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EXPLORING THE FACTORS THAT INFLUENCE THE ADOPTION OF ONLINE PHARMACY IN PORTUGAL:

A STUDY ON CONSUMER´S ACCEPTANCE AND PHARMACIST´S PERCEPTION

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Abstract

Due to the fast technological evolution and the penetration of the internet in people's daily lives, the online purchase of medicines and pharmaceutical products is an option that can bring several advantages to consumers' lives. Despite this, the adoption of this method by Portuguese consumers is still relatively low. Few studies have focused on the non-adopters' intention of use, and the pharmacist perception of online pharmacies in Portugal. Thus, this study aims to explore the factors that influence the adoption or non-adoption of this type of service, as well as to analyze the perspective of community pharmaceutical service providers. With this, this study also intends to design innovative improvement strategies for pharmaceutical e-commerce platforms. For this purpose, an online questionnaire was applied to Portuguese consumers regarding the awareness and practice of this method. An interview was also designed aimed at analyzing how pharmaceutical professionals perceive the use of e-commerce in this sector in Portugal, this second tool being considered complementary to the first.

The results indicate that there is a relatively high percentage of Portuguese people aware of the practice of purchasing medicines/pharmaceutical products over the Internet. Despite this, most have never used this service as a means of purchasing this type of product. The reasons most mentioned by the smaller part of the sample that uses this method are home delivery, convenience, and competitive prices, which is in line with the literature. On the other hand, the reasons most mentioned by respondents who have never used this method are lack of knowledge of this type of service, pharmacy preference, lack of trust, and lack of advice on products and their use. The results of the interviews may indicate that Portuguese community pharmacists still have limited confidence in the online sale of pharmaceuticals, although favorable opinions are increasing. From these results, it was possible to conclude that it is necessary to implement more effective marketing strategies, adequate organizational structures, and well-defined logistics processes that allow speed and efficiency in transport and delivery.

Keywords: e-commerce, medicines, pharmaceutical products, online pharmacy

Resumo

Devido à rápida evolução tecnológica e à penetração da internet no dia-a-dia das pessoas, a compra online de medicamentos e produtos farmacêuticos é uma opção que pode trazer diversas vantagens para a vida do consumidor. Apesar disso, a adoção deste método pelos consumidores portugueses ainda é relativamente baixa. Poucos estudos incidiram sobre a intenção de uso dos não utilizadores e a perceção do farmacêutico em relação às farmácias online em Portugal. Assim, este estudo tem como objetivo explorar os fatores que influenciam a adoção ou não deste tipo de serviço, bem como analisar a perspetiva dos prestadores de serviços farmacêuticos comunitários. Com isso, este estudo também pretende traçar estratégias inovadoras de melhoria para plataformas de e-commerce farmacêutico. Para o efeito, foi aplicado um questionário online aos consumidores portugueses sobre o conhecimento e prática deste método. Foi também elaborada uma entrevista com o objetivo de analisar como os profissionais da área farmacêutica percebem a utilização do e-commerce neste setor em Portugal, sendo esta segunda ferramenta considerada complementar à primeira.

Os resultados indicam que existe uma percentagem relativamente elevada de portugueses com conhecimento da prática de aquisição de medicamentos/produtos farmacêuticos pela Internet. Apesar disso, a maioria nunca utilizou este serviço como meio de aquisição deste tipo de produto. Os motivos mais citados pela menor parcela da amostra que utiliza esse método são a entrega em domicílio, a conveniência e os preços competitivos, o que está de acordo com a literatura. Por outro lado, os motivos mais citados pelos entrevistados que nunca utilizaram esse método são o desconhecimento desse tipo de serviço, a preferência pela farmácia, a falta de confiança e a falta de aconselhamento sobre os produtos e seu uso. Os resultados das entrevistas podem indicar que os farmacêuticos comunitários portugueses ainda têm uma confiança limitada na venda online de medicamentos, embora as opiniões favoráveis estejam a aumentar. A partir desses resultados, foi possível concluir que é necessário implementar estratégias de marketing mais eficazes, estruturas organizacionais adequadas e processos logísticos bem definidos que permitam agilidade e eficiência no transporte e entrega.

Palavras-chave: comércio eletrónico, medicamentos, produtos farmacêuticos, farmácia online

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Acronym list

B2C	Business to Customer
CEO	Chief Executive Officer
EU	European Union
FEUP	Faculty of Engineering of the University of Porto
INFARMED	Autoridade Nacional do Medicamento e Produtos de Saúde, I.P
IT	Information Technology
OTC	Over the Counter
R&D	Research and Development
UAE	United Arab Emirates
UTAUT	Unified Theory of Acceptance and Use of Technology
US/USA	United States of America
UNCTAD	United Nations Conference on Trade and Development

1. Introduction

1.1 Context

Technology continues to expand and accomplish increasingly impressive achievements. Some of these technological advances resulted in varied commercial transactions carried out over the internet. Most often, industries dedicated to R&D, such as pharmaceuticals, implement innovative technologies to gain competitive advantage in the market. E-commerce has been gaining strength as a means of communication, strategy, and business practices, assisting in the exchange of information and execution of transactions between companies and individuals. E-commerce changed the nature of the economy and the healthcare industry as well (Alsadoun et. al, 2020). It provides the pharmaceutical industry with the best transaction mode for competitive advantage and sustained growth and enables customers to make secure and convenient transactions related to health products and services, allowing the consumer to receive medication at home or pick up at the nearest community pharmacy.

Despite the advantages of online pharmacies and the expansion in the global market, there are still limitations that influence the adoption and implementation of this business model. The current limitations represent a challenge involving different actors like public and private sectors as well as scientific institutions and academia and the cooperation between them is of paramount importance to effectively improve healthcare assistance (Baldoni et. al, 2019).

1.2 Problem statement

Currently, there is an unprecedented increasing demand for online shopping services in Portugal, being 2020 the year with the highest increase in the series that started in 2002 (Instituto Nacional de Estatística, 2020). Despite this, few studies exist on the use of online pharmacies in Portugal. Considering this, we devised a research plan that will help to gauge the attitude of pharmacy users with regards to online pharmacies and in this way contribute both to the literature and to practitioners/pharmacy managers who want to leverage their businesses on an online presence.

1.3 Background

E-pharmacies (online pharmacies) are companies that sell medicines and health products using electronic commerce and have specific methods of delivery (Rahaman et al., 2019). Generally, online pharmacies can be grouped into three categories: so-called "click-and-

mortar" pharmacies, where the website corresponds to the online branch of a community physical pharmacy; the legal websites of duly authorized distributors who supply medicines and pharmaceutical products in nearby pharmacies and the illegal websites, where national health authorities do not control the type of products and transactions that occur, and whose existence occurs exclusively in cyberspace.

Online pharmacies allow consumers freedom from time and location, privacy when ordering since it can be done anywhere and at affordable prices; it allows online pharmacy operations to reach a broader clientele and decrease infrastructure costs compared to only traditional pharmacies (Makinen et al., 2005). Unfortunately, there are still a considerable number of risks related to online medicines and health products purchase. The most frequently cited risks are hidden fees added to drug prices, data protection breaches, and unlicensed pharmacies that may not assure drug quality, drug safety, and legal distribution (Davis, 2007).

Although the history of online pharmacies started in the USA back in 1999, the use of the internet for selling and delivering drugs and OTC (Over the Counter) drugs has not gained ground in Europe. There is currently a gap in the literature regarding the factors that influence this business model adherence, both by consumers and by community pharmacies. There is a need to understand better the barriers in the adoption and implementation of pharmaceutical e-commerce and from there, evaluate the need to develop strategies to overcome the inherent challenges in the European context.

1.4 Structure of document

Firstly, this document will focus on the conceptual approach concerning online pharmacies and their features, introducing the main concepts underlying the topic under research and the subsequent problem statement The next chapter introduces the logic of the literature review with a synthesis of selected articles as well as the research gap. Then, a theoretical approach to the methodology used will be made, presenting the tools and approaches followed for the collection and processing of data, as well as the questions that arise for this research. In the following section, the results of the applied questionnaire and interviews are presented. The discussion of the results is presented in the chapter that follows, referring to the focal points arising from this analysis. This is followed by the presentation of a service blueprint, and the presentation of a practical example of an online pharmacy. Finally, the main research findings are presented in the last chapter of this document.

2. Literature review

With the help of RStudio and the VOS network, a reasonable number of relevant and recent papers from scientific journals and authors specialized in the area of interest using the best keywords combination were found.

The literature review was conducted on the Scopus database by searching the following keywords: KEY (*"on-line pharma*"* OR *"internet pharma*"* OR *"e-pharmacy"*) OR KEY (*"online pharma*"* OR *"internet pharma*"* OR *"epharmacy"*) OR KEY (*cyberpharmacies*)). These keywords led to 245 results.

The literature search in the Scopus database generates a greater number of articles, comparing to what will be selected. In this first approach, articles with different points of view were selected to better identify and understand the gap that will be studied. We used the PRISMA methodology to narrow down the results (image 1).
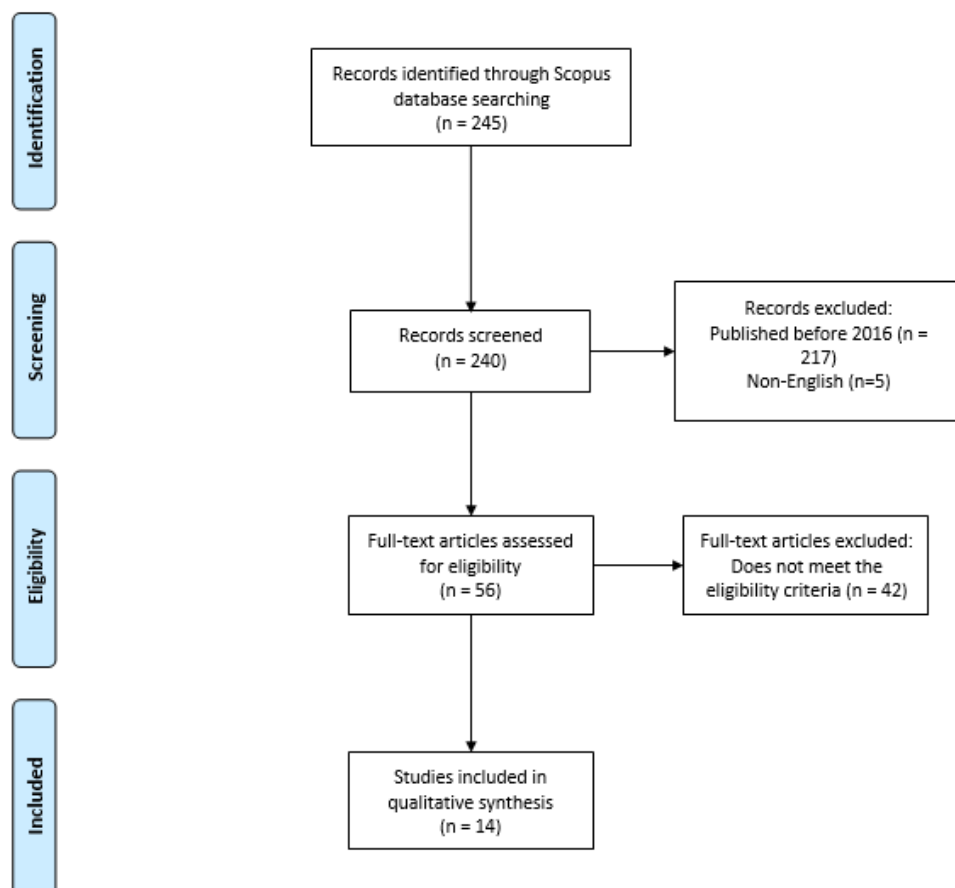

Image 1 - Prisma Flow Diagram

Non-English articles published more than five years ago were excluded. This selection resulted in 56 eligible articles that were later analyzed by the abstract. This final analysis resulted in 14 complete reviewed articles that included studies covering topics related to the use and intention of use of online pharmacies and their features. Reviewed articles are synthesized in the following table:

Table 1 - Literature review synthesis

Reference (first author, year)	Times cited	Country	Contributions	Limitations and Future Research
(Ma, 2021)	0	China	This study uses the basis of the technology acceptance model to investigate the factors that influence non-adopters´ intention of using online pharmacies. The authors intents to contribute to the promotion of online pharmacies adoption amongst these potential consumers. The results show that perceived usefulness and trustworthiness influence non-adopters´ intention and led the authors to suggest improvement strategies.	The study did not take into consideration the different types of non-adopters who may have different opinions. Perceived risk and trustworthiness were treated as a single construct. The authors suggest that future studies should explore the different types of constructs as multi-dimensional and explore how different environmental factors may impact the findings since this study was conducted only in China.
(Kumaran, 2020)	0	Malasya, Yemen, UAE, Brunei	This article describes the main issues related to the illegitimacy of online pharmacies and the unsafe practices of some of these businesses. The authors list some desirable activities that online pharmacies should perform to assurance the operations' safety and reduce fraud and the number of illegal online pharmacies websites.	The authors do not refer to limitations nor suggest future research. The article is focused on the legal issues of online pharmacies and although it is a very important aspect of the proposed research, it gives part of the answer to my research question.
(Alsadoun, 2020)	0	Saudi Arabia	This study investigates the major factors affecting the user's intention to adopt online pharmacy in Saudi Arabia. Unified Theory of Acceptance and Usage of Technology (UTAUT-2) was utilized along with the use of other Technology Acceptance Model (TAM) to examine the perception of users	This study focuses on the main challenges regarding customer acceptance in Saudi Arabia, so the conclusion of the study is inherent to the reality of this specific country and may be different in another context. Despite studying consumer behavior and presenting important conclusions, the study does

Reference (first author, year)	Times cited	Country	Contributions	Limitations and Future Research
			on online pharmacy intention of use. The authors concluded that perceived risk and trust can be considered as the main factors that might influence consumers' adoption intention of online medicine.	not mention specific recommendations and a set of policies to improve user acceptance.
(Liu, 2020)	0	China	This article explores the consumers' satisfaction factors addressed in Business to Customer (B2C) online pharmacy reviews and analyzes their perception towards it. The study gives insights about important aspects to improve such as logistics, marketing strategies, and employee service attitudes.	Although this article presents an interesting perspective, it has some limitations. First is the possible results bias since the data were crawled from only two Chinese online pharmacies. Also, these online pharmacies could have filtered out some strong negative consumers' opinions for commercial purposes. Second, the authors suggest looking further into the western countries advanced online pharmacies and carrying out more comparisons with growing pharmacies.
(Hou, 2020)	0	China	This paper discusses the online and offline channels of the pharmaceutical supply chain. The authors develop a susceptible-infected-susceptible epidemic model of the dual-channels. The findings are related to improving sales, increasing potential customers into purchases, and achieving dual-channel coordination. Also, this article provides managerial insights for implementing successful dual-channel pharmaceutical supply chains.	The authors pointed out several limitations in this research. The potential factors are not considered comprehensively in the dual-channel susceptible-infected-susceptible (SIS) epidemic model. More detailed quantitative analysis on the factor of influence model is identified as potential future research. Also, actual data can be collected based on these models and results can be tested empirically. Finally, more issues such as channel selection, network design, and fulfillment service contracts can be addressed regarding dual-channel pharmaceutical supply chains.
(Srivastava, 2020)	0	India	This paper aims to identify and empirically validate factors for adoption, usage, and intention to recommend e-pharmacy services by Indian consumers. Using the technology acceptance model, extended unified theory of acceptance and use of technology and self-determination theory. Results show that performance expectancy, effort expectancy, social influence, and hedonic motivation have a positive correlation	This study has geographic limitations since it was conducted in an urban suburb city of Bengaluru, India, thus concluding that research findings cannot be generalized to a larger population set. The researchers recommend improving the proposed model´s explanatory power using a mix of qualitative and quantitative approaches.

Reference (first author, year)	Times cited	Country	Contributions	Limitations and Future Research
			with the adoption of e-pharmacy and the intention to recommend.	
(Rahaman, 2019)	0	UAE	This study aims to study and gain insights from medical practitioners in prescribing and by pharmacies in dispensing medication. The study focuses on the context control, awareness, security, and trust processing perspectives of an online pharmacy. The analysis proposes a model of e-prescription integrated with an e-pharmacy that enables the dispensing of medication by the nearest pharmacy at the patient´s doorstep to reduce patient waiting time and prescription errors.	Researches suggest that issues such as quality of the product, security and, trusting the concept of buying medical necessities online should be addressed in future research to accomplish a deeper understanding of e-pharmacies and their approach to dispensing medication.
(Jain, 2019)	0	India	The objectives of this paper are to study the role of e-commerce in supply management among Indian online pharmacies and to study the customer satisfaction level from this system. The results of this research paper implicate the awareness about online pharmacies among Indian citizens, so they can purchase their medication from home, saving time and cost.	This research has geographic limitations since it is carried out in Uttar Pradesh, India, thus concluding that research findings cannot be generalized to a larger population set. Researchers considered the time factor as a limitation since this topic is very wide and time was limited to cover every aspect related to this system. Therefore, the results of this study may change due to demographic characteristics and the time of the study. Finally, the authors considered potential bias due to the involvement in online pharmacies of the respondents.
(Li, 2019)	2	China	This paper aims to study strategies for the pharmaceutical e-commerce platforms to capture the market share, obtain higher profits and achieve the sustainable development goal, by providing theoretical support and decision-making suggestions.	This study is limited to the subsidy strategy of the monopoly platform. Future research should focus on multi-platform competition and user multilateral attributes since in the real market there are several medical e-commerce platforms and consumers can choose between multiple platforms.

Reference (first author, year)	Times cited	Country	Contributions	Limitations and Future Research
(Lombardo, 2019)	1	Italy	This study assesses the opinion of a sample of Italian Pharmacists regarding the online sale of pharmaceutical products, as well as their knowledge about falsified drugs. It concludes that Italian pharmaceutics has low confidence in the use of websites to sell pharmaceuticals, although comparative analysis may indicate that the level of confidence is increasing, and favorable opinions are growing. This article gives important insights into the pharmacist's perception regarding online pharmacies and the methodology can be used as a guide for future research.	The present study is targeted at Italian Pharmacists and the results may not be applied to other regions. Despite presenting very important conclusions about the pharmacists' perception of pharmaceuticals' online sales, the study does not mention specific recommendations to improve user perception.
(Fittler, 2018)	3	Hungary	This study gathers information on the frequency and attitudes of Hungarian consumers purchasing medications online and their perceived benefits and disadvantages. The study shows that in the future more patients will get their medications on the internet. The results indicate that it is necessary to inform and educate the public on the safe use of online pharmacies. Potential threats to patient's safety prevention strategies are listed in the article.	The reports are subject to bias and untruthful data by respondents since online pharmacy use was self-reported which may influence the results. The study does not differentiate between legitimate and illegitimate actors. The study is performed throughout Southern Hungary and the results may not be relevant for other regions´ populations.
(Abanmy, 2017)	6	Saudi Arabia	This study aims to investigate the extent of the use of online pharmacies in Saudi Arabia. The results indicate that the practice of buying medicine online is not yet common amongst the sample caused by people´s unawareness of the existence of online pharmacies. The study suggests developing a logo to identify registered pharmacies and regulations enhancement.	The limitations of this study are regarding the small sample size, lack of age range coverage, and geographic limitation. The author suggests that future research should include a larger sample, a correlation between a customer profile and their individual online experience, greater male gender representation.

Reference (first author, year)	Times cited	Country	Contributions	Limitations and Future Research
(Sezgin, 2016)	10	Turkey	This study aims to identify influencing factors on pharmacists´ acceptance of pharmaceutical service systems, using a cross-sectional study conducted employing a research model based on technology acceptance theories. The findings provide insights into influencing factors and practical implications regarding perceived behaviors and system use. The authors believe that the procedure of the study would be a valuable asset for researchers who have plans to apply a cross-sectional study about healthcare professionals' acceptance of technology.	Further studies, including cross-cultural (to observe user attitudes towards the technology in different cultural settings) and longitudinal approaches (to observe changes in user attitudes in different periods), are required to increase the predictive value of the model.
(Yin, 2016)	3	China	This study uses the unified theory of acceptance and use of technology (UTAUT) model to examine the Chinese consumer acceptance of online pharmacies and to explore the different drivers of online purchase intention. The results show that aspects such as performance expectancy, social influence, perceived trust, perceived risk, effort expectancy, and perceived trust directly influence consumers on the adoption of online purchase. Based on the results, the authors presented suggestions to develop online pharmacies.	Some measure items were adapted based on online medicine aspects and prior research results, which can influence the results. Besides that, the study is carried amongst the Chinese population and the findings may not be suitable in other regions. Authors suggest that regulatory supervision and management are needed, as well as innovative business models to develop online medicine trading.

The selected studies address the issue of online pharmacies and their applications, both from the consumer perspective, as from the perspective of pharmacists and pharmaceutical service providers. The approach to these two aspects is extremely important because it is possible to retain very relevant information:

(1) it allows understanding the needs and the level of acceptance of consumers and potential consumers, revealing their perception and level of confidence concerning the online pharmacies as shown by Ma (2021), Alsadoun & Iskandar (2020), Liu et al. (2020), Srivastava & Raina (2020), Jain, Arya, & Gupta (2019), Fittler et al. (2018), Abanmy (2017), and Yin, Li & Qiao (2016).

(2) Allows studying the technical aspects of this type of service using the opinion and experience of professionals related to the area as shown by Rahaman et al. (2019), Lombardo, Marino & Cosentino (2019), and Sezgin & Yıldırım (2016).

(3) Also provides content about theoretical support and improvement strategies for the pharmaceutical e-commerce platforms as explored by Hou et al. (2020) and Li & Huang (2019). Using the results obtained, the authors explore the different motivators for the adoption and implementation of pharmaceutical e-commerce, with most of the articles presenting suggestions for improvement aimed at this type of service.

It was possible to notice that a considerable number of authors such as Alsadoun & Iskandar (2020), Srivastava & Raina (2020), and Yin, Li & Qiao (2016) used the same theoretical model to examine the acceptance and perception of online pharmacies by both consumers and pharmacists. The Unified Theory of Acceptance and Use of Technology (UTAUT) model proposed by Venkatesh et al. (2003) "provides a useful tool for managers needing to assess the likelihood of success for new technology introductions and helps them understand the drivers of acceptance in order to proactively design interventions (including training, marketing, etc.) targeted at populations of users that may be less inclined to adopt and use new systems" (p. 426). This model represents a theoretical basis that can be used in the proposed research.

Throughout the review, the issue that stood out the most was the fact that there were no studies carried in Portugal that address the topic, which represents a research opportunity. The selected articles present studies carried out, mostly, in Asian countries and some European countries, but no study was found that included a Portuguese sample. The results found may not be consistent with the reality of the country since there may exist

sociodemographic and cultural aspects influencing the use of online pharmacies, which translates into a gap in the literature.

Since in Portugal this type of service is still not widespread among consumers, this research will address the perspective of existing consumers and potential ones, exploring the factors that influence the adoption or non-adoption of this type of service. Simultaneously, the present study will be complemented with the analysis of the perspective of community pharmaceutical service providers concerning online pharmacies to better understand the theoretical and technical aspects that support this type of platform in Portugal.

3. Methodology

Considering the analysis of the articles and the literature gap portrayed in the previous chapter, it is possible to elaborate the research questions that will serve as a guide and help to conduct the research. According to Williams (2007), research questions help researchers to focus on ideas, manage the work, and choose the suitable approach or perspective of the topic of interest.

Q1: How do Portuguese consumers perceive the use of online pharmacies?

Q2: What are the factors that influence the adoption or non-adoption of this technology?

Q3: How do pharmaceutical professionals perceive the use of new technologies such as e-commerce in community pharmacies?

Q4: How to overcome the perceived online pharmacies challenges?

Leedy and Ormrod (2010) define research as a systematic process that aims at data collection, analysis, and interpretation to increase the understanding of a phenomenon. The methodology is the area of study that aims to answer a question and add knowledge, through the description and application of data collection and treatment techniques, thus, the set of scientific procedures used in an investigation process (Prodanov & Freitas, 2013). To investigate and systematize the answers to these proposed research questions, it is fundamental to select the appropriate research approach and design.

To explore and better understand the perception and level of acceptance of both consumers and pharmaceutical professionals regarding online pharmacies, the mixed method is the most appropriate approach for this research. Mixed methods research is formally defined by Johnson & Onwuegbuzie (2004) as "the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study" (p.17).

Creswell (2014) points that the researcher not only selects the approach but also decides the type of study or research design which are types of inquiry that provide specific direction for procedures. The research strategy describes how the researcher intends to carry out the work (Saunders, Lewis & Thornhill, 2007). To conduct this study, two different strategies are used: a survey aimed at consumers and a case study aimed at professionals, to gain data from these two different perspectives. A survey can be described as obtaining data or information about

characteristics, actions, or opinions of a certain group of people, indicated as representative of a target population, through a research instrument, usually a questionnaire (Tanur apud Pinsonneault & Kraemer, 1993). In this study it is applied an exploratory research survey in order to explore the perspective of the participants concerning the use of online pharmacies, seeking to discover new possibilities from the results obtained.

According to Yin (2009), the case studies method is preferred when "(a) `how´ or `why´questions are being posed, (b) the investigator has little control over events, and (c) the focus is on a contemporary phenomenon within a real-life context" (p. 2). The interviews are applied to professionals from 4 pharmacies in the city of Porto and lead to a case study methodology, which allows the observation of details of the perception and experience followed by these professionals, providing differentiated insights that can contribute to explaining the potential resistance or the trend in adopting the business model in question.

In this study, the data collection instrument used is the questionnaire, a method in which the information collected is filled out directly by the participant. Roopa & Rani (2012) defines questionnaire as a series of questions to obtain statistically useful information about a specific topic which can become a vital instrument that allows making statements about specific groups or entire populations when properly constructed and responsibly administered. The present questionnaire is applied online and consists of 17 questions. It is structured and presents mostly closed-ended questions, that is, limited answers to a fixed set of responses. It includes yes/no questions, multiple choice questions, and scaled questions. Some questions also present the respondent with the option to add a different answer from those presented. The objectives of the questionnaire are to describe the sociodemographic profile of the sample, investigate their level of knowledge and habits related to online shopping, and inquire about the factors that influence the adoption or non-adoption of purchasing medicines and pharmaceutical products method. The constructs are based on previous studies (literature review chapter) however, adapted to the Portuguese context and the present study design questions.

Simultaneously the semi-structured interview is also used as one of the primary data collection instruments directed at community pharmacy professionals. Interviews take a mixed approach: closed and open questions are asked so that there is a direction but allowing the interviewee to express his/her opinions and experiences and so that the interviewer has insights and content not explored in the original script since one of the advantages of this instrument is the possibility of collecting more detailed data that are not present in other

sources. The interview script consists of 12 questions that aim to analyze how pharmaceutical professionals perceive the use of e-commerce in this sector in Portugal.

Questionnaires and semi-structured interviews are often used in mixed method studies to generate confirmatory results (Harris & Brown, 2010). Questionnaires can provide evidence of patterns amongst a larger set of population, while qualitative interview data often gather more in-depth insights on participants' thoughts, attitudes, and actions (Kendall, 2008). The questions in the questionnaire and interview script were formulated according to the present research objectives and will be further explored in the "Results" chapter.

As for the time horizon, this is a cross sectional study, since the information is collected in a short period of time (Fontelles et al., 2009).

By using this approach and design, it is expected to identify and explore the answers to the questions raised and that from their analysis, structure improvement strategies that can help to overcome the potential identified challenges of e-commerce in the pharmacy business. In this way, the present study intends to deepen the knowledge about this topic and stimulate the interest of broader scientific studies development, aiming at the business model improvement and the quality of the services provided in the online pharmaceutical e-commerce platforms.

4. Results

4.1 Survey

An online survey was applied to address consumer's perception of the use of online pharmacies. The survey was developed using the Google Forms application and distributed randomly via FEUP email and social media such as WhatsApp, Facebook, and Instagram between March and April 2021. The questionnaire had an introductory paragraph that explained its purpose and insured confidentiality and anonymity of data collection and analysis. All of the respondents agreed to the survey fulfillment. The target population was Portuguese citizens and residents and a total of 185 responses were collected.

The first group of questions was demographic questions such as gender, age, and education level. It had also questions aimed to investigate:

- Frequency of internet use
- Frequency of general online shopping
- Awareness of "e-commerce" and "online pharmacy" terminology
- Previous history of buying medicines online.

The second section of questions was targeted to the respondents who already had at least one experience with medicine online purchase and covered the following topics:

- Type of products purchased
- Frequency of this type of transaction
- Reasons for choosing online medicines shopping
- Evaluation of satisfaction level
- Whether or not the covid-19 pandemic influenced their first experience.

The third section was targeted at the respondents that never bought medicines online and the questions were to analyze:

- The reasons for not choosing online medicines shopping
- Whether or not the covid-19 pandemic could influence the first experience with this type of transaction.

Most of the questions had yes/no types of responses. Other responses included specific statements such as reasons to/not to buy medicine online with the possibility to add options. There were also responses with scales to measure frequencies. The full questionnaire is presented in the appendix of this document.

4.2 Questionnaire results

A total of 185 responses were collected, the data were stored and analyzed using Google Forms and are presented as percentages.

a) Respondents' demographics

Most respondents were females (118, 63.8%), the main age was between 18 and 28 years old (139, 75.1%) (image 2), respondents degree concentrated mainly in high school graduates (66, 35.7%) and college graduates (69, 37.3%).

Table 2 - Respondents' demographics

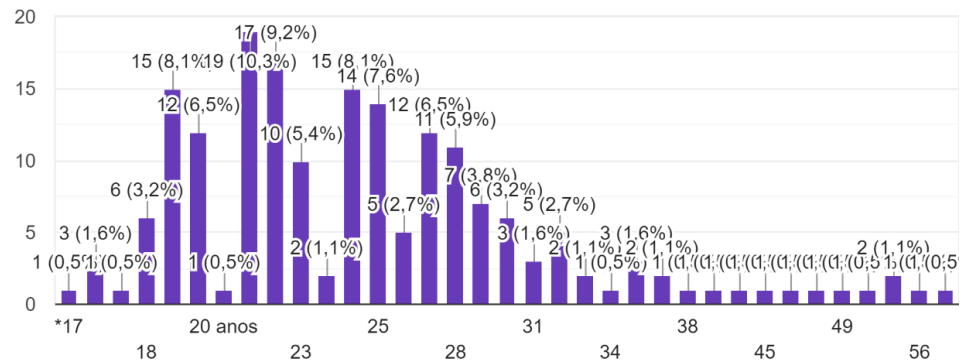|	Frequency (percentage) N (%)
Gender	
Male	66 (35.7)
Female	118 (63.8)
Other (non-binary)	1 (0.5)
Age	
<18	5 (2.7)
18-28	139 (75.1)
29-39	31 (16.8)
40-50	5 (2.7)
>50	5 (2.7)
Education level	
High school	66 (35.7)
College degree	69 (37.3)
Master, Ph.D., and advanced degrees	50 (27)

Age

n=185

Image 2 - Respondents´age

b) The extent of use of online pharmacy and user experience

When asked about how often respondents browsed on the internet, 171 (92.4%) answered more than ten times a week, 180 (97.3%) respondents have already used the internet to make online purchases being that 147 (79.5%) were acquainted with the term "e-commerce". As for "online pharmacy", 118 (63.8%) were familiar with the term (image 3), and out of the total of participants 140 (75.7%) never used the internet to purchase pharmaceutical products online (image 4).

Of the 45 (24.3%) respondents who have already used online platforms to purchase pharmaceutical products, the majority made purchases of cosmetic products (36, 80%) and non-prescription drugs (28, 62.2%). Concerning frequency, 40 (88.9%) carry out this type of transaction 1 to 5 times a year. When asked about the level of satisfaction, 26 (57.8%) considered the experience to be good, 14 (31.1%) considered it very good and 5 (11.1%) reasonable.

Table 3 - The extent of use of online pharmacy and user experience

	Frequency (percentage) N (%)
Frequency of internet use	
1-3 times per week	2 (1.1)
4-10 times per week	12 (6.5)
>10 times per week	171 (92.4)
Familiarity with the term "e-commerce"	

16

|	Frequency (percentage) N (%)
Yes	147 (79.5)
No	38 (20.5)
Previous experience with online shopping	
Yes	180 (97.3)
No	5 (2.7)
Frequency of online shopping	
Weekly	18 (9.7)
Monthly	53 (28.8)
Eventually	102 (55.1)
Never	10 (5.4)
No answer	2 (1.1)
Familiarity with the term "online pharmacy"	
Yes	118 (63.8)
No	67 (36.2)
Previous experience with pharmaceutical products online shopping	
Yes	45 (24.3)
No	140 (75.7)
Types of products purchased	
Cosmetics	36 (80)
Non-prescription drugs	28 (62.2)
Prescription drugs	6 (13.3)
Food supplements	16 (35.6)
Compounded medications	4 (8.9)
Childcare products	3 (6.7)
Other	3 (6.7)
Frequency of pharmaceutical products online shopping	
1-5 times a year	40 (88.9)
6-10 times a year	4 (8.9)
+10 times a year	1 (2.2)
Satisfaction level	
Reasonable	5 (11.1)
Good	26 (57.8)
Very good	14 (31.1)
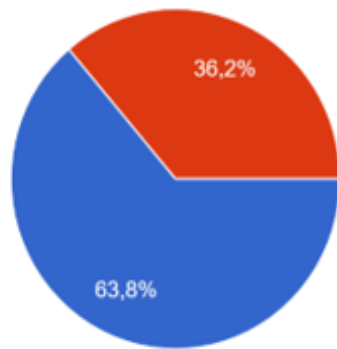
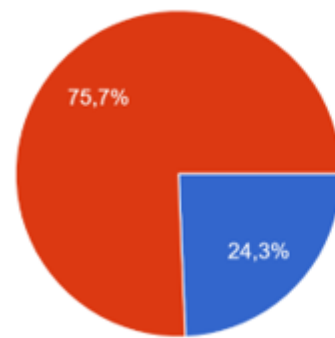Image 3 - Awareness of the term "online pharmacy"

Image 4 - Previous experience with pharmaceutical products online shopping

c) Reasons for buying/not buying medicine online

Table 4 lists the reasons why participants do/do not choose online platforms to buy medicines and pharmaceutical products. For those who had already bought online, home delivery (33, 73.3%), convenience (28, 62.2%), and competitive prices (22, 48.9%) are the main reasons that led to this choice. On the other hand, the unawareness of online pharmacy's existence (63, 46.3%) and preference for the physical pharmacy (53, 39%) were the most popular response amongst participants who had never bought medicines nor pharmaceutical products online.

Table 4 - Reasons for buying/not buying medicine online

	Frequency (percentage) N (%)
Reasons for buying medicines online: N = 45	
Unavailability at the pharmacy	10 (22.2)
Competitive price	22 (48.9)
Convenience	28 (62.2)
Home delivery	33 (73.3)
Constant availability	11 (24.4)
Privacy	2 (4.4)
Long waiting time at the pharmacy	0
Other	1 (2.2)
Reasons for not buying medicines online: N = 136	
Lack of knowledge of this type of service	63 (46.3)

Lack of inspection and regulation	5 (3.7)
Lack of trust	28 (20.6)
Lack of advice on products and their use	27 (19.9)
Lack of information regarding the origin and conservation of products	14 (10.3)
Lack of quality when compared with products purchased at the pharmacy	2 (1.5)
Long delivery period	14 (10.3)
Pharmacy preference	53 (39)
Lack of protection of personal data	3 (2.2)
No reason	32 (23.5)
Other	11 (8)

d) Covid-19 pandemic on user experience

Regarding the current situation due to the Covid-19 pandemic, participants who had already bought medicines or pharmaceutical products online were asked if their first experience was during the pandemic, 22 (48.9) said yes.

Respondents who never did this type of transaction were asked whether they would consider purchasing medicines or pharmaceutical products in the future influenced by the current Covid-19 pandemic situation, the majority said yes (71, 51.1%).

Table 5 - Covid-19 pandemic influence on user experience

	Frequency (percentage) N (%)
First experience during the pandemic	
Yes	22 (48.9)
No	23 (51.1)
Possible first experience during the pandemic	
Yes	71 (51.1)
No	12 (8.6)
Maybe	56 (40.3)

4.3 Interview

The interviews in this study were conducted online through the Zoom platform during the month of May 2021. They were addressed to 4 pharmacy professionals in the city of Porto, Portugal. The average duration of each interview was 10 minutes, except for one that lasted about 38 minutes. The interviews are considered ancillary to the questionnaire so that it was possible to gather opinions from professionals and cross-reference with the information collected from consumers, complementing the study. The script is presented in the appendix of this document.

In one of the interviews, the professional stated that she believes that low consumer adoption is linked to the fact that people prefer to go to pharmacies to get proper pharmaceutical advice. Despite this, she believes that the creation of a website for online sales would be beneficial for the pharmacy, as this could increase sales volume, increase the pharmacy portfolio, and, consequently, the pharmacy's profit.

Another interviewee also believes that the implementation would be beneficial, but it would require the expansion of the pharmacy team, a department responsible for the online segment. She adds that the pharmacy already has pages on social networks where people turn to clarify doubts, but that it is something residual. Interviewee: "I believe that there is indeed a need for online pharmacies in Portugal because this makes people have their products more conveniently. Society is changing and younger people are not always available to move. Online is a way for them to continue with their health care, through a good service, combined with the convenience of being at home". She goes on saying that the biggest challenge is to give the right information [regarding medicines/pharmaceutical products and their use through the platform], never forgetting the pharmacy's primary concern, which is the user's well-being.

Another respondent stated that the website implemented in the pharmacy where he works increased the visibility of the pharmacy and sales, especially during the covid-19 pandemic. He stated "We have two different websites, one just for prescription drugs, and other linked to everything else, for cosmetics, for services we promote in the pharmacy, discounts, online discounts, and so on, different services that complement each other in the end. We opted to make two sites with different names for greater distinction, so people can see that the same site is not the same thing, that is, one is exclusively for submitting prescription, period, there are several fields, such as the prescription number, the person can enter only the prescription number, when it is a non-materialized one, therefore the prescription number and the code,

submit it on the website and we receive this form, or you can take a picture of the prescription, we process it, and when we deliver the order, we collect the original prescription." Regarding delivery methods, he stated: "Either we deliver within the limits of the municipalities, those municipalities close to us and that the law allows us to deliver, the customer pick the order up at the pharmacy, there are both options on the website, and home delivery has a cost of travel".

Most respondents stated that they do not have in-depth knowledge of the Portuguese legislation applied to the online sale of medicines and pharmaceutical products.

When asked about improvement strategies and the future of online pharmacy, one of the professionals stated: "Diversify products, have good visibility and the lowest possible cost. Online commerce will grow. I think it will keep. I am sure this will be the future, there will be fewer trips to the pharmacy in the future. Especially medications for chronic use".

5. Discussion

In this chapter, we present the results obtained in this study, discussing, and interpreting them in light of the theoretical assumptions analyzed, always considering the defined objectives for this study as guidelines for data analysis. The objective of this study is to analyze how consumers perceive the use of online pharmacies and to understand the factors that influence the adoption or non-adoption of this technology, as well as analyze how pharmaceutical professionals perceive the technology, and from that, design strategies that can meet the needs of Portuguese users and increase the competitiveness of online pharmacies.

5.1 The extent of use of online pharmacy and user experience

According to the present study, 97.3% of the participants had previous experience with online shopping. It should be noted that 5 respondents answered that they had never bought online but when asked about frequency, 10 respondents answered "never", which can figure a bias. In the study published by the Instituto Nacional de Estatística (2020), it is reported that the percentage of e-commerce users registered in 2020 the biggest increase in the series started in 2002 being that 44.5% of people aged 16 to 74 years made orders via the internet in the 12 months preceding the interview. The difference in these results may be explained by the fact that our dataset may be less representative of the population, as it is smaller than the one used in the abovementioned study. Despite this growth, Portugal remains well below the European average, since according to the Eurobarometer (2019) only 44.8% of Portuguese people shop online, while the European average stands at 72%.

Despite the high number of participants who had purchased online, only 24.3% of respondents had used the internet to buy medicines or pharmaceutical products, although 63.8% were acquainted with the term "online pharmacy". This shows that although e-commerce is relatively known among consumers, the use for purchasing pharmaceutical products is not yet widespread in Portugal, which can be confirmed by the relatively low frequency of pharmaceutical products online shopping since most respondents (88.9%) makes this type of transaction only 1 to 5 times a year. According to one of the professionals interviewed, the website of his pharmacy that sells prescription drugs does not have a significant adherence due to the fact that the vast majority of consumers do not adopt this behavior. The average sales on this site, according to the respondent, is 1 to 2 sales daily.

Compared to the survey carried out by Infarmed (2010), there is a significant evolution compared to 2010, when only 6% of internet users aged between 18 and 64 had purchased medicines over the internet. From this comparison, it is possible to note that in the last few years there has been a great increase in the online sales of pharmaceutical products in Portugal.

The most popular type of products purchased is cosmetics products followed by non-prescription drugs and food supplements possibly as a result of lighter legislation, lower prices, and more publicity on these types of products. One of the interviewees works in a pharmacy that has two different websites, one just for filling prescriptions and the other for selling cosmetics, services promoted by the pharmacy, discounts, among others. Although the services complement each other, the volume of online sales of cosmetics and pharmaceutical products is much higher than the other website, with the average for the first being 30 sales daily and the second 1 to 3 sales. Supplements, and personal care products (dermocosmetics and oral hygiene) represent the largest share of turnover in a community pharmacy, each segment representing about 7% of the billing amount of pharmacies in Portugal in 2019 (Roma, 2019). The margins of this segment are more desirable, especially in the case of negotiations made at scale directly with the labs, therefore, the pharmacy e-commerce business plan should pay special attention to this segment.

To determine the importance that this practice may be having in the habits of the population, it is also necessary to understand the degree of satisfaction of those who have already used it, even to predict whether it will be a practice to evolve or, on the contrary, it still has flaws that cause discomfort to the users. 57.8% considered the experience to be good, 31.1% considered it very good and 11.1% reasonable, none of the respondents considered the experience bad or very bad. Further research aimed at better understanding the consumers' level of satisfaction and its features should be considered.

5.2 Reasons for buying/not buying medicine online

The questions about why participants do or do not choose online platforms to buy medicines and pharmaceutical products can be considered the most crucial issue of the survey. The purpose of these questions was to determine which aspects are most relevant for adopting or not adopting this method, and thus, for enabling improvements in the favorable elements and design strategies to reverse the unfavorable ones.

A review article by Orizio et al. (2011) mentions that the reasons most frequently pointed out by consumers of online medicines are the difference in price and convenience. In this

study, it is possible to make the same observations since most respondents chose home delivery, convenience, and competitive price as the main reasons for choosing this method. The press release published by Infarmed (2010) points to the same reasons as being the most common among Portuguese consumers.

According to Yin, Li & Qiao (2016), it is convenient for consumers to purchase medicines online for their parents since elderly people often have difficulties making purchases online. In one of the interviews, the professional stated that a large part of the online purchases of medication was made by the children of the holders of the prescription, as this behavior on the part of elder people is still not regularly verified. In the present study home delivery and convenience (73.3% and 62.2%) were pointed out as the most important reasons for buying medicines online. Davis (2007) argues that individuals who live far from a physical pharmacy, the elderly, disabled people, and those who face constraints related to schedules can benefit from the ease and speed of this method. E-commerce allows consumers to reduce the time spent and avoid travel to physical pharmacies, which can sometimes become more expensive than the shipping charges. Therefore, home delivery and the convenience this brings to the consumer are also highly important for this type of service and they must have well-articulated logistics by the companies.

The reason competitive price was also a common response among respondents (48.9%). In a study investigating commercial strategies used by online pharmacies to increase sales, Levaggi et al. (2009) point out that 64% of online pharmacies advertise lower prices compared to conventional pharmacies, as a selling argument. Thus, it is possible to conclude that price is a highly relevant factor as it allows consumers to compare prices and obtain lower prices (Ma, 2021) and is a tool that should be used by pharmacies to increase market competitiveness, through periodic market studies and negotiations with suppliers that allow increasing the profit margin of sales, keeping the retail price appealing to consumers. Price competitiveness was identified by all interviewed as one of the biggest challenges for online pharmacies.

Surprisingly, privacy was not a common response among respondents even though it is a widely discussed factor in the literature, as in the study by Srivastava & Raina (2020), which points out that privacy and confidentiality are considered major concerns of consumers for any e-health service. This result may lead to an approach focused on increasing the health literacy rate among Portuguese consumers and awareness about information privacy issues related to the use of online pharmacies.

The unavailability at the conventional pharmacy or constant online availability were also relatively common responses and the results indicate the importance of online pharmacies for consumers who seek alternative Sources.

Concerning reasons for not buying medicine online, the lack of knowledge of this type of service stood out as the most common reason (46.3%), which represents a barrier that can be overcome by online pharmacies by investing more in marketing strategies. A study on digital pharmaceutical marketing states that the pharmaceutical sector faces many challenges in adopting this type of strategies: most of the companies lack a proper vision when implementing digital marketing solutions, lack of efficient workforce specialized both on the industry and the new digital marketplace, inability of many pharmaceutical marketeers to execute an overall effective digital strategy, strict regulations requirements related to digital campaigns launches, and poorly maintained websites (Parekh, Kapupara & Shah, 2016). Following are described some strategies that online pharmacies can adopt to increase market competitiveness and presence in the digital era: **(1)** development of mobile apps that allows easier and personalized access to content related to the diagnosis and pharmacological profile of each user; **(2)** creation of a social network allied to the app which can become a motivator to return to the app and online patient support; **(3)** creation of a structural organization suitable for digital marketing; **(4)** ensuring adequate IT support; **(5)** provide technology-based services (patient and health care provider services) aimed to help users monitor, manage and clarify doubts about their health with professionals available 24/7.

The last strategy can also be applied to fill some of the major concerns among respondents: pharmacy preference, lack of trust in this type of service, and lack of advice on products and their use. According to one of the interviewees, when delivering the order for prescription drugs, they always ask if there is any doubt and clarify issues related to the use of the drugs, hence the legislation only allows pharmacists or pharmacy technicians to do this type of service.

Ma (2021) identifies trustworthiness as an important driver of online pharmacies adoption; therefore, online platforms need to improve consumers´ perceived trustworthiness. For instance, websites or mobile apps can highlight government operation licenses as the common logo adopted by the European Commission (2012) for legally operating pharmacies/retailers in EU countries as a measure to help consumers identify the sites that operate legally (image 5).

Image 5 - EU logo for online sale of medicines

Privacy and security policies should be clear and provided to the platforms' users to reduce perceived risk. Additionally, pharmacists' professional licenses, and drug/pharmaceutical products certificates should also be available for consultation. This strategy can also improve the lack of information regarding the origin and conservation of products, which was also a relatively common response from the participants (10.3%). A study from the US shows that although it is estimated that 1 in 4 internet users have already purchased medicines through e-commerce platforms, it is nevertheless clear that consumers are not aware of the dangers of accessing this route counterfeit drugs, exposing themselves as a consequence to a health hazard (Blackstone et al. 2014). In Portugal, the majority (65%) of respondents from the inquiry by Infarmed (2010) who have purchased drugs over the internet say they check whether websites are authorized, however, only about 20% do so correctly, referring to the Infarmed website. These data reveal the importance of informing and educating consumers on the correct way to make this type of purchase, reinforcing the idea that despite the advantages, there are dangers that can jeopardize the consumer's health. Although the extent of online purchase of medicines and pharmaceutical products is limited in Portugal, ensuring the legality and inspection of online pharmacies is of paramount importance and may increase the level of confidence of the population, as well as increasing the level of security preventing public security issues related to counterfeit medicines and pharmaceutical products, which implies cooperation between all the stakeholders involved. Further research is needed to explore consumers' awareness and trustworthiness.

Long delivery period was also a relatively common response (10.3%). This is an issue that can be improved by structuring the delivery logistics, to guarantee the correct dispensing, delivery, and pharmaceutical advice to the consumer. Concerning home delivery, transport must be carried out ensuring that the vehicles and shipping containers used are suitable for this purpose, to prevent the exposure of medicines to conditions that can alter their quality

and integrity. Liu et al. (2020) argue that the most important task for online pharmacies is to enhance logistics, boost the delivery and transportation speed, and invest in self-built logistics as much as possible.

All the above strategies should be implemented according to the Portuguese regulations within the legal framework of online pharmacies.

5.3 COVID-19 pandemic and user intention

The purpose of the questions related to the COVID-19 pandemic was to assess the impact of the current situation on the intention of use of the technology under study, inquiring whether it influenced or could influence the first experience with this type of transaction.

COVID-19 pandemic has impacted the world on multiple levels, including the e-commerce business model. United Nations Conference on Trade and Development-UNCTAD (2021) reported that the e-commerce sector experienced a rise in its share of all retail sales from 16% to 19% in 2020. The same report shows that online business-to-consumer (B2C) sales stood at $2.9 trillion in 2020 for the world´s top 13 companies. According to data from the Trends Observatory, a survey developed by the Ageas Portugal Group & Eurogroup Consulting Portugal (2020), 57% of respondents admit to having made more online purchases in the last six months. This increase is in line with e-commerce data in Portugal, which points to an estimated growth of 150-170% since March, compared to the same period last year. The same results show that categories such as food and healthcare lead the way consumption increases by the Portuguese population.

From the consumers' perspective, the pandemic invited a new way of thinking to avoid physical contact and to minimizing displacements, which led people towards digitalized alternatives including buying medicines through online platforms (Awari & Suryawanshi, 2020). In the present study, almost half (48.9%) of the respondents admitted that their first experience with online purchasing medicines or pharmaceutical products was during the pandemic.

From the pharmaceutical companies' perspective, the crisis also presents new opportunities as the COVID-19 outbreak has led to major changes in B2C business models. One of the interviewees stated that the growth in online sales was essentially due to confinement. He says that the cosmetics and other pharmaceuticals website had an astonishing "boom" as people could not leave the house, despite the prescription drug website remaining with low

adherence. He finishes by saying that online commerce made the bureaucratic part easier, the work done in the back office. Despite this, the respondent admits that online pharmacies face some challenges such as the competition between them and managing the high investments for the maintenance of platforms and continuity of service after the pandemic. For the remaining respondents, the pandemic did not affect sales as the pharmacies where they work do not have active sales websites.

More than half (51.1%) of the respondents who never bought medicines or pharmaceutical products online admitted that they would consider making this type of transaction due to the current situation. This result endorses the fact that the implementation and effective management of innovative technologies in the pharmaceutical field will provide benefits during the pandemic both for consumers and companies, allowing the optimization of pharmacies´ activities and ensuring the provision of quality pharmaceutical assistance to the population, particularly in the context of the COVID-19 pandemic (Kilova, Mihaylova, & Peikova, 2021). Future needs should be studied and monitored extensively, as this trend is likely to increase.

5.4 Capsule - a practical example

Capsule is a New York-based online pharmacy startup founded in 2015. It offers same-day prescription delivery, with couriers delivering by bike or by car. The company has expanded beyond prescriptions through an app (image 6) that connects people with more health offerings, such as telemedicine and mental health services. It also provides reporting on medication adherence. According to CEO Eric Kinariwala, after raising a recent $300 million funding round, online pharmacy startup Capsule is now valued at more than $1 billion. "The long-term ambition of Capsule is that it is the single place where consumers can access all of the needs that they have in their health care in a single, simple, holistic place, and we're doing that in a way that brings everybody else that's building different parts of health care together versus trying to own all of those things ourselves," Kinariwala said in an interview (LaVito, 2021).

Capsule is an example of an online pharmacy successfully implemented, providing benefits for consumers and health companies, and ensuring the provision of pharmaceutical assistance.
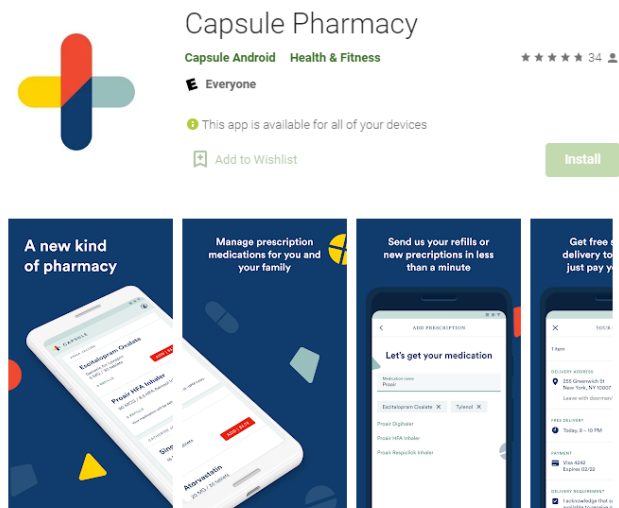
Image 6 - Capsule app

5.5 Comparison between Portugal and other countries regarding major factors that influence consumers´ adoption of online pharmacies

Table 6 - Comparison between Portugal and other countries regarding major factors that influence consumers´ adoption of online pharmacies

	Portugal	China	India	Saudi Arabia
		(Ma, 2021); (Yin, Li & Qiao, 2016)	(Srivastava & Raina, 2020)	(Alsadoun & Iskandar, 2020); (Abanmy, 2017)
Perceived usefulness		✓		
Perceived risk		✓		✓
Trustworthiness	✓	✓		✓
Performance expectancy		✓	✓	
Effort expectancy			✓	
Social influence		✓	✓	
Constant availability of the medicine	✓			✓
Convenience	✓			
Competitive price	✓			

6. Online pharmacy service blueprint

As discussed in the previous chapter, there are several challenges in the implementation of online services in the context of community pharmacies. The strategies to implement the service must be adequate to both consumers and providers, as well as cost-effective. Considering the strategies discussed previously, the authors propose to elaborate a service blueprint, which is a picture or map aimed to help providers and service marketeers design, deliver, and manage new and established services (Shostack, 1984). Service blueprints can communicate through visual concepts complex service processes more clearly and efficiently to stakeholders than verbal descriptions (Holdford, 2019). This tool allows to visualize the architecture of an online pharmacy, identify several actors, and the flow of possible actions throughout the service. It also defines where and how the service takes place, how interactions between customer and provider flows, as well as waiting points. Additionally, it highlights key moments that interfere with the adoption and use of the online pharmacy:

(1) ☆**Select products and add to cart:** this moment is linked to the competitive price issue previously discussed. The choice of the pharmacy products will be closely related to the prices that are charged, as well as the delivery fees. Through constant market studies and contracts with suppliers that allow the cost of products and the service itself to be reduced as much as possible, it is possible to maintain attractive prices for consumers.

(2) ☆**Receive order:** the convenience that home delivery provides the consumer is undoubtedly one of the main reasons that lead to the option of shopping online, as the questionnaire results shows. After all, purchases can be made without leaving the house, saving time and money.

(3) ☆**Prepares and dispatches order using picking, packing, and shipping processes:** the packaging in which the product is delivered is the first physical contact that the consumer has with the service provided by the online store, being one of the essential points for creating a good impression and relationship between consumer and provider. Ensuring the safety and correct transportation of the order is crucial to maintaining the quality and integrity of the products. The shipping process must be done as efficiently as possible, as according to the results of this study, the main reasons for choosing this service are home delivery and the convenience it brings. For this, pharmacies must adopt their own delivery structure or have well-defined partnerships with delivery companies, which enable delivery in the shortest possible time.

(4) ☆Payment and geolocation system processes: the use of secure payment methods enables quick and convenient payment to the consumer, while the use of geolocation systems makes it possible to calculate the proximity of the delivery address more accurately and in this way, provide the consumer with more accurate information concerning the time and conditions of delivery, thus improving efficiency.

(5) ☆Contact customer service in case of questions or complaints/Provides pharmaceutical advice and clarifies doubts through 24/7 online chat: consumer support provides the consumer with greater security and increases the level of confidence in the service provided. It helps users to monitor, manage and clarify doubts about their health and product characteristics with professionals available 24/7. This tool allows addressing the main factors identified by respondents as influencing the non-adoption of the online service: pharmacy preference, lack of trust, and lack of advice on products and their use. Furthermore, it can represent an important means of innovation and differentiation comparing with current online pharmacy business models.
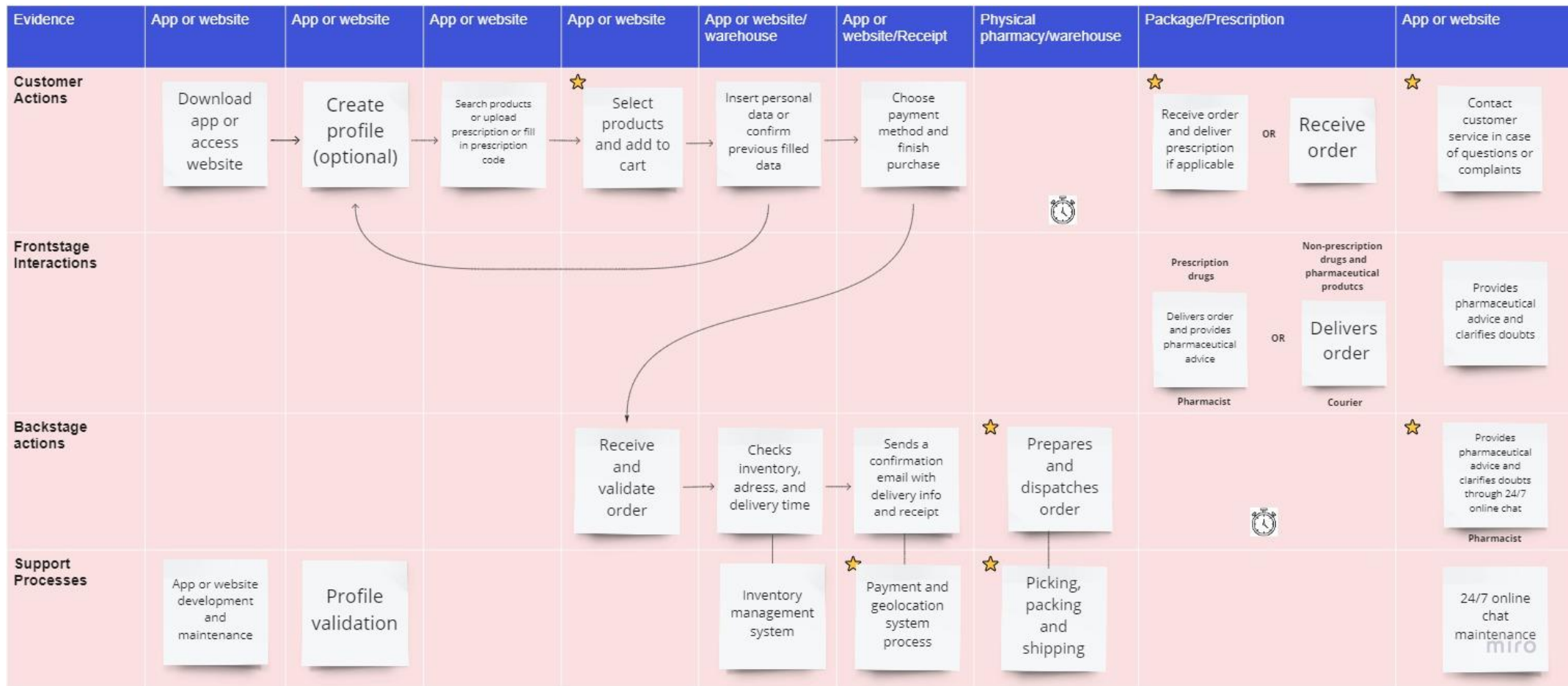
Evidence	App or website	App or website	App or website	App or website	App or website/ warehouse	App or website/Receipt	Physical pharmacy/warehouse	Package/Prescription	App or website
Customer Actions	Download app or access website	Create profile (optional)	Search products or upload prescription or fill in prescription code	⭐ Select products and add to cart	Insert personal data or confirm previous filled data	Choose payment method and finish purchase	🕐	⭐ Receive order and deliver prescription if applicable OR Receive order	⭐ Contact customer service in case of questions or complaints
Frontstage Interactions								Prescription drugs — Delivers order and provides pharmaceutical advice (Pharmacist) OR Non-prescription drugs and pharmaceutical produtcs — Delivers order (Courier)	Provides pharmaceutical advice and clarifies doubts
Backstage actions				Receive and validate order	Checks inventory, adress, and delivery time	Sends a confirmation email with delivery info and receipt	⭐ Prepares and dispatches order	🕐	⭐ Provides pharmaceutical advice and clarifies doubts through 24/7 online chat (Pharmacist)
Support Processes	App or website development and maintenance	Profile validation			Inventory management system	⭐ Payment and geolocation system process	⭐ Picking, packing and shipping		24/7 online chat maintenance

Image 7 - Online pharmacy service blueprint

7. Conclusions

This study presents some limitations that can figure in significant scope for future research. First, there is a geographical limitation since the questionnaire was carried out in Porto, Portugal, thus concluding that the research results cannot be generalized to a larger population set. Further research should explore how environmental factors such as social, cultural, and regulatory context may influence the individual intention of use. Also, the predominant age group among respondents (18-28) may not be representative of the main consumers of medicines and pharmaceutical products. Future studies should explore how age can influence the level of trustworthiness and the different needs of older consumers. The data collection and analysis are exclusively a qualitative approach, which can generate some bias, thus a mix of a qualitative and quantitative approach is recommended to enhance and strengthen the level of reliability of the research results. We also suggest analyzing more constructs such as performance expectancy, social influence, perceived risk, and perceived trust, in order to better understand the influence factors of adoption or non-adoption of online medicine and pharmaceutical products purchase. Online pharmacies are still in the initial stage of development in Portugal, therefore researchers should expand the data source and improve the collection and analysis methods.

The interviews are considered ancillary to the questionnaire, so the number of interviews conducted is not representative and the results may be biased. More studies with a larger number of participants and interviews designed and analyzed with more precise methods should be considered in the future.

This study proved to be important to better understand the intention of use of the internet as a means of purchasing medicines and pharmaceutical products by Portuguese consumers, as well as to explore pharmaceutical professionals´ perception regarding this business model.

It is possible to conclude that there is a relatively high percentage of Portuguese people aware of the practice of purchasing medicines/pharmaceutical products over the Internet. Despite this, most have never used this service as a means of purchasing this type of product. The majority of those who performed or are used to perform this type of transaction only do it 1 to 5 times a year. This low frequency can be improved by better exploring the factors that cause low adoption by consumers. According to the results, the main factors that lead to choosing online medicines purchase are home delivery, convenience, and competitive prices. It is important for stakeholders to exploit these factors in order to capture a larger market share and maintain consumer interest. This is possible through periodic market studies allowing to maintain attractive prices, investing in well-articulated logistics structures, and promoting safe and fast delivery methods. It has also been

shown to be necessary to increase literacy among consumers due to unawareness about information privacy and the risks related to counterfeit medicines.

On the other hand, it is also necessary to reverse the factors that influence most consumers not to opt for this method. The main factors identified were lack of knowledge of this type of service pharmacy preference, lack of trust in this type of service, and lack of advice on products and their use. For this purpose, strategies to capture potential consumers were described in this study such as implementing more effective marketing strategies, adequate organizational structures, and well-defined logistics processes that allow speed and efficiency in transport and delivery. Also, recurring to continuous market studies, developing 24/7 pharmaceutical assistance tools such as chats built into the platform, ensuring adequate IT support, and making available the licenses of the professionals and the technical sheet of the products to users. It is also important to emphasize the importance of cooperation between all the stakeholders involved to increase the health literacy level and trustworthiness amongst consumers, and the level of security of the service.

These strategies were incorporated into a service blueprint to visualize organizational processes in order to assist the optimization of the service and customers´ experience.

The results of the interviews may indicate that Portuguese community pharmacists still have limited confidence in the online sale of pharmaceuticals, although favorable opinions are increasing.

The research model can provide support for future studies that may be developed, and the data collected can be used as a basis to better understand the factors that influence the adoption or non-adoption of this business model. There is a need to develop more studies that can measure multiple constructs and strategies in a longer time spectrum and a larger and more representative sample.

This study allowed to acquire important knowledge about this business model which, in the future, may be able to support and guide its implementation, when faced with the situations discussed in this dissertation.

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9. Annex

Farmácias online em Portugal

O presente questionário destina-se a avaliar, a nível nacional, a atitude e perceção dos consumidores em relação a compra de medicamentos e produtos de saúde através de farmácias online por meio do comércio eletrónico (e-commerce). As questões apresentadas não têm associadas respostas corretas ou incorretas, pretendem apenas recolher opiniões pessoais.

O questionário é de caráter anónimo e confidencial. As informações recolhidas serão utilizadas apenas para fins académicos, sendo parte integrante de um trabalho de investigação do Mestrado em Inovação e Empreendedorismo Tecnológico, da Faculdade de Engenharia da Universidade do Porto, sob orientação do Prof. Doutor Mário Amorim Lopes.

A sua colaboração e disponibilidade neste estudo são muito importantes. Agradeço desde já e em caso de dúvidas não hesite em entrar em contato através do email
201903019@fe.up.pt
Obrigada,

Evelyn Oliveira Santos
*Obrigatório

Farmácias online em Portugal

1. Confirma que está em acordo com o preenchimento do inquérito? *

    Marcar apenas uma oval.

    ◯ Sim
    ◯ Não

Secção sem título

2. Género *

    Marcar apenas uma oval.

    ◯ Feminino
    ◯ Masculino
    ◯ Outra: _____

3. Idade *

_____

4. Nível de escolaridade *

Marcar apenas uma oval.

◯ Sem escolaridade

◯ Ensino básico completo

◯ Ensino secundário completo

◯ Ensino superior completo (licenciatura)

◯ Avançado (mestrado, doutoramento, etc)

5. Frequência de uso de internet *

Marcar apenas uma oval.

◯ 1-3 vezes por semana

◯ 4-10 vezes por semana

◯ +10 vezes por semana

◯ Nunca

6. Frequência de compras online *

Marcar apenas uma oval.

◯ Diariamente

◯ Semanalmente

◯ Mensalmente

◯ Eventualmente

◯ Nunca

◯ Sem resposta

40

7. 1. O e-commerce refere-se a um modelo de negócio em que os processos de compra e venda são estruturados através da internet. Está familiarizado com o termo "e-commerce"? *

Marcar apenas uma oval.

◯ Sim

◯ Não

8. 2. Já recorreu à internet para efetuar compras online? *

Marcar apenas uma oval.

◯ Sim

◯ Não

9. 3. As Farmácias online são empresas que vendem medicamentos e produtos de saúde por meio do comércio eletrónico. Está familiarizado com o termo "Farmácia online"? *

Marcar apenas uma oval.

◯ Sim

◯ Não

10. 4. Já recorreu à internet para efetuar compras de produtos farmacêuticos online? *

Marcar apenas uma oval.

◯ Sim

◯ Não

Farmácias online em Portugal

41

11. **4.1 Se respondeu sim, que tipos de produtos?**

Marcar tudo o que for aplicável.

- [ ] Produtos de cosmética
- [ ] Medicamentos não sujeitos à receita médica
- [ ] Medicamentos sujeitos à receita médica
- [ ] Suplementos alimentares
- [ ] Manipulados
- [ ] Produtos de puericultura (produtos infantis como biberões, fraldas, etc)

Outra: [ ] _____

12. **4.2 Com que frequência faz este tipo de transação?**

Marcar apenas uma oval.

- ( ) 1 a 5 vezes por ano
- ( ) 6 a 10 vezes por ano
- ( ) Mais de 10 vezes por ano

13. **4.3 O que o leva a optar pela via online para este tipo de transação?**

Marcar tudo o que for aplicável.

- [ ] Indisponibilidade na farmácia
- [ ] Preço competitivo
- [ ] Conveniência
- [ ] Entrega ao domicílio
- [ ] Disponibilidade constante
- [ ] Privacidade
- [ ] Longo tempo de espera na farmácia

Outra: [ ] _____

14. 4.4 Como avalia a(s) sua(s) experiência(s) de compra online de produtos farmacêuticos?

Marcar apenas uma oval.

◯ Muito má

◯ Má

◯ Razoável

◯ Boa

◯ Muito boa

15. 4.5 No contexto da pandemia, recorreu a farmácias online para efetuar compras pela primeira vez?

Marcar apenas uma oval.

◯ Sim

◯ Não

Farmácias online em Portugal

16. 4.6 Se respondeu não, o que o leva a não optar pela via online para este tipo de compra?

Marcar tudo o que for aplicável.

☐ Falta de conhecimento deste tipo de serviço

☐ Falta de fiscalização e regulamentação

☐ Falta de confiança

☐ Falta de aconselhamento sobre os produtos e a sua utilização

☐ Falta de informação em relação à origem e conservação dos produtos

☐ Falta de qualidade em relação aos produtos adquiridos na farmácia

☐ Longo período de entrega

☐ Preferência da farmácia

☐ Falta de proteção de dados pessoais

☐ Sem motivo

Outra: ☐ _____

43

17. 4.7 No contexto da pandemia, recorreria a este tipo de serviço pela primeira vez?

Marcar apenas uma oval.

○ Sim
○ Não
○ Talvez

Concluído

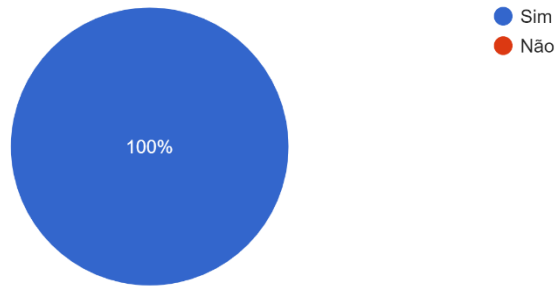Muito obrigada pela sua colaboração e tempo dispensado!

Google Formulários

Annex 3 – Questionnaire results

Confirma que está em acordo com o preenchimento do inquérito?
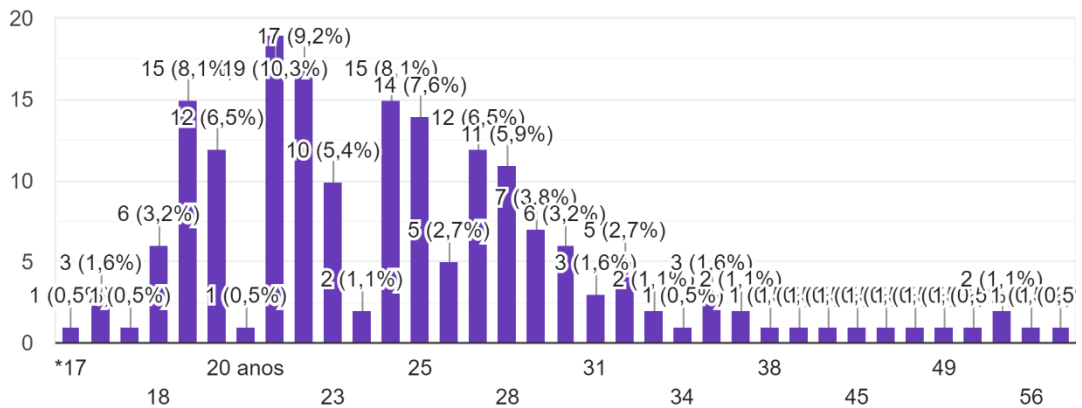185 respostas

- ● Sim
- ● Não

100%

Género
185 respostas

- ● Feminino
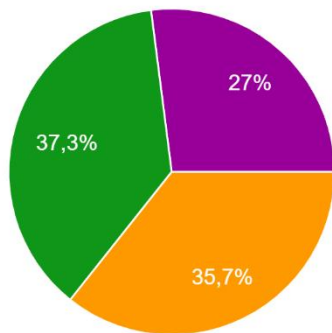- ● Masculino
- ● não binário

35,7%

63,8%
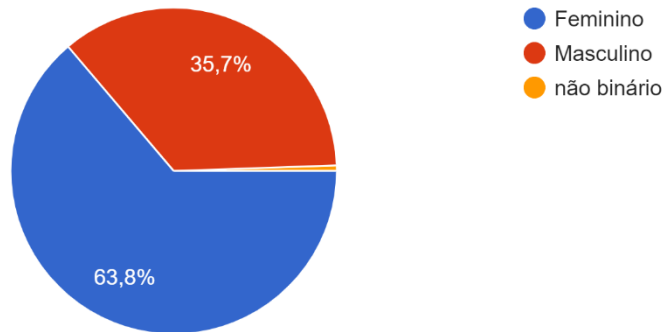
Idade
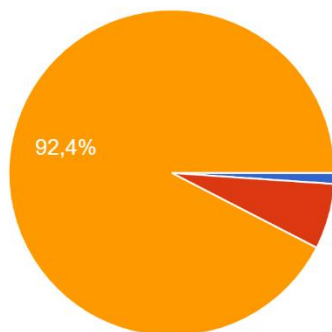185 respostas

Nível de escolaridade
185 respostas

- ● Sem escolaridade
- ● Ensino básico completo
- ● Ensino secundário completo
- ● Ensino superior completo (licenciatura)
- ● Avançado (mestrado, doutoramento, etc)

27%
37,3%
35,7%

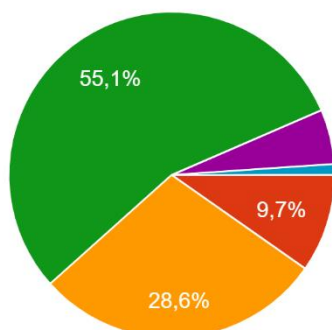## Frequência de uso de internet
185 respostas

- ● 1-3 vezes por semana
- ● 4-10 vezes por semana
- ● +10 vezes por semana
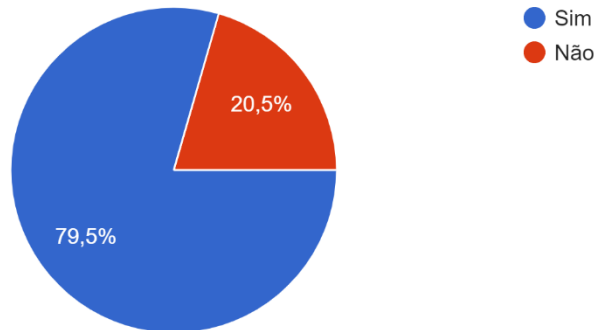- ● Nunca

92,4%

Frequência de compras online
185 respostas

- ● Diariamente
- ● Semanalmente
- ● Mensalmente
- ● Eventualmente
- ● Nunca
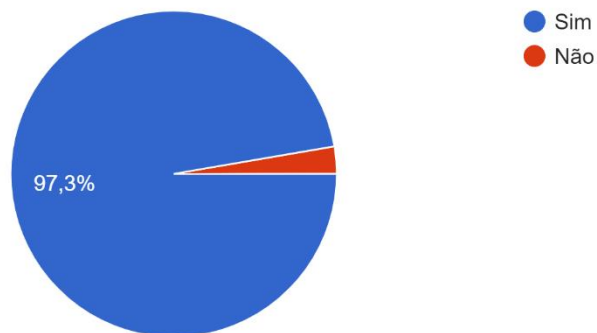- ● Sem resposta

55,1%
9,7%
28,6%

1. O e-commerce refere-se a um modelo de negócio em que os processos de compra e venda são estruturados através ... familiarizado com o termo "e-commerce"?

185 respostas

- ● Sim
- ● Não

20,5%

79,5%

2. Já recorreu à internet para efetuar compras online?

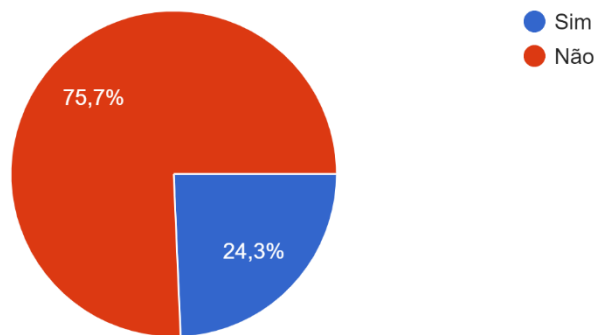185 respostas

- ● Sim
- ● Não

97,3%

3. As Farmácias online são empresas que vendem medicamentos e produtos de saúde por meio do comércio eletrónico. Est...iliarizado com o termo "Farmácia online"?
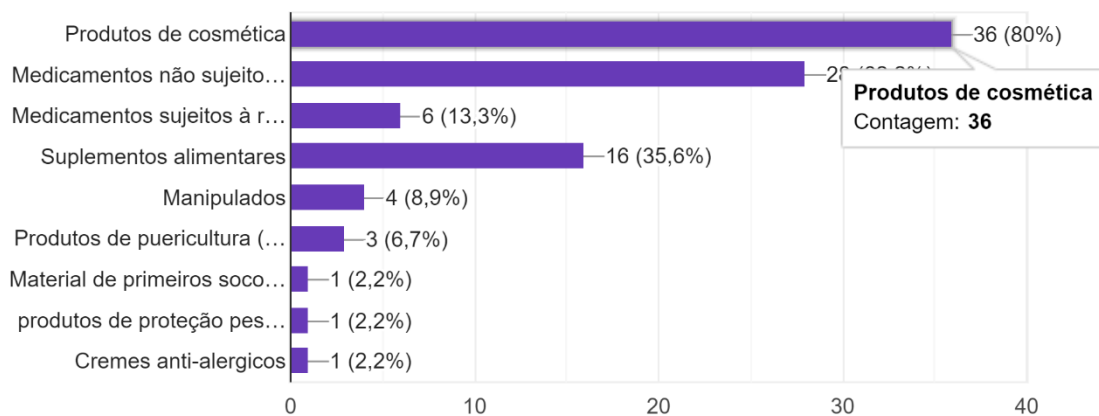
185 respostas

- ● Sim
- ● Não

36,2%

63,8%
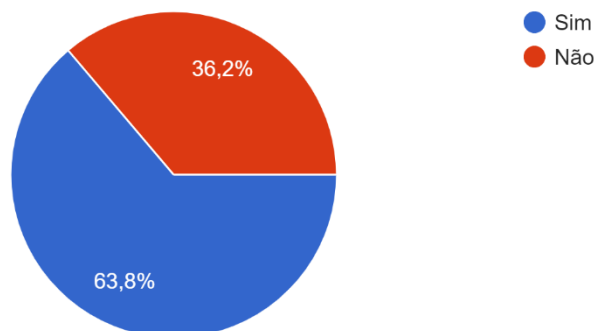
4. Já recorreu à internet para efetuar compras de produtos farmacêuticos online?

185 respostas

● Sim
● Não

75,7%

24,3%

4.1 Se respondeu sim, que tipos de produtos?

45 respostas

Produto	Valor
Produtos de cosmética	36 (80%)
Medicamentos não sujeito…	2_ (__,_%)
Medicamentos sujeitos à r…	6 (13,3%)
Suplementos alimentares	16 (35,6%)
Manipulados	4 (8,9%)
Produtos de puericultura (…	3 (6,7%)
Material de primeiros soco…	1 (2,2%)
produtos de proteção pes…	1 (2,2%)
Cremes anti-alergicos	1 (2,2%)

Produtos de cosmética
Contagem: **36**

4.2 Com que frequência faz este tipo de transação?

45 respostas

● 1 a 5 vezes por ano
● 6 a 10 vezes por ano
● Mais de 10 vezes por ano

8,9%

88,9%

48

4.3 O que o leva a optar pela via online para este tipo de transação?

45 respostas

Categoria	Valor
Indisponibilidade na farmá…	10 (22,2%)
Preço competitivo	22 (48,9%)
Conveniência	28 (62,2%)
Entrega ao domicílio	33 (73,3%)
Disponibilidade constante	11 (24,4%)
Privacidade	2 (4,4%)
Longo tempo de espera n…	0 (0%)
Não existência de loja física	1 (2,2%)

4.4 Como avalia a(s) sua(s) experiência(s) de compra online de produtos farmacêuticos?

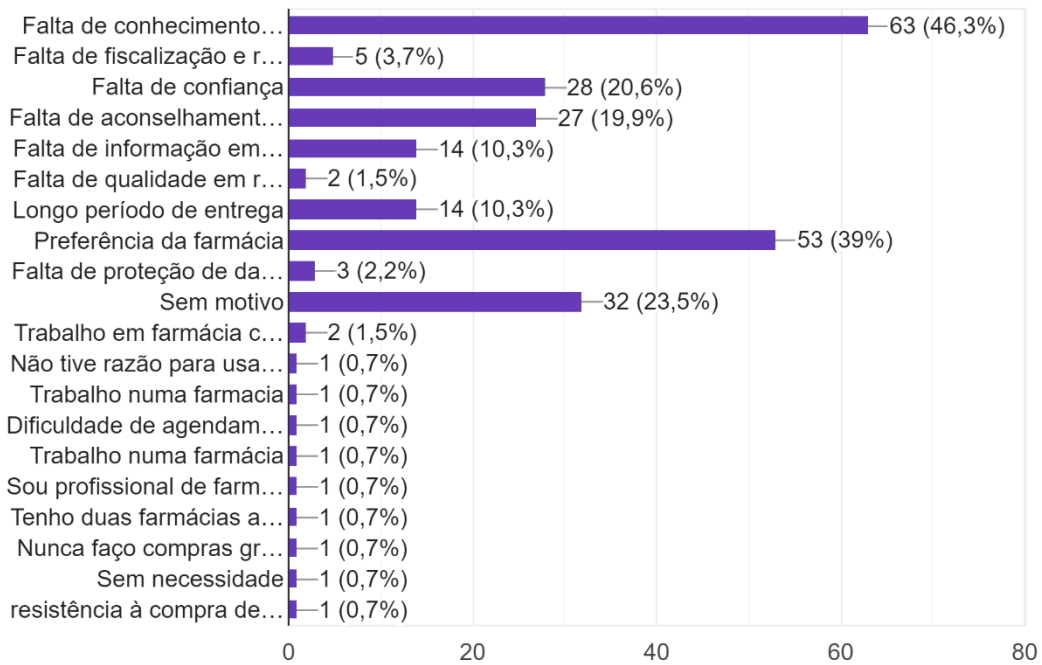45 respostas
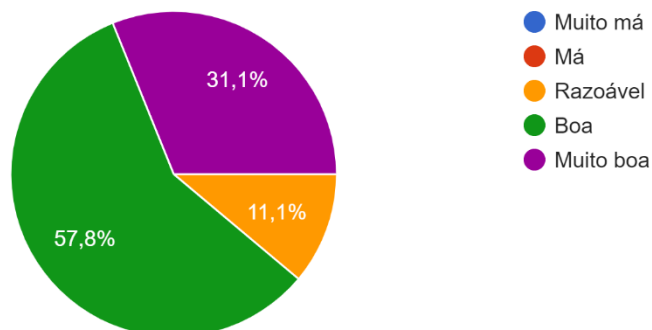
- Muito má
- Má
- Razoável: 11,1%
- Boa: 57,8%
- Muito boa: 31,1%

4.5 No contexto da pandemia, recorreu a farmácias online para efetuar compras pela primeira vez?

45 respostas

- Sim: 48,9%
- Não: 51,1%
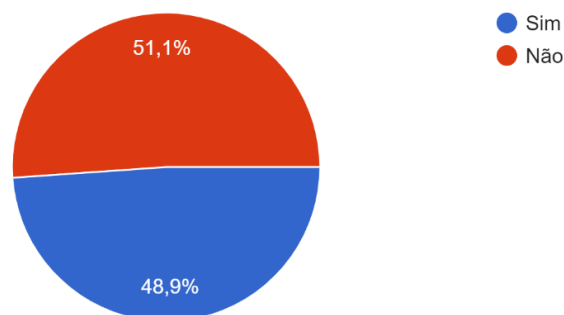
4.6 Se respondeu não, o que o leva a não optar pela via online para este tipo de compra?

136 respostas

Categoria	Valor
Falta de conhecimento…	63 (46,3%)
Falta de fiscalização e r…	5 (3,7%)
Falta de confiança	28 (20,6%)
Falta de aconselhament…	27 (19,9%)
Falta de informação em…	14 (10,3%)
Falta de qualidade em r…	2 (1,5%)
Longo período de entrega	14 (10,3%)
Preferência da farmácia	53 (39%)
Falta de proteção de da…	3 (2,2%)
Sem motivo	32 (23,5%)
Trabalho em farmácia c…	2 (1,5%)
Não tive razão para usa…	1 (0,7%)
Trabalho numa farmacia	1 (0,7%)
Dificuldade de agendam…	1 (0,7%)
Trabalho numa farmácia	1 (0,7%)
Sou profissional de farm…	1 (0,7%)
Tenho duas farmácias a…	1 (0,7%)
Nunca faço compras gr…	1 (0,7%)
Sem necessidade	1 (0,7%)
resistência à compra de…	1 (0,7%)

4.7 No contexto da pandemia, recorreria a este tipo de serviço pela primeira vez?

139 respostas

- Sim — 51,1%
- Não — 8,6%
- Talvez — 40,3%
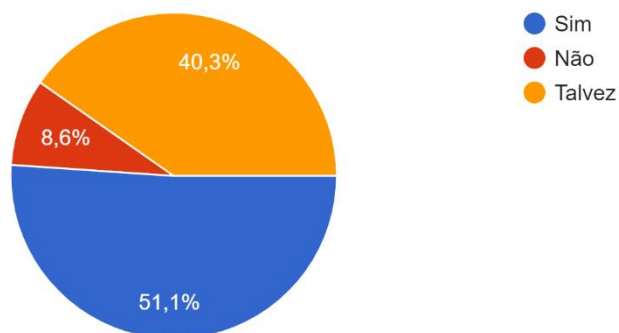
Annex 4 - Interview script

Concorda com a gravação desta sessão?

Esta entrevista será conduzida no âmbito do mestrado em Inovação e Empreendedorismo Tecnológico da Faculdade de Engenharia da Universidade do Porto com o objetivo de analisar a forma como os profissionais farmacêuticos percebem o uso de novas tecnologias como o e-commerce em farmácias comunitárias, bem como desenvolver estratégias para superar os desafios percebidos das farmácias online. As informações recolhidas serão utilizadas apenas para fins académicos. Alguma dúvida até aqui? Podemos começar?

Guião de entrevista (profissionais de Farmácia)

1. Está familiarizado com o termo "Farmácia online"?
2. A sua farmácia tem um website?
3. Se sim, que tipos de serviços efetuam na plataforma?
4. Se não, porquê? Acha que seria vantajoso para a empresa implementar um website que permitisse o e-commerce?
5. Na sua opinião, que tipos de produtos podem ser comercializados nas plataformas online?
6. Consegue dar alguns exemplos de farmácias online que existem em Portugal?
7. Na sua opinião, existe a necessidade de farmácias online em Portugal? Porquê?
8. Acha que este tipo de serviço é bem difundido entre os consumidores? Em caso negativo, porque este tipo de serviço não é popular entre os consumidores portugueses?
9. Ao seu ver, quais são os principais desafios enfrentados neste tipo de modelo de negócio?
10. Que medidas poderiam ser adotadas para superar estes desafios?
11. Acha que a atual legislação portuguesa aplicada à venda online de medicamentos e produtos farmacêuticos está de acordo com a demanda deste tipo de serviço?
12. Acha que a pandemia afetou de alguma forma este tipo de serviço?