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Research paper

Effects of the COVID-19 pandemic on the perception of on-demand delivery by the younger generation: An exploratory analysis for Brazil

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ABSTRACT

This paper analyses the effects of the COVID-19 pandemic on the perception of young generation (from 19 to 39 years old) about on-demand delivery services. An exploratory analysis was performed using data from a social media questionnaire and estimating a structural equation model. The findings showed that the perception of on-demand services and on-demand deliveries influenced on-demand purchases before and during the COVID-19 pandemic. Furthermore, the consumer profile influenced on-demand purchases before the COVID-19 pandemic. The practicality of buying and receiving products at home is the main motivation of the young generation regarding the use of on-demand delivery services before and during the COVID-19 pandemic. The findings showed the importance of extending this exploratory analysis to other age groups in the post-pandemic time due to the increase in on-demand deliveries and the related impacts of this delivery service.

1. Introduction

The digital market has changed how transactions and deliveries have been made in the last decade. For a long time, Business-to-Consumer (B2C), i.e., business selling to the consumer, has been the traditional way to offer products and services in the digital world. However, peer-to-peer (P2P) services have increased in the last decade, including on-demand deliveries. P2P connects customers and providers through a digital platform (Taylor, 2018), offering on-demand services in a minimum time. Typical examples of on-demand services are online marketplaces that provide instant deliveries (Dablanc et al., 2017; Taylor, 2018) or ride-sharing systems (Masoud et al., 2017). In terms of urban freight transport, on-demand orders generally require fast delivery. Therefore, analysing the consumer behaviour for this service is central to identifying sustainable strategies for this online market and shedding light on how to manage the service to integrate it into the urban mobility system.

During the COVID-19 pandemic, e-commerce deliveries have increased and reshaped (Bhatti et al., 2020; Oliveira et al., 2022; Villa and Monzón, 2021), becoming essential for many people (Figliozzi and Unnikrishnan, 2021). Similarly, on-demand delivery has increased during the COVID-19 pandemic, mainly food delivery (Ali et al., 2021; Gavilan et al., 2021; Han et al., 2021; Zanetta et al., 2021). For example, the main Brazilian food delivery app (iFood) received approximately 48 million orders in December 2020, increasing 86% compared to December 2019 (Statista, 2022a). Furthermore, some players increased the variety of products offered on platforms, such as groceries and essential commodities in Latin America during the COVID-19 pandemic (Statista, 2022b).

However, the literature on on-demand delivery services is limited (Frenken and Schor, 2017; Han et al., 2021) and is most scarce when focussing on the impact of the COVID-19 pandemic. Most of the literature on on-demand delivery services focusses on the app-based characteristics (Cho, Bonn and Li, 2019; Parwez, 2022), working conditions (Aguilera, Dablanc, & Rallet, 2018, 2022; Dablanc et al., 2017; Parwez, 2022; Puram et al., 2022; Smith et al., 2021), consumer behaviour (Gavilan et al., 2021; Han et al., 2021), consumer experience (Gavilan et al., 2021), customer satisfaction (Han et al., 2021; Suhartanto et al., 2019; Wang, Somogyi, and Charlebois, 2020), the economic performance of on-demand food delivery (Seghezzi and Mangiaracina, 2021), and environmental impacts (Siragusa and Tumino, 2021). Furthermore, most of the studies focused on on-demand food deliveries. However,

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according to Han et al. (2021), the literature does not understand the motivation of consumers to use on-demand delivery services. On the other hand, on-demand services are transforming cities, and depth investigation is required concerning this phenomenon (Ash, Kitchin, & Leszczynski, 2018; Bissell, 2020).

Therefore, this paper aims to analyse the effects of the COVID-19 pandemic on the perception of on-demand delivery by the young generation (ages 19–39 years). This analysis was carried out using data from Brazilian respondents. Brazil was severely affected by the COVID-19 pandemic, with 28,7 million cases and 659,000 deaths until March 2022. The high level of uncertainty about the disease, the fear of contagion and the lockdown measures adopted in the country may have changed the behaviour of the citizens. Additionally, the use of on-demand delivery services has increased exponentially. The delivery apps reached 14% of the Brazilian population, with 13.6 million users (Statista, 2022c), concentrated in some States (Rio de Janeiro, São Paulo, Minas Gerais, and Espírito Santo) (Abrasel, 2021). Brazil ranks 12th in revenues for global on-demand delivery services, with US $638.30 million (Statista, 2022c). Although the service offers primarily ready meals, there is an increase in the supply of products from other sectors, such as supermarkets, pharmacies, electronics, pets, and household suppliers. Furthermore, users are expected to increase by 19.4 million in 2027 (Statista, 2022c). Thus, Brazil is one of the world's largest on-demand delivery service markets, and this particular circumstance justifies this research.

The contribution of this paper is twofold: first, it compares and analyses the perception of consumers regarding on-demand delivery services before and during the COVID-19 pandemic; second, it applies in the analyses indicators not usually considered by scholars, mainly those related to consumer characteristics. Although this paper used a non-probabilistic sampling technique for data collection, the findings present an in-depth exploration of the effects of on-demand delivery shopping by the young generation before-during the COVID-19 pandemic, considering the perspective of the respondents. Additionally, the findings show the importance of sustainable strategies for on-demand delivery services.

This paper unfolds in five sections: after this brief introduction, Section 2 describes the role of consumers in on-demand delivery services; Section 3 provides the data and the research method; Section 4 describes the results and discusses the role of the COVID-19 pandemic in on-demand delivery services; and Section 5 closes the paper drawing the conclusion and further work.

2. Customers and on-demand delivery services: related works and development of the hypotheses

The type of product, the destination of delivery, the customer experience and the behaviour influence the delivery services on demand. Concerning the product type, most of the literature focusses on on-demand deliveries for groceries (Arslan, Agatz, & Klapp, 2021). For example, in New Zealand, most on-demand delivery services offer food, alcohol, and nicotine as the usual products acquired by the on-demand delivery service (Miles et al., 2022). In Thailand, small businesses widely use on-demand deliveries in the food industry (Naunthong, 2021). In Brazil, on-demand delivery services are frequently used to order food-related products, especially ready meals. Bissell (2020) pointed out that on-demand food delivery platforms are changing habits in the city in different circumstances. However, this delivery service is not exclusive to grocery stores. For example, Arslan et al. (2021) investigated strategies for on-demand personal shopper services related to the retail industry by solving a Personal Shopper Problem. The authors compared the performance of personal shoppers without and with consolidation and of customers who go to stores to buy themselves. The results showed that consolidation strategies increase the number of orders served. In addition, personal shoppers save time and resources by shopping from customers, even when they serve customers individually.

According to Hong et al. (2019), in general, customers who choose on-demand delivery services are interested in receiving the products in a convenient location to themselves, which, depending on the product type, can be the home, a store nearby the home, the working place or a pick-up point (automatised or not).

The online customer experience and their behaviour influence on-demand delivery services regardless of delivery destination and type of products. Han et al. (2021) analysed the influence of the sharing economy on customer satisfaction and repurchase intentions. The authors analysed the customer's choice of meal delivery services to increase their competitiveness and maximise their benefits by using on-demand delivery services to support the restaurateur. Suhartanto et al. (2019) showed that food quality improves the loyalty of customers to on-demand delivery services, but the same evidence was not identified for service quality. Furthermore, the experiential value of online food delivery influences the willingness to order (Gavilan et al., 2021), and customer trustworthiness is an important quality attribute of the on-demand food delivery service (Cho, Bonn, and Li, 2019). The informativeness, payment and safety, usefulness, and convenience of on-demand delivery services influence customer satisfaction and reuse intention (Song, Jeon, and Jeon, 2017).

Mehrolia et al. (2020) evaluated the customer response to ordering food online during the COVID-19 outbreak in India. The results showed that the perceived benefits of online food deliveries (e.g., convenient, safe, cost-effective, contact-free delivery, and e-wallet payments) influenced the purchase decision. Customer satisfaction with on-demand food delivery services in Malaysia is affected by time, climate, delivery service, security/privacy, and price (Azman, Mashuri, & Ibrahim, 2021). Sernicola et al. (2020) identified that the first lockdown (March to May 2020) contributed to new ways of buying and receiving groceries in Italy. The respondents increased the frequency and amount spent on e-groceries during lockdown. Furthermore, the authors showed a propensity to use the virtual sales channel to buy, mainly for those who (i) have a full-time job, (ii) have shopped online during the lockdown, and (iii) have not perceived a difference in the range of products offered offline or online. Furthermore, the travel time to reach the store and the number of family members between 12 and 18 years negatively influence the frequency of e-grocery stores after the pandemic.

Zanetta et al. (2021) evaluated online food delivery during the peak of the second wave of the COVID-19 pandemic using the Unified Theory of Acceptance and Use of Technology. The results showed a tendency of Brazilian respondents to continue ordering food online after the pandemic. Fear of contagion moderates the willingness to order online food delivery (Gavilan et al., 2021).

Prasetyo et al. (2021) identified the influential factors for customer satisfaction and loyalty in the on-demand food delivery service during the COVID-19 pandemic in Indonesia. The authors found that motivation has the highest effect on customer satisfaction, followed by product price, information, and promotion, while ease of use of the app was insignificant.

Ali et al. (2021) evaluated how the COVID-19 pandemic affected on-demand behaviour in Pakistan. Optimism (positive perception of technology) and innovation (predisposition to try new technologies) positively influence the adoption of the intentions of on-demand food delivery services, mainly among young men with high-income and high-education-level customers.

As shown in this section, most of the literature focusses on the reasons for using on-demand delivery services, particularly for food, including the experience during the COVID-19 pandemic. In general, the on-demand purchase is influenced by three components: the price of the product (Azman et al., 2021; Han et al., 2021; Suhartanto et al., 2019; Wang, Somogyi and Charlebois, 2020; Zanetta et al., 2021), purchase convenience (Song, Jeon and Jeon, 2017; Cho, Bonn and Li, 2019; Wang, Somogyi and Charlebois, 2020; Gavilan et al., 2021; Zanetta et al., 2021), and purchase frequency (Mehrolia, Alagarsamy and Solaikutty, 2020; Zanetta et al., 2021). However, none of these authors considered all of these factors simultaneously in their analysis.

2.1. Development of the hypotheses

Perception is how one sees the world, influenced by their experience (Given, 2022, p. 607). Therefore, individual perception influences opinions and judgments (Given, 2022, p. 607). Regarding e-groceries, previous positive experiences influence consumer behaviour (Maltese et al., 2021). On the other hand, the price of the product is a driving force for e-grocery stores (Marcucci et al., 2021). Therefore, based on customer experience, the first hypothesis of this paper is *H1: Perception of on-demand services positively contributes to on-demand purchases*. The diversity of establishments and products, practicability, and purchase convenience contribute to the perception. During the COVID-19 pandemic, exposure to SAR-COV-2, contactless, and isolation awareness could also influence perception of on-demand services.

The second hypothesis concerns the importance of deliveries for on-demand services, influencing the purchase intention of the customer (Seghezzi and Mangiaracina, 2021). The literature considers the following delivery attributes: delivery fee (Maltese et al., 2021; Seghezzi and Mangiaracina, 2021), delivery service (Azman et al., 2021), and service speed (Han et al., 2021; Seghezzi and Mangiaracina, 2021). According to Seghezzi and Mangiaracina (2021), being fast becomes essential, while the delivery fee is one fundamental factor for on-demand delivery services since the customer is unwilling to pay more. The delivery fee can increase the demand for on-demand delivery services (Maltese et al., 2021). Therefore, the delivery fee influences the on-demand shopping (Yeo, Goh, & Rezaei, 2017; Seghezzi and Mangiaracina, 2021). However, there does not seem to be a clear pricing policy for delivery fees in Brazil (De Oliveira et al., 2022; Mello et al., 2022). Seghezzi and Mangiaracina (2021) identified that the delivery fee, the daily demand and the salary of the riders had influenced the profitability of on-demand food delivery services in Milan (Italy). Considering that the delivery fee and speed influence on-demand delivery, the second hypothesis is *H2: On-demand deliveries contribute to on-demand shopping.*

Scholars have analysed a few characteristic profiles of customers of on-demand delivery services. Some of the factors identified in the literature are age (Mehrolia, Alagarsamy and Solaikutty, 2020; Zanetta et al., 2021) and inhabitants per household (Cho, Bonn, and Li, 2019). Although Mehrolia et al. (2020) considered age an influential factor in on-demand food delivery services, they did not find statistical significance for age alone. This factor has to be associated with other variables (e.g., purchase frequency, affective and instrumental beliefs, perceived benefits, perceived threat and product involvement), which explained 58.5% of the variance in the purchase decision on on-demand food delivery service (Mehrolia, Alagarsamy and Solaikutty, 2020). As this paper focusses on the younger generation, the age of the respondent is considered relevant in influencing on-demand purchase. The household was one reason for the popularity of on-demand food delivery services in China (Cho, Bonn and Li, 2019). Taking into account single-person and multi-person households, Cho et al. (2019) identified differences in the relationships for food delivery app attributes (convenience, design, trustworthiness, price, diversity of products) and perceived value. Thus, the convenience and the design quality of the attributes of on-demand food delivery apps are positively evaluated by multi-person households. Additionally, multi-person households perceived more value for demand food delivery than those of the single-person household (Cho, Bonn, and Li, 2019). Moreover, Mehrolia et al. (2020) suggested applying gender, educational level, and monthly income as customers' characteristics in on-demand delivery services. However, no studies with these attributes of the consumer profile were found. Therefore, the third hypothesis was drawn as *H3: The consumer profile contributes to on-demand delivery shopping.* The consumer profile is based on age, gender, household income, educational level, occupation, type of work, number of inhabitants per household, and geographical area.

These hypotheses were considered in the path model (Fig. 3) and the design of the research method, detailed in the next section.

3. PATH model, data, and research method

This section describes the data collection, the characterisation of respondents and the method to analyse the influence of on-demand shopping on consumer behaviour by partial least squares structural equation modelling.

3.1. Path model

A path model describes the research hypotheses and the relationships between variables (Hair et al., 2017). The structure of this model contains rectangles, which represent the observed data obtained from a questionnaire (also called indicators), and circles, which represent the latent variables (or constructs). These variables are not measured directly. The arrows show the relationships between the constructs and between the constructs and the indicators. Arrows always represent a directional relationship with theoretical support, interpreted as causal relationships (Hair et al., 2017).

A path model has two elements: (i) the structural model, which displays the relationships between the constructs; and (ii) the measurement model, which displays the relationships between the constructs and the indicator variables. The measurement model can be an exogenous latent variable, where the constructs explain other constructs in the model, or endogenous latent variables, where the constructs are explained in the model (Hair et al., 2017). Fig. 1 shows the path model based on the hypotheses drawn before. The indicators are formative and represent a causal relationship with the latent variables. Indicators are not mutually interchangeable. The correlation between the indicators can be positive, negative, or zero (Haenlein and Kaplan, 2004). The sequence of the path model is from left to right (Hair et al., 2017), indicating the order of each construct to explain the other one. The constructs on the left side are independent (exogenous) and are used to explain the latent variables on the right side, that is, the dependent variable (endogenous).

The variables in the consumer profile are related to the socioeconomic characteristics of the respondent, i.e., age, gender, household income, educational level, occupation, household size, working arrangement, and geographic area (urban vs. rural). Variables related to on-demand purchases include product price and shopping frequency. The characteristics of on-demand delivery considered in this analysis are delivery fee and speed, cited as fundamental for on-demand delivery services (Han et al., 2021; Seghezzi and Mangiaracina, 2021). Finally, to understand how individual perception contributes to on-demand purchases, the following factors were considered: the importance of the diversity of establishments and products, the practicability of shopping and receiving the products at home, and convenience of shopping (Song, Jeon and Jeon, 2017; Cho, Bonn and Li, 2019; Wang, Somogyi and Charlebois, 2020; Gavilan et al., 2021; Zanetta et al., 2021). Furthermore, perceptions about lower exposure to the SARS-CoV-2 virus, contactless purchase and delivery, and awareness of social isolation during the COVID-19 pandemic were investigated when ordering on-demand delivery services.

3.2. Data collection procedure

A questionnaire was designed to obtain data. Perception was obtained using the 5-Likert scale. A snowball sampling procedure was used to collect data using social networks. This procedure is appropriate when the population is inaccessible by other means (Baltar & Brunet, 2012; Seabra et al., 2021). This sampling technique was chosen due to the difficulty in reaching the respondents due to the COVID-19 pandemic. Data collection occurred between July and September 2021. This period corresponded to the second wave of cases in Brazil.

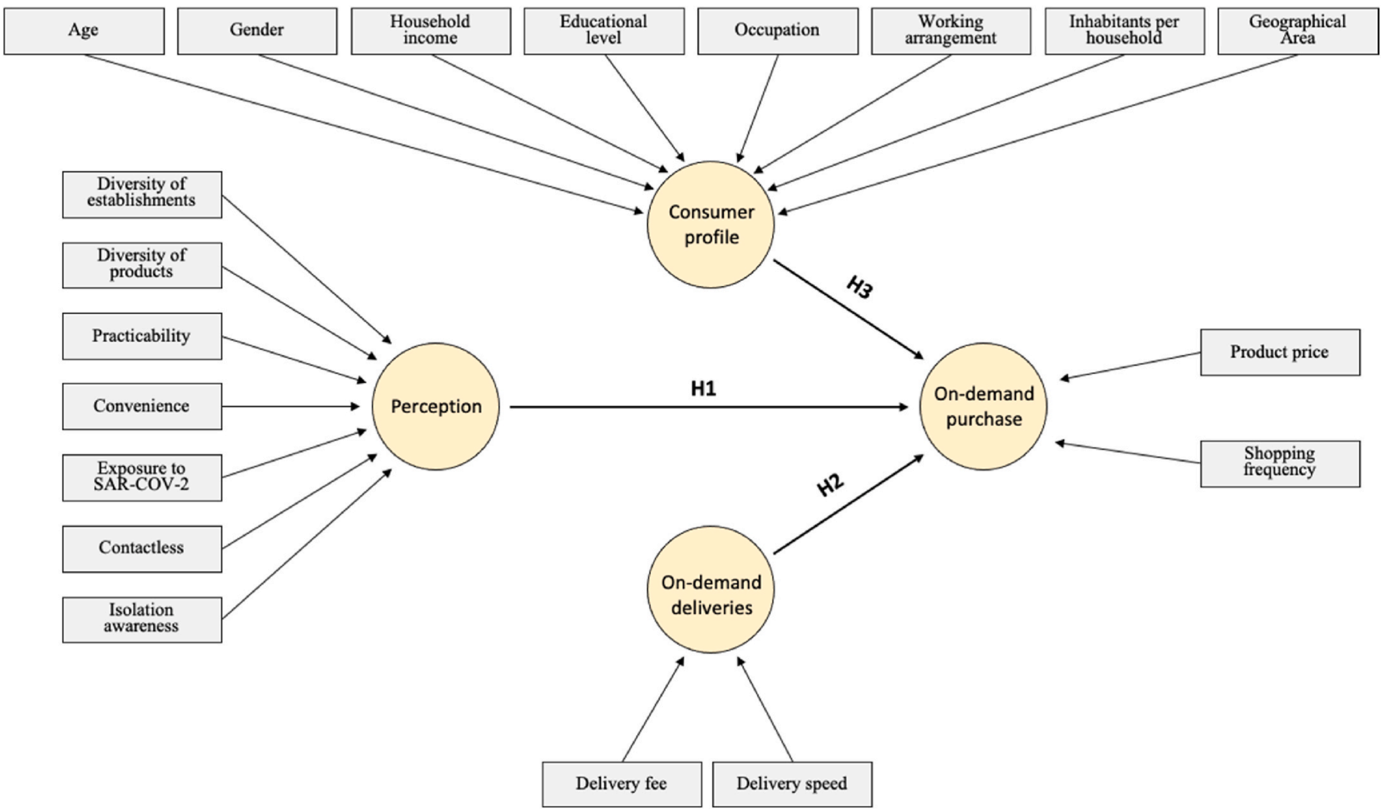

Fig. 1. Path model.

Through this process, the sample had 1232 responses (95% of confidence level and 2.79% margin of error). However, due to the biased sample, snowball sampling analysis cannot be generalised (Kirchherr and Charles, 2018). Despite bias due to the non-probability sampling procedure, the findings provided valuable information for an in-depth and contextualised exploration of the phenomenon analysed

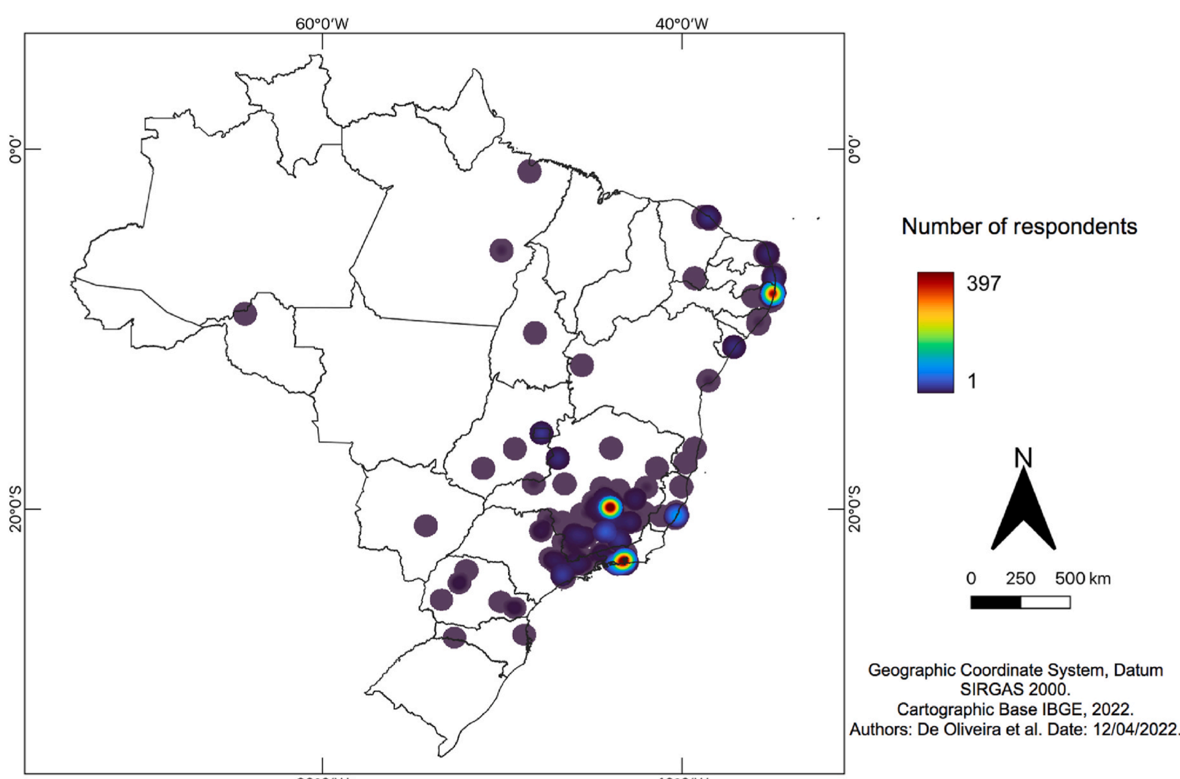

Fig. 2. State of the residence of respondents.

(Kirchherr and Charles, 2018). Thus, our findings present a far-reaching exploration of the effects of on-demand delivery shopping by the young generation before and during the COVID-19 pandemic considering the perspective of the respondents.

3.3. Characterisation of respondents

Respondents live in 114 municipalities in 19 Brazilian states (Fig. 2); 96% live in urban areas, in municipalities with an urbanisation rate greater than 0.75. Most of the respondents live in the states of Minas Gerais and Pernambuco. Minas Gerais is one of the states with a concentration of users of on-demand delivery, according to Abrasel (2021). Table 1 summarises the descriptive statistics of the respondents.

Since 83% of the respondents have 19–39 years of age, this article focusses on this group, hereafter named the young generation. According to (2021), research on younger motivation to share consumption is still incipient. Regarding the education level, the respondents have a higher education level (graduate/post-graduate). Most of the young generation respondents of the questionnaire are women (55%), live in households with more than 2 to 4 persons, and 7% live alone, and 82% have a monthly income per household higher than BRL 3300 ($609.80, 1US$ ~ BRL 5.41, September 2022), equivalent to three national minimum wages. Furthermore, 29% have a formal job, while 50% of the respondents are students with scholarships. Regarding the working arrangement, 42% of the respondents worked remotely, 29% worked in person, 21% had a hybrid regime and 9% worked remotely during the first months of the pandemic.

Since the snowballing procedure produces a bias in data collection, the sample was compared with official and business report data. In Brazil, approximately 34.4 million inhabitants have between 19 and 39 years of age, of which 50% are men (IBGE, 2022), which represents 21% of the total population. Furthermore, 21.4% of the young generation has a higher education level (IBGE, 2022). Furthermore, 13.6 million Brazilians used on-demand delivery services (Statista, 2022c); of these, 82% were between 20 and 39 years; 86% had a higher education level (graduate/postgraduate), and 88% had an income higher than BRL 2001 ($609,99). When comparing the profile of the respondents with the official data, an imbalance among the variables is observed. Therefore, a

Table 1
Description of the younger generation sample (N = 1019 responses).

Variable	Description	Percentage
Gender	Female	55%
	Male	45%
Number of household residents	1 person	7%
	2 persons	23%
	3 persons	31%
	4 persons	29%
	More than 4 persons	10%
Monthly household income	≤ BRL 1100 ($203.27)	2.1%
	> BRL 1101 ($203.45) and ≤ BRL 3300 ($609.80)	15.9%
	> BRL 3301 ($609,99) and ≤ BLR 6600 ($1219.60)	24.7%
	> BLR 6600 ($1219,79) and ≤ BRL 11,000 ($2032.67)	23.7%
	> BRL 11,001 ($2032.86)	33.7%
Education Level	High School	17%
	Graduate degree	56%
	Postgraduate degree	27%
Occupation	Student	50%
	Formal job	33%
	Informal job	14%
	Unemployed	3%
Working arrangement	Remote work	42%
	Work in person	29%
	Hybrid work	21%
	Remotely in the first months	9%
Geographical area	Urban Municipalities	96%
	Rural Municipalities	4%

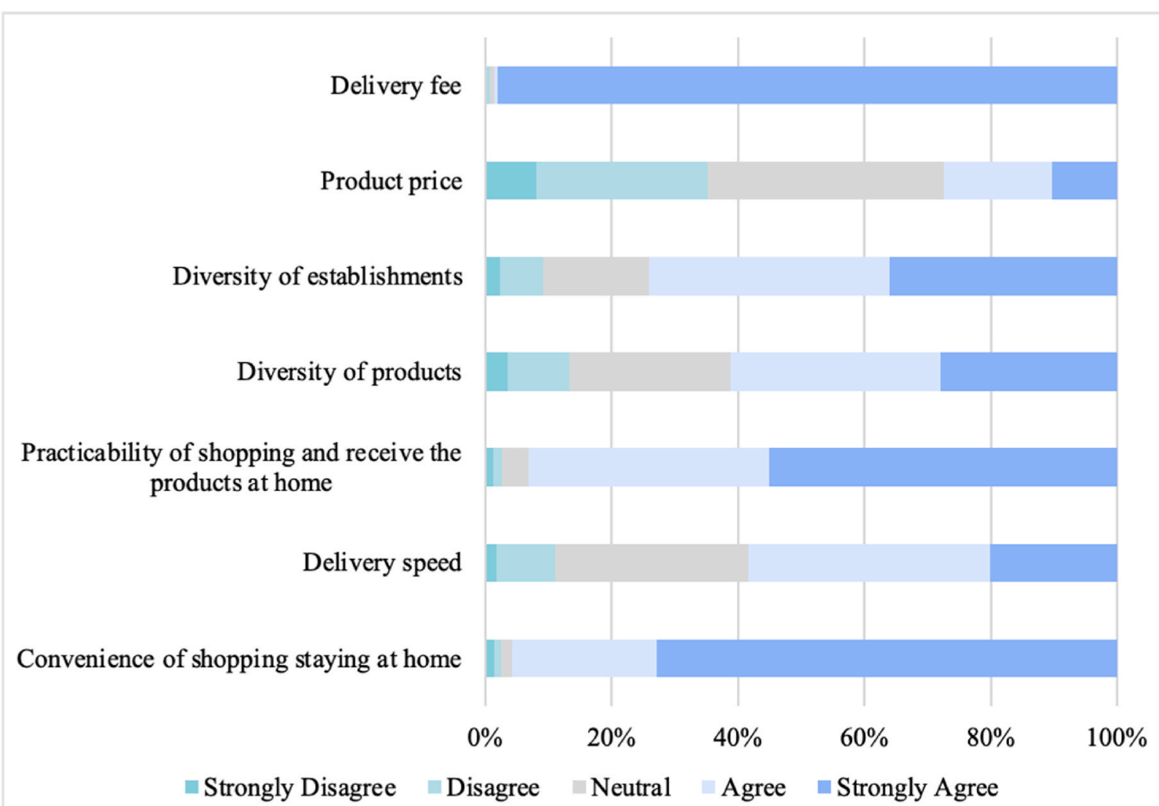

Fig. 3. Perception of on-demand delivery services before the COVID-19 pandemic.

procedure was applied to adjust the weights of the variables (i.e education level) for the overall class distribution to become balanced. With this procedure, the sample became representative of the young generation in Brazil.

3.4. Influence of on-demand shopping on consumer behaviour

Partial least-squares structural equation modelling (PLS-SEM) is a second generation of the multivariate method. This method allows development theories to incorporate unobservable variables measured by indicator variables (Hair et al., 2017). PLS-SEM estimates coefficients that maximise the R-squared value of endogenous constructs using ordinary least squares regression (Hair et al., 2017). Hair et al. (2017) provided details on how to estimate PLS-SEM using SmartPLS software (Hair et al., 2021).

The evaluation of a formative measurement model considers collinearity and assesses the relative importance of the formative indicators. The variation inflation factor (VIF) is calculated to measure collinearity. Values below 5 are expected (Hair et al., 2017). The relative importance is given by the outer weight, which expresses the relative contribution of the indicator to the construct (Hair et al., 2017). The values can be compared since the values are standardised (Hair et al., 2017). The t-statistics provide the statistical significance of the outer weight.

The PLS-SEM was chosen because of the data characteristics since the PLS-SEM did not require a minimum sample size or normal data. Moreover, different data scale types can be used. All data from the questionnaire were transformed into dummy codes. The PLS-SEM path model was estimated from the data stated by the respondents before the COVID-19 pandemic (837 observations) and during the COVID-19 pandemic (1019 observations).

4. Results and discussion

Table 2 summarises the data on the characteristics of on-demand purchases. The young generation used massively on-demand delivery services before and during COVID-19.

Of the respondents, 82% used on-demand delivery services before the COVID-19 pandemic, and all of them used on-demand services during the pandemic. In both situations, the most typical products ordered from on-demand delivery services were meals (44% and 60%, respectively), groceries (7% and 16%, respectively), and beverages (18% and 18%, respectively).

In relation to shopping frequency, while 39% of young generation used the on-demand delivery service once a month before the pandemic, it increased from 2 to 4 times per week during the pandemic for 38% of them and 33% order the on-demand delivery service once a week. Besides, while most of the orders occurred at the weekends before the COVID-19 pandemic (52% of respondents), during the pandemic it shifts to non-specify days (54% of respondents). Additionally, 54% of respondents started ordering on-demand services due to the COVID-19 pandemic.

Among the reasons for using the on-demand delivery service before the pandemic was the convenience of buying from home (76%) and the practicability of shopping online and receiving products at home (11%). During the COVID-19 pandemic, in turn, the main reasons were convenience to buy from home (48%), less exposure to contagion (34%), and respect for social isolation (8%).

Taking into account the mode of transportation, the use of a private car or motorcycle to buy products in physical stores was used by 61% of the respondents before the pandemic and 67% of them during the pandemic. Although walking retained the same percentage (20%), bicycle use for shopping increased from 1% to 2%; the public transportation decreased from 4% to 1%; the taxi decreased from 13% to 10%.

Physical stores were the usual place for younger respondents to buy products despite the COVID-19 pandemic, except for meals, which were generally purchased in both on-demand services or physical stores. Furthermore, beverages and pharmacy products (medicines without medical prescription) were purchased using on-demand services. Table 3 summarises these data.

Table 2
Characteristics of the on-demand purchase of the younger generation sample (N = 1019 responses).

Variable	Description	Before the COVID-19 pandemic	During the COVID-19 pandemic
Products	Meals	60%	44%
	Fresh food	2%	7%
	Supermarket	7%	16%
	Pharmacy	10%	14%
	Beverage	18%	18%
	Other	3%	1%
Frequency	At least once a month	39%	25%
	1 time a week	39%	33%
	2 - 4 times a week	19%	38%
	5 - 7 times a week	2%	4%
	>7 times a week	0%	0%
Weekday	No specific day	41%	54%
	During the week	7%	11%
	On the weekend	52%	35%
Reason	Convenience of shopping at home	76%	48%
	Speed of delivery	2%	1%
	Practicability of shopping and receiving the products	11%	5%
	Diversity of products	6%	1%
	Diversity of establishments	2%	0%
	Product price	2%	1%
	Delivery fee	1%	0%
	Lower exposure to Covid-19 contagion	–	34%
	Contactless Purchase and Delivery	–	2%
	Respect for social isolation	–	8%
Transportation mode for shopping purpose	Car or motorcycle	61%	67%
	Walking	20%	20%
	Taxi or similar	13%	10%
	Public transportation	4%	1%
	Cycling	1%	2%

Fig. 3 shows that before COVID-19, the young generation of respondents used on-demand delivery services mostly due to the shopping convenience (e.g.: the convenience of shopping while staying at home, the practicability of shopping and receiving the products) than for delivery convenience (delivery speed and delivery fee). The diversity of the establishments and products was also considered positive by the younger respondents.

During the COVID-19 pandemic, the respondents had a positive perception about on-demand delivery services, as shown in Fig. 4. In addition to the motivations related to the COVID-19 pandemic, we highlight the positive perception of the convenience of shopping at home, the practicability of shopping and receiving the products, the delivery fee, and the price of the product.

Table 3
Typical place to buy products (N = 1019).

Type of product	On-demand services	On-demand services or physical stores	Physical stores	Total
Meals	47%	53%	1%	100%
Fresh food	22%	6%	72%	100%
Supermarket	23%	7%	69%	100%
Pharmacy	32%	13%	55%	100%
Beverages	40%	22%	38%	100%

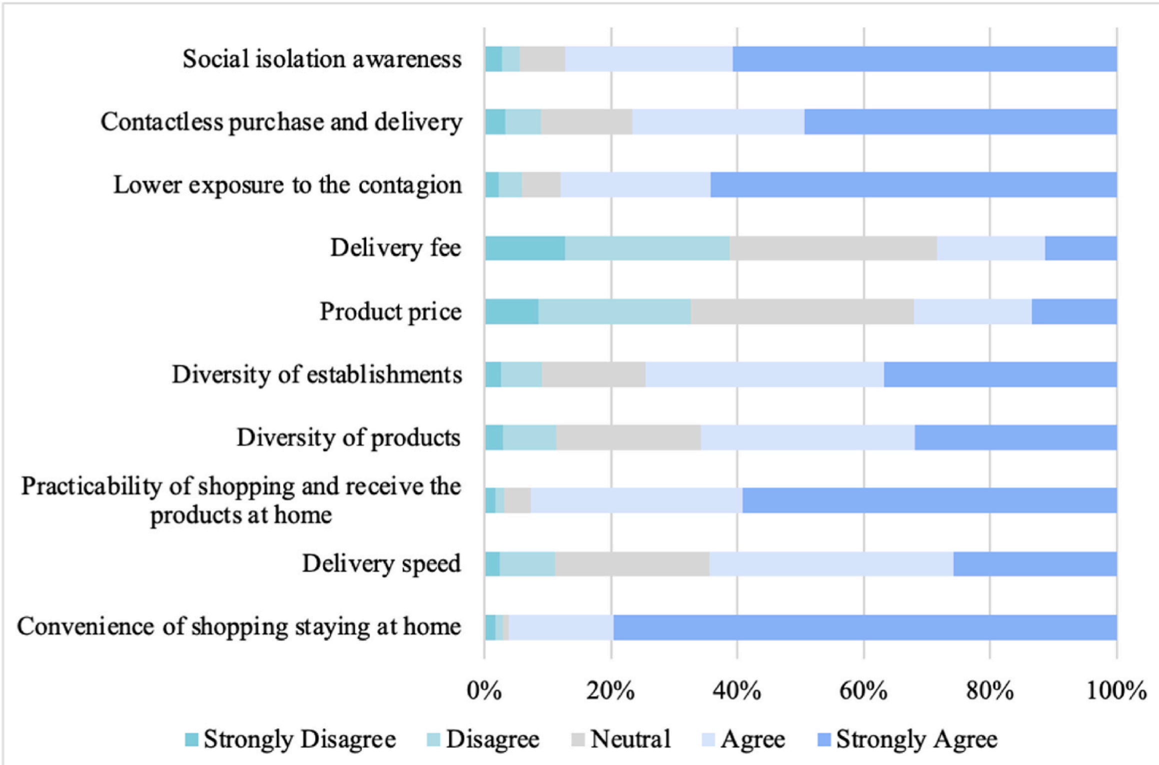

Fig. 4. Perception about on-demand services during the COVID-19 pandemic.

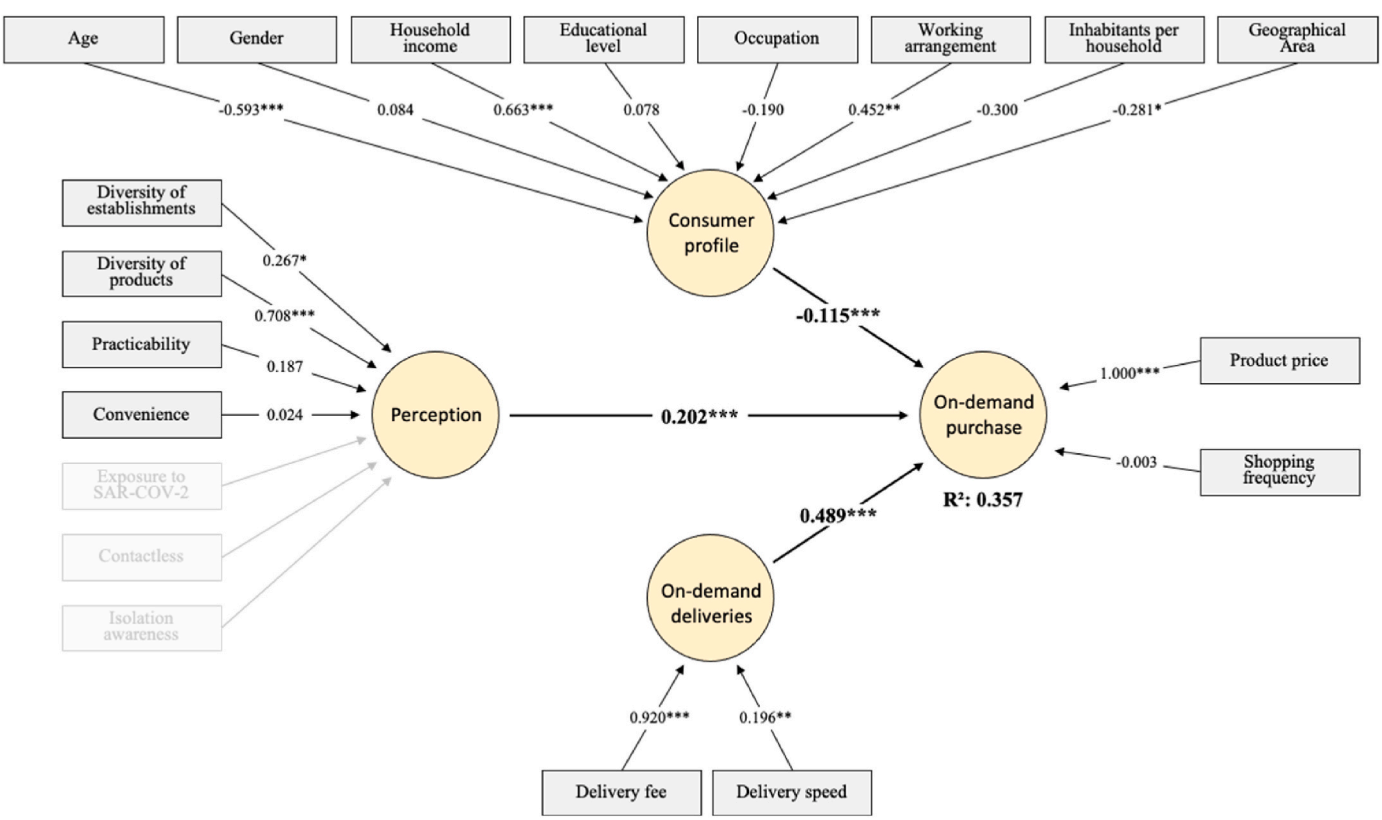

Fig. 5. PLS-SEM results from before the pandemic.
(Significance level of p-value: *** 0.001; * 0.1).

4.1. Effect of the COVID-19 pandemic on on-demand delivery services

Fig. 5 shows the results of the PLS-SEM considering the scenario 'before pandemic', including the outer weights of the measurement model, the path coefficients of the structural model, and the R-squared of the endogenous construct. Before the pandemic, *on-demand deliveries* had the strongest effect (0.489) on *on-demand purchases,* followed by the *perception of on-demand delivery services* (0.202). The *consumer profile* (−0.115) negatively impacted *on-demand purchases*.

The *diversity of products has* a major effect (0.708), while the *practicability of shopping and receiving the products* has a minor effect (0.187) on the *perception of on-demand services*. The *delivery* fee has a major effect on *on-demand* deliveries (0.920), followed by *delivery speed* (0.196). *Household income* has the main effect (0.633), followed by *working arrangement* (0.664) in the *consumer profile*. In contrast, *age* (−0.593) and *geographic area* of residence (−0.281) have a negative effect. In addition, the indicators of *gender*, *educational level, occupation* and *inhabitants* per *household* have no statistical significance, indicating that they do not have a real effect on consumer behaviour. Finally, the price of the *product* significantly influences *on-demand purchases* (1.000), while the frequency of *shopping* does not contribute to *on-demand purchases*. Thus, before the pandemic, on-demand services were affected by on-demand deliveries, which affected the perception of on-demand services.

Fig. 6 shows the results 'during the pandemic'. On-demand *deliveries* also have the strongest effect (0.586) on *on-demand purchases,* followed by the *perception of on-demand delivery services* (0.213). *The consumer profile* (0.042) is not statistically significant and does not contribute to *on-demand purchases*. Therefore, during the COVID-19 pandemic, the consumer profile did not affect the on-demand delivery service. Consequently, variables related to the consumer profile do not affect on-demand purchase, despite the statistical significance of other variables.

During the COVID-19 pandemic, the *diversity of products* has had a major and positive effect (0.673) on the perception of the construct *of on-demand services,* followed by the diversity of establishments (0.261) and practicability (0.256). On the contrary, the awareness of *isolation* negatively influenced the *perception of on-demand services*. The *delivery* fee has a major effect on on-demand deliveries (0.885), followed by the *delivery speed* (0.236). Finally, the price of the *product* has a major effect on *on-demand shopping* (1.000), followed by the *shopping frequency* (0.*075*).

4.2. Discussion

Table 4 compares the estimated effects of the constructs before and during the COVID-19 pandemic. During the COVID-19 pandemic, on-demand deliveries had more influence on on-demand purchases, with an impact of 19.8%. Thus, many respondents chose on-demand services due to the delivery service. On the other hand, the perception of on-demand services was not a factor in determining this type of service, i.

Table 4
Comparison of the estimated effects of the constructs.

Hypotheses	Before the COVID-19 pandemic	During the COVID-19 pandemic	Impact
H1: Perception about on-demand services influences on-demand purchase	0.202***	0.213***	5.4%
H2: On-demand deliveries influence on-demand purchase	0.489***	0.586***	19.8%
H3: The consumer profile influences on-demand purchase	- 0.115***	0.042	−63.5%

Significance level of t statistics: *** 0.001.

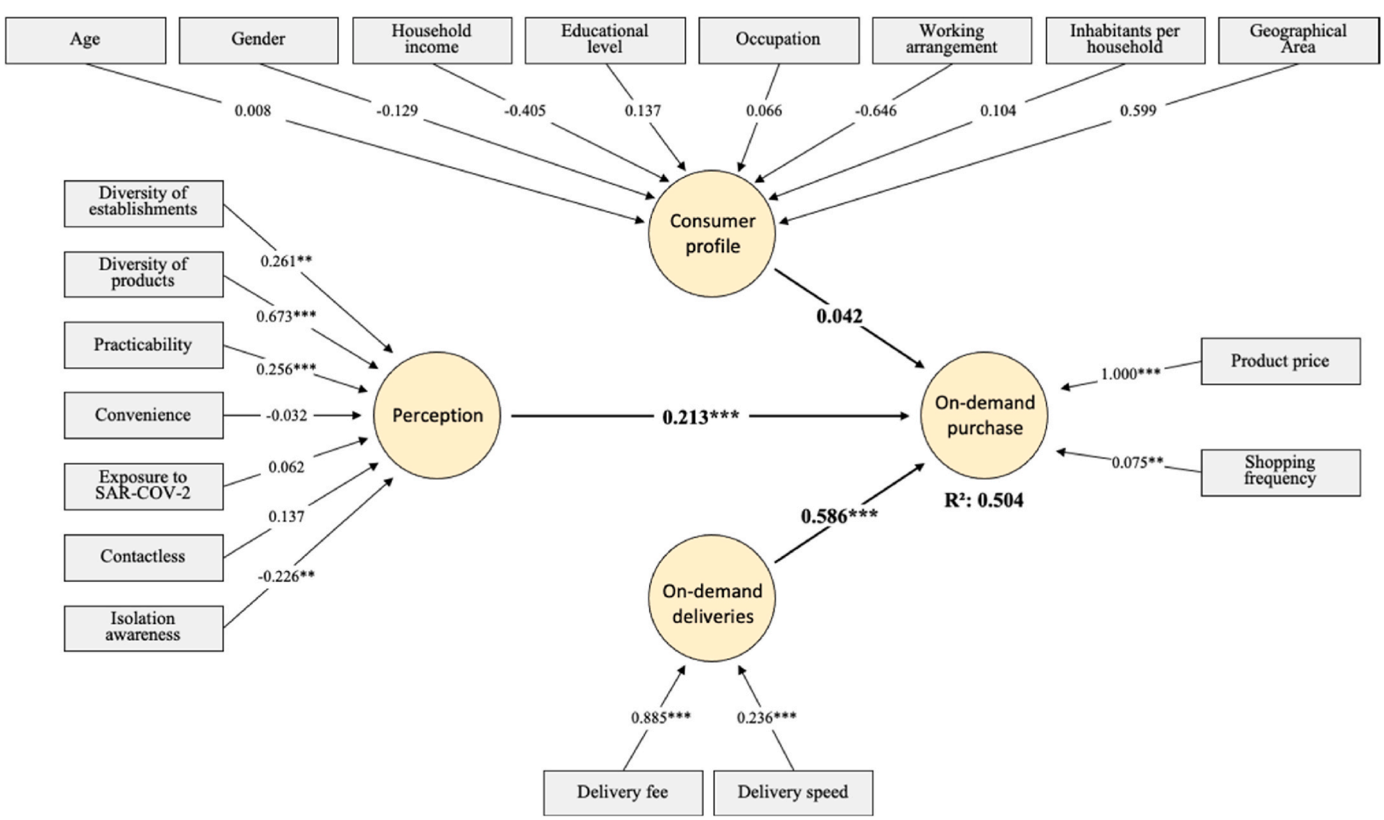

Fig. 6. Estimated PLS-SEM model during the pandemic.
(Significance level of p-value: *** 0.001; ** 0.5).

e., before the pandemic, the variables related to the perception of on-demand services had more influence on the use of on-demand delivery services during the COVID-19 pandemic.

These findings demonstrate that perception of on-demand services positively contributes to on-demand purchases (H1) before and during the COVID-19 pandemic. However, this influence is stronger during the pandemic. In the same way, on-demand deliveries influence on-demand shopping (H2), which also becomes stronger during the pandemic. Finally, the consumer profile influences the on-demand delivery shopping (H3) only before the COVID-19 pandemic.

Table 5 compares the estimated effects of the measurement paths before and during the COVID-19 pandemic. The diversity of establishments and products negatively impacted the perception of on-demand services (−2.2% and −4.9%, respectively). Although the practicality of buying online and receiving the product at home was not statistically significant before the pandemic, it became statistically significant and more important during the pandemic. Awareness of social isolation contributed negatively to on-demand purchase. In contrast, lower exposure to the SAR-COV-2 virus and contactless purchase and delivery did not have statistical significance.

Table 5
Comparison of estimated effects of outer weights.

Hypotheses	Before the COVID-19 pandemic	During the COVID-19 pandemic	Impact
The diversity of establishments contributes to the perception of on-demand services.	0.267*	0.261**	−2.2%
The diversity of products contributes to the perception about on-demand services.	0.708***	0.673***	−4.9%
Practicability contributes to the perception about on-demand delivery services	0.187	0.256***	36.9%
Shopping convenience contributes to on-demand purchase	0.024	−0.032	33.3%
Lower exposure to the SAR-COV-2 virus contributes to on-demand purchase	–	0.062	–
Contactless purchase and delivery contribute to on-demand purchase	–	0.137	–
Social isolation awareness contributes to the on-demand purchase	–	−0.226***	–
The price of the product contributes to the purchase on demand.	1.000***	1.000***	0.0%
The frequency of shopping contributes to the purchase on demand.	−0.003	0.075**	2400.0%
The delivery fee contributes to the on-demand deliveries	0.920***	0.885***	−3.8%
Delivery speed contributes to on-demand deliveries	0.196**	0.236***	20.4%
Age contributes to the consumer profile	−0.593***	0.008	−98.7%
Gender contributes to the consumer profile	0.084	−0.129	53.6%
Household income contributes to the consumer profile	0.663***	−0.405	−38.9%
Educational level contributes to the consumer profile	0.078	0.137	75.6%
Occupation contributes to the consumer profile.	−0.190	0.066	−65.3%
The working arrangement contributes to the consumer profile	0.452***	−0.646	42.9%
The number of inhabitants per household contributes to the consumer profile	−0.300	−0.104	−65.3%
Geographical area contributes to the consumer profile	−0.281*	0.599	113.2%

Significance level of t statistics: *** 0.001; ** 0.05; * 0.1.

The price of the product contributes the same to the on-demand purchase before and during the COVID-19 pandemic. However, the importance of the frequency of purchases increased by 2400% when comparing before and during the COVID-19 pandemic. Regarding on-demand delivery, the delivery fee reduced importance by −3.8%, while delivery speed increased importance by 20.4%. Therefore, respondents considered the delivery speed to be more important than the delivery fee during the pandemic.

Finally, during the pandemic, the characteristics of the consumer profile that contributed the most to purchases on demand were geographic location (113.2%), educational level (75.6%), gender (53.6%), and employment arrangement (42.9%). Furthermore, the impact of age (−98.7%), occupation and number of inhabitants per household (−65.3% each), and household income (−38.9%) was negative.

The findings highlight in both contexts (before and during the COVID-19 pandemic) that the main motivation of the young generation regarding the use of an on-demand delivery service is its practicability of buying and receiving products at home. During the pandemic, one of the reasons for the importance of the practicality effect is related to avoiding contact with people and social isolation. However, the young generation also considered this service practical even before the pandemic. Furthermore, the Brazilian government has deemed this service essential due to the COVID-19 pandemic. Therefore, although this paper did not focus only on groceries, its results are aligned with the recent literature, which shows that this is the most requested type of product in the on-demand delivery services (Arslan et al., 2021). The primary motivation to use on-demand delivery services is its practicability, converging with the literature (Cho, Bonn and Li, 2019; Gavilan et al., 2021; Song, Jeon, and Jeon, 2017; Wang, Somogyi, and Charlebois, 2020; Zanetta et al., 2021). Thus, practicability and convenience should be increased in the marketing of the on-demand delivery service.

The contribution of the delivery fee to the on-demand delivery service was kept at the same level before and during the pandemic. During the pandemic, the platforms offered free delivery purchases to stimulate consumption. However, free deliveries are economically unsustainable, although the fee strongly influences the on-demand delivery service (Seghezzi and Mangiaracina, 2021). Therefore, strategies that offer free delivery should impact the on-demand delivery system, which impact, in tun, is not yet measurable. However, one of the strategies to keep the service running on a similar path as during the pandemic for this consumer needs to combine both the delivery fee and the price of products, which, in turn, may be regulated by the market itself (e.g., diversity of products).

Finally, this article evaluated some variables suggested by Mehrolia et al. (2020) but not considered by scholars before, such as gender, educational level, and monthly household income. Other items were included due to the potential contribution to on-demand purchases, such as geographical area and work arrangement. Although these variables were shown to be statistically influential in this study before the pandemic, they were not significant during the pandemic. Therefore, the consumer profile that was important before the pandemic is no longer important during the pandemic. It may be related to the fact that, in addition to the risk of contagious, most stores closed or have restricted opening times and have moved a significant part of their operation to delivery services as a means of survival.

The main question that emerges from the findings of this research is related to its sustainability; that is, how far will this "pattern" of on-demand delivery services be maintained after the pandemic? The social dimension of humankind demands personal interactions, and the probability of returning to purchase products at physical stores is high as long as the disease is under control. Thus, it is essential to understand consumers' future behaviour of the on-demand delivery service in a post-pandemic scenario, particularly the young generation.

5. Conclusions

The article aimed to understand the motivation of the young generation to use on-demand delivery services before and during the COVID-19 pandemic. The findings showed that the perception of on-demand services positively affected on-demand purchases (H1) before and during the COVID-19 pandemic. In addition, practicability, the diversity of establishments and products, and convenience contributed to the perception of on-demand services. In addition to that, the price of the product contributed to the purchase on demand before the pandemic. During the pandemic, the price of the product and the frequency of purchases contributed to the on-demand shopping.

Furthermore, on-demand deliveries influenced on-demand shopping (H2) before and during the pandemic. In addition, the delivery fee and speed contributed to on-demand deliveries. Finally, the consumer profile influenced on-demand delivery shopping only before the pandemic (H3). Before the pandemic, age, household income, remote work, and geographic area contributed to the consumer profile.

Based on the results, it is possible to conclude that the COVID-19 pandemic positively affected the motivation of the young generation to use on-demand delivery services. The practicability of the service was considered a critical variable even before the pandemic. Fear of contagion contributed to the use of on-demand delivery services for other products beyond meals and beverages. An interesting aspect that emerged from the COVID-19 pandemic is related to the concern of young consumers with the delivery fee and the price of products, which gained importance during the pandemic. These two important variables probably affect the on-demand delivery market and shape the service. Thus, the challenge is to maintain this positive motivation by offering environmentally, social and economical services.

However, attention is needed to analyse the strategy widely used by apps that offers free delivery for purchases over a certain amount. Mello et al. (2022) state that distance directly influences the delivery fee. In this way, when the consumer is looking for products with free delivery, someone is paying the transport cost. In the case of applications, it is unclear whether this cost is the responsibility of the establishment offering the service or is a strategy of the application to increase the demand for the service. Regardless of the situation, the delivery fee is a central factor in on-demand delivery services. Thus, for future studies, it is essential to analyse the trade-off between the delivery fee paid by the consumer and the cost of transporting the on-demand delivery service. Another factor that deserves attention in future research is the role of the type of product in on-demand delivery services. The literature focusses mainly on food delivery. However, there is a growth in the supply of other types of products.

As a limitation, the results cannot be generalised due to the sampling process chosen and the lack of knowledge of the consumer profile of on-demand delivery services. Data refer to a particular group of young people whose characteristics (education, income, means of transport, among others) are above the level of the country. Thus, it cannot be said that this group of respondents corresponds to the profile of the consumer of on-demand delivery services. However, as an exploratory approach to the issue, this investigation identified key variables for further investigation. Therefore, for further work, it is suggested to extend the sample to check if the main results are kept consistent.

This paper only evaluated the consumer point of view. However, the on-demand service provided, especially for those involved in the last-mile delivery service, also deserves investigation, as the service increased during the pandemic, very often with reductions in the value received for the service provided. In the short term, this can affect the perception of the on-demand delivery service. In this line of investigation, further work should address the role of crowndshipping related to on-demand delivery services.

Finally, since time and speed are the core value of the on-demand delivery service, most of this service is provided by motorbike users in Brazil, as it provides low-cost transportation. However, motorcycles have a high environmental and social cost, as they are very pollutant and unsafe under certain traffic conditions. Therefore, keeping the on-demand delivery service low cost and safe is another challenge that the sector may face.

CRediT authorship contribution statement

Leise Kelli de Oliveira: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Writing – original draft, Writing – review & editing, Supervision. **Cheyenne Mariana de Oliveira Carneiro:** Methodology, Software, Formal analysis, Investigation, Data curation, Writing – review & editing. **Maria Leonor Alves Maia:** Conceptualization, Methodology, Validation, Investigation, Writing – review & editing, Supervision, Funding acquisition. **João Guilherme da Costa Braga França:** Methodology, Software, Formal analysis, Investigation, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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