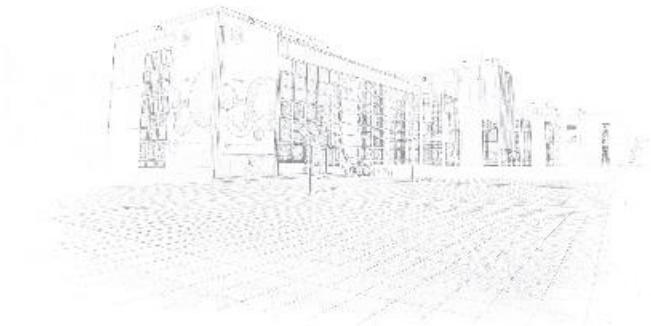

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Dissertação de Mestrado:

Brazilians Acceptance on Multi Attribute Reverse Auction Model for B2C ecommerce's

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Marketing e Negócios Digitais

Brazilians Acceptance on Multi Attribute Reverse Auction Model for B2C ecommerce's

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ABSTRACT

Different types of e-commerce's have been used worldwide for years and among them we have some models such as business-to-business (B2B), business-to-consumer (B2C), business-to-government (B2G), and customer-to-customer (C2C). This study addresses the use of auctions in a business-to-consumer (B2C) model. More specifically, it makes an analysis of the Brazilians acceptance over an e-commerce system which uses an adaptation of the auction variety, the multi attribute reverse auction.

Based on a questionnaire applied to a sample of 73 individuals, this study tests the Brazilian individuals´ acceptance on auctions when considering online shopping, using descriptive statistics and confirmatory factor analysis (CFA, a structural equation model), with SPSS tool. It has been employed the technology acceptance model (TAM), previously used in different studies, a measurement scale that we adapted to assess the likability of Brazilians to use a multi attribute reverse auction e-commerce as well as the factors that lead them to that.

Results from this study shows the perceived usefulness and the likability of Brazilians to use a multi attribute reverse auction e-commerce.

Combining auctions to e-commerce is not yet very studied, therefore this research allows important insights for practitioners and academics.

As far as research limitations, this study is limited to the Brazilian market, therefore limiting extrapolations.

In practice, the research seems to prove that brands should pay attention to reverse auction e-commerce as another way to allow a unique experience and a complete omni channel strategy, using all the possible touching points to meet consumers purchase behaviors.

Keywords: Reverse auction, E-commerce, Online purchase, TAM, Consumers' behavior.

SUMMARY

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INTRODUCTION

E-commerce is a concept that can be extended to any type of business or commercial transaction that involves the transfer of information over the Internet. E-commerce is currently one of the most important phenomena, growing worldwide, and it allows consumers to buy goods and services electronically, without barriers of time or distance. This results in countless advantages for companies (Bamfield, 2013; Chintagunta et al., 2012; Balabanis et al., 2006). The following derivations are considered: (1) Mobile commerce (commerce through mobile devices); (2) T-commerce (commerce through the medium of television) and (3) Social commerce (commerce using social networks), among others (websites, market places…).

As far as e-commerce, it is possible to identify the following main types: Business-to-Business (B2B); Business-to-Consumers (B2C); Consumer-to-Consumer (C2C); Consumer-to-Business (C2B); Business-to-Administration/Government (B2A/B2G); Business-to-Institutions (Activated between institutions); Business-to-Employee (sales to employees); Consumer-to-Administration/Government (C2A/C2G – e.g.: paying taxes); E-procurement. Each of this business models represent a different operation between sellers and buyers (Abdelkarim and Nasereddin, 2010).

Mobile commerce is an increasingly necessary option, due to the growth of consumption through smartphones and tablets. Some virtual store environments are being designed to be used on mobile phones with the same quality — without harming the shopping experience itself. In other words, m-commerce is a way to allow accessing to products and services using a wireless environment, mainly the internet. It aims to allow information exchange and products or services transactions using a mobile device, therefore allowing users to access information and services at any time, from anyplace – convenience and easy to purchase goods or services (Abdelkarim and Nasereddin, 2010).

In 2018, $25.6 trillion was the money spent globally through e-commerce. In 2020 the world faced an increase on transactions (UNCTAD, 2020) and, in Brazil, the e-commerce volume is expected to keep growing until at least 2023 (Statista, 2020).

In 2020, when pandemic period of COVID-19 hit the world economy, people's behavior had changed over the interaction with each other (Bhatti, et al., 2020; Ma, 2020; Ye, 2020).

Because of COVID-19 e-commerce sales increased, due to people trying to keep social distance and prioritizing buying from home (Bhatti, et al., 2020).

Official statistics from seven countries, including China and United States, which represents half of global GDP show that online retail rose significantly in these countries from around $2 trillion in 2019, to around $2.5 trillion in 2020 and $2.9 trillion in 2021 (UNCTAD, 2022).

Since the 90's, electronic auctions (a type of auction adapted to e-commerce) have successfully been employed in B2C and C2C e-commerce activities on the Internet – reverse auction. Mainly organizations and governments used this model to make commercial transactions. Different from traditional auctions, where bidders bid greater values in order to win the auction and get a specific good or service, in reverse auction, buyers refer to maximum prices they accept to pay in exchange for goods or services and, subsequently, potential sellers offer proposals with values equal to or lower than those mentioned by the interested entities (Menezes, Silva and Linhares, 2007).

Reverse auctions can have multi-attributes on it, so providing benefits either to suppliers, because of an increasing on negotiation possibilities, and, above all, to the buyers, who can consider many attributes and alternatives before choosing a specific supplier (Yan and Yuan, 2012).

We start this research by mentioning its main objective, brief explanation on methodology and specific motivation. We than present the literature review done in

related concepts. Research model and Methodology are explained and Data collected are presented. We end this work by stating main conclusions, limitations and recommendations for future work.

CHAPTER 1 – REASON WHY, MOTIVATION AND DATA COLLECTION

1.1 Objective

The main objective of this study is to understand if Brazilians are familiar with the concept of electronic auctions, therefore evaluating their acceptance and main motivations to use a multi-attribute reverse auction to buy something on the internet.

1.2. Motivation

The motivation to do this study came from the idea that multi-attribute reverse auction model may provide benefits for people involved in the process of purchasing goods or services. Besides, it could also help vendors to get more sales opportunities (Yan and Yuan, 2012).

1.3. Methodology – brief description

Based on a previous and several times used model to measure purchase intention, this study was carried out using the TAM model (Davis et al., 1989). For a quantitative analysis, data was collected from Brazilian individuals through an online questionnaire. We further applied a Confirmatory Factorial Analysis, a model of structural equation model (SEM) to extract results, using the SmartPLS tool (Ramayah et. al., 2017; Khoi & Ngan, 2019; Mekić & Hadžimusić, 2020).

CHAPTER 2 - LITERATURE REVIEW

2.1. E-commerce definition and its evolutions through time

The e-commerce, acronym to electronic commerce, represents all types of commercial transactions, for profit or not, carried out using electronic equipment, such as Tablets, Smartphones and Computers (Chintagunta et al., 2012; Bamfield, 2013; Balabanis et al., 2006; Nasir, 2017); in other words, e-commerce is the process of using a network, mainly internet, in order to buy and sell goods, or even transmitting funds or data (Khan, 2020). The expression e-retail is also sometimes used, referring to the transactional processes for online shopping (Khan, 2020).

It is worldwide accepted that e-commerce begun in the 1960's, with companies starting to use EDI (Electronic Data Interchange) to share business documents (eg. product orders; debit and credit documents) with other companies (Khan, 2020); in 1979, the ANSI (American National Standards Institute) developed ASC X12 as a universal standard for companies to share documents through electronic networks (Khan, 2020). In the 1980's, the world economy assisted to a considerable increase in the number of individuals and organizations starting to share electronic documents and, by the 1990's, the rise of eBay and Amazon totally changed and revolutionized the e-commerce industry.

E-commerce involves different models of operation, as previously stated - business-to-business (B2B), business-to-consumer (B2C), business-to-government (B2G), consumer-to consumer(C2C) and mobile commerce are the most commonly used (Nisar, 2017; Khan, 2020). Considering these types of transactions, it is said that B2C and C2C have the same objective, meaning to reach the final user. By adopting an e-commerce model, businesses are enhancing their own competitive advantages (Nisar and Prabhakarc, 2017; Khan, 2020).

E-commerce shopping experience is different from the traditional shopping experience (Nisar, 2017): (1) location: people who buys offline tend to choose a

nearby location to do it, which differs from online shopping, where the shopping experience is available anywhere, anytime (24/7) and worldwide. (2) Online stores have no physical existence and this allows a prompt answer to market changes and requests; that is not possible on physical stores due to structure costs and operational strategies. (3) Online shopping, despite its convenience, represents a considerable risk to consumers, since they are not able to touch and try the products before receiving them.

Despite the differences and some risks associated to e-commerce, there is a considerable number of advantages for companies that decide to introduce e-commerce models in their strategies: it's around the clock availability (allowing 24x7, worldwide), the speed of access (on offline stores people can be affected by crowds; e-commerce sites or market places run quickly), the wide availability of goods and services (ex.: Amazon's first slogan: Earth's Biggest Bookstore), easy to access (in e-commerce, clients can browse the product category and use the site search feature to find the product in a quick way) and international reach, since e-commerce is based on internet, they enable any business to access the global market (Nasir, 2017; Khan, 2020). Last, but not the least, e-commerce implies lower costs (mainly shipping and warehouse costs) and few or no structure costs, such as rent, inventory, cashiers, among others – Khan, 2020).

2.2. E-commerce Globally

According to the United Nations Conference on Trade and Development (UNCTAD, 2020), in 2018 sales in E-commerce hit $25.6 trillion globally, an increase of 8% compared to 2017. Besides, 30% of global gross domestic product (GDP), in 2018, has come from business-to-business (B2B) and business-to-consumer (B2C) e-commerce sales (UNCTAD, 2020).

In 2018, $21 trillion represented the value of B2B e-commerce globally, considering market platforms and electronic data interchange transactions. For B2C e-commerce the value reached $4.4 trillion, an increase of 16% compared to 2017 (UNCTAD, 2020).

United States mastered, by 2018, the overall e-commerce market sales along with China and United Kingdom as seen in Table 1 (UNCTAD, 2020).

Table 1. E-commerce sales: Top ten economies in 2018.

Rank	Economy	Total e-commerce sales ($ billion)	Share of total e-commerce sales in GDP (%)	B2B e-commerce sales ($ billion)	Share of B2B e-commerce sales in total e-commerce (%)	B2C e-commerce sales ($ billion)
1	United States	8,640	42	*7,542*	87	*1,098*
2	Japan	3,280	66	3,117	95	163
3	China	2,304	17	943	41	1,361
4	Korea (Rep.)	*1,364*	84	*1,263*	93	102
5	United Kingdom	918	32	652	71	266
6	France	807	29	687	85	121
7	Germany	722	18	*620*	86	101
8	Italy	*394*	19	*362*	92	*32*
9	Australia	348	24	326	94	21
10	Spain	333	23	261	78	72
	10 above	**19,110**	**35**	**15,772**	**83**	**3,338**
	World	***25,648***	**30**	***21,258***		**4,390**

Source: UNCTAD, 2020.

We have assisted to a considerable variance on internet user and purchases online among the top 20 economies. In 2018, 87% of worldwide internet users purchased online; in Thailand and India, 14% and 11%, respectively, also brought online (UNCTAD, 2020).

It grows, in fact, the global online shoppers, when analyzing data from 2016 to 2018; in 2018, having an increase of 9% compared to the previous year, it accounted for 1.4 billion people shopping online, representing one quarter of the world's population aged 15 and older (UNCTAD, 2020).

Chart 1. Global online shoppers (million), 2016-2018.

Source: UNCTAD, 2020.

In 2020, when pandemic period of COVID-19 hit the world economy, people's behavior had changed over the interaction with each other. By the time the World Health Organization (WHO) published pandemic guidelines for lock-downs to contain the stop the spread of the virus and a global economy crisis has urged (Bhatti, et al., 2020; Ma, 2020; Ye, 2020).

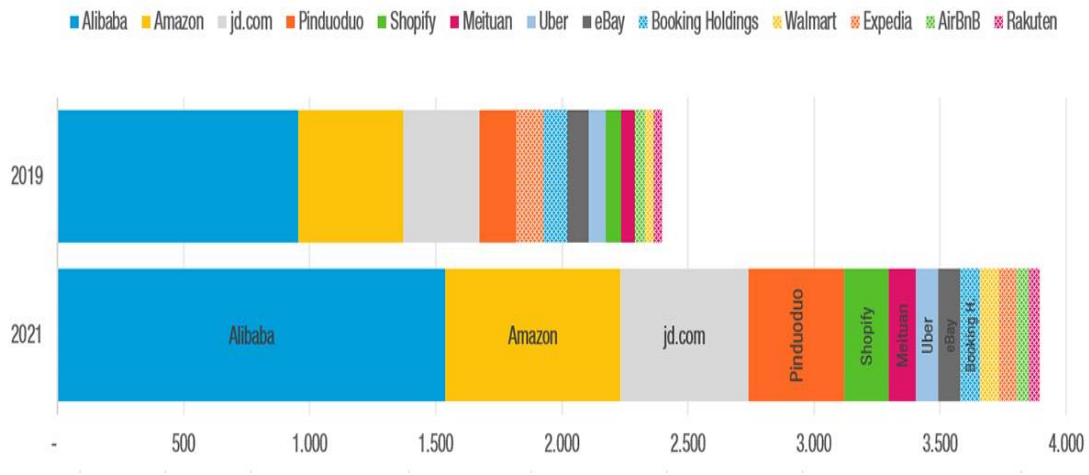
According to research 52% were avoiding crowded areas and go brick and mortar shopping, along with that 36% were willing to come back to brick and mortar shopping only after having the corona virus vaccine (Bhatti, et al., 2020). Besides, sales in e-commerce increased because of COVID-19, since people were trying to keep social distance and prioritizing buying from home (Bhatti, et al., 2020).

Across 66 countries, it was noticed an increase of internet users who bought something online, from 53% before the pandemic (2019) to 60% along the pandemic period (2020/21). Developing countries before pandemic with a low adoption of e-commerce have faced the most increasing numbers of consumer online. In the United Arab Emirates, users who shopped online more than doubled, from 27% in 2019 to 63% in 2020. In Bahrain it was three times more than previously, reaching 45% in 2020, and in Uzbekistan it rose from 4% in 2018 to 11% in 2020 (UNCTAD, 2022).

Official statistics from seven countries, including China and United States, which represents half of global GDP show that online retail rose significantly in these countries from around $2 trillion in 2019, to around $2.5 trillion in 2020 and $2.9 trillion in 2021 (UNCTAD, 2022).

Some of the biggest online retailers and market businesses have seen their revenue to go up in pandemic time. Among a group of a top 13 consumer-based e-commerce Alibaba, Amazon, JD.com and Pinduoduo increased their revenues by 70% between 2019 and 2021, also their share of total sales has increased through all these 13 platforms, rising from around 75% in 2018 and 2019 to over 80% in 2020 and 2021 as shown in Chart 2 (UNCTAD, 2022).

Chart 2. Sales in billion dollars by major consumer-focused e-commerce businesses before and during the pandemic.



Source: UNCTAD, 2020.

In United States, it was expected a rise from $431.6 billion to $469.2 billion in e-commerce from 2020 to 2021. Along with that, in 2021 a survey showed that 60% of shoppers would rather be grocery shopping online than physically, an increasing rate compared to 45% in 2020 (Forbes, 2021).

Besides having a tough 2020, the e-commerce retail faced a double digit growth and it keeps growing. In Latin America from 2020 to 2021 e-commerce sales rose 25%; the same happened in Russia, UK, and Philippines' markets with a rise of over 20% in online sales. Following the growth period Indian e-commerce market is supposed to grow from $46.2 billion in 2020 to $111.4 billion by 2025 (Shopify, 2022).

2.3. E-commerce business models

2.3.1. B2C E-commerce

B2C happens when a company sells a good or a service to a final consumer (individual) or a group of consumers (Khan, 2020). It is mainly associated to retail and/or for trading information (Drigas and Leliopoulos, 2013; Kumar and Raheja, 2012): individuals visit a company website or a marketplace, click on a shopping link that will lead them to a list of offers, where they can accomplish the purchase of the desired products and / or services.

This model of ecommerce can be supported by some specific elements, like catalogues, orders, price lists, product maintenance guarantees and credit card processing (Kumar and Raheja, 2012).

2.3.2. B2B E-commerce

According to Khan (2020), B2B e-commerce best definition consists in transactions between two organizations (e.g.: a company selling packages to another company that will use them at its production line; raw materials are also possible examples of B2B e-commerce transactions; Wholesalers offering online to retailers aims also a B2B negotiation.

2.3.3. B2G E-commerce

Business-to-government (B2G) is described as an electronic commercial transaction between two entities: a company and the public government. This model is usually applied on processes of public procurement, licensing procedures, and other government-related operations (Paradkar, 2014). The public sector, the

government and its representative institutions, are the key players of this model, trying to establish an e-commerce experience to make its procurement system more efficient (Singh, 2015). The author emphasizes the low weight of B2G transactions, when compared to other models of e-commerce, due to the lack of development on government e-procurement systems and informatics equipment's.

Nemat (2011) states that B2G is a variant of B2B, and it is seen as the commercial cooperation with the public sector. Government entities open public tenders for the supply of goods or services; companies are able to bid against each other to fulfill the needs of the government entity, by answering with competitive proposals and having the chance to be chosen as supplier.

2.3.4. C2C – E-commerce

This type of e-commerce aims to provide ways that allow private individuals to buy and sell from or to other private individuals. This e-commerce involves transactions between two parts (individuals), usually using a platform (Nemat, 2011).

As an example, there are some websites where consumers place an item for sale on it and other consumers bid over it (offering a value), thus being able to purchase (when they turn out to be the best alternative). This kind of platforms usually charge a flat fee or commission over transactions (Nemat, 2011).

It is expected that this kind of e-commerce will grow in the future, since it reduces costs and perceived risks by using a platform as an intermediary (Nemat, 2011). As examples of C2C e-commerce we can mention eBay and Napster, which have already made millions of dollars in sales (Gupta, 2014).

2.3.5. Mobile Commerce

Mobile commerce is another type of e-commerce that can be defined as any process that transfers ownership or rights so that to order and use goods and services; it is performed by using mobile access to networks on an electronic device (Abdelkarim and Nasereddin, 2010).

Succinctly, m-commerce is any electronic transaction that uses a wireless environment, mainly the internet. It is a way to allow users to have access to information, and buy products and services anytime, from anyplace - using their device (Abdelkarim and Nasereddin, 2010).

In Brazil, a research performed by FGV EAESP in 2019, showed that there were 230 million active cellphones in the country. Since 2018, Brazil has more than one smartphone per inhabitant; for the next few years, the number of smartphones is expected to grow until it reaches 240 million devices, according to some studies (Epoca Negócios, 2019).

2.3.6. E-procurement and Reverse Auction Systems

E-procurement and e-purchasing are concepts that have been used as synonym (Vaidya et. al., 2006). E-procurement stands for the use of internet-based information and communication technologies (ICTs) to perform tasks involved in procurement process: search, sourcing, negotiation, ordering, reviewing, among others (Vaidya et. al., 2006). E-procurement can be understood as an end-to-end solution that connects procurement processes in organizations. Forms of e-procurements can be seen on different stages of the procurement process such as e-Tendering, e-Marketplace, eAuction/Reverse Auction and e-Catalogue/Purchasing (Vaidya et. al., 2006).

Vaidya, Sajeev and Callender (2006) conceptualized e-procurement as a subset of e-Commerce, that procurement process mainly through internet.

E-procurement consortiums improve the evolution of B2B marketplaces; these marketplaces gather all members of a supply chain together in the same place (Brull, 2000; Ageshin, 2001).

2.4. E-commerce in Brazil

Brazil is the one with the largest share of e-commerce in Latin America (Statista, 2020), and its electronic commerce has been growing for years (ABCOMM, 2019). The projections until 2023 point to continued growth in volume as shown in Table 2:

Table 2. Brazil E-commerce growth.

Year	Volume (B)	Growth
2003	1.200	50%
2004	1.700	42%
2005	2.500	47%
2006	4.300	72%
2007	6.300	47%
2008	8.200	30%
2009	12.600	54%

2010	16.880	34%
2011	21.440	27%
2012	25.500	19%
2013	31.110	22%
2014	39.500	27%
2015	48.190	22%
2016	53.491	11%
2017	59.910	12%
2018	68.896	15%
2019*	89.824	23%
2020*	105.992	18%
2021*	122.951	16%
2022*	140.164	14%
2023*	159.787	14%

Source: adapted from ABCOMM, 2019.

Following these predictions (ABCOMM, 2020), it was expected that in 2020, the Brazilian ecommerce could present an average ticket price of R$ 320,00; this

amount represents the average price consumers are paying on a product. The number of orders will get to 342 million and the number of consumers behind it will be of approximately 68 million people.

According to ABCOMM study (2020), in 2020 it was expected to exist about 135,000 thousand active virtual stores, representing 7.04% of all websites in Brazil. Besides, 37% of transactions were expected to be done through smartphone and marketplaces were expected to represent 38% of all sales. Paypal (2019) estimates that there were 930,000 websites dedicated to e-commerce in Brazil and most of them were using free platforms to operate. From this number, 7.3% profit over R$ 100,000.00 and receive over 500,000 visits a month and 25.96% offer high end price, being over R$ 100.00.

Sales in Brazil grew 41% in 2020 compared to 2019, driven mainly by the number of orders and purchases of cell phones. Pandemic period in 2020 forced a migration of consumption from physical stores to online ones, leading over 17 million Brazilians to buy for the first time in e-commerce's, representing a 23% growth, where the ticket price showed a growth of 8% from 2019 (Didier, 2021).

Surveys showed that 58% of retail sales were made via online in 2021 and in August the revenue was 20.04%, bigger than the same period of 2020. In spite of the number, Brazilian' retail may suffer from the population decreasing power of purchase due to inflation (Albuquerque, 2022).

E-Commerce in Brazil grew by 31% in the first half of 2021, in comparison to the same period of 2020, sales rose by a record of 31%, average price of purchased items increased 22%, increase of 7.4% in number of orders, and mobile sales had a grew by 56.2%. These results are mainly related to pandemic when many people did not want to leave their house (International Trade Administration, 2022). In the whole year, in Brazil, e-commerce showed an increase of 16% in 2021, when compared to the previous year (Baguete, 2022).

When comparing the first quarter of 2022 with the same period in 2021, online purchases rose by 12.59%. Using the same comparative basis, revenue also had a boom of 11.02% (E-Commerce Brasil, 2022).

In 2021 the inflation reached the highest growth in six years with 10.06% a year. High inflation usually leads to more expensive products along with higher interest rates over split payments. Besides, shipping becomes more expensive due to the increase of prices in goods such as gas and energy. All these factors weaken people's power of purchase, what may lead to a plunge in e-commerce sales (Mandaê, 2022).

Inflation is projected to go higher for the sixteenth time, having the Index of Prices to the Wide Consumer (IPCA) around 7.89% in the end of 2022. Projections for 2023 and 2024 point for a decreasing of 4.1% and 3.2% respectively (Pontes, 2022).

In 2025 the Brazilian e-commerce market is expected to increase by 95%, reaching US$79 billion in revenue, according to market reports. The forecast is double the growth rate of the world market, which is expected to rise by 55.3%, reaching more than US$8 trillion in transaction value (Baguete, 2022).

2.5. Brazilian Internet Users and their Purchase Behavior Online from 2015 to 2020

A study developed by Agência Brasil de Comunicação in 2016, altogether with data collected in 2015 by the IBGE (Brazilian Institute of Geography and Statistics) revealed that, at that time, 92,1% of residents have accessed internet through smartphones, while 70,1% have done it using personal computers. In 2015, the percentage of people who accessed the internet was 57,5% of the population, aged

10 and over, corresponding to 102.1 million people. Young people, aged 18 or 19, represented the highest proportion (82,9%).

The higher the income, the greater the use of the internet: 92,1% of people who earn more than 10 minimum wages accessed the internet, against 32,7% of people with no income or earning up to a quarter of the minimum wage (Agência Brasil de Comunicação, 2016).

In 2018, a survey performed by PayPal showed that, from the total spent in the 12-month period (from March 2017 to March 2018) by Brazilian online shoppers, about 14% took place via smartphones.

As far as purchases made via smartphone on websites in other countries, the total spent reached 28% in 2018; in 2016, it was 18% and, in 2015, it was no more than 14% (PayPal, 2018).

Research presented annually by We Are Social and Hootsuite (2020), emphasizes that Brazil is the third country when it comes to time spent per day using internet, and the sixth regarding daily time spent using mobile internet.

Between March 2017 and March 2018, 76% of Brazilian Internet users bought online (via app or website); in 2016, that rate was 67%. Of those online buyers (2017/18), 52% bought products on Brazilian websites, 40% bought domestically and on websites from other countries and 8% bought only on foreign websites (PayPal, 2018). In brief:

- 62% was spent on Brazilian websites through app or website;
- 16% was spent in market places via app or website;
- 13% was spent on foreign websites through app or website;
- 9% was spent via social media.

PayPal (2018), also studied on what occasions or times of the year do cross-border buyers buy more than normally on websites in other countries (% selected by cross-border buyers):

- 43% on Black Friday (49% in 2016);
- 39% at Christmas (43% in 2016);
- 29% in seasonal sales (38% in 2016);
- 15% on Mother's Day (21% in 2016);
- 13% on Children's Day (new item in the survey);
- 11% on Valentine's Day (16% in 2016);
- 11% on Father's Day (14% in 2016);
- 9% at Easter (10% in 2016);
- 8% on Women's Day (new item in the survey);
- 7% on Cyber Monday (11% in 2016).

PayPal (2018) also analyzed if online shoppers were planning to increase or decrease their online spending in the next 12 months:

- 45% said they will buy **more**;
- 27% said they will keep the current standard of online shopping;
- 8% said they will buy **less**.

PayPal (2018) stated some reasons why respondents expect their online spending to increase over the next 12 months:

- Convenience when buying online (63%);
- Change in disposable income (46%);
- Increase in the number of online commerce platforms (32%);
- Changes in the economy (25%).

Reasons for respondents (PayPal, 2018) to expect their online spending to decrease over the next 12 months:

- Plan to save more money (48%);
- Changes in the economy (38%);
- Change in disposable income (35%);
- Change in exchange rates (9%).

For PayPal (2018), those were the top 5 categories of products purchased online by Brazilians in the 12-month period (March 2017 to March 2018):

- Clothes, shoes and accessories (65%);
- Electronic equipment, computers / tablets / smartphones (55%);
- Appliances, household items and furniture (51%);
- Beauty products and cosmetics (50%).
- Tickets for cinema, theater, concerts and sporting events (44%).

In cross-border online shopping (PayPal, 2018), the most used payment methods in the 12-month period were:

- 49% PayPal (48% in 2016).

- 33% MasterCard (31% in 2016).
- 27% Visa (32% in 2016).

For domestic online purchases (PayPal, 2018), the most used payment methods in the 12-month period were:

- 54% bank payment slip (57% in 2016);
- 47% PayPal (45% in 2016);
- 47% MasterCard (52% in 2016);
- 42% PagSeguro (48% in 2016);
- 38% Visa (47% in 2016).

Following research results, the number of Brazilian internet users in 2020 has increased from 74% to 81% of all population what represents 152 million people. Either in 2019 or in 2020, smartphones kept the first position of usage for internet access, but the curious thing is the overcoming of smart TV's over personal computers for internet usage (G1, 2021).

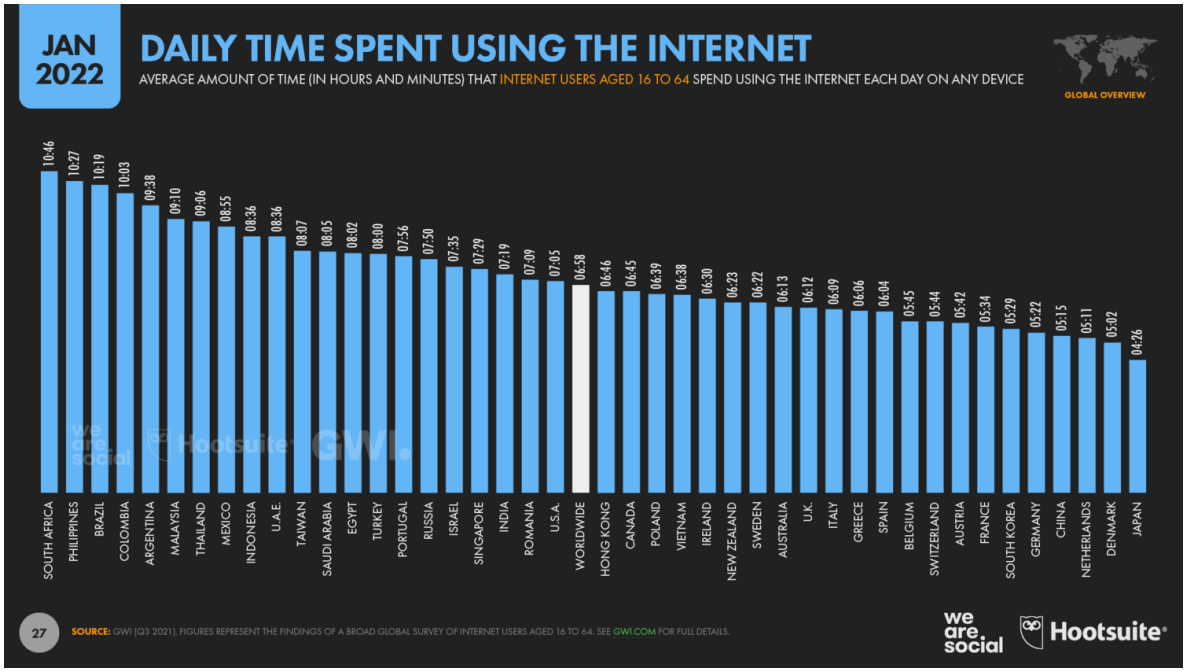
How internet has been used in Brazil did not differ on preferences from 2019 to 2020, keeping the same order of preference:

- Voice/Video call, 80%.
- Search about health 53%.
- Financial transaction 43%.
- Search in government websites 42%.
- Work activities 38%.
- EAD courses 21%.

2.6. E-commerce in Brazil - Actual Situation – 2021/2022

By January 2022, there were 165.3 million internet users in Brazil. Brazilian time spent daily on the internet is one of the highest in the world, positioned in third place with an average of 10 hours a day, only behind South Africa and Philippines, according to a research done by DATAREPORTAL and demonstrated in Chart 3 (Kemp, 2022).

Chart 3. Daily time spent using internet by country.

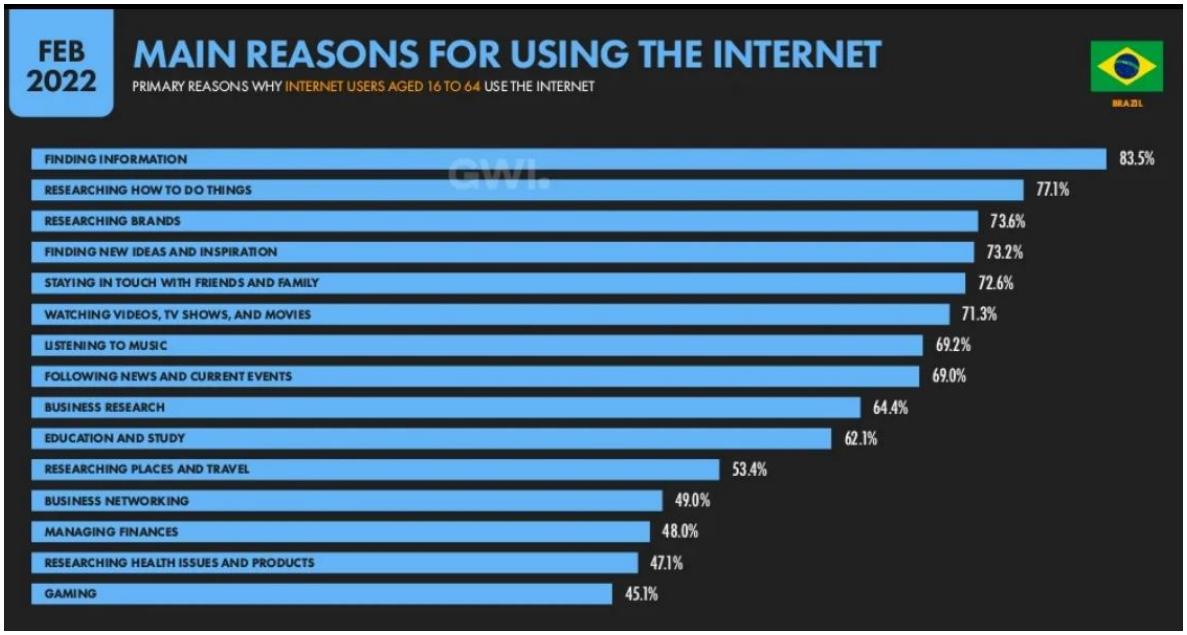


Source: Kemp, 2022.

Around 23.0 percent of Brazilian population are still offline, what represents 49.37 million people and most people using internet, 97.2% of population, use it through mobile phones (Kemp, 2022).

Regarding the reasons Brazilians use internet the main ones are for “finding information”, “researching how to do things”, and “researching brands”, along with others listed in Chart 4 (Kemp, 2022).

Chart 4. Main reasons for using the internet in Brazil.



Source: Kemp, 2022.

In the first semester of 2022 the Brazilian e-commerce had a growth of 12.6% in the first semester, R$ 39.6 billion, and 9.7 million online purchases, 14% more than the same period of 2021. Telephony, home appliances, electronics, fashion and accessories and IT were the categories with the highest revenue. Appliances grew 25.8%, and fashion and accessories, 25.5%. Telephony and IT, despite being in the top 5, showed a drop in revenue, with a reduction of 0.6% and 20.3% respectively (Yuge, 2022).

The credit card was the most used method for digital purchases in the first three months of 2022, representing 82.6% of total revenue (Yuge, 2022).

The number of unique customers — who made at least one purchase — reached 24 million, up from 23 million in the same period in 2021, 16 million in the same period in 2020 and 13 million in the same period in 2019 (Yuge, 2022).

2.7. Auction Definition and Electronic Auction

Auctions are a centuries-old practice, characterized by giving more flexibility to pricing processes and resulting in a broader business to buyers and sellers and in a more accurate allocation of assets (Menezes, Silva and Linhares, 2007).

Regarding to the main characteristics of auctions, it is right to say that they result in object acquisition by those who bid greater values in order to win the auction (Faria et al., 2010).

From the second half of the 1990s, auctions were employed, with great success, in B2C and C2C e-commerce activities on the Internet, being the eBay site the greater example (registering a turnover of app. US $ 24 billion in 2003). Such success has result mainly from some purchasing processes by organizations and governments, mainly through the reverse auction instrument. In this modality, buyers inform the maximum price they admit to pay for a certain good or service, and receive decreasing bids from supplier's interested parties (Menezes, Silva and Linhares, 2007).

2.8. Electronic Reverse Auction

An electronic sourcing tool was born in the mid of 1990's to help companies in the way they acquire goods and services from external suppliers. Also called as e-RA, Online Auctions or Reverse Online Auction, the electronic reverse auctions are defined as an online, real-time and dynamic auction between organizations and suppliers (Beall, et al., 2003); possible suppliers will be competing against each

other, in order to be the one chosen to provide goods or services to the (demanding) organization.

Contrary to the traditional auction, the reverse auction is characterized by the fact that the auction winner is the one who usually offers the lowest price for acquisition, after many rounds among bidders. This auction is largely adopted by government entities (Freitas and Maldonado, 2013).

In this process, the interested parts on selling perform biddings where the criteria for choosing the best suppliers for an organization may come from product or service specificities, such as design, quantity, quality, delivery, and related terms and conditions (Beall, et al., 2003; Pawar and Aital, 2017). Suppliers will be able to bid in between the time period of the auction, and are limited in some way regarding to check which actions of their bidding competitor are been taken meanwhile (Pawar and Aital, 2017).

Giampietro and Emiliani (2007), stated that many Fortune Global 2000 companies use e-reverse auction as a purchasing tool, like General Electric that spends 50-60 billion dollars a year and people in charge of dealing with it believe that 50-60% of this amount can be auctioned.

In Brazilian public sector purchases, reverse auctions have been used in bidding for goods and services, through the Electronic Auction model, having achieved positive results in terms of agility, transparency and cost reduction. Despite the good results, the one-dimensional character that governs them, restricting trading to price variable, represents an underutilization of its full potential. Occurs that, most of the time, a negotiation involves considering other attributes, such as the quality of products and services, delivering times, ways of payment, warranty and technical assistance. As a practical result, electronic auctions have been used, preferably, in the processes of acquisition of commodities and goods and services. For acquisitions that involve greater added value, other forms of bidding have been used (Menezes, Silva and Linhares, 2007).

2.8.1. Multi Attribute Electronic Reverse Auction

Multi attribute electronic reverse auction is an online mechanism for bidding, contemplating a buyer and many sellers involved. The most important characteristic in this mechanism is its consideration over multi attribute besides only price: quality, delivering date, supplier prestige and other attributes may also be taken into consideration by the buyer. Also, many factors may affect the creation of a multi attribute reverse auction, such as goods or services, ways of trading, buyer's preference, and buyer/seller feedback (Menezes, et al., 2007).

Menezes et al. (2007) declare that, when it comes to traditional electronic reverse auction, where the price is the only and main variable to be considered, suppliers usually go for the minimum requirements asked by buyers. On the other hand, when facing a multi attribute electronic reverse auction, where multi variables are considered by the buyer, the competition among suppliers is more likely to be tough.

This may benefit both suppliers, because of an increasing on negotiation possibilities, and, above all, benefits the buyer, who can consider many attributes in order to buy from a specific supplier (Yan and Yuan, 2012). For Bichler, Kaukal and Segev (1999), the utility of a negotiation, based on procurement auction, should present not only one attribute, as price, but many others issues, like delivering time, terms of payment and product's quality.

2.8.2. Benefits of Multi Attribute Electronic Reverse Auction

The growing usage of e-RA's have been laying down over some benefits it brings to participants. E-RA's eases the job of buyers and suppliers when it comes to communication in real time and worldwide, since its operation is via Internet. It decreases also the dependence on external assistance for buying process

performed by buyers. Regarding the price, it allows buyers to have control of the price variable, what is a major characteristic on sourcing decision (Beall et al., 2003).

For the buyer, price seems to be the main factor in an e-RA; suppliers fight with each other on higher and higher price reduction to win the auction (Gumussoy and Calisir, 2009). Other benefits for buyers include boosted productivity, procurement cycle time reduction, easiness to access many suppliers at once, more competitive environment, standardization, and transparency on purchasing. It creates a more competitive environment, standardization, and transparency in purchasing processes. At the same time, these advantages reduce costs and time, since they come up with more opportunities for companies, enabling them to offer higher quality products (Bartezzaghi and Ronchi, 2003; Carter et al., 2004).

E-RA have been having success in putting down the prices of purchases. Croom and Brandon-Jones (2005) say that, according to their experience, the usual saving on prices is around 16%. Notice that this is a mechanism used for a variety of products.

Different from a traditional personnel purchase mode, the advantages of reverse auctions lay on: (1) trading transparency, since seeking tenders and bid through Internet can increase it, also decreasing communication costs and time and giving more choices to buyers; (2) cutting good's price, focusing on quality, and decreasing transaction costs; (3) contributing to improve the match between demand and supply when considering multi attributes (Yan and Yuan, 2012).

Wolfstetter (1999) states that the efficiency of the auction will depend on the existence of specific mechanisms and rules that increase its attractiveness and reduce the possibilities of collusion, predatory competition and other forms of market power.

2.8.3. Disadvantages of Electronic Reverse Auction

As main disadvantages one may say that not all purchase activities are appropriated to multi attribut reverse Auctions, specifically for those in which the internet system is not well developed and/or the credibility of the system being used creates doubts (Yan and Yuan, 2012).

2.8.4. Electronic Reverse Auction and the Public Sector

As said previously, the public sector tends to use e-procurement as a tool to get valuable services or products for less money (Vaidya et al., 2006). In fact, it was already a common practice even before e-commerce: public organizations used to create contests for various supplies.

Always aiming for the lowest costs, the public sector specifically adopts the electronic reverse auction. This is an attempt to include as many sellers as possible in the process, in order to increase competition and take advantages by getting more value for less money (Vaidya et al., 2006; Wyld, 2011).

CHAPTER 3 - RESEARCH MODEL AND METODOLOGY

3.1. Research Definition

This study aims mainly to identify the acceptance of Brazilians over a Multi Attribute Reverse Auction Model for B2C ecommerce.

3.2. TAM Research Model

The technology acceptance model (TAM) has been used in many areas to understand and predict user's behavior, such as voting, dieting, family planning, donating blood, education, consumer's purchase behaviors, and computer usage (Taherdoost, 2018).

Many models and frameworks have been developed to understand user's adoption of new technologies and these models present factors that can affect the user acceptance, such as Technology Acceptance Model, Theory of Planned Behavior and Diffusion of Innovation theory, Theory of Reasoned Action, Model of PC Utilization, Motivational Model, Unified Theory of Acceptance and Use of Technology and Social Cognitive Theory. These traditional frameworks have been used by many studies and others have combined previous models or included new constructs to already existing models to allow to continue their studies (Taherdoost, 2018).

In the past researches, three theories of behavior have been compared: technology acceptance model (TAM), theory of reasoned Action (TRA) and theory of planned behavior (TPB). In this comparison, Davis et al. (1989) considered TAM the better option to explain the willingness to adopt a technology, compared to the theory of reasoned behavior (TRA). Another researcher has concluded that TAM and TPB both can explain well the behavioral intentions, although TAM outperforms

TPB on explaining the attitude besides of being a simpler model than TPB (Harryanto et al., 2018).

The Technology Acceptance Model (TAM) is a measurement scale, developed by Fred D. Davis in 1989, aiming to predict user's acceptance of computer and information systems as well. Davis theory is elaborated on making hypothesis about determinants on user acceptance. This theory comes from the analysis of other theory, the Theory of Reasoned Action (Fishbein and Ajzen, 1975), which aims to explain consumer's purchasing behavior.

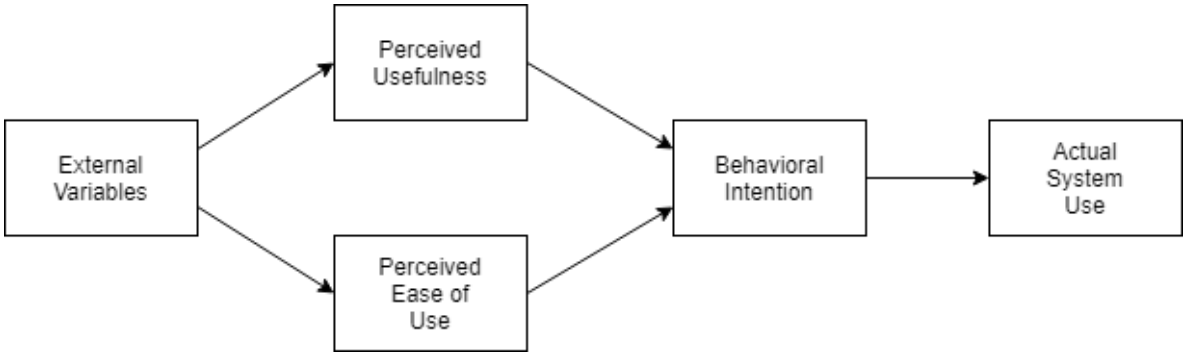
From the TAM model perspective, the intention as a behavior is the result of a conscious decision-making processes (Shroff et al., 2011). For the purpose of measuring the usage and the acceptance of a certain technology system, this model indicates three main factors that influence these behaviors: perceived usefulness - PU, perceived ease of use – PEOU - and attitude towards usage - ATU (Shroff et al., 2011).

Marangunić and Granić (2015) stated that TAM has become an important model to understand and predict human behavior on accepting, or not, technologies. Davis (1989), through TAM, assumed that the main determinant factor of people to use a system is the behavioral intention to use (BIU) it. BIU is a result from user's attitude towards using the system (ATU), their perceived usefulness (PU), and perceived ease of use (PEOU). As illustrated at Figure 2, PU and PEOU, along with each other, influence significantly on ATU, which in consequence impact on BIU. Besides, PEOU is also seen as an important factor that affects PU (Shroff et al., 2011).

Initially the TAM model considered attitude as a variable for analysis; Davis (1993, pp. 476) defined attitude towards usage (ATU) as "…the degree to which an individual evaluates and associates the target system with his or her job". However, in a further study, Davis and Venkatesh (1996) removed attitude towards usage,

claiming that this variable is linked to emotions and cannot be fully considered an important factor on behavioral intention (Sebetci, 2015). In addition, Shroff et al. (2011) concluded in their study that findings over attitude towards usage (ATU) are in accordance with previous studies (Davis, 1989; Shroff et. al., 2011), which demonstrate that this variable has been only modest in predicting technology acceptance. Thus, in 1996, it was formed the final version of TAM model by Venkatesh and Davis (1996), shown in Figure 1, with the conclusion that perceived usefulness (PU) and perceived ease of use (PEOU) directly influence behavior intention; it was not necessary to consider attitude towards usage (ATU) construct (Lai, 2017).

Figure 1. Technology acceptance model.



Source: Venkatesh and Davis (1996).

From the TAM model perspective, the intention as a behavior is a result of conscious decision-making processes (Shroff et al., 2011). For the purpose of measuring the usage and the acceptance of a certain technology system, this model indicates two main factors that influence these behaviors: perceived usefulness – PU - and perceived ease of use - PEOU (Shroff et al., 2011; Venkatesh and Davis, 1996).

If a new technology or innovation improves a person's performance and it is not difficult to use in order to perform a task, users perceive it as useful and easy to

use, leading then to a more likely adoption of this technology or innovation (Sebetci, 2015).

3.3. External Variables

Davis (1989) believes that external variables influence perceived usefulness (PU) and perceived ease of use (PEOU), as shown on Figure 1.

Harryanto et al. (2018) on their research based on TAM model, define external variables as gender, experience, complexity and volunteerism, stating that these variables affect usability and behavioral intentions.

Gardner and Amoroso (2004) see the external variables as something with no clear pattern. For them, external variables are exposed as perceived complexity using a system, experience, and voluntariness.

3.4. Perceived Usefulness (PU)

For Davis (1989, pp. 320), the perceived usefulness (PU) is seen as "… the degree to which a person believes that using a particular system would enhance his or her performance".

Davis (1989) says that, based on past researches, there are two factors that considerably influence most people on accepting or rejecting an information technology. The first factor is felt when people are willing to use an application, really believing that it will help them to outperform skills on their job activity. This is seen as the Perceived Usefulness (PU) variable; the other factor is the Perceived Ease of Use (PEOU).

Perceived usefulness, along with perceived ease of use, urge as two fundamental and distinct constructs that impact in the decision to use an information

technology. These are not the only factors to explain users ’behavior and future studies are needed to discover more about their role on determining the information technology usage (Davis, 1989).

3.5. Perceived Ease of Use (PEOU)

Perceived ease of use (PEOU) refers to "… the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, pp. 320). Perceived usefulness and perceived ease of use can be considered as cognitive factors.

As mentioned before, Davis (1989), states that there are two determinant factors leading people to use information system: one is the perceived usefulness (PU) and the other one is the perceived ease of use (PEOU). So, when users notice the usefulness of an application and, at the same time, they are evaluating its ease of use, this can influence also on their real usage of the application.

Effort may be allocated by a person to various activities, and being a finite resource (Davis, 1989), it is claimed that applications perceived to be easier to use, in comparison to others, are more likely to be accepted by their users (Davis, 1989).

Perceived ease of use’s importance is supported by the concept of self-efficacy (Davis, 1989). Self-efficacy in its definition is similar to perceived ease of use, since it is regarded to the perception of how well someone can perform actions required in some situations (Davis, 1989).

PEOU has also impact on innovations ’adoption. Tornatzky and Klein (1982), in their study over characteristics of innovation and its adoption, found out that complexity, as the degree of how difficult it is to understand and use an innovation, is significant among many types of innovations. Thus, complexity relates in its meaning with perceived ease of use (Davis, 1989).

Perceived ease of use (PEOU) and perceived usefulness (PU) affect attitude towards the usage of a system (Sebetci, 2015; Shroff et al., 2011). Besides, perceived ease of use (PEOU) affects directly the variable perceived usefulness (Sebetci, 2015).

There is a conclusion based on many past studies that perceived ease of use (PEOU) may produce a different effect depending on the user experience. In general, users with low or no experience on a system, tend to use the system if it really seems easy to use for them (Harryanto et al., 2018).

3.6. Behavioral Intention to Use (BIU)

Shroff, Deneen and Ng (2011) see the behavioral intention to use (BIU) as a crucial factor to determine whether a user will, in fact, use a system (or not). Yi and Hwang (2003) found that there is an important influence between behavioral intention and actual usage of the web-based environment.

3.7. Hypothesis

Considering the fact that attitude towards use (ATU) has been removed from TAM model research (Venkatesh and Davis, 1996), it will not be considered in the scope of this study.

According to this research objective and literature support, mainly from Davis (1989), Venkatesh and Davis (1996) and Shroff, Deneen and Ng (2011), Figure 2, exemplifies where the following hypothesis are placed in TAM model:

H1: External variables such as age, gender, experience (Davis, 1989; Abu-Dalbouh, 2016) influence perceived usefulness (PU).

H2: External variables such as age, gender, experience, and education (Davis, 1989; Abu-Dalbouh, 2016) influence perceived ease of use (PEOU).

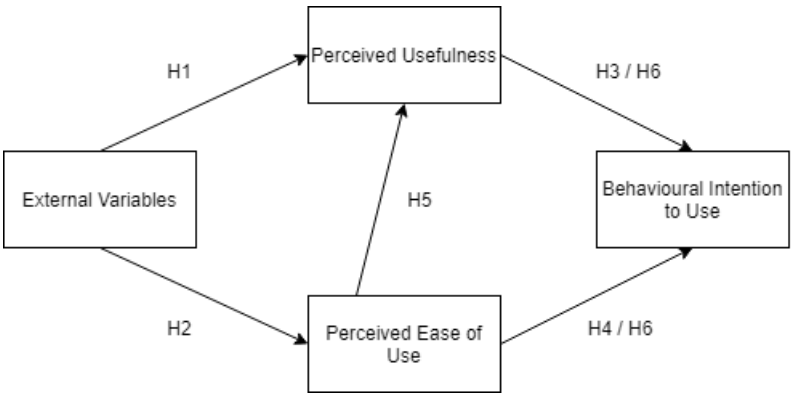
H3: People will realize the usefulness of the system, where the reverse auction model is embedded and it will flourish their likeliness to use it. In other words, the perceived usefulness (PU) will have a significant influence on behavioral intention to use - BIU (Davis, 1989; Abu-Dalbouh, 2016).

H4: The ease of use perceived by individual over the system, where the reverse auction model is embedded, will somehow influence them towards using it. In other words, the perceived ease of use (PEOU) will have a significant influence on behavioral intention to use - BIU (Davis, 1989).

H5: The ease of use perceived by individuals over the system, where the reverse auction model is embedded, will impact the perceived usefulness over the system by individuals. In other words, perceived ease of use (PEOU) will have a significant influence on perceived usefulness - PU (Davis, 1989).

H6: The ecommerce reverse auction model presented seems to be more useful than ease to use. Perceived usefulness (PU) will have more effect significance over behavioral intention to use (BIU) than perceived ease of use - PEOU (Venkatesh and Davis, 2000).

Figure 2. Modified TAM model (Venkatesh and Davis, 1996).



Source: (Venkatesh and Davis, 1996).

3.8. Investigation Methodology

The modified TAM model, previously discussed, will be the support framework for this investigation and for the purpose of reaching the research objective, testing the hypotheses and using already validated scales, previously used in literature.

In order to collect data, a questionnaire (in Appendix) was developed and applied to a convenience sample, due to budget and time constraints.

Since the reverse auction model ecommerce is a theoretical concept, respondents were presented with a key element to explain the concept of a Multi Attribute Reverse Auction Model: a video of a *mockup app*, representing a real app for mobile devices. The video aimed to show respondents what the system would look like, its functionalities and the usage on performing actions to find products to buy. This will be an experiment proceeding, based on Davis and Venkatesh idea and operationalization (1996).

Bellosta et al. (2004) have implemented their multi-attribute reverse auction mechanism in an e-commerce, where it is possible to handle negotiations on multiple attributes. Considering this implementation, the mockup for this current study, has brought some similar characteristics in order to make an interface close to the real case scenario.

In Figure 3, 4, and 5, we can see the mockup screen showing the process of creating a Request for Bid (RFB), setting preferences on the desired product or service, and submitting to the e-commerce where supplier will promptly check it so that they can make their offers (Bellosta et al., 2004).

Figure 3. Multi Attribute Reverse Auction Mockup – Reverse auction screen.

Figure 4. Multi Attribute Reverse Auction Mockup – Create new reverse auction screen.

Figure 5. Multi Attribute Reverse Auction Mockup – Reverse auction screen.

At Figure 6 and 7 we can see offers done by suppliers who want to win this auction and become the chosen seller for the simulated buyer.

Figure 6. Multi Attribute Reverse Auction Mockup – Reverse auction screen – Offer1.

Figure 7. Multi Attribute Reverse Auction Mockup – Reverse auction screen – Offer 2.

Furthermore, in Figure 8 we see the buyer checking the offer details where it presents many attributes like price and highlights previous requirements that match with what the buyer is looking for. From this screen the buyer may allow the offer and, by so, ending the auction and starting the deal with the chosen supplier.

Figure 8. Multi Attribute Reverse Auction Mockup – Reverse auction screen.

3.8.1. Target Population

According to this study objective, only Brazilian people were considered for data analysis; as already mentioned, a questionnaire (in Appendix) was applied and sent directly to the target population via online messengers and social media groups.

No restrictions on regions, gender, social status and/or any other social and economic variables.

3.8.2. Questions Vs Scales

According to previous research (Davis, 1989; Shroff et al., 2011), measurement scales have been divided into five sections: Section 1 is used for introduction, where the research is briefly presented to the subject and/or reason why for the research. Section 2 asks about auctions and previous experience on multi attribute reverse auction e-commerce. In Section 3 it is showed an imaginary multi attribute reverse auction model operation in an app of B2C e-commerce.

This third section is used to give people the basic knowledge to answer the main questions they are supposed to answer in this research. This was done via a video mockup of a proposed reverse auction model ecommerce (Davis and Venkatesh, 1996).

In Section 4, some demographics data for segmentation were collected. Besides that, this section covers the external variables data of modified TAM model in Figure 1 (Venkatesh and Davis, 1996) and variables for validity of answers.

Section 5 is intended to complete data regarding demographics and to validate further answers.

The fifth section aims to ask respondents the main questions for this research, based on TAM model from Davis and Venkatesh (1996), and adapted to meet the needs of this study, as done by Shroff, et al. (2011). In this section respondents are asked about their perceived ease of use (PEOU), and their perceived usefulness (PU). Each question has been categorized for each variable; thus, we have:

- Perceived usefulness (PU): Q14, Q15, Q16, Q17, Q18.

- Perceived ease of use (PEOU): Q12, Q15.
- Behavioral Intention (BIU): Q19, Q20, Q21.

At section five, we used TAM Model related questions, supported by a 5 Likert scale (Shroff et al., 2011) as follow: 5, Strongly agree; 4, Agree; 3, Neutral; 2, Disagree and 1, Strongly disagree.

Based on the modified TAM model, Figure 1, the causal effect of every variable either External Variables, Perceived Usefulness, Perceived Ease of Use, Behavioral Intention, will be validated on their causal effect on each other.

3.9. Data Collection

Questionnaire was made available on Google Forms, aiming to deliver it online for target population data collection. We shared it online through different online communication channels for random people to answer.

CHAPTER 4 - RESULTS AND ANALYSIS

4.1. Descriptive Statistics

As a result, from the questionnaire applied, it was possible to get a total of 73 valid answers. A 5 Likert Scale has been adopted (Shroff et al., 2011), as follows: 1 - Strongly Disagree; 2 - Partially Disagree; 3 – Neutral; 4 - Partially Agree; 5 - Strongly Agree. Table 3 shows general respondents characteristics:

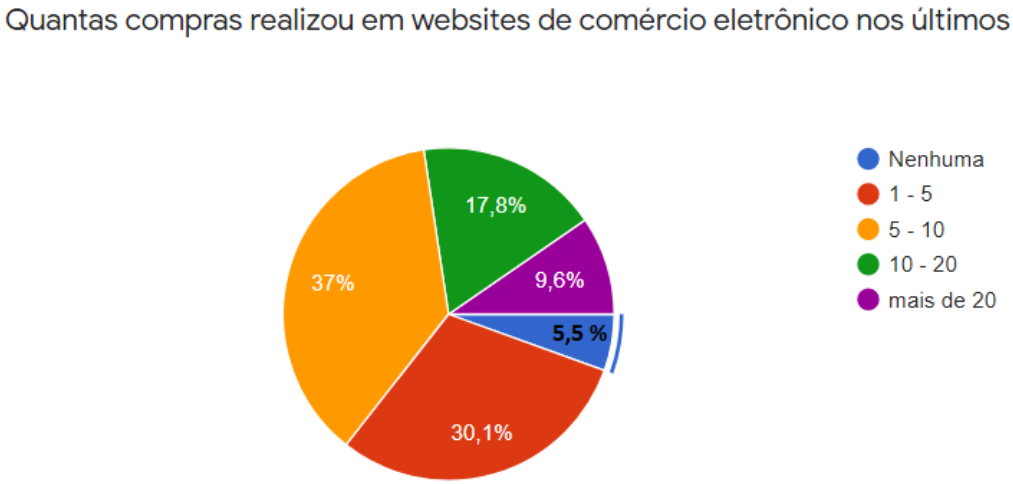
Table 3. Descriptive Statistics.

Respondents	73
Brazilian nationality	91.8%
Not Brazilian nationality	8.2%
Female	45.2%
Male	54.8%
Age(16-25)	20.5%
Age(26-35)	54.3%
Age(36-45)	6.8%
Age(46-65)	6.8%

Age(56+)	12.3%

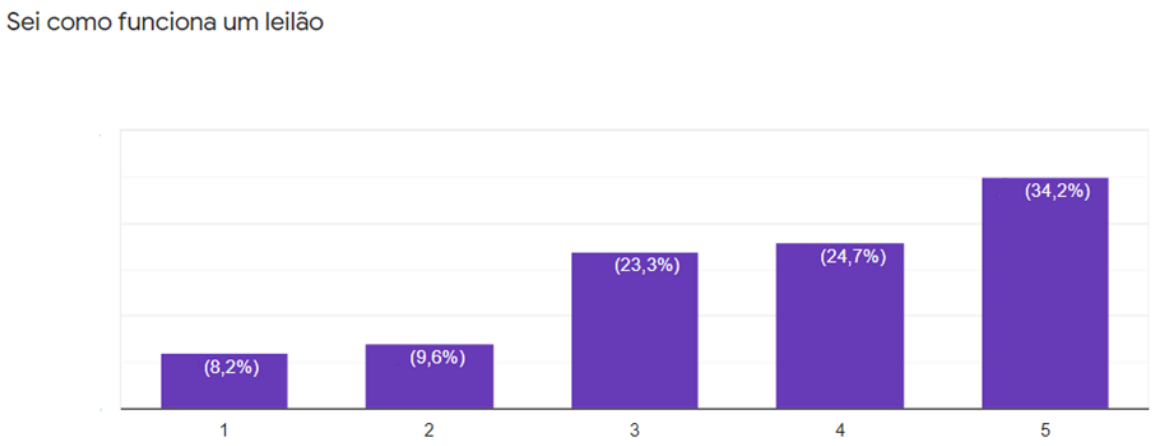
To identify if respondents are frequent e-commerce clients, by counting how many purchases they have made in the last 12 months, the majority of them bought from 5 to 10 times, as shown in Chart 5:

Chart 5. “How many purchases did you made in e-commerce websites in the last 12 months?”.



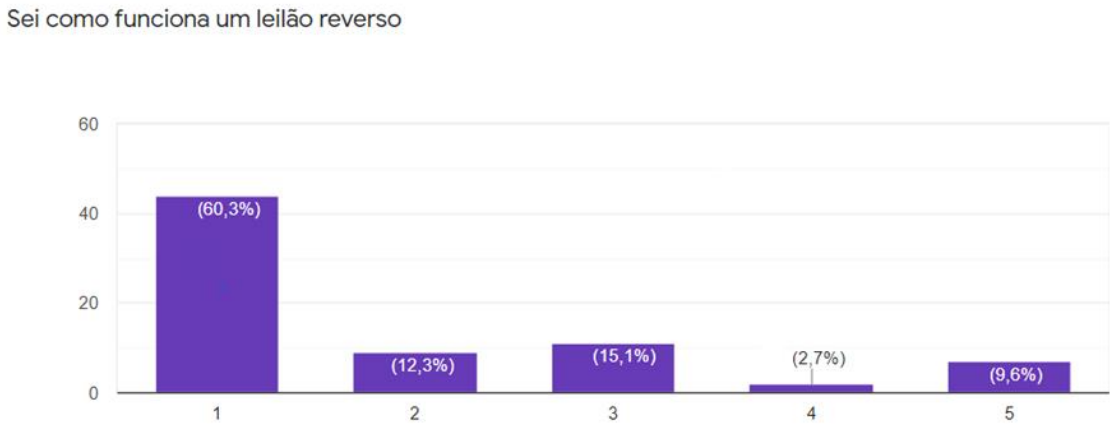
For this research, it was important to know if respondents knew beforehand how an auction works. Chart 6 shows that the majority of participants agree “in a certain way” **to the statement:**“ I know how an auction works” (58,9%).

Chart 6. “I know how an auction works”.



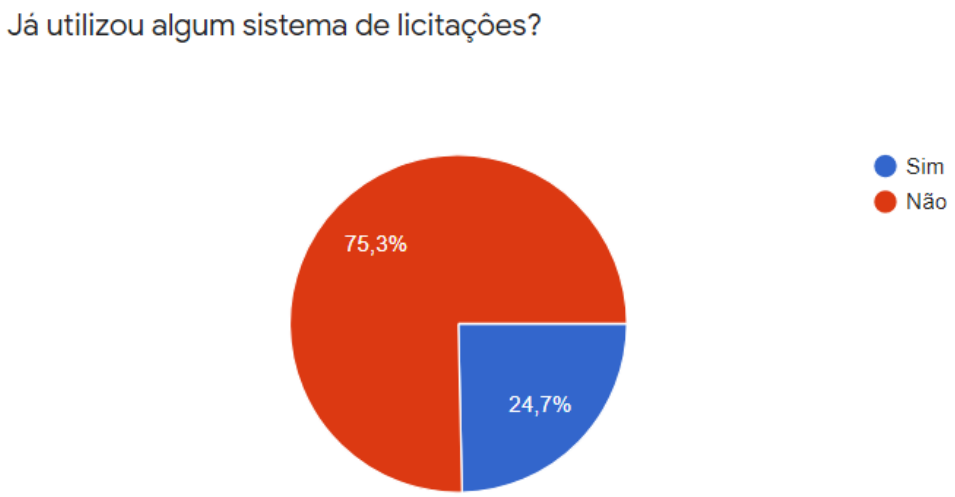
For a complete characterization of the sample’s level of knowledge on reverse auction, we add a specific question/statement: “I know how a reverse auction works”. Chart 7 shows that the majority of the participants are not familiar with the concept (72.6%).

Chart 7. “I know how a reverse auction works”.



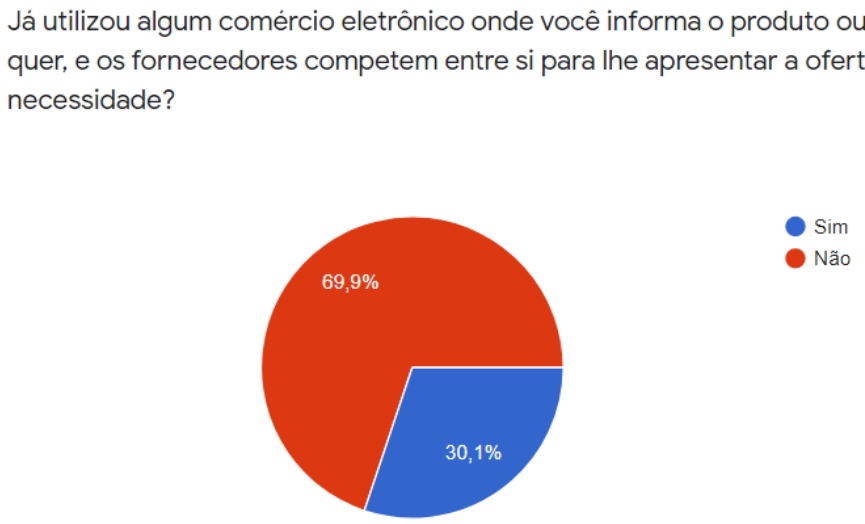
According to the question, “Have you ever used any bidding shopping system?”, Chart 8 shows that most answers were negative (75.3%).

Chart 8. “Have You ever used any bidding system?”.



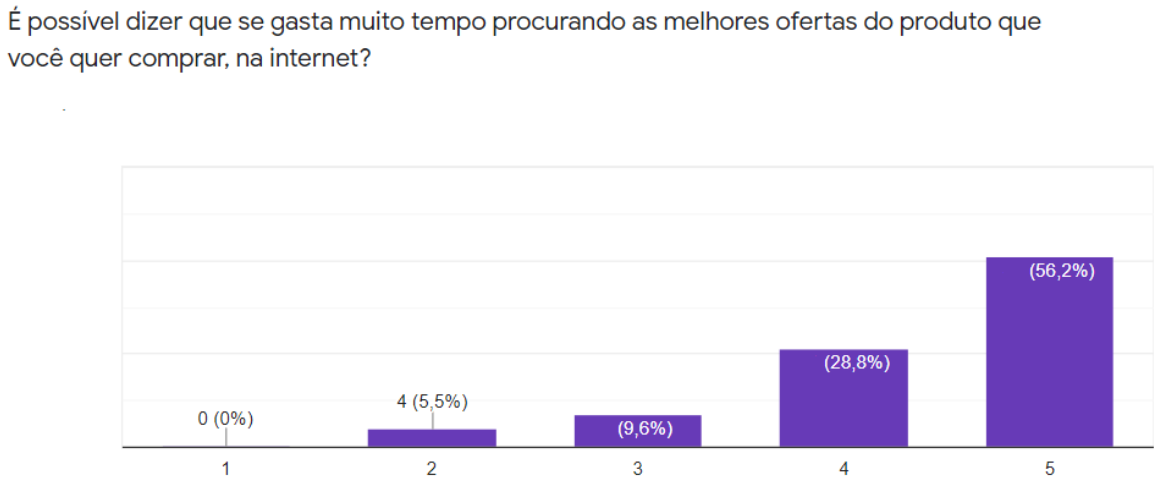
Aiming to know if respondents have already had some previous experience with the analyzed system it was asked: “Have you ever used any e-commerce model where you ask for a product or service, and suppliers compete with each other in order to present the most suitable offer according to your need?”. Most respondents, 69.9% said that they have not used nothing similar before, as shown in Chart 9.

Chart 9. “Have You ever used any e-commerce model where you inform about a product or service you wish and sellers compete with each other to present you the most suitable offer according to your needs?”.



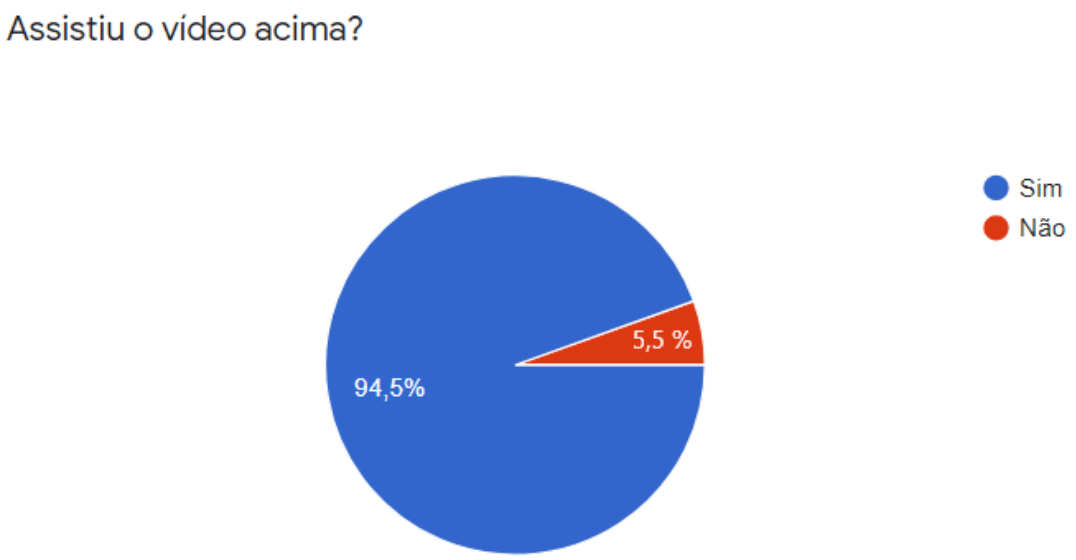
We also asked respondents to answer the following question:“ Is it possible to say that you spend too much time looking for the best product offers on the internet?”; as we can see in Chart 10, most respondents partially agree (28.8%), and strongly agree (56.2%) on they spending too much time on this task.

Chart 10. “Is it possible to say that You spent too much time looking for the best offers for the product you want to buy on internet?”.



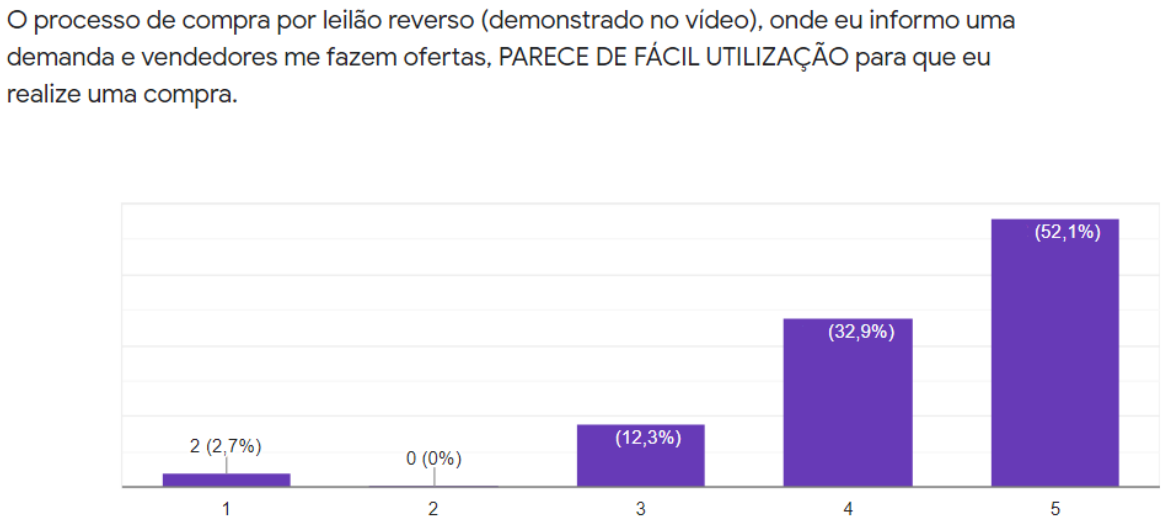
As already mentioned, a video was shown in the questionnaire to explain what a reverse auction model is all about. Chart 11 shows that 94,5% of the participants watched the explanatory video.

Chart 11. “Did you watch the explanatory video above?”.



Since most participants claimed to have seen the explanatory video on a multi-attribute reverse auction system, we than asked if they considered it as an EASY-TO-USE way to make a purchase". Chart 12 confirms that most of them declared that they agree with "SEEMS EASY TO USE" (85% agree in a certain way).

Chart 12. Reverse auction (as shown in the video above) vs SEEMS EASY TO USE in order to perform a purchase".



Most respondents, 84,9 %, partially agree and strongly agree that using a reverse auction model would save them time in the process of looking for offer on the internet – Chart 13. The question was:" The use of websites and/or applications (as shown in video), where I inform what I want and sellers make me offers, WOULD SAVE ME TIME looking for the best offer on internet".

Chart 13. “The use of websites and/or applications (as shown in video), where I inform a demand and seller make me offers, WOULD SAVE ME TIME looking for the best offer on internet”.

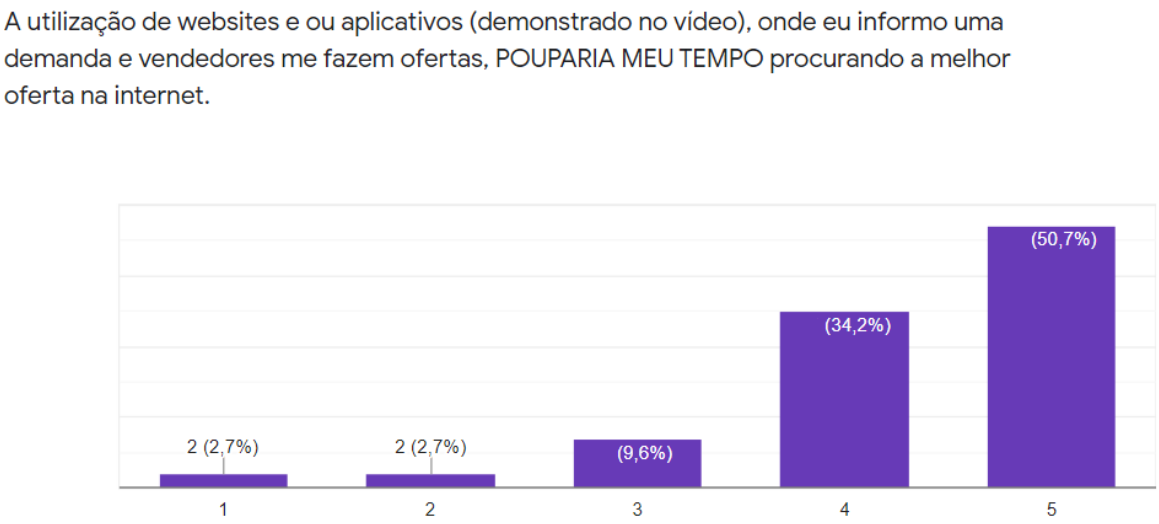
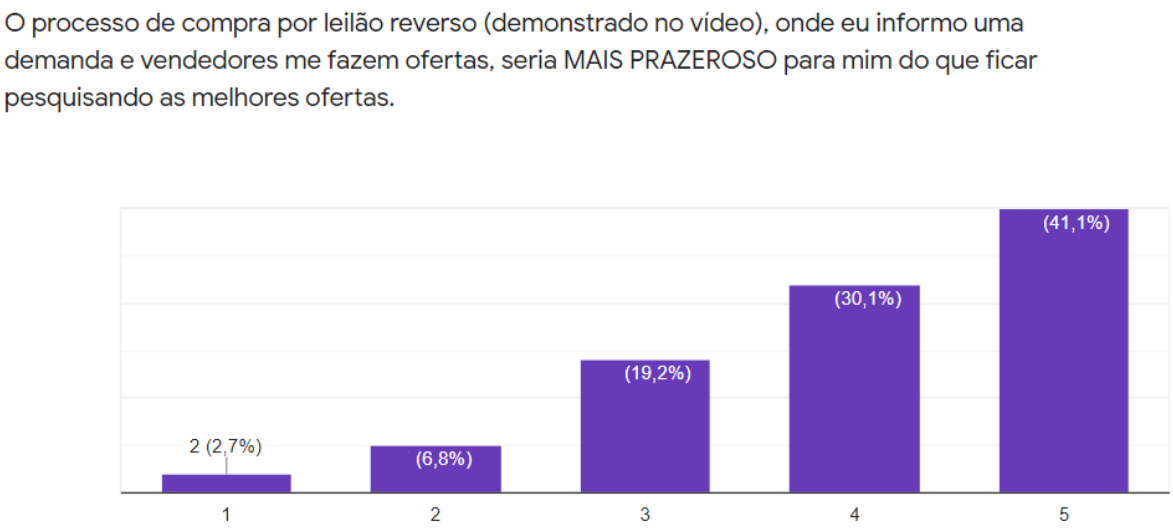


Chart 14 shows most respondents, 71.2% partially agree and totally agree, it would more pleasant for them to use a reverse auction then looking for the best offers. When asked: “The purchase process through reverse auction (as shown in video), where I inform what I want and sellers make me offers, would be MORE PLEASANT for me than keep looking for better offers.”.

Chart 14. Reverse auction (as shown in video) vs MORE PLEASANT for me



Through a reverse system, respondents are likely to believe they would have the best offer for the lowest price, as shown in Chart 15, where 68,6 % of them partially agree and strongly agree with the following statement: “Through the reverse auction system purchase process (as shown in video), where I inform about what I want/need and sellers make me offers, I believe that I will get THE BEST OFFER FOR THE LOWEST PRICE.”.

Chart 15. Reverse auction system purchase process vs THE BEST OFFER FOR THE LOWEST PRICE”

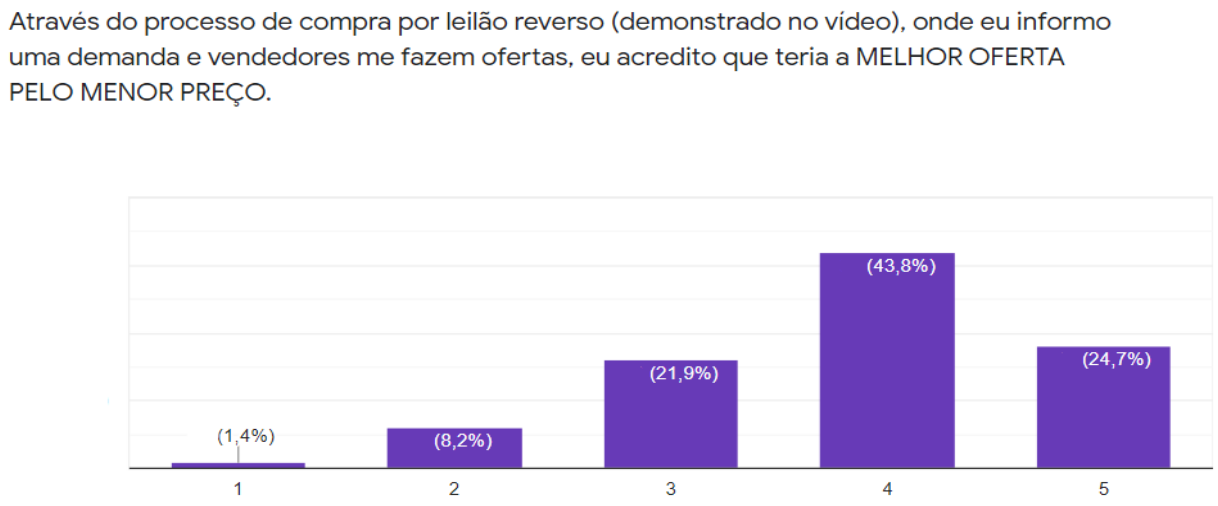
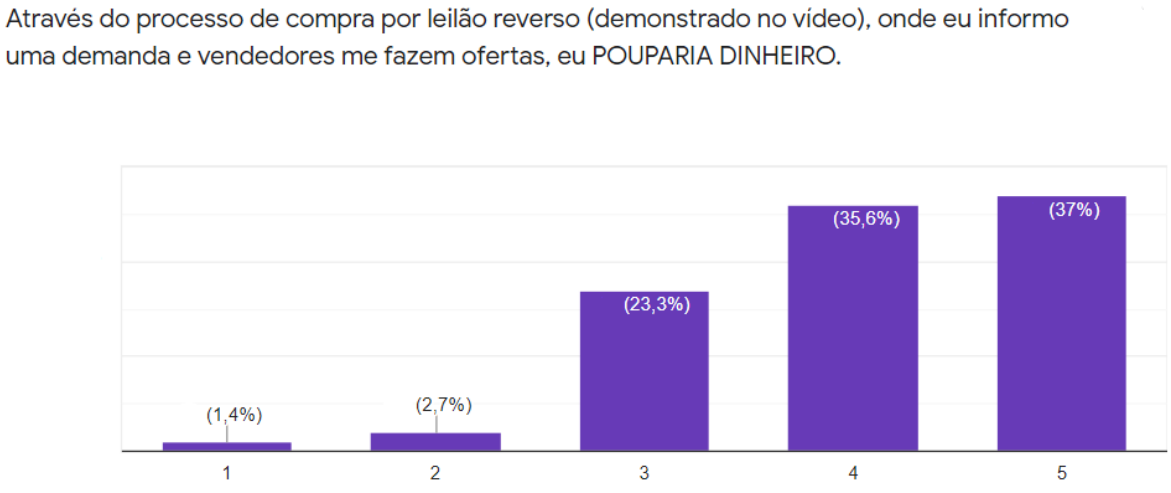


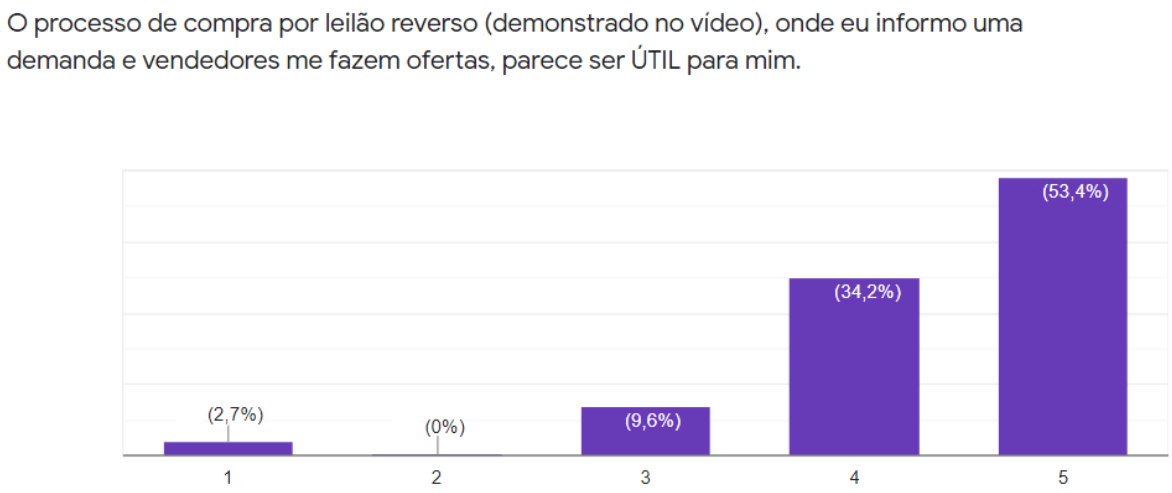
Chart 16 reveals that most respondents (72,6 %) partially agree and strongly agree that they would save money on reverse auction purchase system; question: “Through the reverse auction purchase system (as shown in video), where I inform about what I want/need and sellers make me offers, I will SAVE MONEY.”.

Chart 16. Reverse auction purchase system (as shown in video) vs SAVE MONEY



Regarding the utility of a reverse auction system, 87,6% of the respondents declared to partially agree and strongly agree (Chart 17).

Chart 17. “The reverse auctions purchase system (as shown in video), where I inform what I want/need and sellers make me offers, seem USEFUL to me.”.



As far as Behavior Intention to Use (BIU) factor, Chart 18 shows that the majority of respondents would like to use a reverse auction system (56.2%, strongly agree and 26% partially agree):

Chart 18. “I would like to use an e-commerce like the one exemplified in the video.”.

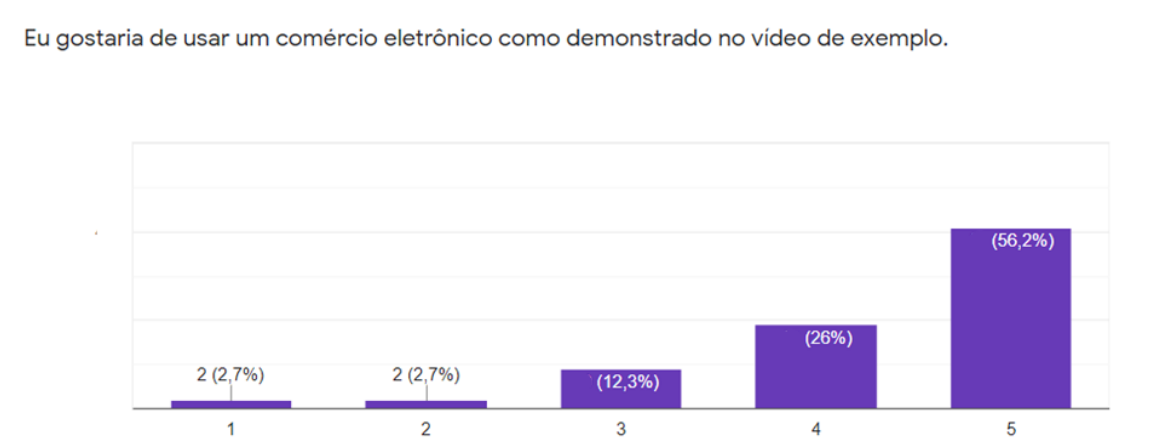


Chart 19 reveals that a considerable number of participants would use a reverse auction model INSTEAD of the ones they usually use: 34.2%, partially agree and 30,1% strongly agree.

Chart 19. “I would use the e-commerce demonstrated in the example video, INSTEAD of the ones I usually use.”.

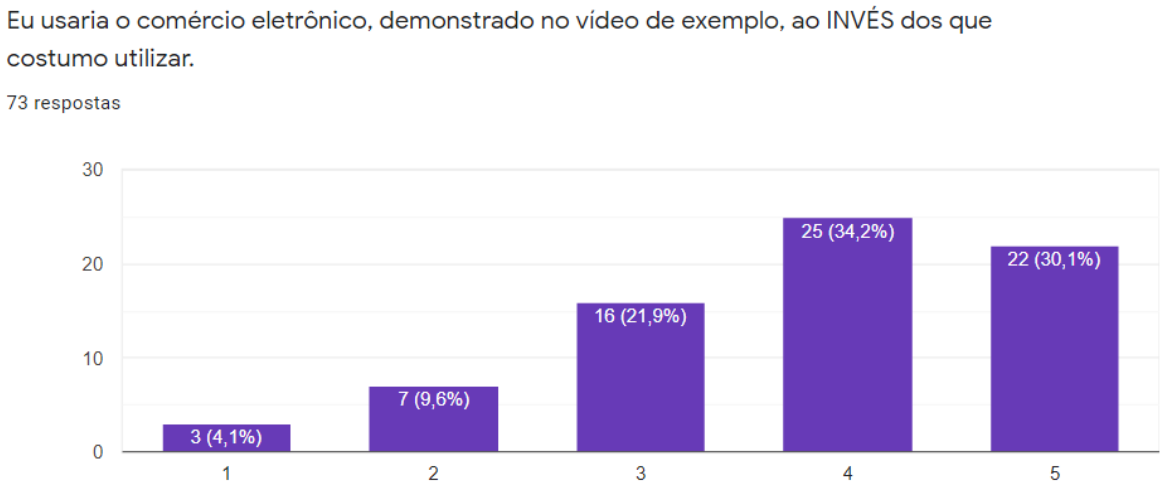
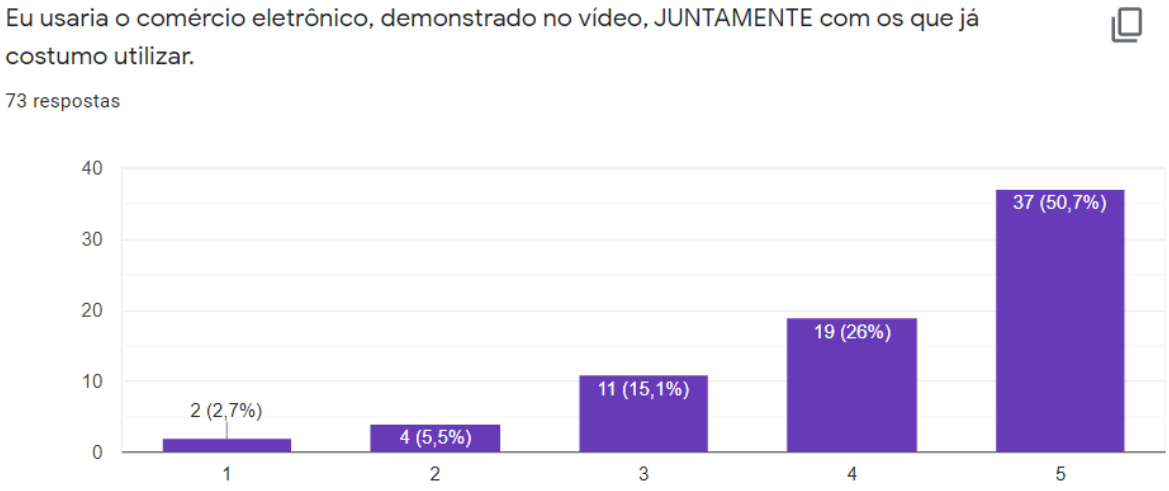


Chart 20 proves that the participants consider to use reverse auction models along with the e-commerce models that they usually use.

Chart 20. “I would use the e-commerce demonstrated in the example video, ALONG WITH the ones I usually use.”.



4.2. Results: reliability and validity of measurement items

A Confirmatory Factorial Analysis, a model of structural equation model (SEM), has been used to compare the scales 'convergent and divergent validity. Through the indicators 'factorial loads it was possible to evaluate the convergent validity. Supported by previous studies, in order to have the results, it has been used the SmartPLS tool (Ramayah et. al., 2017; Khoi & Ngan, 2019; Mekić & Hadžimusić, 2020).

Through the indicator " factorial loads" it was evaluated the convergent validity. Coefficients for the PU variable were significantly far from zero and the loads between the latent and observed variables were high in all cases (α> 0.7), for some cases.

In the case of External Variables it presented many low coefficients in factor loading, considering >= 0.4 an acceptable value (Guadagnoli, 1988). Following previous literature it is recommended to remove from analysis the factor loadings with values lower than 0.3 (Field, 2013), as can be seen in questions Q17, Q4, Q5, Q7, Q20. Moreover, values greater than 0.4 are stable for further analysis (Guadagnoli, 1988).

By having such lower factor loadings for analysis, it may present high measurement error and small percentage of common variance. Low reliability could be the reason for finding weak factor loading in External Variables, what could be a consequence of inadequate elaboration of items (Briggs, 2003).

Considering the weak factor loadings found in some External Variables questions - Table 4 -, those have been removed and another convergent validity and reliability was performed, as shown in Table 5.

Table 4. Convergent validity and reliability.

Variable	Item	Stand. Coef.	Cronbach's Alpha	CR	EVA
External Variables	Q17	-0.009	0.228	0.339	0.204
	Q2	0.782			
	Q3	0.504			
	Q4	-0.238			
	Q5	0.109			
	Q6	0.504			
	Q7	-0.551			
	Q18	0.488			
	Q20	0.327			
PEOU	Q8	1	1	1	1
PU	Q9	0.781	0.840	0.886	0.610
	Q10	0.729			
	Q11	0.729			

	Q12	0.759			
	Q13	0.894			
BIU	Q14	0.928	0.607	0.794	0.579
	Q15	0.815			
	Q16	0.460			

Source: Adapted from software.

All factor loadings (Stand. Coef.) show values >= 0.4 what is acceptable for further analysis (Guadagnoli, 1988), and can consider latent variables adequately explaining the observed variables (Hair et al., 1995).

By having normalized values, it was measured the scales 'reliability, through Cronbach alpha indicator - Table 5-, being 0.6 the minimum reference value (Malhotra, 1997), and 0.7 to be more restrictive (Nunnally, 1978). For the case of External Variables Alpha's Cronbach, it presents a low value of 0.520; despite of being a low value it may be considered acceptable for further analysis (Ghozali, 2013; George & Mallery, 2003; Ferdinand, 2002).

Factors 'compound reliability (CR) and extracted variance analysis (EVA) are the extracted indicators from confirmatory analysis, used to evaluate scales ' reliability. Both indicators have presented reference threshold above 0.7 and 0.5, respectively, in most cases (Hair et al., 1995). Although External Variables presented a low EVA of 0.405, its CR is > 0.7, what makes it acceptable (Hair et al., 2017).

Table 5. Convergent validity and reliability after suppressing some variables.

Variable	Item	Stand. Coef.	Cronbach's Alpha	CR	EVA
External Variables	Q2	0.780	0.520	0.727	0.405
	Q3	0.592			
	Q6	0.598			
	Q18	0.550			
PEOU	Q8	1	1	1	1
PU	Q9	0.781	0.840	0.886	0.610
	Q10	0.727			
	Q11	0.730			
	Q12	0.759			
	Q13	0.894			
BIU	Q14	0.928	0.607	0.794	0.579
	Q15	0.815			
	Q16	0.460			

a) In PEOU variable, Stand. Coef., Cronbach's Alpha, CR, and EVA has not been calculated since it has only one question associated, thus the values are consequently 1.

Source: Adapted from software.

Beyond analyzing reliability and validity of measurement scales, structural equation model (SEM) has been used to test research hypotheses.

To check goodness of fit form our model it has been used the standardized root mean square residual (SRMR) which is a FIT index for constructs validity (Perry et. al., 2013; Alhassany & Faisal, 2018).

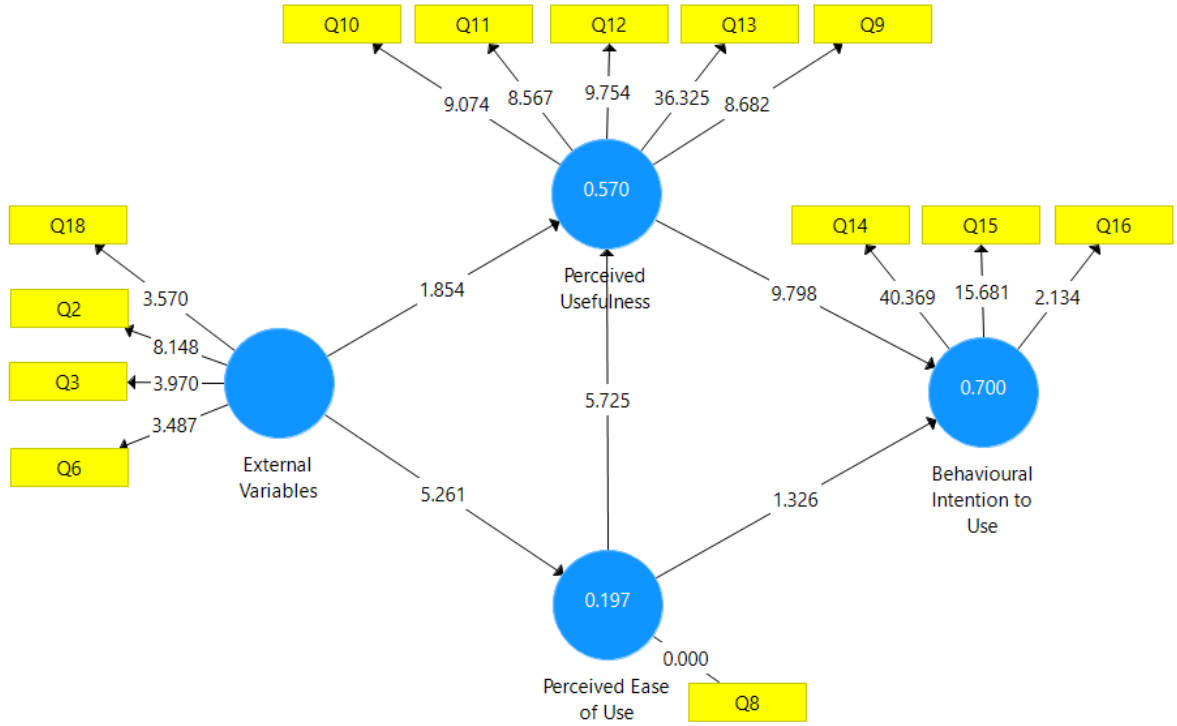
Values in SRMR are between 0 and 1. The lower the SRMR, the better the model fit (Brown, 2006; Schermelleh-Engel et. al., 2003). Ideally SRMR is supposed to be < 0.08, thus the value found of 0.088, nearly passed the test of fit (Henseler et. al., 2016). The results of the structural model are shown in Table 6.

Table 6. SRMR

	Saturated Model	Estimated Model
SRMR	0.088	0.088

Source: Elaborated by author.

Figure 9. Result for structural model (T-statistics).



Source: Elaborated by author.

In Figure 9 it is seen that all T-statistics are larger than 1.96 thus all results are considered significant.

Table 7 shows the results of the SEM analysis and the evaluation of hypotheses through path. Almost all the stated hypothesis have been considered relevant, $p < 0.0$ (Mooi, 2018); the only hypothesis not accepted was the impact that effect perceived ease of use (PEOU) has on behavioral intention to use (BIU), $p > 0.0$.

From the results it is proved that the usefulness perceived by the public (PU, $\beta = 0.741$), regarding the proposed system, impacts the most their willingness to really use it (BIU), more than the easiness of using it (PEOU, $\beta = 0.608$).

It is also seen that perceived ease of use has a great impact (PEOU), on perceived usefulness (PU), β = 0.6.

Furthermore, external variables have a slightly greater impact in perceived usefulness (PU), β = 0.478, compared to the impact it has over perceived ease of use (PEOU), β = 0.444.

Perceived has more impact on behavioral intention to use (BIU), β = 0.741, than the impact perceived ease of use (PEOU) has on behavioral intention to use (BIU), β = 0.652.

Table 7. Non- standardized coefficients (β) of the model.

	βSC	STDEV	T Statistics	p value / Sig.	Valuation
Perceived Usefulness -> Behavioral Intention to Use	0.741	0.745	9.798	0.000	Accepted
Perceived Ease of Use -> Perceived Usefulness	0.652	0.630	5.725	0.000	Accepted
Perceived Ease of Use -> Behavioral Intention to Use	0.608	0.588	4.944	0.185	Not Accepted
External Variables -> Perceived Usefulness	0.478	0.507	6.522	0.064	Accepted
External Variables ->	0.444	0.473	5.261	0.000	Accepted

Perceived Ease of Use					

Source: Elaborated by Author.

4.3. Hypothesis Results

In order to evaluate the acceptance of a Multi Attribute Reverse Auction Model for B2C ecommerce's, demonstrated in this study, with support of previous studies, is necessary to check if hypothesis are supported, to finally understand if people present a behavior intention to use the system and what drove them to that behavior.

Table 8. Hypothesis Results.

H1: It is possible to say that, in this study, external variables, such as age, gender, and experience, have influence over perceived usefulness (PU).	Supported
H2: It is possible to say that, in this study, external variables, such as age, gender, and experience, have influence over perceived ease of use (PEOU).	Supported

H3: It is possible to say that, in this study, perceived usefulness (PU) has influence over behavior intention to use (BIU).	Supported
H4: It is possible to say that, in this study, perceived ease of use (PEOU) does not have influence over behavior intention to use (BIU).	Not Supported
H5: It is possible to say that, in this study, perceived ease of use (PEOU) have influence over perceived usefulness (PU).	Supported
H6: Perceived has more impact on behavioral intention to use (BIU), β = 0.741, than the impact perceived ease of use (PEOU) has on behavioral intention to use (BIU), β = 0.652. Thus, it is possible to say the hypothesis is true. The e-commerce reverse auction	Supported

model presented seems to be more useful than easy to use.	

Source: Elaborated by Author.

From the results of hypothesis, showed in Table 8, it was possible to understand which variables would have influence in the adoption of the proposed reverse auction e-commerce system and if people would be interested on using such mechanism for their purchases.

In other words:

H1: It is supported. Thus, it is possible to say that, in this study, external variables, such as age, gender, and experience, have influence over perceived usefulness (PU).

H2: It is supported. Thus, it is possible to say that, in this study, external variables, such as age, gender, and experience, have influence over perceived ease of use (PEOU).

H3: It is supported. Thus, it is possible to say that, in this study, perceived usefulness (PU) has influence over behavior intention to use (BIU).

H4: Not supported. Thus, it is possible to say that, in this study and considering the sample that we were able to get, perceived ease of use (PEOU) does not have influence over behavior intention to use (BIU).

H5: It is supported. Thus, it is possible to say that, in this study, perceived ease of use (PEOU) have influence over perceived usefulness (PU).

H6: Hypothesis supported: the e-commerce reverse auction model presented seems to be more useful than ease to use.

CHAPTER 5 – CONCLUSIONS, LIMITATIONS AND FUTURE WORK

5.1. Main Conclusions

In this study we tried to evaluate Brazilians Acceptance on Multi Attribute Reverse Auction Model for B2C ecommerce transactions.

Allowing customers to use e-commerce business models to get the products and services they need, enables companies to increase their own competitive advantages. In fact, they are perceived as entities that bet on giving a different shopping experience to their clients (actual and potential); at the same time, they are also seen as entities that follow trends, since e-commerce is now vastly used by the majority of consumers, including Brazilians. In this research we focused on the multi-attribut reverse Auction model, a recognized type of e-commerce.

Suppliers and buyers can have benefits if they choose for multi-attribute reverse auction model: (1) for suppliers, they get an increase on negotiation bargaining power; (2) for buyers, they have access to a considerable variety of information, translated into options and attributes, as well as the control of the price variable (Beall et al., 2003; Menezes, et al., 2007; Yan and Yuan, 2012). Besides, this method seems to improve the match between demand and supply (Yan and Yuan, 2012).

Based in the literature on e-commerce and reverse auction, this study aimed to identify the acceptance of Brazilians over a Multi Attribute Reverse Auction Model for B2C and C2C e-commerce. For this purpose, we based our study on the TAM model, developed by Davis in 1989, after some minor changes (adaptations) in order to fit our research objective.

TAM model is commonly used to predict user's acceptance of computer and information systems, by analyzing some factors: (1) behavioral intention to use (BIU), as main factor, and (2) factors that have impact over BIU, such as external

variables, perceived usefulness (PU), perceived ease of use (PEOU) and behavioral intention to use (BIU).

In order to test the research model created after the literature review, a questionnaire was done using already validated scales, supported by a 5 Likert points. This questionnaire was made available online and sent to the predefined target (Brazilians) to be answered (Shroff et al., 2011), as already explained. Moreover, the questionnaire contained an explanatory small video to allow participants to better understand what multi attribute reverse auctions are and how they are operationalized. There is still some illiteracy on the subject.

This study seems to prove that Brazilians' acceptance on multi attribute reverse auction model for B2C ecommerce's is a reality, when considering the behavior intention to use (BIU), found in the results. Furthermore, this acceptance is impacted by external variables - perceived ease of use (PEOU), and perceived usefulness (PU).

Perceived usefulness is the only factor that directly and most impacts the individual's behavioral intention to use a reverse auction model when they go shopping. Indirectly we see that perceived ease of use (PEOU) have some influence over perceived usefulness (PU) and also that some external variables have some influence over perceived usefulness and perceived ease of use (PEOU).

All these findings seem to prove that Brazilians are receptive to use a multi-attribute reverse auction e-commerce model, since it is perceived as useful in a buying purchase process.

5.2 LIMITATIONS AND FUTURE WORK

This study has presented some limitations that may have had impact on the results.

The first limitation is related to the small sample. We only got 73 participants: due to the covid-19 pandemic situation and some timing and budget constraints, it was very difficult to get more people involved in this research. Consequently, we didn't get accurate results, which does not allow data extrapolation.

Variables related to TAM model, have been analyzed with SmartPLS tool, thus it was possible to apply a confirmatory factorial analysis (CFA). After convergent validity and discriminant analysis, it was necessary to remove some variables which presented low factor loadings in order to prevent further measurement errors. This is probably due to the degree of illiteracy related to this e-commerce business model, therefore we recommend, for future work, to use a larger sample and combine analysis with some qualitative research, such as personal interviews and Delphi method. Combining B2C clients' perspectives with those from some market experts should allow a better understanding of which variables also have an impact on the decision to make purchases in an e-commerce reverse auction system.

Other external variables may also be added to the "original" TAM model in future works, to get a better understating of factors impacting on perceived usefulness (PU), perceived ease of use (PEOU), and consequently behavior intention to use (BIU).

We also think it could be interesting to ask participants about using an e-commerce reverse auction system to buy specific products or services (eg. Cars, Events, Tourism, among others).

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APPENDIX

1. Online Questionaire

Survey(Shroff et al., 2011)					
Section 1				Introduction	
Autor: Ruan Porto Marques					
No âmbito do estudo "A aceitação dos brasileiros sobre o modelo de leilão reverso para B2C e-commerces", do curso de Mestrado em Marketing e Negócios Digitais da Universidade Portucalense Infante D. Henrique, este questionário tem o intuito de validar a aceitação positiva de indivíduos brasileiros perante o modelo de leilão reverso em B2C e-commerce.					
Section 2				External variables and validation of sample	**H1 / H2**
2	Sei como funciona um leilão	Concordo Totalmente	5		
		Concordo	4		
		Indeciso	3		
		Discordo	2		
		Discordo Totalmente	1		
3	Sei como funciona um leilão reverso	Concordo Totalmente	5		
		Concordo	4		
		Indeciso	3		
		Discordo	2		

		Discordo Totalmente	1		
4	Já utilizou algum sistema de licitações?	Sim	1		
		Não	2		
5	Já utilizou algum comércio eletrônico onde você informa o produto ou serviço que você quer, e os fornecedores competem entre si para lhe apresentar a oferta mais adequada a sua necessidade?	Sim	1		
		Não	2		
6	É possível dizer que se gasta muito tempo procurando as melhores ofertas do produto que você quer comprar na internet?	Concordo Totalmente	5		
		Concordo	4		
		Indeciso	3		
		Discordo	2		
		Discordo Totalmente	1		
Section 3					
<vídeo exemplificando o uso de um aplicativo de e-commerce idealizado sobre o modelo de leilão reverso para o model B2C>				Example Reverse Auction e-Commerce B2C	**H1 / H2**
7	Assistiu o vídeo acima?	Sim	1	External variables and validation of sample	
		Não	2		

Section 4					
Q	Variável	Valor	Código		
8	O processo de compra por leilão reverso (demonstrado no vídeo), onde eu informo uma demanda e vendedores me fazem ofertas, PARECE DE FÁCIL UTILIZAÇÃO para que eu realize uma compra.	Concordo Totalmente	5	Perceived ease of use(PEOU)	**H2 / H4 / H5 / H6**
		Concordo	4		
		Indeciso	3		
		Discordo	2		
		Discordo Totalmente	1		
9	A utilização de websites e ou aplicativos (demonstrado no vídeo), onde eu informo uma demanda e vendedores me fazem ofertas, POUPARIA MEU TEMPO procurando a melhor oferta na internet.	Concordo Totalmente	5	Perceived usefulness(PU)	**H1 / H3 / H5 / H6**
		Concordo	4		
		Indeciso	3		
		Discordo	2		
		Discordo Totalmente	1		

10	O processo de compra por leilão reverso (demonstrado no vídeo), onde eu informo uma demanda e vendedores me fazem ofertas, seria MAIS PRAZEROSO para mim do que ficar pesquisando as melhores ofertas.	Concordo Totalmente	5	Perceived usefulness(PU)	**H1 / H3 / H5 / H6**
		Concordo	4		
		Indeciso	3		
		Discordo	2		
		Discordo Totalmente	1		
11	Através do processo de compra por leilão reverso (demonstrado no vídeo), onde eu informo uma demanda e vendedores me fazem ofertas, eu POUPARIA DINHEIRO.	Concordo Totalmente	5	Perceived usefulness(PU)	**H1 / H3 / H5 / H6**
		Concordo	4		
		Indeciso	3		
		Discordo	2		
		Discordo Totalmente	1		
12	Através do processo de compra por leilão reverso (demonstrado no vídeo), onde eu informo uma demanda e vendedores me fazem ofertas, eu acredito que teria a MELHOR OFERTA PELO MENOR PREÇO.	Concordo Totalmente	5	Perceived usefulness(PU)	**H1 / H3 / H5 / H6**
		Concordo	4		

		Indeciso	3		
		Discordo	2		
		Discordo Totalmente	1		
13	O processo de compra por leilão reverso (demonstrado no vídeo), onde eu informo uma demanda e vendedores me fazem ofertas, parece ser ÚTIL para mim.	Concordo Totalmente	5		
		Concordo	4		
		Indeciso	3	Perceived usefulness(PU)	**H1 / H3 / H6**
		Discordo	2		
		Discordo Totalmente	1		
14	Eu gostaria de usar um comércio eletrônico como demonstrado no vídeo de exemplo.	Concordo Totalmente	5		
		Concordo	4		
		Indeciso	3	Behavioural Intention to Use	**H3 / H4 / H6**
		Discordo	2		
		Discordo Totalmente	1		
15	Eu usaria o comércio eletrônico, demonstrado no vídeo de exemplo, ao INVÉS dos que costumo utilizar.	Concordo Totalmente	5	Behavioural Intention to Use	**H3 / H4 / H6**

		Concordo	4		
		Indeciso	3		
		Discordo	2		
		Discordo Totalmente	1		
16	Eu usaria o comércio eletrônico, demonstrado no vídeo, JUNTAMENTE com os que já costumo utilizar.	Concordo Totalmente	5	Behavioural Intention to Use	**H3 / H4 / H6**
		Concordo	4		
		Indeciso	3		
		Discordo	2		
		Discordo Totalmente	1		
Section 5				External variables and validation of sample	**H1 / H2**
Q	Variável	Valor	Código		
17	Gênero	Feminino	1		
		Masculino	2		
		Outro	3		
18	Idade	16 - 25	1		
		26 - 35	2		

		36 - 45	3		
		46 - 55	4		
		56 +	5		
19	Tem nacionalidade brasileira?	Sim	1		
		Não	2		
20	Quantas compras realizou em websites de comércio eletrônico nos últimos 12 meses?	Nenhuma	1		
		1 a 5	2		
		5 a 10	3		
		10 a 20	4		
		mais de 20	5		

2. Table of questions, results and hypothesis.

Question	Result	Related Hypothesis
“I know how an Auction works.”	58.9 % partially agree and strongly agree.	H1 / H2
“I know how a Reverse Auction works.”	72.6 % partially agree and strongly agree.	
“Have ever used any procurement system?”	75.3 % said they never used any procurement system.	
“Have ever used any e-commerce where you inform a product or service you wish and sellers compete with each other to present you the most suitable offer according to your needs?”	69.9 % informed they have not.	
“Is it possible to say that it is spent much time looking for the best offers of the product you want to buy on internet?”	75 % partially agree and strongly agree.	

“Did you watch the video above?”	94.5 % have watched the video with the reverse auction system example.	
“The process of buying through auction (as shown in video), where I inform a demand and sellers make me offers, SEEMS EASY TO USE for me to make a purchase”.	85 % said the reverse auctions system seems easy to use.	
“Gender”	45.2 % are female and 54.8 % male.	
“Age”	Prevalence of people aging from 26 to 35 years old. Less prevalent it had 6,8% ranging from 36 to 45 and the same for 46 to 55 years old	
“Brazilian nationality?”	91.8 % of respondents are Brazilians.	
“How many purchases you made in e-commerces in the last 12 months?”	The majority of them bought from 5 to 10 times in the last 12 months.	

“The purchase process through reverse auction (as shown in video), where you inform a demand and seller make offers, SEEMS EASY TO USE in order to perform a purchase”	85% agree in certain way.	H2 / H4 / H5 / H6
“The use of websites and/or applications (as shown in video), where I inform a demand and seller make me offers, WOULD SAVE ME TIME looking for the best offer on internet”	84.9% we partially agree	H1 / H3 / H5 / H6
“The purchase process through reverse auction (as shown in video), where I inform a demand and seller make me offers, would be MORE PLEASANT for me than keep looking for better offers.”	71.2% partially agree and strong agree.	

“Through the reverse auction purchase system (as shown in video), where I inform a demand and seller make me offers, I would SAVE MONEY.”	72.6% partially agree and strongly agree.	
: “Through the reverse auction system purchase process (as shown in video), where I inform a demand and seller make me offers, I believe I would have THE BEST OFFER FOR THE LOWEST PRICE.”	68.6% partially agree and strongly agree.	
“The reverse auctions purchase system (as shown in video), where I inform a demand and seller make me offers, seem USEFUL to me.”.	87.6% partially agree and strongly agree.	H1 / H3 / H6
“I would like to use an e-commerce like the one exemplified in the video”.	56.2%, strongly agree, or 26% partially agree, they would like to use a similar e-commerce.	H3 / H4 / H6

“I would use the e-commerce demonstrated in the example video, INSTEAD of the ones I usually use”	34.2%, partially agree, or strongly agree, 30.1%.	
“I would use the e-commerce demonstrated in the example video, ALONG WITH the ones I usually use”.	50.7%, strongly agree, or partially agree, 26%.	