013), user preferences and perception (Borba & Tezza, 2021), and the use of applications for services (Hur et al., 2017).

This study focuses on user perception, which consists of concepts inherited from the Technology Acceptance Model (TAM) theory, elaborated by Davis (1985), in which the authors argue that design characteristics of systems influence perceived usefulness and perceived ease of use, and these influence attitude towards use; and the Planned Behavior Theory (PBT), developed in the field of psychology by Ajzen (1991), which theorizes an individual's behavior based on variables such as attitude towards behavior, subjective norms (SN) and perceived behavioral control (PBC). Both TAM and PBT provide key concepts for current studies of the use of technologies. External factors, for example, present in TAM, are classified as antecedents of perceived value, and subjective norms present in TPB, as well as perceived value, depending on the context, influence perceived usefulness (Schneider & Tezza, 2021).

Food delivery app and user value perception

The expansion of the food industry favors the environment around delivery services. Four forms of food service stand out in this industry: delivery, take-out or drive-thru, grab-and-go, and catering (Galante, 2021). Thus, restaurants seek help from their suppliers to bring more innovation and increase sales, facilitate the operation of the business (ANR, 2021).

In this context, perceived value is a factor that can interfere with consumer purchase decisions, use or purchase intention (Yan et al., 2021), technology adoption (Hsu & Lin, 2018), consu-



mer satisfaction (Khasawneh & Haddad, 2020), online e-commerce reputation (Li et al., 2020), continuous use intention (Lin et al., 2018), and impulsive buying behavior (Yang et al., 2021).

Hedonic and utilitarian values are usually found together when investigating the online consumer's perceived value (Yang et al., 2021). They can be combined with other values as extrinsic or intrinsic values (Zhang et al., 2017). Monetary and convenience values are used to measure value perception (Khasawneh & Haddad, 2020). Performance expectation and risk perception are elements that influence value perception. Value perception, in turn, influences the intention to use mobile financial services (Yan et al., 2021).

Hedonic values caused by customer-to-customer (C2C) and business-to-customer (B2B) social network interactions tend to positively influence e-commerce reputation (Li et al., 2020). Restaurant self-service technologies can leverage consumers' perceived values and positive emotional responses through customization and functionality (Ahn & Seo, 2018). Also, omnichannel shopping experiences can affect the consumer's perceived value and the intention to use or purchase (Chen & Chi, 2021).

Consumers' perceived value in user-centered design has recently gained attention from UX researchers. This work adopts the view that customer perceived value is a unidimensional construct, and results from an evaluation of the benefits and sacrifices associated with a product or service (Zeithaml et al., 2020). Value perception can contribute to predicting purchase behavior and offers competitive advantages to application software providers. Convenience, design, trustworthiness, price, and various food choices help explain perceived value, attitude, and intention to continuously use food apps. Moreover, some attributes can be more significantly perceived according to different groups of people (Cho et al., 2019; Cho et al., 2020).

The literature on value perception regarding food delivery app usability shows differences in classifying the elements influencing such perception, and many authors define the dimensions based on service quality (Azizul et al., 2019; Aslam et al., 2021; Cho et al., 2019). This research is based on the conceptual model developed by

Cho et al. (2019). The model was adapted by replacing the dimension "design" with "usability", because the items in this dimension were based on user comments on online store sites and ReclameAqui®, encompassing usability concepts as well as design concepts. Also, disregarding the dimensions "attitude" and "intention to continue using", as well as the moderating variable of whether the respondents were from single-person households. In this sense, the research focused on the antecedents of perceived value of food delivery apps.

Previous research has considered convenience as a) an element that influences the users' perceived value and purchase intention; b) a component of perceived value to measure intention to use m-banking (Ahn & Lee, 2019); and c) a benefit to measure perceived value, attitude, and intention of continuous use of m-payment (Lin et al., 2018). Convenience has presented a positive relationship with the perceived value of food delivery apps in the studies by Cho et al. (2019), Azizul et al. (2019), and Aslan et al. (2021). Therefore, we believe that:

H1. The perceived convenience of the food delivery app has a positive relationship with the user's perceived value.

Usability is highlighted as a dimension for measuring perceived value. Studies observed that the perception of website quality and ease of use could be considered advantages for online shopping, influencing the consumer's perceived value (Katta & Patro, 2020). Thus, our second hypothesis is:

H2. The perceived usability of the food delivery app has a positive relationship with the user's perceived value.

Trustworthiness also showed a positive relationship with the perceived value of food delivery apps in previous studies (Cho et al., 2019; Aslam et al., 2021). Also, the literature suggests that trust affects the perceived value and use intention of mobile applications (Wang, 2016) and



significantly influences the perceived value of online shopping (Zhang et al., 2013). Therefore, hypothesis three is:

H3. The perceived trustworthiness of the food delivery app has a positive relationship with the user's perceived value.

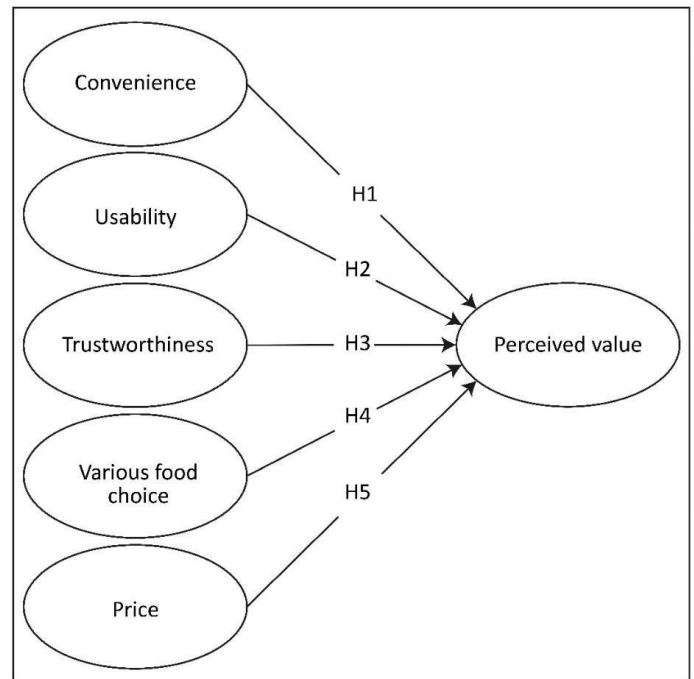
Variety food choices is an element that showed a positive relationship with the user's perceived value of food delivery apps (Cho et al., 2019; Aslan et al., 2021). The research by Kulviwat et al. (2006) suggests a relationship between the variety of choices in online shopping and online purchase intention. Christodoulides and Michaelidou (2010) observed that search variety was an antecedent factor of e-satisfaction and e-loyalty. Thus, the fourth hypothesis is:

H4. The perceived variety of choices of the food delivery app has a positive relationship with the user's perceived value.

Cho et al. (2019) found that price was not significant for the user's perceived value of a food delivery app. However, other studies observed a positive relationship (Azizul et al., 2019; Aslam et al., 2021). As the competitive price is seen as a benefit, it may positively impact the perceived value of the websites of foreign sellers (Huang & Chang, 2019). However, fees perceived at the time of purchase can represent a sacrifice for the consumer and tend to be a negative aspect in perceived value and people's intention to use IoT services (Hsu & Lin, 2018). Considering it, we believe that:

H5. The perceived price of the food delivery app has a positive relationship with the user's perceived value.

Figure 1
Structural research model and hypotheses



Source: elaborated by the authors (2022).

MATERIALS AND METHODS

Data Collection And Sampling

Data were collected between March and May 2022 from 348 food delivery app users residing predominantly in southern Brazil. Before starting data collection, the survey was evaluated by two specialists in administration and marketing, generating adjustments in the instrument. Finally, three pre-test interviews were conducted with food app users to improve the instrument.

The survey was applied online using SurveyMonkey, disseminated on social media, and sent by email. Data were coded in MS Excel and analyzed in R software.

Socio-Demographic Characteristics And Food Delivery App Usage Information

Socio-demographic information provided by respondents indicated they were mostly single (57%) females (58%), and between 25–29 years old (31%). When examining characteristics of food application usage behavior, most respondents use the Android operating system (58%) and place one to three orders per month (42%).

**Table 1**

Socio-demographic profile and behavioral characteristics of FDA users

Socio-demographic	N	%	User-behavior	N	%
<i>Gender</i>			<i>Operating system</i>		
Male	144	41.4	Android	202	57.8
Female	203	58.3	iOS/Apple	146	42.2
Not stated	1	0.3	Order Frequency		
<i>Age group</i>			More than 3x per week	27	7.8
18 – 19	21	6.3	Between 1 and 3x per week	127	36.5
20 – 24	48	13.8	Between 1 and 3x per month	145	42.0
25 – 29	109	31.0	Specific dates in the year	49	13.8
30 – 34	69	19.8	Household size		
35 – 39	40	11.5	Live alone	70	20.1
40 – 44	30	8.6	Live with at least one other person	278	79.9
45 – 49	7	2.0			
50 – 54	9	2.6			
Over 55	15	4.3			
<i>Marital status</i>					
Married	79	22.4			
Stable union	54	15.5			
Single	199	57.5			
Widowed	1	0.3			
Separated	4	1.1			
Divorced	11	3.2			

Source: Elaborated by the authors (2022).

Measures

The survey items were composed based on the previous surveys from Cho et al. (2019), Bevan et al. (2015), and Zanquet et al. (2024). The instrument measures six conceptual dimensions: convenience, usability, trustworthiness, price, various food choices, and perceived value of a food delivery application. Twenty-four items were part of the instrument, each assessed through a 5-point Likert scale, ranging from totally disagree to totally agree. Six other items were designed to describe the respondents' profiles.

Therefore, the instrument had 30 items. The total sample was 348 responses, with an effect size of 0.801 (large effect according to Cohen, 1992). The analyses were performed in the R software. 190 of the cases were randomly selected for exploratory factor analysis (EFA) via polychoric correlation matrix by the package "psych" (Revelle, 2022), and 158 were randomly selected for partial least squares structural equation modeling (PLS-SEM), by the package "plspm" (Sanchez

et al., 2015).

RESULTS AND DISCUSSION

Measurement Validity And Reliability

The exploratory factor analysis (EFA) was adopted to characterize the users' perceived value of food delivery applications. The first round was carried out with the orthogonal rotation (Varimax). Five items had a low factor loading and were removed from the study.

The item "It did not take too long for me to learn how to use the food delivery app" was not related to the dimensions of the study. It was an item proposed considering the usability dimension, suggesting that learning is not hindering the app's usability. Perhaps because of the application's popularity, the steps when using it are well-known and not very complex compared to a B2B software. On the other hand, the perception regarding usability concerns the apps' functionalities, not the customer's path to purchase.

The remaining items removed in this round had been selected to represent trustworthiness. The item "I feel that I am influenced by the notifications or messages presented by the food app," had a low load, as it may have a closer relationship with the provider's social image than with trustworthiness. The item "Restaurant reviews presented within the food application influence my trust in the application" does not seem to show an effect on trustworthiness, as the providers, in part, seek to increase the partner restaurants' permanence announcing in the app. This dynamic indicates that well-evaluated restaurants have priority in the providers' marketplace. Items "I trust the delivery time information the food app stipulates" and "If there is a problem with the order, I am sure I can get a refund from the food app" are items that could be restructured in the risk perception dimension, and not directly in the trustworthiness dimension.

The EFA's second round was also performed in the R software and led to the final model. Polychoric correlations were used to start the data measurement process. Based on the correlation matrix, the output of the parallel analysis was rendered, and the presence of the six dimensions in the dataset was indicated through factor analysis.



The Varimax was subsequently applied as a procedure for generating the factors. In the analyses, factor loadings greater than 0.30 meet the minimum level for interpreting an exploratory structure and were considered, resulting in clusters of six dimensions that explain 53% of the variance. Table 2 presents the results of the variable-factor associations with their respective factor loadings of the remaining 19 items.

Table 2
Variable-factor association

Item	Dimension	Standardized factor loading	Cronbach's α
<i>Convenience</i>			0.57
1	The food delivery app I use seems convenient to me	0.63	
2	The food delivery app I use allows me to place orders at any time	0.66	
3	The food delivery app I use allows me to order anywhere	0.53	
4	The payment methods available in the food app I use are convenient for me	0.52	
<i>Trustworthiness</i>			0.49
5	The images advertised in the food app I use convey credibility	0.61	
6	The products provided in the food app I use are priced right for me	0.61	
<i>Usability</i>			0.66
7	The structure of the food delivery app I use is logical and easy to follow	0.73	
8	It takes several clicks to complete the order in the food app I use	0.46	
9	I can easily change choice options (e.g., restaurants, items, and payment) within the food app I use	0.64	
10	The filters in the food app I use work properly	0.46	
11	The design (organization and colors) of the food app I use conveys credibility	0.49	
<i>Price</i>			0.46
12	Promotional combo offers are an attractive feature for me when using the food delivery app	0.40	
13	When using the food app, I prioritize shopping at restaurants that provide coupons and free delivery	0.98	
<i>Perceived value</i>			0.59
14	I usually recommend the food app I use to people close to me.	0.47	
15	I feel that it is easier to purchase using the food app compared to buying in a physical store	0.54	
16	I feel that the food app I use offers multiple benefits that imply my preference for making the purchase	0.82	
<i>Various food choices</i>			0.78
17	The food delivery app I use offers a variety of options to choose from.	0.85	
18	The food delivery app I use offers a variety of food types to choose from.	0.88	
19	There are many pricing options through the food app I use	0.56	

Source: Elaborated by the authors (2022).

When analyzing Cronbach's Alpha, factors 01 and 02 showed substantial internal consistency, and factors 03, 04, 05, and 06 were moderate. Studies on the value perception of food delivery apps show the tendency for conceptual models to be composed of multidimensions (Aslam et al., 2021), and our results follow the same trend.

Factor 01 results from clustering variables that measure usability. According to Rubin and Chisnell (2008), the items reflect usability because users can do what they want in the way they expect without obstacles, hesitation, and questioning. Market professionals need to pay attention to the different technical factors for creating an app, as it can impact its usability. Items 07, 08, 09, 10, and 11 cover assessments of technical elements of the device, mainly concerning user interaction with the screen sensor, filter, and alignment of user interface blocks.

Factor 2 is the result of clustering items to measure the perception of variety offered by the food delivery app. Online suppliers offer consumers many choices when purchasing products and services. Electronic agents are triggered by passing recommendations to consumers (Wirtz et al., 2021).

In the technology environment, startups develop an astonishing variety of services (Wirtz et al., 2021), and mobile devices are endowed with various functions (Cho et al., 2020). As a result, the following items are part of the various food choices dimension: Item 17) "The food delivery application I use offers a variety of options to choose from"; Item 18) "The food delivery app I use offers a variety of food types to choose from"; and Item 19) "There are many pricing options through the food app I use."

Factor 3 receives the cluster of variables to measure the perception of the price offered by food delivery apps. From the seller's perspective, pricing can be structured by list price, discounts, allowances, payment period, and credit terms (Kotler, 2021). In this sense, the selected items seek to measure the consumer's positive perception of the price, as discounts are common in food delivery applications. Thus, potential items for the price dimension are: Item 12) "The promotional combo offers are an attractive feature for me when using the food delivery app"; and



Item 13) "When using the food app, I prioritize shopping at restaurants that provide coupons and free delivery."

Factor 04, on the other hand, represents the cluster of the perceived value items of food delivery applications. Perceived value can be explained in a single dimension as a result of evaluating the benefits and sacrifices associated with purchasing a product or service (Zeithaml et al., 2020). From this perspective, the potential items for perceived value are Item 14) "I usually recommend the food app I use to people close to me."; Item 15) "I feel that it is easier to purchase using the food app compared to buying in a physical store"; and Item 16) "I feel that the food app I use offers multiple benefits that imply my preference for making the purchase."

Factor 05 addresses the trustworthiness dimension of food delivery applications. Through the trustworthiness of the website/application, the supplier can reassure the consumer. Thus, the consumer comes to believe in the supplier's capacity, benevolence, and integrity (Fisher & Chu, 2009). The following items are added to the trustworthiness dimension: Item 5) "The images advertised in the food app I use convey credibility" and Item 6) "The products provided in the food app I use are priced right for me."

The credibility of images and fair prices reduce the consumers' worries. Therefore, the items reflect the user's belief in the ability, benevolence, and integrity of the service provider. Factor 06 covers the perceived convenience of food delivery apps, i.e., convenience represents the guarantee of access and use of the application at any time and place (Cho et al., 2019).

Also, the potential items for the convenience dimension are: Item 01) "The food delivery app I use seems convenient to me"; Item 02) "The food delivery app I use allows me to place orders at any time"; Item 03) "The food delivery app I use allows me to place orders anywhere"; and Item 04) "The payment methods available in the food app I use are convenient for me."

Researchers consider the dimensions of convenience, design, trustworthiness, price, and various food choices as antecedents of perceived value. These five dimensions showed a positive relationship with the perceived value of food de-

livery apps in the research by Azizul et al. (2019) and Aslam et al. (2021). The study by Cho et al. (2019) did not show a positive relationship for the price dimension.

The results of the exploratory factor analysis obtained in this study suggest maintaining the six dimensions: convenience, usability, trustworthiness, price, various food choices, and perceived value. The dimension "design" used in previous studies was replaced with "usability," as the items in this dimension were based on user comments on online stores and the Reclame Aqui website, encompassing usability concepts.

Research Model Measurement

Subsequently, the analysis of partial least squares structural equation modeling (PLS-SEM) was used to measure the relationships between the dimensions and test the hypotheses. The reflective measurement model estimated by the PLS-SEM is evaluated using criteria of reliability and validity.

After testing the indicator's reliability, items 03 and 07 were removed, as they had a low load. The other indicators listed in Table 3 were maintained due to their high load (above 0.50). These are significant loads (at the 95% significance level). The reliability of internal consistency checks the extent to which indicators that measure the same dimension are associated. From the result of the calculation of the ρ_c statistic, the internal consistency reliability is considered from "satisfactory to good," as the values are between 0.70 and 0.90.

Table 3

Composite reliability ρ_{hc}

Dimension	RhoC
Convenience	0.784
Usability	0.800
Various food choices	0.884
Trustworthiness	0.775
Price	0.787
Perceived value	0.768

Source: Elaborated by the authors (2022).

Convergent validity is the extent to which the dimension converges to explain the variance of its items. The average variance extracted (AVE)



was used to evaluate the dimension's convergent validity for all indicators of each dimension. AVE is equivalent to the dimension commonality. The minimum acceptable AVE is 0.50, and values equal to or above indicate that the dimension explains 50% or more of the variance of the indicators that make up the dimension. Table 4 shows the results of the AVE statistics.

Table 4

Average variance extracted (AVE)

Dimension	AVE
Convenience	0.549
Usability	0.501
Various food choices	0.719
Trustworthiness	0.633
Price	0.649
Perceived value	0.529

Source: Elaborated by the authors (2022).

The AVE of the various food choices dimension was higher, demonstrating that it is a cluster of items with high explanatory capacity. By the R^2 statistic, the independent dimensions explain 0.225 of the perceived value (the dependent dimension).

Structural model assessment

After evaluating the validity and reliability of the measurement model, the study observed the significance of the relationships in the structural model. Figure 2 shows the path model indicating the results of this study. The ellipses represent the dimensions of convenience, usability, trustworthiness, price, various food choices, and the dependent endogenous construct perceived value. Items are represented in rectangles. The relationships between dimensions and their items are shown by arrows (paths).

Table 5 presents the results of the hypotheses and dimensions that directly influence the users' perceived value. The results show that the perceived value of food delivery app users is influenced by convenience ($\beta = 0.18$; $p < 0.05$), trustworthiness ($\beta = 0.19$; $p < 0.05$), and price ($\beta = 0.23$; $p < 0.05$), thus, hypotheses H1, H3, and H5 are supported. In particular, the price dimension has a greater influence on perceived value

than trustworthiness and convenience.

Table 5

Structural model estimation

Hypothesis	Total effect	Estimate	Std. error	t-stat.	p-value	Result
H1	PV ~ Conv	0.177	0.087	2.035	0.042	Supported
H2	PV ~ Usab	0.045	0.098	0.460	0.646	Not supported
H3	PV ~ Trust	0.185	0.087	2.128	0.033	Supported
H4	PV ~ Vari	0.117	0.086	1.361	0.174	Not supported
H5	PV ~ Prec	0.231	0.073	3.174	0.002	Supported

Source: Elaborated by the authors (2022).

These findings diverge from the previous studies that sought to measure perceived value since three dimensions presented a significant relationship with perceived value: price, trustworthiness, and convenience. Cho et al. (2019) developed their research in China and found no significant relationship between price and value perception. The studies by Azizul et al. (2019) in Malaysia and Aslam et al. (2021) in Pakistan observed a significant relationship for five dimensions, suggesting the importance of the context.

In this study, usability ($\beta = 0.05$; $p > 0.05$) and various food choices ($\beta = 0.12$; $p > 0.05$) were not significant, so hypotheses H2 and H4 were not supported. The respondents demonstrated to give more importance to the perception of utilitarian values than hedonic values. On the other hand, in the studies by Azizul et al. (2019) and Aslam et al. (2021), both values have a positive influence. This difference regarding the price perception may be explained, among other factors, such as the Brazilian inflation, amplified by the pandemic.

Also, the low influence of the usability and various food choice dimensions in value perception among Brazilians may be a result of the reduced number of food app options and an outcome of the consumers' lack of familiarity with mobile resources. According to Kielling et al. (2023), although companies and customers have shown increasing knowledge about mobile solutions, there is still room for development. Given the circumstances, it is reasonable to consider that Brazilian consumers tend to conceptualize value from the perspective of price and utilitarianism. In addition, limitations to making usability com-



parisons with other applications may explain the low perception of hedonic values, since in Brazil only one application has market hegemony.

However, perception of trustworthiness was discriminating for the study sample. The application provider seems to meet consumers' expectations regarding the credibility of the service and setting an adequate price, raising the perceived value of the FDA.

There is consensus in the studies about convenience as a dimension that influences the perceived value of food delivery applications. This may be one factor that explains the users' adherence to only one or two delivery apps; it is possible that users feel irritated when downloading many applications because their systems do not satisfy their needs. Convenience therefore affects dominance in the use of FDAs, i.e. convenience enables users to feel free to act or be in control when using them (Handayani et al., 2022). Regarding convenience, it can be observed that the waiting time for delivery is shorter when demand and supply are high (Pourrahmani et al., 2023). The perception of convenience of the study sample may also be linked to the perceived adequacy of FDA supply in the region.

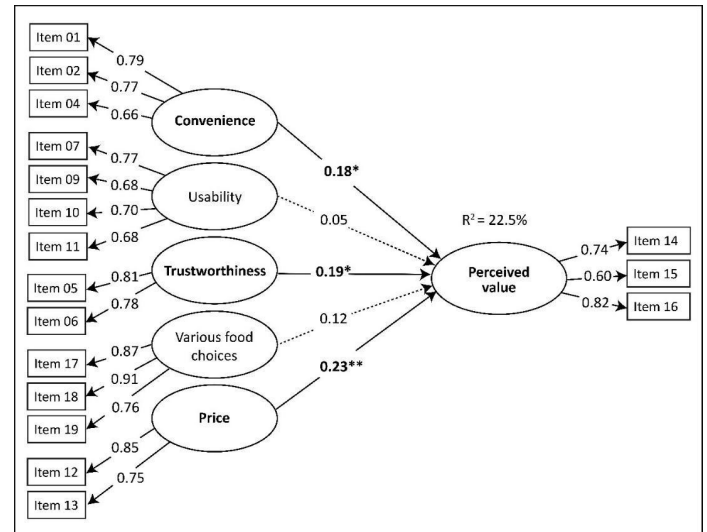
In this sense, the price dimension seems to be an attractive resource for reducing the hegemony of applications. However, providers usually express difficulties in offering their services competitively due to high costs and operational complexity. In the research, the price was presented with more discriminating results. The flexible way in which prices are presented in applications can make it possible for them to be perceived more highly; users have the possibility of controlling their orders based on consideration of the total price, such as adding, subtracting or confirming orders (Handayani et al., 2022).

The results suggested that the variety of restaurants displayed in delivery food applications has little influence on the value perception of food delivery. This finding may also be explained by market hegemony, which reduces and controls the number of partner restaurants per segment, as it occurs in models of restaurant franchising. Delivery service providers have a close relationship with restaurant franchises, hindering the visibility of competing restaurants. Also,

the advertising of food delivery apps tends to display standard products, which stimulates the reduction in the variety of restaurants offered. Also, there is an effort by delivery apps to change this perception, since the availability of healthy food options is a determining factor for food choice on FDAs (Osaili et al., 2023). The price stood out among the other dimensions when considering utilitarian values. Figure 2 shows the dimensions.

Figure 2

Path Model



Source: Elaborated by the authors (2022).

Thus, this study suggests that the five independent dimensions explain 22.5% of the dependent dimension perceived value of food delivery apps. The results are exploratory, and there is still room for future studies about the relationship between these dimensions. It was observed that the convenience, price, and trustworthiness dimensions influence the perceived value of food delivery apps. Moreover, hypotheses H1, H3, and H5 were supported, whereas H2 and H4 were not supported.

CONCLUSIONS

Our findings empirically support the importance of mobile applications in the lives of Brazilian consumers, specifically in the context of food delivery. The analysis of the users' perceived value of food delivery apps emphasized convenience, trustworthiness, and price as dimensions that significantly influence value perception.

The analysis contributes to conceptuali-



zing the perceived value of FDAs. This is a growing field of study, and it is necessary to report the theoretical and practical contributions and recommendations for future research. The research increases knowledge of the true nature of consumers' perceived value of food delivery apps in the context of Brazil in comparison to global studies. The study analyzed perceived value as a unidimensional construct and tested its relationship with antecedent dimensions of application attributes. In the Brazilian context, further research could be carried out based on other antecedents, complementing this study and others in the field such as Silva et al. (2024), which tests credibility as an antecedent factor of perceived value. And as we learn more from each piece of research, we will be able to gain a better understanding of the contemporary phenomenon of using food delivery apps.

As management implications, defining priorities among the dimensions that influence the users' perceived value of food delivery applications is an important element in developing marketing strategies. Companies may choose to offer a product with a high perception of trustworthiness and moderate usability depending on the goal they want to achieve and the degree to which the user perceives value in a given dimension. Also, companies may consider it to establish prices, content development for digital marketing, brand development, and sales.

The perceived value is decisive in the production destination and technology adoption. Software engineering technology trends often stem from business and market scenarios, influencing the research direction and technology. The dimensions of value perception are sources of information for professionals such as product designers or UX researchers to make decisions when prototyping food delivery apps.

The characteristics of the sample and the cross-sectional data collection period are limitations of the study. The study focused on the perceived value dimension and did not cover relations with other dimensions of technology use. Also, the study explores the consumer's viewpoint, disregarding the views of other actors in the application delivery service network, such as application providers, employees, and restau-

rant managers.

Future studies should investigate the value perception of characteristics of products and services typically offered in the app marketplace. Also, studies may observe the perceived value of food delivery apps by conducting complementary qualitative research to identify other concepts that fit the perceived value of FDAs.

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