

THE USE OF E-COMMERCE IN BRAZIL: PANDEMIC AND INFLUENCING FACTORS

Emerson Gomes dos Santos

Escola Paulista de Política, Economia e Negócios
Universidade Federal de São Paulo – UNIFESP
E-mail: emerson.gomes@unifesp.br

Alcides Barrichello

Centro de Ciências Sociais Aplicadas
Universidade Presbiteriana Mackenzie
E-mail: alcidesbarrichel@uol.com.br

Rogério Scabim Morano

Instituto de Ciências Ambientais, Químicas e Farmacêuticas
Instituto de Ciência e Tecnologia
E-mail: r.morano@unifesp.br

Abstract

This study aims to verify possible changes in the relationship between socioeconomic factors and Internet use, and the e-Commerce during the COVID-19 pandemic in Brazil. It was used secondary data from the ICT Household survey conducted in Brazil in 2019 and 2021. Two logistic regression models were developed – one for each year. The literature shows that the COVID-19 pandemic has changed people's lives and their consumption habits. The study sought to know if there would be a change in these effects depending on sociodemographic factors and Internet use. It was observed an increased use of e-Commerce between 2019 and 2021 among people with lower education levels, also among those who live in Brazil's northeast region, and among social media users. People without a formal job began to consume more through e-Commerce.

However, the older population reduced their use of e-Commerce during the period. The research evaluated changes in the relationship between several factors and the use of e-commerce during the COVID-19 pandemic in Brazil. It also contributes by jointly analyzing several factors found in the literature that influence the use of e-commerce, through a representative base of the Brazilian population. The study revealed changes experienced by society due to the pandemic and highlighted the need for changes in new ways of serving consumers. It is worth emphasizing that the sample used is representative of the population, therefore these results can be extrapolated when used to inform broader and more precise decision-making processes.

Keywords: e-Commerce, COVID-19 pandemic, Internet use, socioeconomic factors, Brazilian consumer

Introduction

Trade patterns have undergone major changes throughout the twentieth century with the influence of globalization and digitization. International trade gained strength after the World Wars with the development of new technologies, including the Internet, which made e-Commerce possible. As the pace of electronic media use grew, the number of people who chose e-Commerce increased exponentially, leading to more companies in this market (Geçit & Taşkin, 2020).

This new market environment has been fostered by improved technologies that significantly reduce business costs by simplifying highly complex tasks, breaking paradigms, and transforming business concepts and consumer habits. For example, smartphone users can easily find and share information about products and services. E-Commerce has been seen as a means of doing business that offers users easy access to services and products. Also, it has been the subject of investments in new technologies to continuously improve usability and facilitate the purchase process (Barrichello et al., 2021; Esteves, 2011; Park et al., 2015).

Consumers are also influenced by cultural, personal, social, and psychological factors. Such factors can be used in studies on the use of the Internet to communicate between the consumer and the company (Barrichello et al., 2021; Esteves, 2011). According to Kotler and Keller (2018), consumers carry their life

history with characteristics and experiences that make them unique and affect their consumption process. The authors argue that consumers currently have instant access to information on various subjects, making them more aware and demanding. Several socioeconomic factors influence consumption through e-Commerce (Linero Bocanegra & Botero Cardona, 2020), such as income distribution, regional issues (Li et al., 2020), and economic activities, which are elements that may disseminate such consumption, facilitate online shopping, and promote process integration. In general, e-Commerce promotes the progress of the population and is influenced by educational background, cognition, and knowledge of the Internet (Lyu et al., 2022). The COVID-19 pandemic disrupted the business and industry scenario, changing consumer behavior. According to the World Health Organization (WHO), in April 2020, the virus had already infected 1,654,247 people worldwide and caused 102,193 deaths (Agus et al., 2021). The implementation of social distancing and self-quarantine by authorities as public policy to deal with COVID-19 has created a downturn in business. The outbreak changed where and how people bought goods and accelerated structural shifts in commerce that were felt by all (Accenture, 2020b).

Driven by the pandemic, much research has been carried out to examine consumer behavior. However, they have produced fragmented results (Wang et al., 2022). Industry reports and consumer surveys have shown that the pandemic accelerated a trend toward e-Commerce that was already observed before the crisis (Kim, 2020). Fear notably influenced consumers' perceptions of the economic and environmental benefits of e-Commerce platforms (Tran, 2021). Some authors predict that the digitization of the market and the habits learned during social distancing can bring about structural changes in consumption as individuals maintain their modified behaviors after the end of the pandemic (Caldeira et al., 2021; Clark, 2018; Guthrie et al., 2021; Kim, 2020; Sheth, 2020).

Against this backdrop, the question motivating this research is: Have the relationships between socioeconomic factors, Internet use, and e-Commerce undergone any changes during the COVID-19 pandemic in Brazil? Therefore, this study aimed to verify possible changes in the relationship between socioeconomic factors and Internet use, and the e-Commerce in Brazil during the COVID-19 pandemic, considering periods before and during the health crisis.

For this purpose, secondary data from the ICT Household survey conducted in Brazil in 2019 and 2021 were used with the development of two logistic regression models. It was observed increased use of e-Commerce between 2019 and 2021 among people with lower education levels, also among those who live in Brazil's northeast region, and among social media users. Additionally, people without a formal job began to consume more through e-Commerce. The older population reduced their use of e-Commerce in the period, and the use of desktop and notebook computers, e-Banking, e-Government, and social media via cell phones remained unaltered.

The research contributes by showing changes in the relationships between socioeconomic factors and Internet use and the use of e-Commerce in Brazil as a result of the COVID-19 pandemic. Furthermore, the research carried out contributes by jointly analyzing several factors found in the literature that influence the use of e-commerce, through a representative base of the Brazilian population. The study shows the changes in Brazilian society resulting from the pandemic and the need to change practices to meet new forms of consumption.

E-Commerce and the COVID-19 pandemic

The quality of services is vital for an organization's profitability, regardless of the type of business or size. In general, providing and maintaining high-quality enhances an organization's ability to meet and exceed customer needs and requirements, obtaining customer satisfaction. This, in turn, increases reputation, revenue, and profits (Kotler & Keller, 2018). During the COVID-19 pandemic, there was a significant increase in the use of different electronic means to achieve these goals (Salamin et al., 2022).

Several European Union countries faced the pandemic by temporarily stopping business activities, hoping to reduce deaths. This decision had substantial negative economic consequences for the government, businesses, and individuals (Paraschiv et al., 2022). The pandemic created disruptions in the value chain, changed consumption patterns, and quickly raised lifestyle issues (Accenture, 2020a). As so many people were taking social distancing measures, there was a significant increase in online shopping transactions. According to Nielsen (2020), 50% of respondents reduced visits to shopping malls and entertainment activities, followed

by 46% who said they started to eat out less regularly, and 48% reduced their visits to coffee shops.

In Brazil, for example, several sectors were affected by the health crisis. Just at the start of the pandemic, between March and May 2020, the country's economy accumulated a loss of BRL 124.7 billion, according to the National Confederation of Commerce in Goods, Services, and Tourism. The Federation of Trade in Goods, Services, and Tourism of the State of São Paulo released at the end of 2020 that online commerce had become the most used means in the previous six months and that 46% of consumers used some online service. Also, according to the survey, 72% of people changed their consumption habits in the country (Fecomércio MG, 2020; Fecomércio SP, 2020).

Agus et al. (2021) explored how the behavior of online buyers and sellers changed due to the COVID-19 pandemic. The authors concluded that customer reviews positively affected e-Commerce performance before the pandemic, but that was not the case during the pandemic. This apparent paradox occurred because the economy was shaken in most sectors, and customers were worried about the effects of the pandemic, causing their behaviors to change, mainly in the problem recognition stage of the decision-making process, and buy only necessary items while rethinking and/or postponing the purchase of the items they wanted. Meanwhile, logistics outsourcing did not interfere with the relationship between perceived supply chain capacity and (relative) e-Commerce platform performance, unlike before the pandemic, as sellers were encouraged to supply products or perform promotional campaigns on items customers needed most.

The study by Guthrie et al. (2021) explores the reasons and implications of this change to understand how consumers used e-Commerce to react, deal with, and adapt to periods of restriction imposed by environmental situations. The study highlights the so-called online "unregulated purchases," such as impulse, unplanned, and compulsive purchases (LaRose, 2001), exploring the relationship between online purchases and hoarding behaviors. Wang et al. (2022) add that all abnormal buying behaviors are associated with consumers' emotional state of fear and anxiety due to uncertainties during the initial phase of the pandemic, building an unusual mentality of accumulation and stock.

Wang et al. (2022) revealed six categories of consumer behaviors changed due to the pandemic: i) health-related behaviors, ii) abnormal buying behaviors, iii)

technology-related behaviors, iv) information-related behaviors, v) leisure-related behaviors, and vi) prosocial behaviors. In addition, the authors pointed out that the pandemic caused fundamental concerns regarding personal health, which were integrated into consumption activities and led to healthy behaviors such as self-isolation, social distancing, and mask-wearing.

The pandemic also led to positive changes in consumer behavior, such as accelerated technology acceptance. The use of purchasing and delivering technologies without directly contacting suppliers has increased. While these technologies are not new to so-called modern shoppers, the pandemic has brought new considerations such as fear appeal, risk perception, and social norms in consumers' responses to technology. In addition, other technologies that facilitate consumers' socially distanced lifestyle, such as digital finance and e-Government tools, online connection tools, digital health tools, and virtual tourism tools, have also been explored (Wang et al., 2022).

Nistor (2021) analyzed the evolution of e-Commerce during the COVID-19 pandemic through a comparative analysis of online stores before and during the health crisis. Online commerce was among the sectors favored during the pandemic because it grew more during this period, bringing people of all ages to this segment.

In the European Union, for example, physical purchases were affected by the COVID-19 pandemic so much that online purchases continued to grow, managing to change people's preferences and certain habits. Furthermore, in 2020, online shopping increased by 4%, so 69% of people used the Internet for online shopping, and 72% of people ordered goods (Nistor, 2021).

Socioeconomic and internet usage factors

According to Linero Bocanegra and Botero Cardona (2020), the higher socioeconomic levels and the younger and economically active age groups are more likely, individually, to adopt e-Commerce. The socioeconomic class has a positive moderating effect on the relationship between ease of Internet use and purchase intention through e-Commerce. The lower economic classes tend not to adopt e-Commerce. In addition, people with higher levels of education are placed as innovation adopters. They tend to evaluate new technologies positively and attribute them a high value. Education increases the effect of social influence on the e-

Commerce purchase decision (Ansari, 2018; Barrichello et al., 2021; Sánchez-Torres et al., 2017).

Sex is one of the factors that marketing areas have explored. Studies usually point out that Internet use is similar for men and women (Hernández et al., 2011). However, Szymkowiak and Garczarek-Bąk (2018) diverge from this view and propose that there are different profiles between men and women when it comes to purchasing decisions, in which women are more motivated by emotional and social interaction compared to men. On the other hand, when it comes to education, highly educated consumers typically show a more positive attitude toward e-Commerce. Online consumers tend to have a higher education level than conventional consumers (Ansari, 2018). According to Tatnall and Lepa (2003), older people consider the Internet a threat since they perceive risk more than younger people. In addition, there is the skill factor with technologies and usability of the available tools, further increasing the difficulties of older people.

Lightner (2003) discusses the characteristics of the online shopping experience, relating it to demographic data and preferences by demographic group. According to the author, the sensorial impact of websites became less important as the interviewees increased in age, income, or education. The satisfaction analysis results indicated that, on average, there are strong preferences for online content's security, veracity, and integrity. Furthermore, detailed analyses suggested that preferences for other site features depend on age, education, and income levels, with older, highly educated, and high-income respondents emerging with clearly defined preferences for e-Commerce sites.

Li et al. (2020) raised another point of view, stating that e-Commerce affects the income gap between urban and rural areas in the global context. The authors showed that the development of e-Commerce increases the urban-rural income gap. Thus, the government should create more favorable conditions for popularizing rural e-Commerce to change this situation.

Owens and Sarov (2010) showed that as income increases, the degree of absolute risk aversion decreases, making individuals at lower income levels more risk averse as a greater proportion of their income can be lost if an uncertain decision has a negative impact. The authors referred to literature proposing that income and willingness to buy online will be positively correlated. In addition, they mentioned that, given the positive relationship between education and income, a positive

relationship between education and the likelihood of shopping online was expected. Thus, individuals with more education and income tend to see online shopping as beneficial.

Information technology can substitute urban agglomeration by reducing the cost of carrying out isolated economic activities in remote areas. De Blasio (2008) proposed that Internet use is much more frequent among urban compared to non-urban consumers. The use of e-Commerce is virtually unaffected by the size of the city where the user resides. Geographically distant consumers are discouraged from buying goods because they cannot inspect them beforehand. Leisure activities and cultural items (books, CDs, and tickets to museums and theaters) are the only goods and services for which e-Commerce is most used in isolated areas. In turn, Luo, Wang, and Zhang (2019) make the counterpoint with their studies in the Chinese market, which showed that in the interior regions, the development of e-Commerce contributed to the reduction of spatial inequality in consumption.

The technological advances of the last few years helped develop e-Government services, which emerged due to the interest in increasing government efficiency (Discua Cruz et al., 2022). The COVID-19 pandemic created a situation that accelerated this development since face-to-face services were interrupted to increase social distancing, and citizens had to adapt and start using technology to meet their needs.

Nguyen and Borazon (2022) showed that the development of e-Government was driven by security measures, trust building, government support, and social influence, leading citizens to adapt to technologies. Such adoption also depended on the perceived risks and benefits. In general, government support encouraging people to use e-Government is essential in times of uncertainty. Iqbal and Fridayani (2022) add to this discussion by showing that perceived ease of use, usefulness, and information quality were influential factors for the acceptance of e-Government implementation during the COVID-19 pandemic.

Regarding e-Banking, Chowdhury, Islam, Haque, Chowdhury, and Hossain (2022) observed that increasing the e-Banking communication environment improves customer satisfaction. It has become a challenge for all banks worldwide to keep up with the rapid technological development and provide services through various digital channels while ensuring the delivery of high-quality services.

Salamin et al. (2022) examined the quality of e-Banking services during the pandemic and how this aspect affected customer satisfaction. The results showed that reliability, efficiency, security, privacy, website/app design, and the services' usability positively influence overall customer satisfaction. Furthermore, Al-Hajri, Echchabi, Ghayas, and Akour (2022) indicated that bank customers are highly interested in using e-Banking services. On the other hand, they also revealed that the perceived ease of use, uncertainty, facilitating conditions, and self-efficacy affect the adoption of e-Banking and, therefore, have the potential to increase the adoption of this kind of service.

Social influence affects Internet use and specifically e-Commerce. For Sánchez-Torres et al. (2017), social influence positively affects the decision on the use of e-Commerce both for regular Internet and application users and non-users. According to Bhattacharyya and Bose (2020), social influence occurs through the effects of social media as drivers of e-Commerce. The call-to-action feature in any sponsored post or social media advertisement that redirects the user to an e-Commerce site offering the product is expected to influence the user's decision-making.

As for social media, several companies realized the opportunity to publicize their brands or increase sales through social commerce or s-commerce. This new modality of commerce is based on selling products and services directly on social media, such as Facebook, Twitter, Instagram, and LinkedIn. In this modality, the consumer can carry out all stages of the purchase process in the social media environment (Galinari et al., 2015).

Companies can strengthen their relationship with regular or potential customers, as social media can promote communication with them. Companies can clarify doubts, receive suggestions, and create customized shopping experiences through social media. Companies can still use direct or spontaneous marketing when users like or share the company's page, a product, or the shopping experience with their contacts. When these interactions are well managed, the probability of positive reviews of products and services can be increased, influencing new potential customers. On the other hand, when poorly managed, companies risk compromising their image since people are more likely to share negative experiences (Galinari et al., 2015).

Social media platforms have also changed the targeting approach of marketing strategies. Demographics such as age, sex, or income become relatively less

important. Conversely, they group people by what they do, think, like, and dislike, and most importantly, their behaviors, also known as behavioral targeting (Lee, 2013). Social media is a new channel for reaching different consumers and a new way of building knowledge and brands (Salem, 2019). Also, it is a new channel to reach new consumers.

Thus, from this literature, the following research hypothesis arises:

H1: The relationship between socioeconomic factors, Internet use, and the use of e-Commerce changed during the COVID-19 pandemic in Brazil.

Database and Methodology

This research used secondary data from the ICT Household survey conducted in Brazil in 2019 (Núcleo de Informação e Coordenação do Ponto BR - NIC.br, 2020) and in 2021 (Núcleo de Informação e Coordenação do Ponto BR - NIC.br, 2022), built with data collected between October 2019 and March 2020, and October 2021 and March 2022, respectively.

These surveys cover studies conducted by CETIC.br (<https://cetic.br/pesquisa/domicilios/>). CETIC.br is a department of The Brazilian Network Information Center (NIC.br) and adopts research methods based on guidelines and parameters established by multilateral international organizations. CETIC.br collected primary data using mobile devices and structured questionnaires and adopted the CAPI (Computer-Assisted Personal Interviewing) method. The sample has data from 20,536 households in 2019 (Núcleo de Informação e Coordenação do Ponto BR - NIC.br, 2020) and 21,011 households in 2021 (Núcleo de Informação e Coordenação do Ponto BR - NIC.br, 2022), both with national scope and representing, by inference, the Brazilian population.

Data were collected by random sampling, considering Brazilian households and their population over ten years of age as the target population. The sample was stratified based on clusters at multiple levels of selection using information from the Demographic Census and the National Household Sample Survey, both conducted by the main provider of data and information about the country, named Brazilian Institute of Geography and Statistics (IBGE – <https://www.ibge.gov.br>).

This study's target population was individuals who declared to have used the Internet in the last three months (Internet users). The sample for this population was

retrieved from the 2019 and 2021 ICT Household Survey and counted 13,332 responses and 14,582 responses, respectively.

In addition, individuals who declared “I do not know” or “It does not apply” for questions related to the variables of interest for this study were excluded from the analysis. Therefore, 13,187 responses formed the sample, representing an estimated population of 132,520,258 Brazilians in 2019, and 14,451 responses formed the sample, representing an estimated population of 147,277,701 in 2021.

Data were processed with the R[®] software, considering the sample selection structure (weight, stratum). The details and methodological choices are addressed in the following sections.

The dependent variable is related to e-Commerce and allows observing the phenomenon of buying or ordering products or services via the Internet in the last 12 months, even if the payment was made offline.

Table 1 presents the definition of e-Commerce and describes the independent variables sex, age, education level, economically active population, region of the country, and household area, and variables related to Internet use (devices used to access the Internet, social media use, e-Banking, and e-Government). The data analyzed considered the population who used the Internet in the last three months.

Table 1 – Definition of variables used in the research.

Dependent variable			Variable description
E-Commerce			In the last 12 months, the respondent bought or ordered products or services via the Internet, even if the payment was made offline
Socioeconomic variables and Internet use			Variable description
Sex			Corresponds to ‘male’ or ‘female’
Age group			Age group established based on the age
Level of education			Divided into four levels of education among ‘illiterate’ and

	'higher education'
Economically active population	Respondent's condition regarding economic activity (employed or not)
Region of the country	Regions of Brazil (North, South, Central-West, Northeast, Southeast)
Household area	Divided into Urban or Rural
Desktop	The respondent used the Internet on a desktop computer in the last three months
Notebook	The respondent used the Internet in a notebook in the last three months
Cell phone	The respondent used the Internet on a cell phone in the last three months
Social Media	The respondent used the Internet to participate on social media such as Facebook, Instagram, or Snapchat in the last three months
E-Banking	In the last three months, the respondent used the Internet to check financial information or make payments or other transactions
Social Media on Cell Phones	The respondent used a cell phone to access social media such as Facebook, Instagram, or Snapchat in the last three months
E-Government	Individuals that used electronic

government in the last three months

Source: Elaborated by the authors

The data was analyzed using two logistic regression models, assessing the influence of independent variables related to sociodemographic and Internet usage factors on the dependent variable e-Commerce for each year (2019 and 2021).

This approach made it possible to assess the relationship between the variables and statistically understand whether factors influencing e-Commerce changed before and during the COVID-19 pandemic in Brazil.

The Wald test was performed in the process of logistic regression analysis to assess the significance of each coefficient of the logistic equation in the model (Domínguez-Almendros et al., 2011; Hair et al., 2009; Heeringa et al., 2017). The Wald test verifies whether each estimated parameter significantly differs from zero, testing the hypothesis that a given coefficient is null.

Results and Discussions

Table 2 presents results related to the sociodemographic factors and factors related to Internet use. The number of people using e-Commerce increased from 40% to 46%, which means around 30% more Internet e-Commerce users, suggesting that around 15 million more people are shopping on Internet in 2021.

The profile of Internet users did not change regarding sex and level of education, but there was an increase in older people using the Internet in the period analyzed. In the last two age ranges, from 45 years old on, there was a larger increase than for the other age ranges showing the inclusion of older people among Internet users. There was also an increase in users in rural areas, which indicates that this group of Internet users had a higher level of use during the pandemic.

In terms of social media, there are around 19 million new users. Additionally, the number of Internet users that began to use e-Banking and e-Government services during the pandemic also increased. Online payments increased by 25 million new people buying. Despite a decrease in the number of people using a desktop for e-Commerce, there was a slight increase in the use of notebooks, and cell phone users substantially grew.

Table 2 – Estimates of totals and percentages concerning e-Commerce, sociodemographic, and Internet usage factors.

Variable	Responses	2019		2021	
		Total	%	Total	%
E-Commerce	No	80,045,747	60.4	79,200,981	53.8
	Yes	52,474,511	39.6	68,076,720	46.2
Sex	Male	63,818,488	48.2	72,070,716	48.9
	Female	68,701,770	51.8	75,206,985	51.1
Age Group	From 10 to 15 years old	27,988,465	21.1	30,922,379	21,0
	From 16 to 24	14,821,612	11.2	15,700,945	10.7
	From 25 to 34	26,907,826	20.3	27,036,730	18.4
	From 35 to 44	26,521,598	20.0	29,187,122	19.8
	From 45 to 59	25,678,705	19.4	29,494,815	20,0
	60 years old or more	10,602,051	8.0	14,935,710	10.1
Level of education	Illiterate/Preschool education	1,542,466	1.2	2,587,657	1.8
	Elementary school	46,878,089	35.4	51,257,009	34.8
	High school	52,669,887	39.7	59,796,336	40.6
	Higher education	31,429,816	23.7	33,636,699	22.8
Economically active population	Employed	86,496,417	65.3	94,747,269	64.3
	Unemployed	46,023,841	34.7	52,530,432	35.7
Region of the country	South East	57,620,213	43.5	63,032,124	42.8
	North East	34,064,913	25.7	38,236,489	26,0
	North	19,312,288	14.6	21,668,479	14.7
	South	10,987,250	8.3	12,785,055	8.7
	Central-West	10,535,593	8.0	11,555,554	7.8
Household area	Urban	119,164,924	89.9	129,041,729	87.6
	Rural	13,355,333	10.1	18,235,972	12.4
Desktop	No	102,242,456	77.2	120,866,046	82.1

	Yes	30,277,801	22.8	26,411,655	17.9
Notebook	No	94,916,181	71.6	108,803,127	73.9
	Yes	37,604,077	28.4	38,474,574	26.1
Cell phone	No	558,040	0.4	150,919	0.1
	Yes	131,962,218	99.6	147,126,782	99.9
Social Media	No	31,536,055	23.8	27,584,882	18.7
	Yes	100,984,203	76.2	119,692,819	81.3
E-Banking	No	88,562,773	66.8	78,716,781	53.4
	Yes	43,957,484	33.2	68,560,920	46.6
Social Media on Cell phones	No	31,191,117	23.5	26,444,033	18,0
	Yes	101,329,140	76.5	120,833,668	82,0
E-Government	No	52,039,448	39.3	54,355,687	36.9
	Yes	80,480,810	60.7	92,922,014	63.1

Source: elaborated by the authors

The next step was to verify how using e-Commerce was related to sociodemographic and Internet usage factors before and during the pandemic. Two logistic regression models were estimated (Table 3), adopting e-Commerce as the dependent variable in 2019 (model 1) and 2021 (model 2). In both models, the independent variables were sex, age group, level of education, economically active population (employed/unemployed), region of the country, and household area. Furthermore, other variables about Internet use were considered, such as device types, social media, e-Banking, and e-Government.

In 2019, before the pandemic, only sex, cell phone, and social media were not statistically significant to e-Commerce (model 1). It was not possible to find a difference between women and men in their behavior toward e-Commerce. As for cell phone use, it was not significant since practically everyone uses the Internet on their cell phones (only 0.4% do not). During the pandemic in 2021 (model 2), social media was significant, and individuals that used the Internet to access social media, such as Facebook, Instagram, or Snapchat, had a 1.9 times greater chance of purchasing via e-Commerce. Thus, it is possible to conclude that during the pandemic, social media began to play an important role in the operationalization of

trade in products and services, becoming an increasingly effective marketing channel, corroborating (Barrichello et al., 2021; Galinari et al., 2015; Lee, 2013; Salem, 2019). As for the variable regarding the employed population, the results demonstrated that it was not statistically significant, i.e., there were no differences in the participants' behavior regarding e-commerce when analyzing those employed and non-employed. Tables 2 and 3 verify that e-Commerce has increased both for the economically active and non-active population, corroborating Li et al. (2020). However, as both grew proportionally, it was not possible to detect a significant difference between the two groups.

Regarding the age group, only the older population (60 years old or more) was statistically significant for e-Commerce compared to young adults (from 25 to 34) in 2019. Older age reduced the chance of e-Commerce by 30%. In 2021, the chance of older adults adopting e-commerce dropped by 50%. Such results, observed in Tables 2 and 3, may indicate that with the pandemic, there was an increase in the number of older people using the Internet, as pointed out by Nistor (2021) and Wang et al. (2022), but this was not reflected in a higher proportion of e-Commerce by this age group. Such information may be useful for marketing areas in future promotional campaigns for this audience to seek the best way to reach them to achieve sales.

Regarding the level of education, individuals with higher education were 2.9 times more likely to buy via the Internet than those who were illiterate or had preschool education in 2019. During the pandemic, the higher the level of education, the greater the chances of purchasing through e-Commerce. Individuals with higher education had about 5.4 times more chance of buying than those illiterate or with preschool education, and individuals that completed high school or elementary school had about three times more chance of using e-Commerce. Thus, it was concluded that during the pandemic, populations with other educational levels started to buy or bought more online, corroborating Ansari (2018), Linero Bocanegra and Botero Cardona (2020), and Sánchez-Torres et al. (2017). Also, it is possible to say that people with a low level of education lost purchasing power, with less access to credit and technology. Therefore, society and public authorities should minimize this situation of exclusion, also observed in non-pandemic times.

Regarding the household variable, a statistically significant difference between rural and urban areas can be observed before and during the pandemic, which was practically maintained, corroborating De Blasio (2008). However, this difference was

reduced in 2021. Before the pandemic, living in rural areas reduced the chance of e-Commerce by about 36%, and in 2021, this percentage changed to 31%, which may show that people in rural areas had to adapt to the use of e-Commerce as a result of the pandemic.

In 2019, only individuals living in the North of Brazil presented a statistically significant difference with 40% less chance of buying through e-Commerce than individuals in the Southeast (reference area). During the pandemic, this percentage decreased to 53%, and the Northeast also presented a statistically significant difference with 42% less chance of e-Commerce than individuals who live in the Southeast. This result emphasizes the discrepancy between the country's southeastern region, which is more developed, showing that it was more technologically and economically prepared to face the pandemic.

Table 3 – Logistic Regression for e-Commerce in 2019 (model 1) and 2021 (model 2)

	Model 1		Model 2	
Coefficients:	Odds Ratio	p-value	Odds Ratio	p-value
(Intercept)	0.180	0.004	0.019	0.001
(ref = Sex - Male)				
Female	0.926	0.420	0.822	0.329
(ref = Age group - From 25 to 34)				
From 10 to 15 years old	0.702	0.069	0.744	0.393
From 16 to 24	1.061	0.670	0.974	0.878
From 35 to 44	0.887	0.458	1.323	0.292
From 45 to 59	0.930	0.623	0.982	0.926
60 years old or more	0.705	0.023	0.514	0.030
(ref = Level of education - Illiterate/Preschool education)				
Elementary school	1.114	0.767	2.943	0.039
High school	1.683	0.145	3.229	0.019
Higher education	2.873	0.003	5.375	0.001
(ref = EAP - Employed)				

Unemployed	0.787	0.032	1.358	0.143
(ref = Region - Southeast)				
Northeast	0.839	0.135	0.584	0.001
South	0.922	0.573	1.175	0.397
North	0.591	0.002	0.465	<0.001
Central-West	0.734	0.098	0.808	0.196
(ref = Household area - Urban)				
Rural	0.638	0.006	0.693	0.014
(ref = Desktop - No)				
Yes	1.515	0.001	2.148	<0.001
(ref = Notebook - No)				
Yes	2.275	<0.001	1.913	<0.001
(ref = Cell phone - No)				
Yes	0.398	0.068	1.436	0.727
(ref = Social media - No)				
Yes	1.208	0.211	1.919	0.009
(ref = e-Banking - No)				
Yes	4.104	<0.001	4.358	<0.001
(ref = Social media on Cell phone - No)				
Yes	1.871	<0.001	1.873	0.008
(ref = e-Government - No)				
Yes	2.231	<0.001	1.877	0.001

Source: elaborated by the authors

Lastly, regarding variables of Internet use as a type of devices, e-Banking, and e-Government, it can be highlighted that: 1) Desktop users have 1.5 times (in 2019) and 2.1 times (in 2021) more chance of buying on the Internet than non-users; 2) Notebook users have 2.3 times (in 2019) and 1.9 times (in 2021) more chance of buying on the Internet than non-users; 3) increase from 4.1 times (2019) to 4.4 times (2021) the chance of using the Internet to check financial information or make payments or other transactions (e-Banking); 4) decrease from 2.2 times (2019) to 1.9 times (2021) the chance of individuals that used e-Government to use e-Commerce.

In general, Internet use variables remained significant for e-Commerce. Despite the little variation, before and during the pandemic, the use of e-Banking and e-Government remained important and with relevant use, regardless of the occurrence of the pandemic, corroborating Al-Hajri et al. (2022), Chowdhury et al. (2022), Discua Cruz et al. (2022), Iqbal and Fridayani (2022), Nguyen and Borazon (2022), and Salamin et al. (2022). In this way, it can be stated that the established hypothesis H1 was confirmed.

Conclusion

This study aimed to verify possible changes in the relationship between socioeconomic factors and Internet use, and e-Commerce in Brazil during the COVID-19 pandemic, considering the years 2019 and 2021, using secondary data from household surveys conducted in Brazil by CETIC.br, a department of The Brazilian Network Information Center (NIC.br).

In general terms, the results showed an increase in consumption through e-Commerce among people with lower levels of education living in the northeast region of Brazil and among social media users. Also, people without a formal job increased the use of e-Commerce, which is a possible effect of assistance programs, public policies adopted during the pandemic, and civil society mobilization.

On the other hand, older adults over 60 reduced the use of e-Commerce, suggesting that family and friends may have supported them. Also, the more aggressive effects of the pandemic on this age group cannot be ruled out.

The findings showed that the use of desktops and notebooks is still relevant but remained unchanged during the period. The same behavior was observed regarding e-Banking, e-Government, and social media access via cell phone.

The academic contribution of this study lies in evaluating changes in the relation on several factors and the use of e-Commerce during COVID-19 pandemics in Brazil. In addition, the research carried out contributes by jointly analyzing several factors found in the literature that influence the use of e-commerce, through a representative base of the Brazilian population.

As for managerial contributions, the study revealed changes experienced by society due to the pandemic and pointed out the need for changing practices to meet new forms to serve the consumers. It is worth reinforcing that the sample used is

representative of the population, so these results can be extrapolated when used to inform broader and more accurate decision-making processes.

The fact that the study was based exclusively on secondary data is a limitation. Also, other factors related to e-Commerce were not considered and can be addressed in future studies, such as the factors related to deciding to consume through e-Commerce. Finally, future research may contribute by adopting different databases and analysis techniques.

References

Accenture. (2020a). Channel Shift: Prioritizing Digital Commerce. Navigating the Human and Business Impact Of COVID-19. Retrieved December 22, 2022, from https://www.accenture.com/_acnmedia/Thought-Leadership-Assets/PDF-2/Accenture-COVID-19-Channel-Shift-Prioritizing-Digital-Commerce.pdf

Accenture. (2020b). Respond, Reset and Renew. Navigating the Impact of COVID-19 in Consumer Goods. Retrieved December 22, 2022, from https://www.accenture.com/_acnmedia/PDF-121/Accenture-COVID-19-Consumer-Goods-Rapid-Response.pdf

Agus, A. A., Yudoko, G., Mulyono, N., & Imaniya, T. (2021). E-Commerce Performance, Digital Marketing Capability and Supply Chain Capability within E-Commerce Platform: Longitudinal Study Before and After COVID-19. *International Journal of Technology*, 12(2), 360–370. <https://doi.org/10.14716/ijtech.v12i2.4122>

Al-Hajri, S., Echchabi, A., Ghayas, S., & Akour, M. A. (2022). Customers' Acceptance of E-banking During the COVID-19 Pandemic: The Case of Oman. In Abdelghani Echchabi, Rihab Grassa, & Welcome Sibanda (Eds.), *Contemporary Research in Accounting and Finance* (pp. 237–251). Palgrave Macmillan, Singapore. https://doi.org/10.1007/978-981-16-8267-4_10

Ansari, Z. A. (2018). Socio cultural influences on online shopping behaviour. *Journal of Business and Retail Management Research*, 13(2), 255–263.

Barrichello, A., Morano, R. S., & Santos, E. G. dos. (2021). Online purchase decision after viewing ads: factors related to sociodemographic and Internet use on different digital channels. *Int. J. of Internet Marketing and Advertising*, (ahead-of-print).

- Bhattacharyya, S., & Bose, I. (2020). S-commerce: Influence of Facebook likes on purchases and recommendations on a linked e-commerce site. *Decision Support Systems*, 138(August), 113383. <https://doi.org/10.1016/j.dss.2020.113383>
- Caldeira, T. A., Ferreira, J. B., Freitas, A., & Falcão, R. P. de Q. (2021). Adoção de Pagamentos Móveis no Brasil: Prontidão para a Tecnologia, Confiança e Qualidade Percebida. *Brazilian Business Review*, 18(4), 415–432.
- Chowdhury, S. A., Islam, S., Haque, S., Chowdhury, M. S. R., & Hossain, M. E. (2022). CUSTOMER TRUST IN E-BANKING DURING COVID-19. *FINANCE AND BANKING*, 10(1), 45–53.
- Clark, D. (2018). *Alibaba: the House that Jack Ma Built*. New York, NY: HarperCollins Publishers.
- De Blasio, G. (2008). Urban – Rural Differences in Internet Usage, e-Commerce, and e-Banking: Evidence from Italy. *Growth and Change*, 39(2), 341–367.
- Discua Cruz, A., Reyes Hernandez, J. M., & Arias Arévalo, C. R. (2022). Mind the queue: understanding challenges of introducing e-government policies for entrepreneurs during Covid-19 in a Latin American country. *Information Technology and People*, ahead-of-p(ahead-of-print). <https://doi.org/10.1108/ITP-09-2021-0726/FULL/XML>
- Domínguez-Almendros, S., Benítez-Parejo, N., & Gonzalez-Ramirez, A. R. (2011). Logistic Regression Models. *Allergol Immunopathol (Madr)*, 39(5), 295–305. <https://doi.org/10.1016/j.aller.2011.05.002>
- Esteves, Y. de O. (2011). Marketing, Internet e o Comportamento do E-Consumidor. In *VII Congresso Nacional de Excelência em Gestão*. Rio de Janeiro, RJ.
- Fecomércio MG. (2020). Covid-19: comércio brasileiro acumula prejuízo de R\$ 124,7 bilhões - Fecomércio MG. Retrieved November 5, 2022, from <https://www.fecomerciomg.org.br/news/covid-19-comercio-brasileiro-acumula-prejuizo-de-r-1247-bilhoes/>
- Fecomércio SP. (2020). Volatilidade na economia e tensão política agravam situação gerada pela pandemia. Retrieved November 5, 2022, from <https://fecomercio.com.br/conselhos/conselho-de-economia-empresarial-e-politica/noticias/volatilidade-na-economia-e-tensao-politica-agravam-situacao-gerada-pela-pandemia>

- Galinari, R., Cervieri Junior, O., Teixeira Junior, J. R., & Rawet, E. L. (2015). *Comércio eletrônico, tecnologias móveis e mídias sociais no Brasil* (BNDES Setorial Varejo No. BS 41). *BNDES Setorial* (Vol. 41). Rio de Janeiro.
- Geçit, B. B., & Taşkin, E. (2020). The Effect of Value and Service Perceptions on Customer Loyalty for Electronic Commerce Sites; Mediator Role of Satisfaction and Trust. *Business Management Dynamics*, 10(5), 1–12.
- Guthrie, C., Fosso-Wamba, S., & Arnaud, J. B. (2021). Online consumer resilience during a pandemic: An exploratory study of e-commerce behavior before, during and after a COVID-19 lockdown. *Journal of Retailing and Consumer Services*, 61, 102570. <https://doi.org/10.1016/j.jretconser.2021.102570>
- Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2009). *Análise Multivariada de Dados* (6th ed.). Porto Alegre, RS: Bookman Editora.
- Heeringa, S., West, B., & Berglund, P. (2017). *Applied Survey Data Analysis*. New York, NY: Chapman and Hall. <https://doi.org/10.1201/9781315153278>
- Hernández, B., Jiménez, J., & Martín, M. J. (2011). Age, gender and income: Do they really moderate online shopping behaviour? *Online Information Review*, 35(1), 113–133. <https://doi.org/10.1108/14684521111113614/FULL/XML>
- Iqbal, M., & Fridayani, H. D. (2022). E-Government Acceptance Model During Covid-19 Crisis in Tainan City, Taiwan. *TRANSFORMASI: Jurnal Manajemen Pemerintahan*, 14(1), 1–11. <https://doi.org/10.33701/jtp.v14i1.1861>
- Kim, R. Y. (2020). The impact of COVID-19 on consumers: Preparing for digital sales. *IEEE Engineering Management Review*, 48(3), 212–218. <https://doi.org/10.1109/EMR.2020.2990115>
- Kotler, P., & Keller, K. (2018). *Administração de Marketing* (15th ed.). São Paulo, SP: Pearson Prentice Hall.
- LaRose, R. (2001). On the negative effects of e-commerce: A sociocognitive exploration of unregulated on-line buying. *Journal of Computer-Mediated Communication*, 6(1), JCMC631.
- Lee, E. (2013). *Impacts of social media on consumer behavior: Decision Making Process*. Turku University of Applied Sciences.
- Li, L., Zeng, Y., Ye, Z., & Guo, H. (2020). E-commerce development and urban-rural income gap: Evidence from Zhejiang Province, China. *Papers in Regional Science*, 1–20. <https://doi.org/https://doi.org/10.1111/pirs.12571>

Lightner, N. J. (2003). What users want in e-commerce design: Effects of age, education and income. *Ergonomics*, 46(1–3), 153–168. <https://doi.org/10.1080/00140130303530>

Linero Bocanegra, J. P., & Botero Cardona, L. F. (2020). Hábitos de consumo en plataformas e-commerce en adultos jóvenes de la ciudad de Bogotá. *Revista Universidad & Empresa*, 22(38), 211–236. <https://doi.org/https://doi.org/10.12804/revistas.urosario.edu.co/empresa/a.8131>

Luo, X., Wang, Y., & Zhang, X. (2019). *E-Commerce Development and Household Consumption Growth in China* (Poverty and Equity Global Practice No. 8810). *E-Commerce Development and Household Consumption Growth in China*. <https://doi.org/10.1596/1813-9450-8810>

Lyu, D., Zhou, L., & Ma, X. (2022). Income-increasing effect of e-commerce of agricultural products based on IT absorptive theory. *Wireless Networks*, 28(5), 2337–2344. <https://doi.org/10.1007/s11276-022-02904-2>

Nguyen, H. T., & Borazon, E. Q. (2022). Drivers of e-government use during the COVID-19 pandemic: the case of Vietnam. *Online Information Review, ahead-of-print*(ahead-of-print). <https://doi.org/10.1108/OIR-08-2021-0440/FULL/XML>

Nielsen. (2020, April). Race Against COVID-19: A Deep Dive on How Indonesian Consumers Are Reacting to the Virus | Nielsen. Retrieved December 22, 2022, from <https://www.nielsen.com/insights/2020/race-against-covid-19-deep-dive-on-how-indonesian-consumers-react-towards-the-virus/>

Nistor, A. (2021). The influence of the COVID-19 pandemic on e-Commerce. Trends and challenges before and after COVID-19. *Revista Economica*, 73(3), 151–161.

Núcleo de Informação e Coordenação do Ponto BR - NIC.br. (2020). *Pesquisa sobre o uso das tecnologias de informação e comunicação nos domicílios brasileiros: TIC domicílios 2019*. São Paulo, SP: Comitê Gestor da Internet no Brasil - CGI.br. Retrieved from www.cgi.br

Núcleo de Informação e Coordenação do Ponto BR - NIC.br. (2022). *Pesquisa sobre o uso das tecnologias de informação e comunicação nos domicílios brasileiros: TIC domicílios 2021*. São Paulo, SP: Comitê Gestor da Internet no Brasil - CGI.br. Retrieved from www.CGI.br

Owens, T. R., & Sarov, M. G. (2010). Determinants of Consumer Attitudes Towards E-commerce. *Issues in Political Economy*, 19, 29–50.

- Paraschiv, D. M., Titan, E., Manea, D. I., Ionescu, C. D., Mihai, M., & Serban, O. (2022). The change in e-commerce in the context of the Coronavirus pandemic. *Management and Marketing*, 17(2), 220–233. <https://doi.org/10.2478/mmcks-2022-0012>
- Park, C., Jun, J. K., & Lee, T. M. (2015). Do mobile shoppers feel smart in the smartphone age? *International Journal of Mobile Communications*, 13(2), 157–171.
- Salamin, S., Al-Tawara, F., & Qusef, A. (2022). The Correlation between E-Banking Services Quality and Customers' Satisfaction During COVID-19 Pandemic: A Case Study. In *International Conference on Engineering & MIS (ICEMIS)* (pp. 1–7). Istanbul: IEEE.
- Salem, E. A. (2019). *Assessing consumer behaviour within the context of social media marketing*. Brunel University, London.
- Sánchez-Torres, J. A., Arroyo-Cañada, F. J., Varon-Sandobal, A., & Sánchez-Alzate, J. A. (2017). Diferencias entre compradores y no compradores en el comercio electrónico en Colombia: El efecto moderador del nivel educativo y del estado socio-económico en la intención de compra electrónica. *Revista DYNA (Colombia)*, 84(202), 175–189. <https://doi.org/10.15446/dyna.v84n202.65496>
- Sheth, J. N. (2020). Impact of Covid-19 on consumer behavior: Will the old habits return or die? *Journal of Business Research*, 117, 280–283.
- Szymkowiak, A., & Garczarek-Bąk, U. (2018). Gender Differences in E-commerce. *Handel Wewnętrzny*, 4(375 tom II), 250–261.
- Tatnall, A., & Lepa, J. (2003). The Internet, e-commerce and older people: an actor-network approach to researching reasons for adoption and use. *Logistics Information Management*, 16(1), 56–63. <https://doi.org/10.1108/09576050310453741>
- Tran, L. T. T. (2021). Managing the effectiveness of e-commerce platforms in a pandemic. *Journal of Retailing and Consumer*, 58, 102287.
- Wang, X., Shi, W., & Yuen, K. F. (2022). A synthesised review of pandemic-driven consumer behaviours and applied theories: Towards a unified framework. *International Journal of Disaster Risk Reduction*, 77(January), 1–13. <https://doi.org/10.1016/j.ijdr.2022.103104>

