



CATÓLICA
LISBON
BUSINESS & ECONOMICS

The Challenges of Digital Transformation for Community Pharmacies in Portugal

Gonçalo Monteiro

Dissertation written under the supervision of Prof. Henrique
Martins

Dissertation submitted in partial fulfilment of requirements for
the MSc in Strategy & Entrepreneurship, at the Universidade
Católica Portuguesa, 4th January 2023.

Abstract

Title: The Challenges of Digital Transformation for Community Pharmacies in Portugal

Author: Gonalo Monteiro

Healthcare has been facing Digital Transformation and Community Pharmacies (CP) are no exception. The introduction of digital technology posed several challenges to pharmacies management. Departing from Rogers' Diffusion of Innovation Model as a conceptual framework the study classified CP into clusters by their level of adoption of innovation, based on the Technical Directors' answers to an online survey, which retrieved a distribution according to the model used.

The results indicated that low level of adoption CP rely more on Pharmacy associations. Besides, the respondents' perception shows that they believe that CP in Portugal are innovative, however, Innovators were the ones with lower rate of agreement to that. The main challenge identified was the need for an integrated network with other Healthcare agents, to improve communication and data sharing. The synergy between physical and digital, such as the integrations of more digital tools in the Pharmacy's management are other of the biggest concerns.

The discussion of results argues about the challenges that were raised; the CP's innovativeness; the preferred communication channels; the importance of regulatory policies; and the future digital solutions.

Literature gaps are identified to better assess the universe of CP: the pharmacists' job satisfaction, and the importance of the regulatory policies to the innovation of the sector.

Finally, this thesis shows there are opportunities for further digital innovation in the sector, and starts exploring the role of pharmacists, pharmacy associations and suggests different approaches of the government and regulators in the process.

Keywords: Digital Transformation; Community Pharmacy; Innovation Management; Diffusion of Innovation; Healthcare; Pharmacy Associations; Health Policies; Digital Health; Electronic Services

JEL: **I 11:** Analysis of Health Care Markets

Título: Os desafios da Transformação Digital para as Farmácias Comunitárias em Portugal

Autor: Gonçalo Monteiro

A Transformação Digital tem impactado cada vez mais a área da Saúde, particularmente as Farmácias Comunitárias. A introdução de tecnologias digitais tem testado a gestão das Farmácias. O estudo foi enquadrado no Modelo da Difusão de Inovação de Rogers, classificando as farmácias por níveis de adoção de Inovação, com base nas respostas dos Diretores Técnicos a um questionário online. Este retornou uma distribuição de acordo com o modelo.

Os resultados indicam que os níveis de inovação mais baixos dependem mais de associações de farmácias. Além disso, a perceção dos participantes é de que as Farmácias são inovadoras, embora, os Inovadores tenham apresentado maior desconfiança sobre tal. O principal desafio identificado foi a necessidade de uma rede integrada com os demais agentes de cuidados de Saúde. A sinergia entre o espaço físico e o digital, bem como a integração de mais ferramentas digitais na gestão da farmácia são outras das maiores preocupações.

A discussão dos resultados assenta nos desafios que surgiram; na inovação das Farmácias; nos canais de comunicação preferidos; e na importância das políticas de regulação.

São identificadas algumas lacunas na literatura: a avaliação da satisfação com o emprego dos farmacêuticos, bem como a importância das políticas regulatórias na inovação do setor e as futuras soluções digitais para o setor.

Finalmente, a tese aponta oportunidades no setor de maior integração digital, debate o papel dos farmacêuticos e da importância das associações de farmácias e sugere novas abordagens do Estado e dos reguladores.

Palavras-chave: Transformação Digital; Farmácia Comunitária; Gestão da Inovação; Difusão de Inovação; Modelo da Difusão de Inovação de Rogers; Saúde; Questionário; Desafios; Associações de Farmácias; Políticas de Saúde

Index

Abstract.....	1
List of abbreviations	5
List of Tables	6
List of Figures.....	6
Introduction	8
Problem Statement	9
Research Questions.....	9
Context and theoretical background	11
Community Pharmacies	11
<i>The role of the Pharmacist</i>	13
<i>Digital Transformation</i>	14
The Challenges of Digital Transformation in the Community Pharmacies in Portugal	16
Innovation adoption models – Roger’s Diffusion of Innovation	18
Innovation	19
Channels.....	20
Time.....	20
Social System.....	22
Diffusion of Innovations in Organizations.....	22
Methodology.....	25
<i>Survey Platform</i>	25
<i>Survey Structure</i>	25
<i>Interview</i>	26
Results	27
Survey Results	27
Pharmacies’ Demography Characteristics.....	27
Identification of Levels of Innovation Adopters.....	28
Personality and Communication Characteristics per level of Innovation	29
Socioeconomic Characteristics per level of Innovation	32
Digital Characterization of respondents’ pharmacies.....	34
Characterization of the Social System.....	37
Communication Channels	38

Digital Transformation	39
Digital Solutions.....	42
Interview Results.....	44
Discussion.....	47
Challenges	47
Community Pharmacies' Innovativeness	47
Communication Channels	48
Regulatory Policies	48
Future Solutions	49
Limitations and Future Work	50
Recommendations	51
Community Pharmacies	51
Pharmacy Associations.....	51
Policy Makers	51
Industry and companies.....	52
Conclusion.....	53
References	54
Attachments.....	60
Questionnaire Structure in English	60
Questionnaire in Portuguese	63
Clustering values resulting from the Sum of Square method.....	66
Survey Respondents' Online Presence Characterization	67
Survey Results	68
Interview 1: Early Majority.....	68
Interview 2: Late Majority.....	72
Interview 3: Early Adopter	75
Interview 4: Early Adopter	79
Interview 5: Early Majority.....	82
Interview 6: Innovator.....	86
Interviews Key Findings.....	90

List of abbreviations

ANF – Associação Nacional de Farmácias (National Association of Pharmacies – Portugal)

CRM – Customer Relationship Management

CP – Community Pharmacies

DT – Digital Transformation

INFARMED - Autoridade Nacional do Medicamento e Produtos de Saúde, Instituto Público (National Authority for Medicines and Health Products – Portugal)

KYC - Know your Customer

OF – Ordem dos Farmacêuticos (Pharmacists Bar - Portugal)

SEO - Search Engine Optimization

SME - Small and Medium-sized enterprises

SNS – Serviço Nacional de Saúde (Portuguese Health System)

List of Tables

Table 1 - Attributes of Innovations (Rogers, 1983)	19
Table 2 – Social and personality characteristics of respondents per level of Innovation adoption	30
Table 3 - Statements and Analysis Results.....	31
Table 4 - Perception of the importance of the Digital Transformation Challenges	40
Table 5 - Questionnaire Structure in English	63
Table 6- Compatibility Block of Questions in Portuguese	64
Table 7- Observability Block of Questions in Portuguese	64
Table 8- Relative Advantage Block of Questions in Portuguese	64
Table 9- Complexity Block of Questions in Portuguese	64
Table 10- Testability Block of Questions in Portuguese	65
Table 11- Social System Block of Questions in Portuguese	65
Table 12- Digital Transformation Block of Questions in Portuguese	65
Table 13- Digital Services Block of Questions in Portuguese	65
Table 14- Characterization of Respondents Block of Questions in Portuguese.....	66
Table 15- Distribution of respondents per level of Innovation and by group of questions	67
Table 16- Pharmacies Online Presence Characterization.....	68
Table 17 - Distribution of Responses about Social System	68
Table 18 - Average response to DT statements per Level of Innovation Adoption	68
Table 19- Interviews Key Findings	90

List of Figures

Figure 1- Representation of Rogers' Diffusion of Innovations Model (Rogers, 1983) ..	21
Figure 2 - Comparison of earlier and later Adopters' characteristics (Rogers)	22

Figure 3 - Organization Innovativeness (Rogers, 1983).....	23
Figure 4 - Distribution of Respondents per Region.....	27
Figure 5 - Distribution of Respondents per level of Innovation	29
Figure 6 - Distribution per age and Level of Innovation Adoption.....	32
Figure 7 - Distribution per age and group of innovation adoption	33
Figure 8 - Distribution per level of Education and Level of Innovation Adoption	33
Figure 9 - Respondents Distribution per level of Education and groups of Innovation Adoption.....	34
Figure 10 - Socioeconomic statements under analysis	34
Figure 11 - Distribution per level of Innovation and Social Network presence	35
Figure 12 - Distribution per level of Innovation and Website association	36
Figure 13 - Distribution per level of Innovation and Online Sales representation	37
Figure 14 - Preferred Communication Channels	38
Figure 15 - Preferred Communication Channels per group of Innovation	39

Introduction

The study of Digital Transformation (DT) has been facing a huge growth, with an increasing number of studies being published (Hanelt et al., 2021), and a soaring interest from scholars, but also practitioners (Reis et al., 2018). This interest is based on the increasingly importance it has been gaining through the years due to the impact it has been having on businesses, as it is revolutionizing the business sector (Kraus et al., 2021). The DT's impact is causing changes in all areas (industry and society) due to the fast-growing digital technologies and their penetration of all markets (Ebert & Duarte, 2016). This transformation was still ongoing, and it was recognized that businesses had to change, when the Covid-19 pandemic hit and with it the resulting challenges. They posed as an accelerator of the DT, by increasing the organizations' awareness of its need (Mckinsey, 2020).

Healthcare is not an exception, actually it has been one of the main sectors of impact of the DT, by transforming the management and provision of healthcare (I. Marques & Ferreira, 2020). The impact in this sector allows the creation of new business opportunities and yields new business models to address issues in practice, value creation and other problems related to, among others, the ageing of society (Elton & O'Riordan, 2016).

Inside Healthcare, we can find Community Pharmacies (CP) which have, naturally, faced DT's impact as they are the forefront of health care assistance to local population, having a particular relevant role in the proximity dimension of assisting the population (Ângelo et al., 2020). However, CP are still in the early stages of DT (Gatwood et al., 2019) and, as any other business, need to face the digitalization of the individual (Hanelt et al., 2021), as customers or workers expect, among other things, an increased spatial and temporal flexibility (Schwarz Müller et al., 2018).

CP, in Portugal, are privately owned small businesses that are heavily regulated by specific legislation (Ramos Ferreira, 2016), that suffered important changes in 2007 (partial liberalization of its installation, property open to non-pharmacists) (Pita & Bell, 2016). Due to the heavy regulation, the entrepreneurial organization is very conditioned, such as the business model that sets mostly on the transaction of medicines. This has showed a decrease on the net income what shows that most of the CP are essentially microenterprises, with a familiar management (Aguiar, 2015). In microenterprises, often,

innovation is not a managed or systematic process (Faherty & Stephens, 2016), thus it may be centred in the manager.

This way, the aim of this study is to understand what DT means in the context and the universe of CP, how it is impacting them and what are the main challenges that come as a result. Furthermore, it will be also studied how the CP are facing those challenges and, finally, to provide recommendations on possible solutions to those challenges, these may be either for the CP or the whole community or even the government.

To conduct this study where DT can be understood as an Innovation, the Rogers' Diffusion of Innovation model, which classifies the individuals by their inherent level of adoption of Innovation and then draws insights into their behaviour was chosen since the role of the Pharmacist, often leader in the CP, is very important in these small businesses.

To obtain the necessary inputs from Pharmacists, the method chosen is a digital survey so that they can show their perception towards challenges and their perspectives on topics related to the future of CP. Following this, some respondents will be interviewed to go more in-depth in some topics that can hardly be studied with only a survey.

Problem Statement

Given the importance of the CP in the healthcare services and their potential of improving their services, mainly digital ones, statistical evidence is necessary to evaluate this community's digital innovation level, as there are many digital challenges that arose to a community that was considered traditional in this matter. Following this, a qualitative analysis focused on how the Pharmacists perceive the challenges and how they are dealing with them is necessary to complete the scope. As there is not much research made about this topic, this one may lead to pertinent and important results.

Research Questions

This thesis seeks to understand what the CP's position is about the DT and how they are dealing with the challenges that appeared because of that. After understanding what's the status, the aim is to provide recommendations on how the CP and the whole community can better deal with the DT's challenges and adapt to the growing demands.

Research Question 1

What are the main challenges that DT is bringing to CP?

Research Question 2

How are Portuguese CP dealing with these challenges?

Research Question 3

How does the Roger's Diffusion of Innovation model may be applied not only to individuals but also to organizations?

Context and theoretical background

Community Pharmacies

To better understand the context, it is crucial to understand what CP represent in Portugal and what kind of services they provide or aim to. CP are considered key elements by governments and WHO (Rodrigues et al., 2005). In 2021, there were 2921 CP in Portugal (Pordata, 2021), where they have a very good reputation, even exceeding customers' expectations based on the confidence in the pharmacist and their knowledge (Ordem dos Farmacêuticos, 2020). They are distributed geographically in a way that they can provide a service of proximity so this way they are considered one of the first touchpoints when there is the need for healthcare support from patients, an important part of primary care, and are also seen as a big support for the SNS's pillars (Ordem dos Farmacêuticos, n.d.). 97% of the total CP in Portugal are affiliated to ANF, that bases its activity in defending the interests of their affiliates as a whole, with the aim of improving their services. They own Glintt, a technological company that works on the Healthcare DT (Farminveste M&A Department, 2021).

Its ownership until 2007 was restricted to pharmacists, since then it's open to other people (as long as they are not producers of medicinal products or medicinal product prescribers). In order to open a new CP, there needs to be a public contest issued by Infarmed and its location is restricted (Infarmed, n.d.).

In terms of services, they are responsible mainly for dispensing medicines besides many other pharmaceutical services. This service was exclusively provided by pharmacies, until 2007 in Portugal, when the legislation changed and allowed other wholesalers, such as supermarkets to sell non prescript medicine, one of the reasons for this is "to guarantee medicines provision in remote areas" (Kanavos et al., 2011) and enlarge the network of distribution of medicines. Another solution to this, in Portugal (and Poland and Czechia) is the creation of dispensaries that are allowed to sell "over the counter" medicine.

Besides the services mentioned above, pharmacies provide plenty of more services throughout Europe. There, in CP we can find different services such as: medicine waste disposal; medicines review services; minor diagnostics; emergency contraception; smoking cessation; diabetes management; asthma management; hypertension management; vaccinations; and home care services (Kanavos et al., 2011). To these ones

we can add one that was crucial during the Covid-19 pandemic in Portugal: Covid-19 testing, which allowed Portugal to increase the testing coverage.

In the same study it is stated that in few European countries E-trade is allowed. This means that over the counter and prescription-only-medicines can be sold through the internet. In Portugal it can only be done under the specific condition to deliver to the registered home address and the websites are under heavy scrutiny with focus on the prices, delivery and payment conditions, geographical area of operation, among other conditions (Kanavos et al., 2011).

The substitution of medicines to Generic ones is an important service of the pharmacies as it can provide big savings to the users. It is estimated that, since 2011 to 2021, Portuguese have saved up to 4,77 bn€ by doing this replacement (APOGEN, 2022)¹.

A study published in 2017 estimated the social and economic impacts that CP services have on the Quality of Life (QoL) and the results showed that they provide a gain of 8,3% in this index (Félix et al., 2017). This is a very significant impact which can still be increased if the potential services of CP are actually adopted. These potential services are based on a greater integration in primary and secondary care, among other transversal services.

Additionally, CP have a strong social role as a mean of territorial cohesion as they are the first contact of many people to healthcare, this is recognised for example in that their existence or not in a population aggregate is a criterion when considering it for a village or town status.

CP have also been traditionally exposed to varying policies that affected their business, such as the co-insurance on prescribed medicines with rates varying according to effectiveness criteria; changes in the way the reference price is defined; and administrative price reductions (2005, 2007 and 2010). Such high volatility and the reduced pharmaceutical prices and consequently pharmacy revenues, have meant that CP have faced difficult economic and financial conditions (Almeida Simões et al., 2017) but also that the sector has become more competitive.

¹ The study by CEFAR was not published, instead the results were shared via a media report from APOGENI

The role of the Pharmacist

Traditionally, the pharmacist's role consists of dispensing medicines, with a crucial role in public health whether it is the therapeutic part whether it is more focused on the preventive one. However there has been a shift, following the footsteps of the CP' services change. This way, the pharmacists' role spectrum is much wider nowadays.

As seen before, in Portugal, CP are the first entry to the healthcare and the role of the pharmacists consists of providing proximity healthcare services, mainly with minor health issues, as they are often the first healthcare provider that the patient seeks for advice (Leal, 2014). With this, the pharmacists help patients so that they don't need to make unnecessary trips to further healthcare places such as hospitals. In terms of demographical cohesion, the pharmacists have a very relevant duty in spreading the healthcare literacy and promoting the correct path to patients in the Health System (Ordem dos Farmacêuticos, n.d.). By this micro level care, patients may be more aware of the challenges they will need to face and also reduce the time on the services they seek as they can go directly to the specialty or healthcare structure that better suits their needs.

Besides these roles, pharmacists take a crucial role in the public health concern as they have a very important contribution in areas such as therapeutic management; medicines administration; parameters determination; identification of persons in risk; early detection of diseases; and promotion of healthy lifestyles (Ordem dos Farmacêuticos, n.d.).

Anyway, Pharmacists' main asset continues to be the pharmacotherapy's expertise. In this dimension, there are some services that have a big relevance: optimization of periodical therapeutics; medicine's revision; promotion of selfcare.

Nowadays, Pharmacists in Portugal must balance the healthcare related role with the demands of a commercial service (Abreu, 2013), this way they have daily tasks related to stock management; orders and provisioning; prescription processing; and invoicing (Abreu, 2013)². However, in Portugal has been common to see recently graduated Pharmacists choosing different professions besides the CP role and Pharmacies have been facing difficulties recruiting pharmacists (A. Marques, 2022). That may show some dissatisfaction, which may be with the classic method of working; inflexible time

² This study is based on a survey with 113 pharmacists, where 52% of the respondents reveal dissatisfaction on their jobs. Even though the results can hardly be extrapolated, they were interesting and may explain in part the pharmacist's view.

schedules; low remuneration (A. Marques, 2022); moreover, the lack of support by management (Teixeira Diniz, 2020).

Digital Transformation

In a world where everything is being impacted by the advances of technology, it is more and more integrated in people's lives and in industries. This phenomenon led to enormous challenges to managers across industries and contexts (Correani et al., 2020). The Covid-19 pandemic led to an acceleration of the DT (Gabryelczyk, 2020). This way, it is important to understand what the DT consists of and how it's applicable to the CP and their relationship with society.

The organizational changes may be directly related to information technology (IT), as technologies-in-practice ("the particular structures of technology use users enact when engaging recurrently with a technology" (Orlikowski, 2000)) can be changed as actors experience changes in different circumstances. The use of technology may affect the productivity of workers' performance.

There is a concept of DT which focused on digital marketing or e-commerce and theorized about the evolution from business to e-business and the crucial role of the Internet on businesses in the upcoming years (Patel & McCarthy, 2000).

However, this approach represents a small part of the DT nowadays. As the technology evolved, the DT accompanied its rhythm, and so there were plenty more dimensions to focus on than just the internet and its impact on e-commerce. This became a trend in terms of investigation visible in the number of articles dedicated to this topic, per year, over time since 2000, when it had less than 10 to a number close to 300 in 2018 (Hanelt et al., 2021). That growth brought many contributions to the search for a more precise definition of DT.

DT is characterized by a conceptual vagueness which impels that there is still not a consensual unified perspective on the intersection between DT and Innovation Management (Appio et al., 2020). This way, the interconnections between DT, innovation processes, and innovation management may be on the centre of this study, with three different levels of analysis: micro (individuals or teams), *meso* (organization processes and business models) and macro (innovation ecosystems) (Appio et al., 2020).

The DT in a business perspective is seen as the “organizational change triggered and shaped by the diffusion of digital technologies” (Hanelt et al., 2021). Their study breaks down connections with Orlikowski’s one stating that the phenomenon of DT differs from IT-related organizational change and can’t be explained entirely by using established theoretical models. In this study, DT is seen as a multi-dimensional framework where its analysis may be done in several dimensions: Contextual Conditions, Mechanisms and Outcomes.

Contextual Conditions involve the impact of technologies’ properties on the DT, how they shape it. The technologies considered in this case are the SMACIT - social, mobile, analytics, cloud and Internet of things technologies – which due to their reprogrammability, homogenization of data, and self-referential nature (Yoo et al., 2010) interact with the antecedents (that can be material, organizational or environmental) and this way shape DT.

Mechanisms are the link between Contextual Conditions and Outcomes. They can be either Integration or Innovation. The first relates to the alignment of new elements with the ones already prevailing in the organization such as resources, processes, and capabilities. To be able to perform this the organizations need to develop a DT strategy and an increasing technological flexibility. In what concerns Innovation, it is related to the application of new resources, processes, and capabilities. However, Innovation is also seen as an idea or practice that is perceived by individuals as new even though it may not be that new, which might be measured by the lapse of time since its first use or discovery (Rogers, 1983). Here the DT works both in the strategic and operational part as in the first one there is the need for a “mobilization for and acceleration of DT” and in the second, “exploitation and leveraging of digital capabilities” to allow the organizations to create digital innovation. To better understand the process of the diffusion of Innovation, we will focus on Rogers’ Diffusion of Innovation model in the next chapter.

Finally, the Outcomes are related to the organization as a whole and its surroundings and they can be divided in three possible outcomes: organizational setups, economics, and spill-overs. The Organizational Setup outcomes are seen as the impacts of DT in organizations. Through the adoption of and use of digital technologies, the organization’s processes and interactions may change, they may turn their processes more “automatized and data-driven”. In terms of Economic outcome, the firm’s performance may improve because of the DT, either by the improvement of services or the cost reduction. The last

identified outcome is about the Spill-overs, this outcome affects the environment as DT impacts markets, economies, and societies. These can be shaped by DT as there is a growing convergence to the digital whether it regards communication (that is done via information and communication technologies) whether it concerns the merging of physical world with online content. Besides the impact on all the environment, firms must take in consideration the “digitalization of the individual”, as the individual’s expectation on a digital level affects their behaviour and naturally impacts firms’ performances.

In Portugal, the biggest DT boom in the CP’s community was in 2000 with the introduction of the program *Sifarma 2000* and the informatization of the Portuguese CP. That program was developed by Glintt as a management and customer service tool. Nowadays, around 90%³ of the Portuguese CP use that program. Later, in 2015 the paperless prescription was introduced, which allowed a great simplification in the services and a start on the integration of services (Martins, 2020).

The Challenges of Digital Transformation in the Community Pharmacies in Portugal

Healthcare system involves not only pharmacies but also some other agents such as hospitals, clinics, and people among others so there must be an integration between all of them to provide the best healthcare services possible. In such hard times as the Covid-19 pandemic, this integration was absolutely crucial as it reduced the need of trips to healthcare units. As an example, the chronical prescription that had expired, could be automatically renewed by pharmacies (Santos & Novais Santos, 2020).

The first challenge is the need for an integrated health network to promote the complementarity and articulation between the different agents. This would help make a more efficient management of the resources and to make the best and fastest decision regarding the patient’s health. With this, the means could be used in the most efficient way possible in order to provide a much more local service taking advantage of the capillarity of the different agents’ locations (Bastos Martins, 2021).

The second challenge is the impact of the technology in the daily management of the Pharmacy. The daily management of the CP has a great level of uncertainty as there are

³ Data published in Glintt website:
<https://www.glintt.com/pt/o-que-fazemos/ofertas/SoftwareSolutions/Paginas/Sifarma.aspx> (last accessed 28/12/2022).

many changes occurring on the regulation which makes it more difficult to perform a sustainable management. This way, the pharmacies should focus on a strategy of strengthening the bond with their patients by having a KYC dynamic and using more sophisticated CRM tools to get closer to their customers whether it's via a loyalty program or with data analytics that allow a more personalized response to their needs.

The third challenge sticks to the importance of the digital presence of the Pharmacies. The pandemic brought a bigger demand for Pharmacies on a digital level. To face this, there is a higher need for Pharmacies to meet the expectations and provide the best possible digital services. To start, the basic information such as address, contacts, and products/services available is essential to match the SEO's best practices and this way provide a bigger visibility from the customer on the pharmacy. Besides these, there are other services that are crucial to the CP's digital strategy: flexible and intuitive shopping cart; delivery methods (continuous and regularly scheduled); appointment scheduling; payment methods efficacy are key to match the consumers' needs (Bastos Martins, 2021).

The fourth and last challenge relates to the integration of the digital in the proximity dimension of the Pharmacy. This means that the CP need to optimize the consumer's experience at the store level but must bear in mind that there may have synergies with the Digital. As the challenge of being the first level of proximity with the clients arose, mainly during the pandemic, the CP should focus on that dimension in order to provide that level of service and at the same time take some pressure from the remaining healthcare agents, while they may also get more types of services. With a higher integration on a healthcare network, CP would increase their importance on the healthcare system on a proximity level which would provide more detailed information to other agents, which would also work in the other way around. All these allied to a good level of Data Analytics would allow best decisions in terms of healthcare.

Innovation adoption models – Roger’s Diffusion of Innovation

In order to evaluate the mechanism of Innovation in the CP sector, there were some theories considered. First, it was important to frame what would be the type of innovation study. There are two different traditions in the history of innovation study: one from Europe (Godin, 2010a), where the focus is more on the commercialized invention; and another one from America (Godin, 2010b), where the aim is on the technological change. The aim of this study is then much more related to this second one as it aims to understand the impacts of that change.

This way, the first theory contemplated was Abernathy and Utterback’s one, which suggests “how the character of its innovation changes as a successful enterprise matures” (Abernathy & Utterback., 1978). This theory allows to evaluate the industry innovation cycle as after product innovations, come the process innovations. However, using this theory as framework for this study would be much more suitable if its aim was to argue the relation between product and process innovation, and the rate of innovation through time. Also, this theory shows “that a productive unit’s capacity for and methods of innovation depend critically on its stage of evolution from a small technology-based enterprise to a major high-volume producer” (Abernathy & Utterback., 1978), which differs from the type of sector that CP represent.

Then, the method studied next was more focused on the diffusion of innovations which usually include “many more factors, such as the influences of psychological or personal features, technology perceptions, communication behaviour and socio-demographic attributes on diffusion or adoption process”(Trott, 2017). As a reference in this area as also being credited as the one that introduced this concept, there is the Rogers’ Diffusion of Innovation Model. This theory had a wide variety of benefits to reach the aim of this study: it’d help understand the social system of the community, classify the CP by levels of innovation adoption, and most importantly, recognize the process of adoption of innovations. These were the reasons on the basis of the choice of this theory as framework for this study.

Thus, we need to understand what means Diffusion. This is how an innovation’s communication is made through various channels over time between a social system’s members. Here, the communication is based on new ideas to find an understanding about certain events. The newness of these ideas shows an uncertainty which brings up divergence or convergence.

The process of Diffusion has four main elements: Innovation; Channels; Time; and Social System.

Innovation

The first element was already defined before, and now it'll be studied under the light of its diffusion. This way, there are 5 characteristics, according to Everett Rogers, that should be added to the previous definition as they are relevant on its adoption: Relative Advantage; Compatibility; Complexity; Trialability; and Observability.

CHARACTERISTIC	DEFINITION	APPLICATION
RELATIVE ADVANTAGE	“The degree to which an innovation is perceived as better than the idea it supersedes”	It may be measured in economic terms, even though other factors such as “social-prestige factors, convenience, and satisfaction” may also have impact. The individual’s perception on the innovation’s advantage defines how fast the adoption is happening.
COMPATIBILITY	“The degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters”	The higher the fit between an innovation and the prevalent values and norms, the faster an innovation will be adopted.
COMPLEXITY	“The degree to which an innovation is perceived as difficult to understand and use.”	The adoption of an innovation will occur faster if it is easy to understand and use.
TESTABILITY	“The degree to which an innovation may be experimented with on a limited basis.”	When an individual may experiment an innovation, he/she will be keener to adopt it, as there is less uncertainty for the individual.
OBSERVABILITY	“The degree to which the results of an innovation are visible to others.”	As an individual sees the results of an innovation, the debate around it will be stimulated and so the individual will tend more likely to its adoption.

Table 1 - Attributes of Innovations (Rogers, 1983)

Channels

The second element of the Diffusion is the Communication Channels (CC). Based on the definition of Diffusion where an innovation is communicated from one adopter to another part who does not have the knowledge yet about that innovation, the CC is the link between those two parts. These CC can be *Mass Media* channels or *Interpersonal* channels, the latter involves a “face-to-face exchange between individuals” (Rogers, 1983). Most people take their decision of evaluating an innovation based on subjective evaluation from other individuals who adopted it previously. This way, this dependence on other’s experiences shows that the diffusion happens due to the potential adopters’ modelling and imitation of peers’ earlier adoptions of innovation.

Time

Time is relevant in this analysis as it is considered in three different situations: when an individual decides whether he will adopt an innovation after he first had the knowledge about it (innovation decision process); in the innovativeness of an individual (relative earliness or lateness of adoption); and in an innovation’s rate of adoption in a system in a certain period. The Innovation Decision Process leads to the adoption or rejection of the innovation.

Inside the element “Time”, the evaluation of *Innovativeness* is also important as it measures how early the individual adopts a new idea comparing with the remaining system members. There are five identified categories of adopters.

The first is *Innovators*, who are characterized as individuals very interested in trying new ideas, who are seen as cosmopolites. These individuals accept a high level of uncertainty when adopting the new ideas thus sometimes have to deal with eventual failures.

The following category is the *Early Adopters*, these are individuals who represent the second group of adoption. They are seen as a peer member of the social system who are examples to the rest of that system and by that they help speeding up the process of innovation by decreasing the level of uncertainty felt by others.

The third category adopting an innovation is the *Early Majority* which represents a big number of individuals who show willingness to adopt new innovations but rarely take the lead.

The fourth category are the *Late Majority* which in opposition to the previous category they adopt it “after the average member of a social system” (Rogers, 1983).

The last are the *Laggards*, who are the last ones of a certain social system to adopt an innovation. These individuals have a slow rate of adoption of an innovation as they have the past as a reference. Often, by the time they adopt an innovation, it has been already surpassed by another one. They are characterized as having limited resources what may let them believe that an innovation may fail even before they can afford to embrace it.

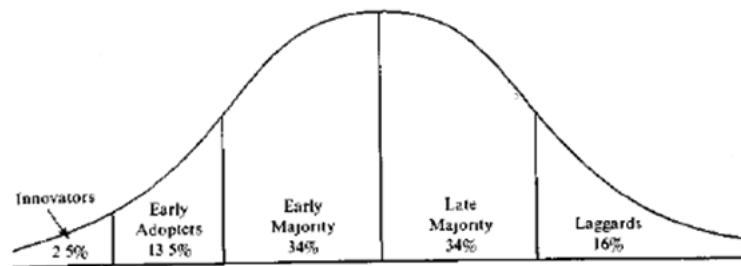


Figure 1- Representation of Rogers' Diffusion of Innovations Model (Rogers, 1983)

According to Rogers' study there are intrinsic characteristics to whether the adopter is an earlier (EA) or a later (LA) one, these may be of three different natures: socioeconomic status; personality variables; communication behavior. We can see in the table below how the EA and LA adopters differentiate themselves.

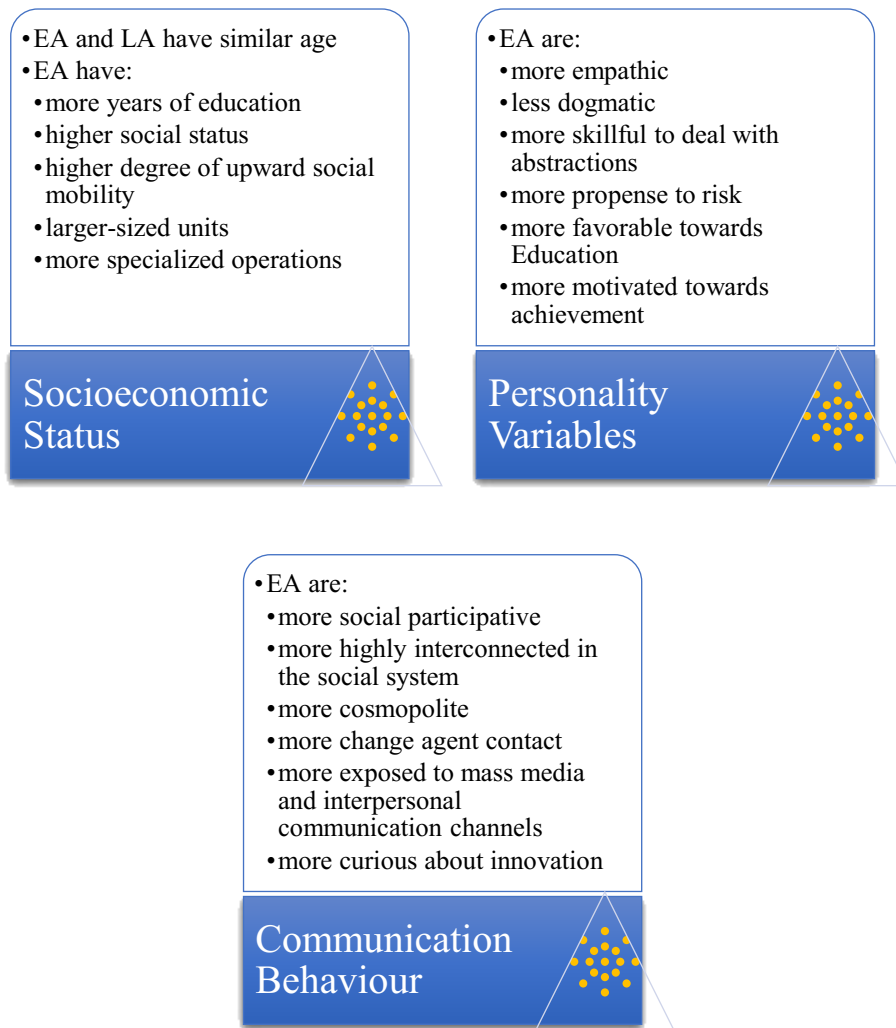


Figure 2 - Comparison of earlier and later Adopters' characteristics (Rogers)

Social System

The Social System represents the system where one is inserted. The social structure of the Social System affects diffusion due to the relations of the social system with diffusion processes. This way, the Social System can be defined as “a set of interrelated units that are engaged in joint problem solving to accomplish a common goal” (Rogers, 1983).

Diffusion of Innovations in Organizations

In Organizations, the process of diffusion has different variables to the ones we have seen before. There can be different types of innovation-decisions:

1. Optional, decision by an individual independent of others.
2. Collective, decision made together with other members of a system.
3. Authority, decision made by a small group with power for that.
4. Contingent, decision made after a previous innovation-decision.

Organizations are sets of individuals that work towards a common goal. This way, a predictable organizational structure is obtained through five vectors: predetermined goals; prescribed roles; authority structure; rules and regulations; informal patterns (Rogers, 1983).

There are independent variables that determine the innovativeness of a company which are divided in three classifications of characteristics: leaders; internal organizational structure; and external (Rogers, 1983).

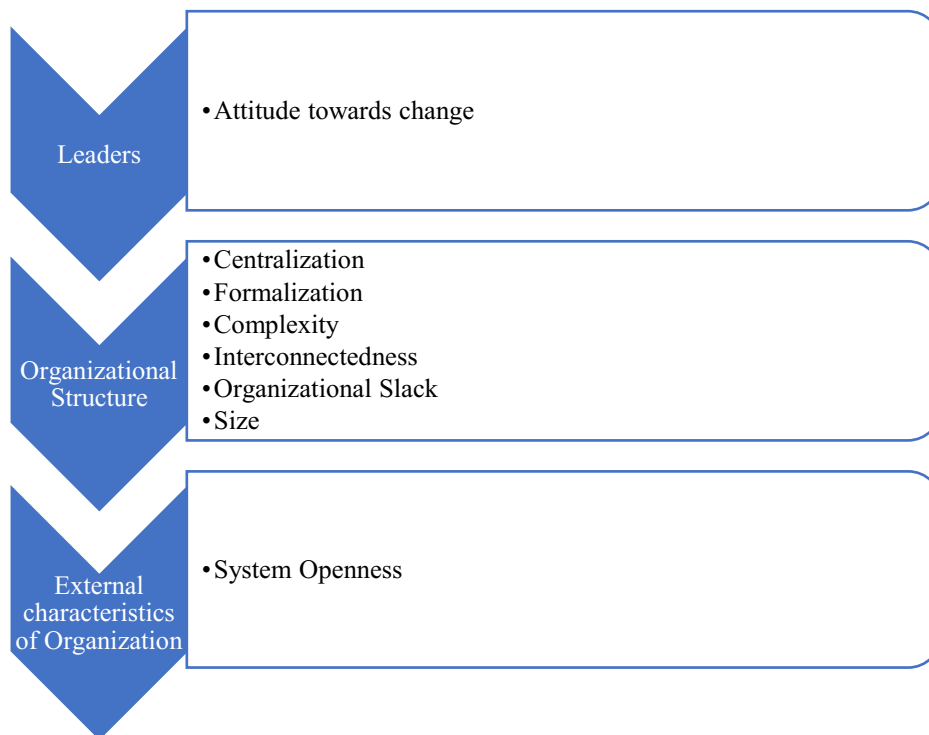


Figure 3 - Organization Innovativeness (Rogers, 1983)

Looking at Organizational Structure's characteristics, we see that those six variables have different impacts on the innovativeness. Centralized organizations tend to be less innovative because top leaders are in a more difficult position to identify operational problems. The same happens with Formal organizations as strict rules and procedures block innovations. In opposite, more complex organizations are more innovative as there is a higher level of expertise and members are more open to propose innovations. The same happens when companies have more interconnectedness; when the organizational slack (availability of uncommitted resources) is higher; and when the company's size is bigger (Rogers, 1983).

CP in Portugal are considered SMEs, which tend to be more centralized, with low organizational slack. Under the lights of the previous framework, we could conclude that they tend to have a low organization innovativeness.

This way, the focus on the leader's characteristics is very important in order to understand the organization's innovativeness as they are key to determine the company's needs.

Methodology

The method chosen to collect data was an online survey followed by in-depth interviews. This was mainly directed to the technical directors or managers of the Portuguese pharmacies.

The distribution of the questionnaire was made in three different stages: the first where it was sent personally to people who fitted the requirements for this study; then, the survey was sent via e-mail for a list (found online) of about 300 pharmacies as an individual e-mail (using an Outlook macro, allowing the e-mails to be sent in a more personalized way); finally, ANF shared the survey in their monthly newsletter. From these three ways, the second one was the one that returned a bigger number of valid answers. From the three divulgation methods, based on the dates every e-mail/message was sent, we can say that the ANF Newsletter was the one that got more valid answers (57), then the personal message (50) and, finally the e-mail sent through the Outlook Macro with 47 responses. However, these numbers were only obtained based on the dates of responses, which may differ from reality, as some people may have answered the questionnaire out of the expected period.

To validate the answers from the survey, six interviews were conducted with respondents that showed their willingness to. However, some were contacted via e-mail but ended up not answering. Besides, no Laggard made their contacts available.

Survey Platform

The platform chosen was Qualtrics. This decision was based on Qualtrics' features that allowed good solutions whether the questions would be in a Multiple Solutions base whether they were to choose the level of agreement to a certain sentence.

Also, the data analytics was made easy on Qualtrics platform which allows a good treatment of the information, and the results are simpler to analyse comparing to other possible platforms.

Survey Structure

The survey has 23 questions divided over 10 blocks.

To assess the pharmacists' perspective on the dimensions of the Diffusion of Innovation Model, the survey has 6 blocks of sentences where the respondents had to show their level of agreement to. These blocks were built with Continuous Rating Scales that “not only solves the problems of information loss, but also allows for applying advanced robust statistical analyses” (Treiblmaier & Filzmoser, 2009). Besides these blocks there is another one with a multiple option question that relates to channels of diffusion.

To understand the impact of DT, there is an open question and another question with Continuous Rating Scales.

In articulation with ANF, there is a block that aims to understand the impact of the adoption of Digital Services at the CP and their needs regarding these. This way, there is a question with Continuous Rating Scales, an open question about the Digital Solutions and a question to order the ways of communicating with the clients.

Finally, there is a block to characterize the respondent and the pharmacy, with multiple choice questions to better organize the data.

In a test run of the survey, a pharmacist took around 8 minutes to complete the whole survey. This step was particularly important to have, in order to show the participants how much time it would take them to answer the whole questionnaire.

Interview

The interview structure was based on 4 different parts: Diffusion of Innovations; DT Challenges; description of the CP ecosystem; Future solutions and digital needs of the pharmacies. It has 11 questions based on the questionnaire ones, where respondents could go deeper in their analysis and share their view with more arguments.

Six interviews were made to respondents of the survey that showed their availability to be interviewed.

Results

Survey Results

There were 289 responses, 120 were so incomplete that were not considered and 15 were considered spam by the platform used for the survey: Qualtrics.

For the analysis of the results only the results with 60% progress or more will be considered such as the responses considered not spam by the platform Qualtrics. (n= 154). This sample represents 5,3% of the total population of CP in Portugal, the sample may represent a higher coverage if we consider that some of the respondents own/manage more than one CP.

Pharmacies' Demography Characteristics

The survey was preferably indicated to Technical Directors or Managers of CP. 115 of the respondents were Technical Directors or Managers; 19 pharmacists; one assistant pharmacist; one owner; 2 pharmacy technicians; and 16 didn't disclose this information.

The answers were very centred in the North of Portugal: with 78 (52%) responses registered (North and Greater Porto area). There were 32 people that chose not to reveal their region. Then the Centre region and Greater Lisbon were very similar in the number of respondents: 29 (19,5%) and 28 (18,8%) respectively.

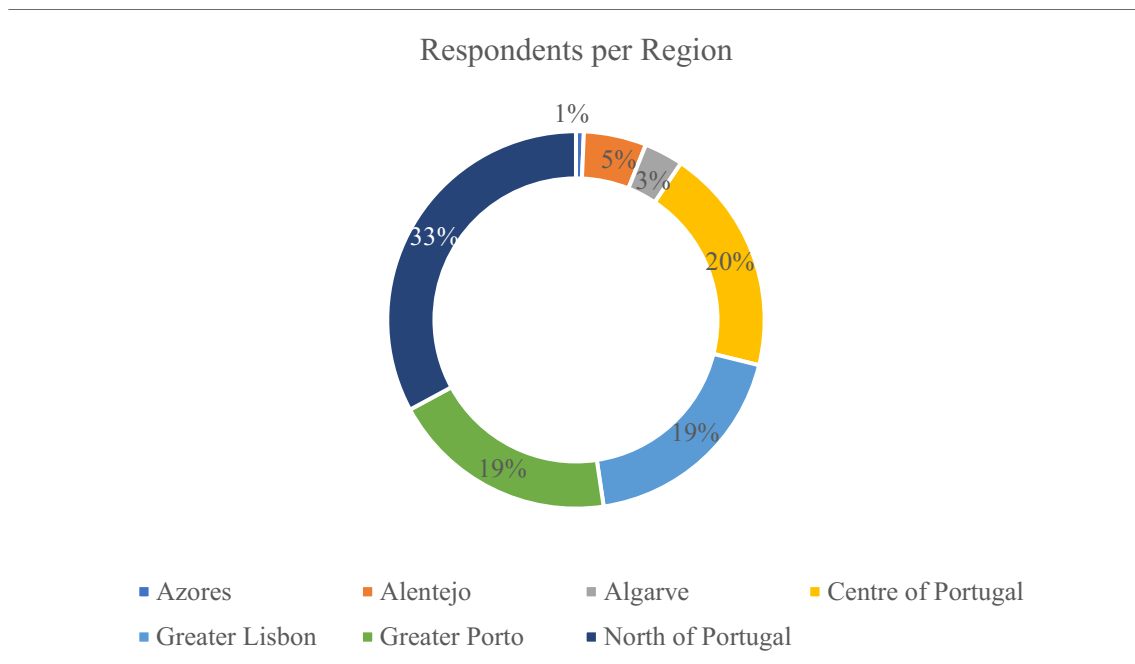


Figure 4 - Distribution of Respondents per Region

Besides this distribution, the CP where the participants of this survey work are very similarly distributed among rural (28%), urban (30%), or suburban (24%) areas, while 18% decided not to disclose this information.

Identification of Levels of Innovation Adopters

To identify the levels of innovation adopters, the questions regarding each of the dimensions that compose that evaluation. This way, the analysis was split into those dimensions: Compatibility; Observability; Relative Advantage; Testability; and Complexity.

The questions in this part of the survey were made in a percentage scale where the respondents could show their level of agreement to each statement in Numerical Rating Scales from 0 to 100.

To assign each respondent to a group it was necessary to divide them into clusters. To start the iteration in each group, the initial clusters' values were all chosen based on the visual representation of the distribution of the answers to the first question of each block. The respondents' affiliation to each group was defined by each one's distance to the value of each cluster's centre, using the Sum of Squares method. After that, the values of every variable (question) in each cluster were defined by the mean of every respondent's answer allocated to the respective cluster. Then each iteration used the Sum of Squares method to define the distance of the respondent to the cluster's centre and allocate them to a different one in case it would be closer to a different cluster than in the previous iteration. The final allocation was defined when the clusters were stabilized. In the table below we can see how many iterations were needed until the stabilization and the values for the different clusters to each block of questions. The iterations were considered stable when the following one had more changes of clusters than in the previous one, for this, six iterations were made to each group even though the choice for every group had already been made in previous iterations. As many respondents had been identified with more than one category throughout the five groups, the definition was made based on the median of the categories.

After this analysis, the definition of the level each respondent is allocated to was made based on the median of every category that person was identified in each block of questions.

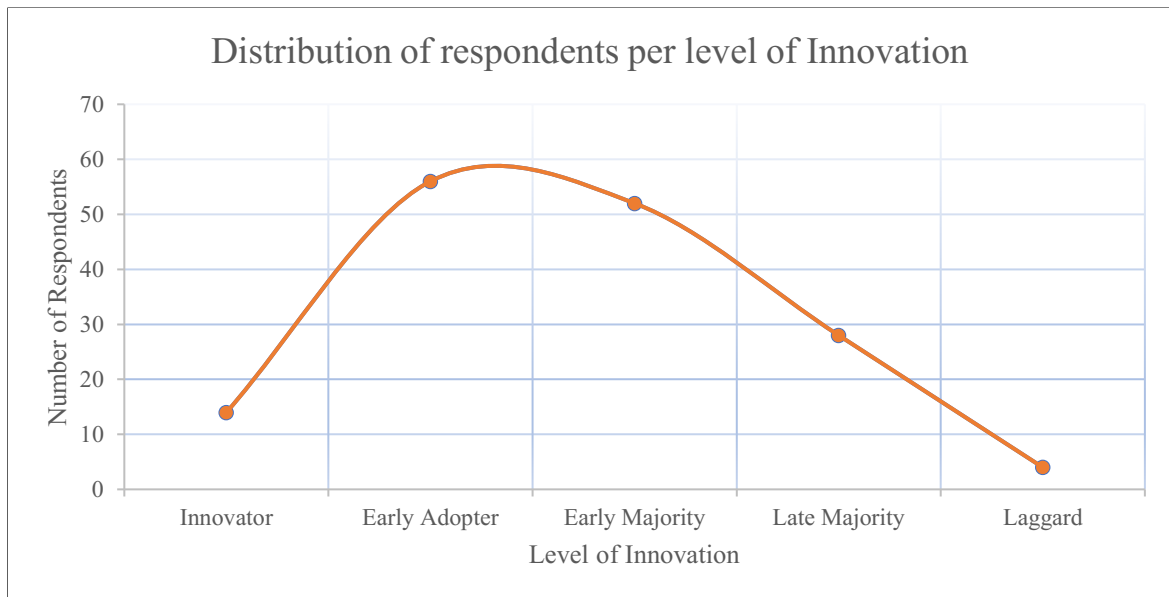


Figure 5 - Distribution of Respondents per level of Innovation

Finally, the distribution of respondents per cluster, based on the median before mentioned, shows that this survey was biased as the people more willing to respond were the most innovative one. This phenomenon may be explained by the fact that the least innovative people do not show willingness to respond to digital surveys, what could prove their unlikeliness to adopt Innovations.

Personality and Communication Characteristics per level of Innovation

Now that the characterization of the sample is made and the level of innovation adoption is set for every respondent, the next is to analyze the characteristics of the individuals of each level of Innovation. This way, some concepts related to personality variables and communication behavior previously analyzed will be tested such as the level of motivation, education, or age of the most innovative ones.

The five sentences under assessment by the respondents can be found in the Attachments, in the *Questionnaire Structure in English* chapter, in the block of questions *Pharmacist/Manager Characterization*.

In the table below we can see the average response to those answers per level of Innovation adoption. As these questions were built in different orientations, the green color indicates how more prone the respondents are to be related to earlier adoption stages while the red shows the opposite, even if in some questions the green may be the highest

or the lowest average. For this analysis, only the answers that were not left empty were considered.

	Question 1	Question 2	Question 3	Question 4	Question 5
Innovator	26	90	99	28	94
Early Adopter	45	68	84	34	80
Early Majority	40	64	77	24	74
Late Majority	42	57	75	19	73
Laggard	25	12	50	11	40

Table 2 – Social and personality characteristics of respondents per level of Innovation adoption

Analysing the table above, we see that besides the first question the two most innovative levels are proving that the statements from 2 to 5 are well related to them.

Related to the first question, opposing to what was stated, Laggards show that they are the ones that are less likely to wait for others to adopt an innovation. However, only two of the four Laggards identified actually answered to this question what may be creating a bias in this particular answer as this question shows that this may be an outlier regarding to the rest of the remaining analysis. Naturally, very close to this level come the Innovators, with a much more robust sample. The remaining three levels are very close to each other which was expected, with the Early Adopters with the highest value what shows that they value the fact of seeing others adopting it first. This fact may be what is separating these individuals from the Innovators level, as in the other questions, these levels are very close to each other.

The second statement is pretty similar to the first one but while the first is related to the more or less dogmatic approach, the second tries to show the individuals' their level of abstraction to potential innovations. From this part of the study, it's visible the earlier adopters' will to be the first ones to adopt a digital innovation. Thus, we can state that earlier adopters (Innovators and Early Adopters) show that have a much higher abstraction level what is leading them to be the first adopters. Inside the early adopters, Innovators show a much higher tendency to that than the Early Adopters.

In the third question, the dimension in analysis is the adopters' level of search for more information about Innovation. Innovators are undoubtedly the ones that seek for more Innovations, trying to keep up with new information and technologies that may impact a

CP's management. Here, there's clearly a tendency by earlier adopters to seek for more innovations even though the Early and Late Majorities are very close to each other.

When it comes to understand how the adopters cope with uncertainty and risk, the fourth statement is the one to study that. As earlier adopters have a natural tendency to be considered more risk-taking and that show less problems with working in an uncertain environment, the result of this question's analysis shows exactly that, even though there is a shift in the level with the highest values: Early Adopters are more able to cope with uncertainty than Innovators. Besides the expected conclusion, it is important to note that the values in this answer are much lower than in other questions when it comes to agreeing to the statement in analysis. This is due to the fact that the community of CP in Portugal is not in favour of uncertainty in general and this may show that there's not much openness to deep changes in the CP ecosystem.

Finally, the last dimension in analysis in these five questions is the motivation. The earlier adopters tend to show a higher natural level of motivation than later adopters. Through the values in question, it's very clear that that group is much more motivated than later adopters.

To sum up this analysis, there are some statements studied before that were being tested. All of them but one could be considered proven. As the remaining one may be considered an outlier, the results meet the trend. The list of the statements and results can be seen below.






	EA may be less dogmatic.
	EA have a greater ability to deal with abstractions.
	EA are more able to cope with uncertainty and risk.
	EA have higher levels of achievement motivation.
	EA seek more information about Innovation.

Table 3 - Statements and Analysis Results

Socioeconomic Characteristics per level of Innovation

To study the socioeconomic characteristics of the individuals, now that the levels of Innovation adoption are defined, the questions that were testing the statements cited previously will be analysed.

The two statements that may be analysed through the results are the following ones:

- Earlier and Later adopters have similar age.
- Earlier adopters have more years of Education.

This way, there were questions that focused on the characterization of the respondents in terms of age and level of Education. Starting with the age structure analysis, the results are the ones below.

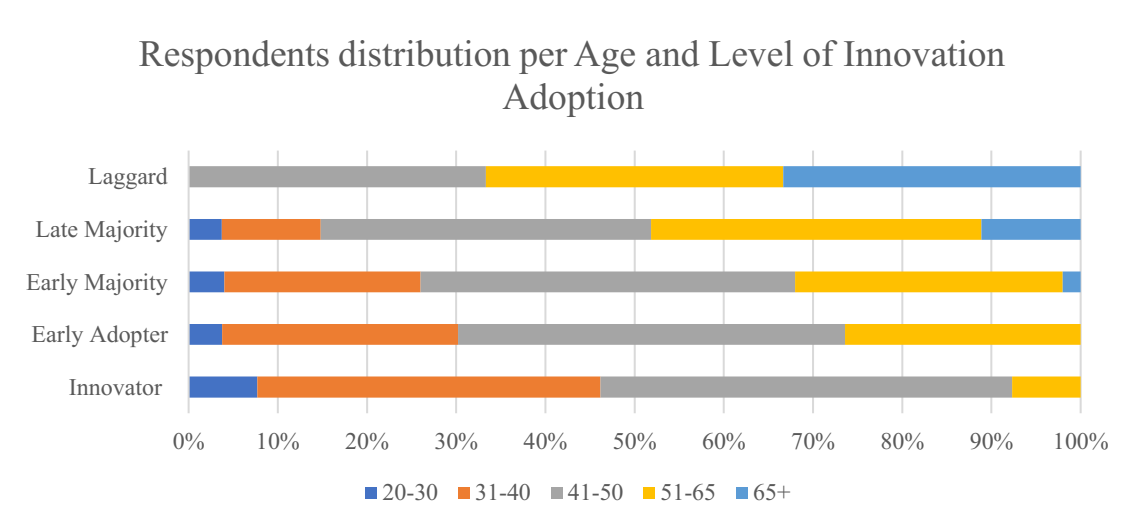


Figure 6 - Distribution per age and Level of Innovation Adoption

If the levels are grouped into earlier (Innovators; Early Adopter; Early Majority) and later adopters (Late Majority; Laggard), the distributions are more comparable.

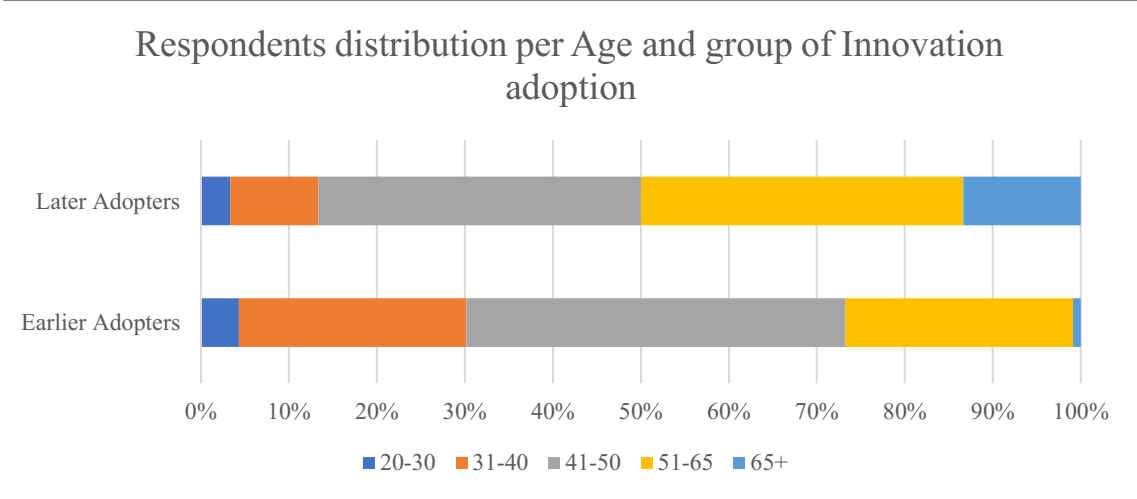


Figure 7 - Distribution per age and group of innovation adoption

This way, we can see that there is a slight difference in the structure. Even though both groups have most of their individuals located in the 41-50 and 51-65 age groups – 69% in the EA and 73% in the LA – the earlier adopters have a much younger base with 26% of people between 31 and 40 years old with only 1% of people with more than 65 years old, while the later adopters have only 10% of people in the group 31-40 and 13% of people in the oldest age group – 65+.

This shows that for this sample the similarity in the age structure is not proven as the earlier adopters represent a younger structure.

In terms of Education, the comparison must be made between the degrees the respondents have.

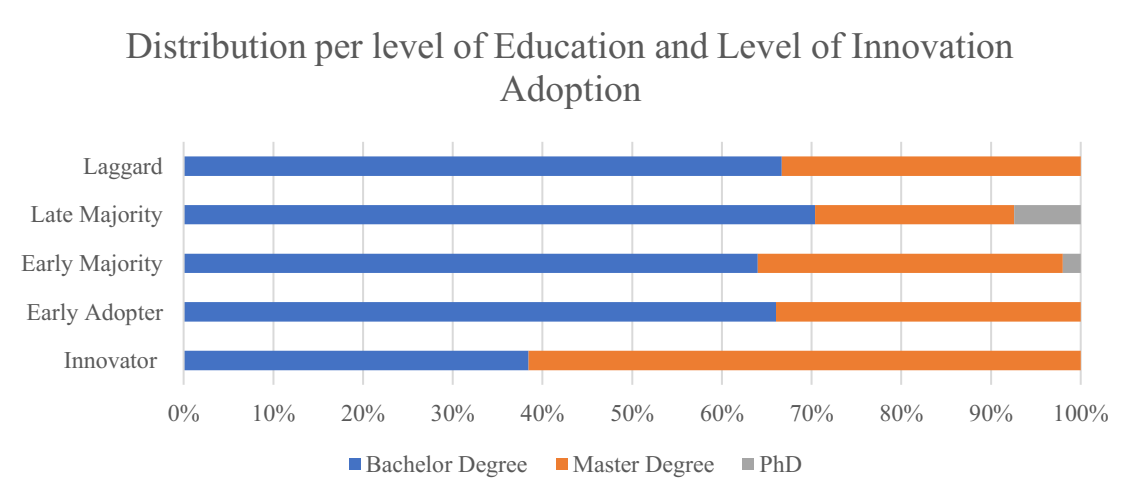


Figure 8 - Distribution per level of Education and Level of Innovation Adoption

As in the Age analysis, the statement regarded the groups of innovation adoption and not the levels.

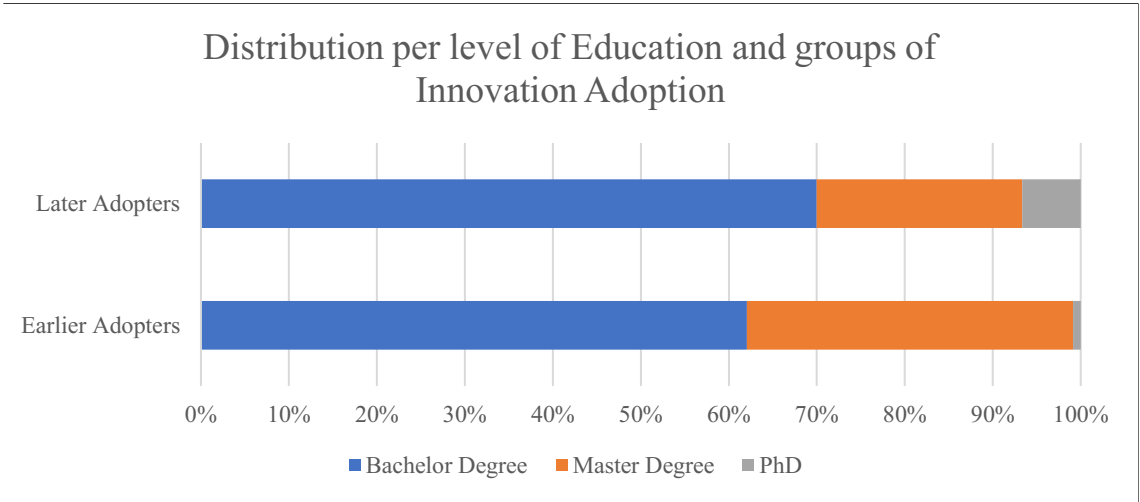


Figure 9 - Respondents Distribution per level of Education and groups of Innovation Adoption

While in the LA there is a higher percentage of PhD (7%) than in the EA (1%), the latter have a much bigger percentage in the master’s degree level – 37% against 23%. If we compare the percentage of people with a bachelor’s degree, the earlier adopters have 62%, while the later have 70%.

Thus, the statement is proved correct by the number of people who have more than a bachelor’s degree.

One of the two statements being tested was proven right while the other didn’t.

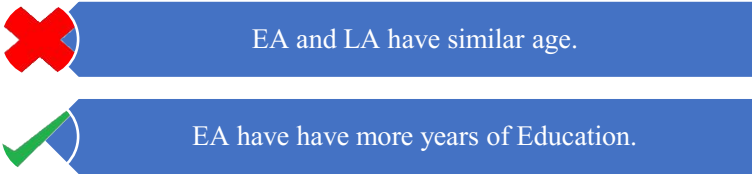


Figure 10 - Socioeconomic statements under analysis

Digital Characterization of respondents’ pharmacies

In the characterization block, there were also questions to describe the landscape of the pharmacies in terms of Digital matters such as social network presence; website; or online sales.

From these variables, it’s possible to extract what’s the pharmacies position in the online presence, and how they are dealing with the rise of e-commerce. The relation between

their level of innovation to the adoption of this kind of technologies may be relevant to the analysis as the future of the CP may well pass through these 3 dimensions.

The first dimension is the social networks presence. Here it was asked to fill for how long the CP has Social Network presence.

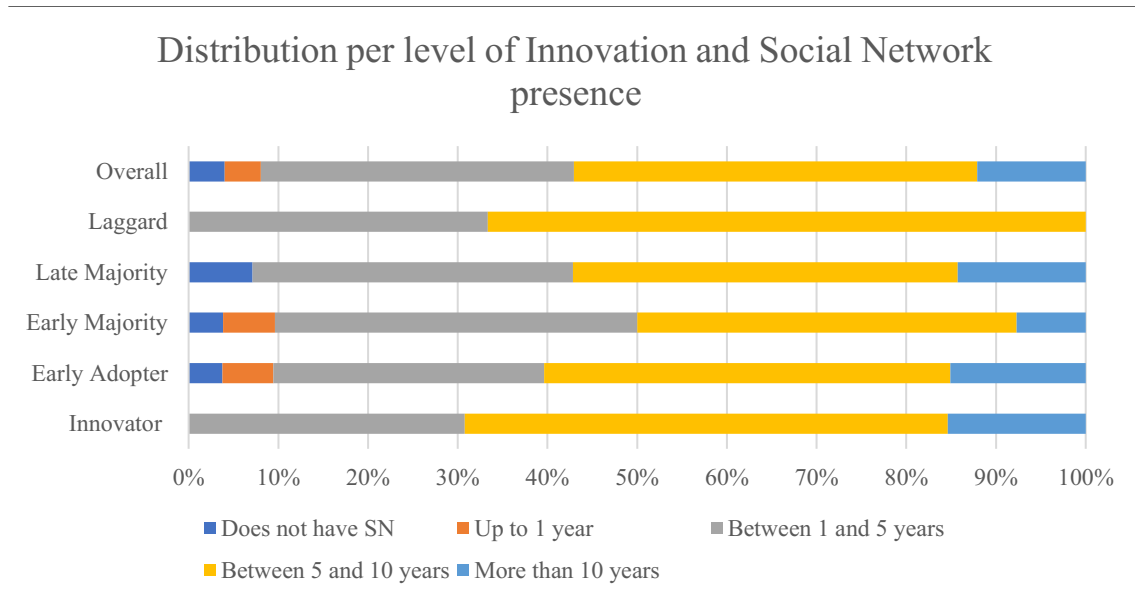


Figure 11 - Distribution per level of Innovation and Social Network presence

The Social Network presence is well diffused among the community of CP. According to the results, in an overview, we can see that only 4% of the respondents' pharmacies do not have a Social Network profile.

Curiously, all the Laggards have Social Network presence and, in an opposite way Early and Late Majority and Early Adopters have individuals that do not have that presence. The expected behavior here would be the earlier adopter group with more online presence and for much longer than the later ones. From this sample, we can't take out that having Social Network presence is a distinctive factor for Earlier or Later adopters.

When it comes to the Website associated with the Pharmacy, there's a much more expected behavior than in the Social Network. None of the Laggards has a website associated, while Innovators have the highest percentage of CP with website for more than 10 years. Early Adopters show the lowest percentage of CP without website.

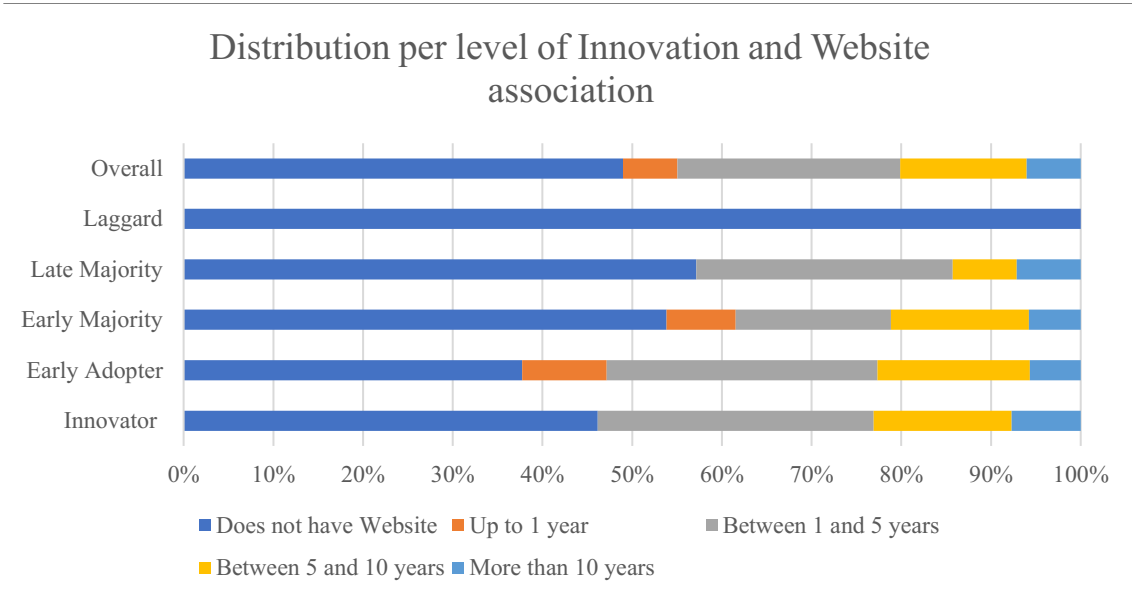


Figure 12 - Distribution per level of Innovation and Website association

Going further in the analysis, the next topic to test is the Online Sales representation in the total of the CP's sales. Here, it'd be expected earlier adopters to have higher percentages of Online Sales than later adopters. This way, it should show that the more innovative ones would adopt new revenue streams adapting themselves to the Digital demand and the more representative way of checking this would be the Online Sales.

As expected, none of the Laggards has Online Sales while in the Late Majority a third of the respondents have Online Sales which represent up to 10% of the total sales. From this, we can see that the Later Adopters show a low level of Online Sales.

Regarding the Earlier Adopters, there are lower values of Pharmacies without Online Sales in each of the three levels. Besides that, in the Early Adopters and in the Early Majority there are pharmacies with Online Sales representing up to 25% of the total Sales, while in the Innovators there is a Pharmacy with more than half of the Total Sales being made Online.

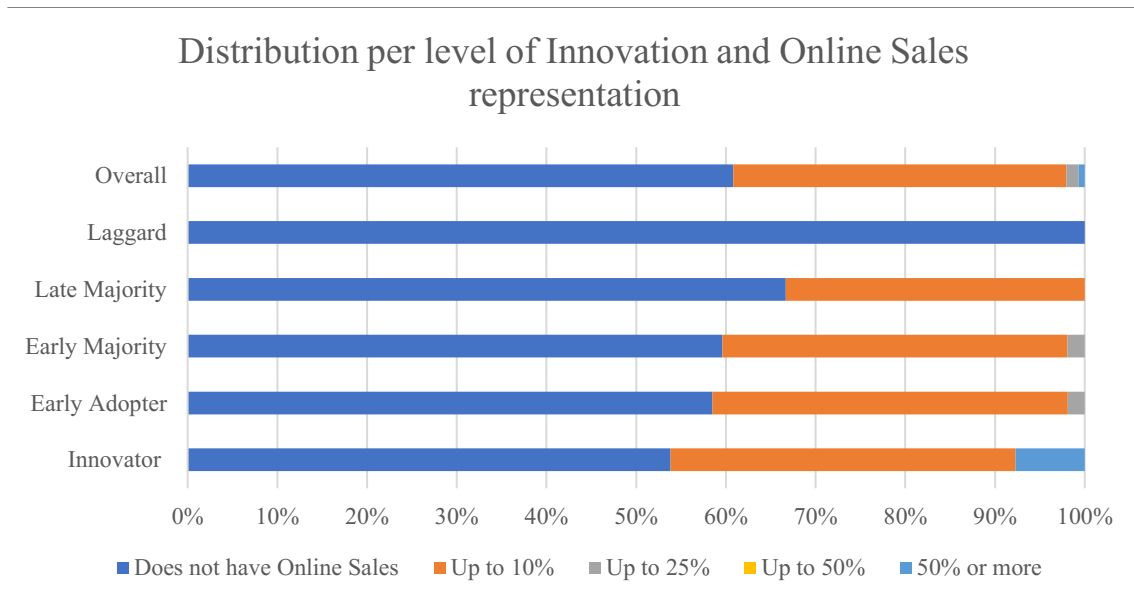


Figure 13 - Distribution per level of Innovation and Online Sales representation

Characterization of the Social System

In this block of questions, the analysis will be focused on the respondents' perception about the Social System where they are inserted. The two questions here are directed into two different social systems: the CP's community; and the community where the CP is inserted locally. The aim would be to understand how these two impact the innovation of the Pharmacies and how innovative these would be because of those.

The statements under analysis are:

1. Pharmacies' Community is very open to innovations.
2. The community where my Pharmacy is inserted is very eager to innovations.

Based on the assumptions above, the higher the level of agreement to the statements, it's expected that the higher would also be the levels of innovation adoption.

From the results above, we can see that about the first statement the Early Adopters and the Early Majority have a very favorable perception about the openness of the community of CP to Innovation. On the other side, expectedly Late Majority and Laggards have the opposite perception, while Innovators agree with this perception, staying at the same level as the Late Majority. This Innovators' perception may be explained by some barriers that they may be finding in some cases when trying to adopt innovations which could be as obstacles to their process of adoption.

When it comes to the second statement, every level showed the expected behavior: as high the individual's perception about the community where they're inserted, the higher is their level of innovation. This shows that the community has a strong influence in the respondent's decision of adopting innovations, this happens in order to fill the community's expectations.

Communication Channels

The following block sticks to the understanding of which is the preferred communication channel of innovations among the respondents.

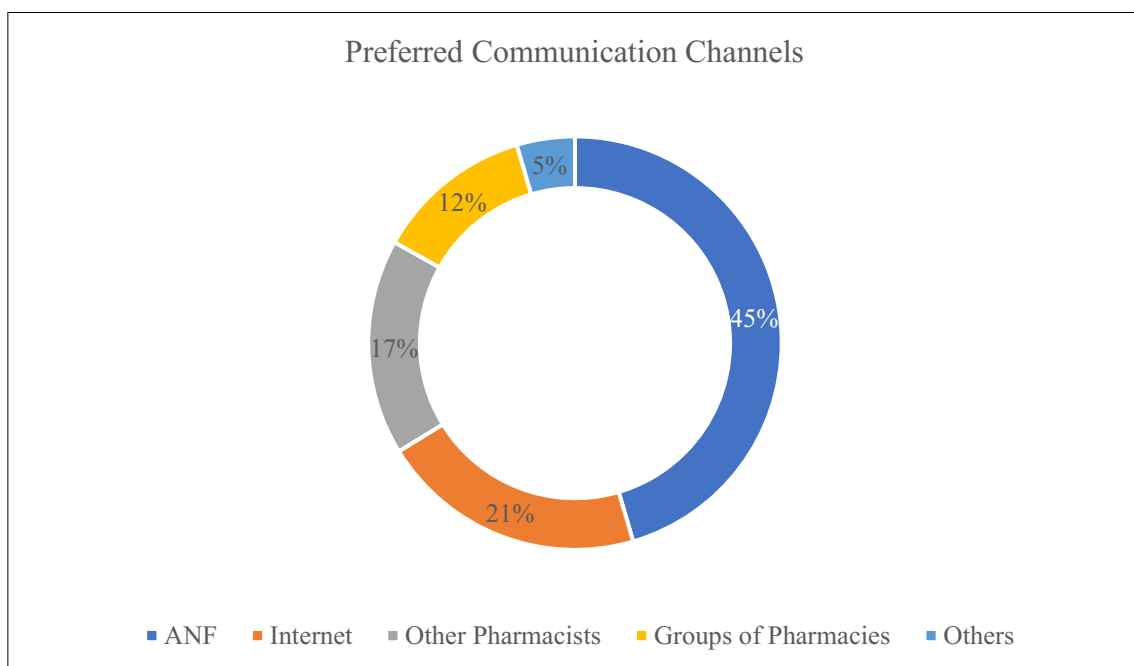


Figure 14 - Preferred Communication Channels

The main Communication Channel of innovations is the ANF, followed by the Internet, Other Pharmacists, and Groups of Pharmacies. There were 5% of the respondents that answered "Others" as preferred channels: Medical Sales Representatives; Courses; Other areas of business; research and reading other sources.

When comparing Earlier and Later adopters' preferred channels, we see that the main differences are that, even though ANF is the preferred channel in both, the Earlier adopters have much more respondents that have the Groups of Pharmacies as preferred channel.

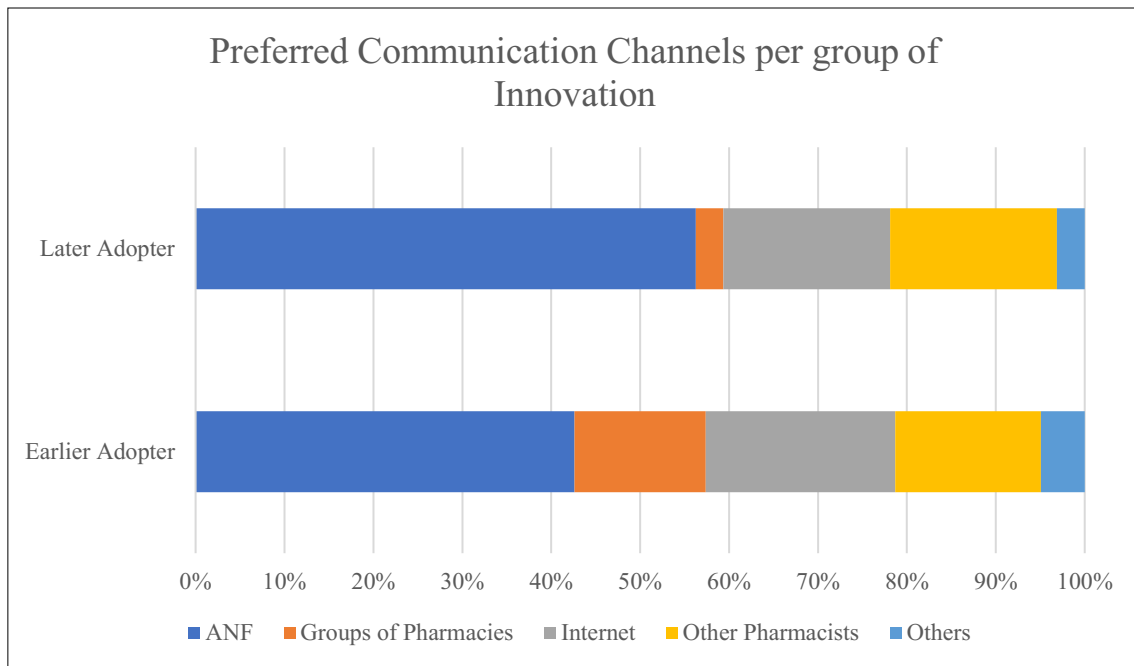


Figure 15 - Preferred Communication Channels per group of Innovation

Digital Transformation

In the block of the DT, the aim is to understand which would be the biggest challenges to CP based on the DT and their perception about it. There were four statements about the DT, and the respondents were intended to show how much the sentences would match their perception. From this, it would be possible to take out which is the respondents' perception about the impact of the DT in the CP.

The statements can be found in the Attachments, in the *Questionnaire Structure in English* chapter, in the block *Digital Transformation*.

From the answers obtained, overall, we see that there's a big level of match of perception of every level with the statements above. On average, statements 1, 2 and 4 are equally important to the respondents (average of 88% of agreement), with the third one causing some doubts, with an average of 83%. Even though it is a high level, we can state that there may be some disbelief on the battle against external contenders.

Anyway, the importance of the DT is clearly perceived as very relevant among the respondents, and it is seen as the two most innovative levels with a very high level of agreement.

The Innovators consider the most relevant the existence of an integrated Health Network and also value the synergy between Physical and Digital as a very relevant challenge to the CP.

Continuing in this block, the next question asks the respondents to order which challenges they consider the most important. These challenges caused by the DT were previously studied and below we can see them and how they were valued.

RANKING	CHALLENGE	AVERAGE
1	Need for an integrated Health Network	2.1
2	Daily management with more digital tools	3.3
3	Synergy between Physical and Digital	3.4
4	Digital Presence	3.9
5	Online Sales	4.1
6	Customers' Digital Demands	4.2

Table 4 - Perception of the importance of the Digital Transformation Challenges

The need for an integrated Health Network is perceived by respondents as the most important challenge for CP by a big difference. This topic is extremely relevant as it'd allow pharmacies to access important health data information that would help a more effective follow-up with the patients and a quicker overall response. This is considered crucial by the respondents.

In second place, the integration of more digital tools in the daily management of the CP is considered also very important for the future with the DT. The digitalization of processes would help optimize them and this way gain more time and lead to the focusing of pharmacists in tasks more oriented to their formation.

In third place and very close to the second, the synergy between physical and digital dimensions of the pharmacy is a relevant concern to the respondents. As the traditional DNA of the pharmacy is based on the proximity, the demand for the digital dimension may impact the perception that the patients have on the pharmacy. This way, the combination of these two is extremely significant that it's made smoothly and according to the people's needs and does not have a too big impact on the traditional view on the pharmacy.

In the last three places, there are three challenges that are very close to each other: Digital Presence; Online Sales; Customers' Digital Demands. Regarding these three challenges and the third one ("Synergy between Physical and Digital") there was an open question that asked how the digital's consumers' preferences impacted their Business Model and

the consumption behaviors. Many answers indicated the need to adapt to these new patterns to keep up with the new reality getting to the point that “those consumers will search for the pharmacies that match their demands” and that if CP won’t be in the new channels, they will lose sales (“If we aren’t in the new channels, we’ll lose sales”). To match these new demands, it’s important to make sure that there are “specialized resources” and also as there will be more customers looking for these digital channels, “this will imply more investment in these areas”. Besides most positive answers, there are some respondents saying that there’s not much impact (mainly due to their location) yet, there’s one that remembers that “CP as a physical space are being highly penalized. Most of the Pharmacies’ entry in these channels can only be viable if made in group”.

Regarding the trends identified on this group of consumers, there are some very interesting inputs by respondents. The first one is that there is more consumption of “other health products”, “mainly dermo cosmetics” and that the consumption trends of not prescribed medicines is highly “influenced by social media and other internet channels”. There’s another trend that shows that there are less of these customers going to the pharmacy, either because they are young (“Younger consumers only go to the CP out of necessity”), either because “they compare more prices and visit fewer times the CP”; or even because “there’s a reduction of anchor-products’ prices and there are more home deliveries”. Finally, in the Digital there’s a higher concern with the prices in spite of the information provided by health professionals (“In the Digital, consumers go essentially for the low prices. At the CP, they are given the relevant information that they do not want to pay for; with that information, they buy online where prices are more ‘crushed’”; “the lower valorisation of advisory services”).

About the impacts of these changes there were two very important points that were brought by the respondents: there is a higher proximity between the consumer and pharmacist (“The Digital makes that patients and health professionals are closer”); there’s a higher visibility on the CP supply of services and products ([DT] “Improves a lot the patients’ perception of the pharmacy’s availability and supply” [of products and services]).

To sum up this block, there’s a response that may be used that touches almost all of the challenges mentioned before: [the Digital demands]” define much of the present and the future of industry funnelling in a certain way the consumption, making it more volatile,

demanding a doubled attention on the stock management, and the physical space and the digital image of the pharmacy”.

In order to face the DT and encourage Portuguese CP to adopt technological innovations, the respondents left some suggestions on how to do it. This way, to make it broader, first of all, there’s the need to “open the mentality” and get “more training” so that there could be an environment where the mindset would be much more turned to the technological innovations and where they’d be more welcoming. From the responses, it was possible to see that some showed a dependence on the government, on one side, and also on the communication channels, on the other side. First, there were statements regarding the need for the government to be more innovative (“Make pressure on the governments to be more open to innovation”) and also to provide more incentives or “contributions to structured projects”. Finally, as one said, a way to be more innovative is “to be always updated, receiving information”, this way the communication channels may be a challenge to some pharmacies as a few stated their importance and seemed to be far or unsatisfied with the main ones (“Timed information, subsidies, or some payment facilities, and more information about them and more intuitive software, more assistance in training from ANF, and their implementation”). The respondents in this case, gave a lot of importance to the sharing of experiences: “exchange experience and ideas among colleagues”; “encouraging the exchange of ideas and best practices among colleagues and other health agents”; “there must be sharing of experiences and companies in the market that propose investments in equipment that brings us gains, namely in the human resources area”. Besides these topics but also related to this last sentence, it’s also important to point out that it was identified the need for external companies to show their support in these areas, which may be a market opportunity to new agents in the ecosystem that may bring a more innovative approach to the sector (“Associating with a company that shows that understands how pharmacies work and how they can improve”).

Digital Solutions

The most mentioned topic was the integration with other health networks so that there could be a greater knowledge about the patient and a direct connection to other health agents mainly medical doctors, with real time information. This would allow a much more personalized and accurate service and also a direct channel to communicate with the doctors that would be following the patients. The responses about this integration

mentioned different outputs/motivations: “integrated network of therapeutical and clinical information about each patient”; “integration with other health systems and web-based prescription dispenser”; “total integration with the remaining health databases”.

The follow-up of the patients is also many times mentioned by respondents. One of the examples was already written before – “web-based prescription dispenser” – which allows a continuous monitoring and of patients’ needs and an automatic renewal of the prescription without the need of going to the hospital. In the “follow-up” topic, it’s also important to note the dimension of following the patient’s prescription taking which would be important to remind them to take them or that they are running out – “automatic follow-up, reminders of medication control”.

Equally stated frequently, the need for developing the Online channel for Sales is a common concern among a big part of the respondents, whether they may be through a website (more times referred) or through an app. Here, there’s a respondent that says the Online Sales should be “developed by ANF”.

There were also plenty of answers that regarded the daily management of the CP, which present serious opportunities in this system. The first dimension is the need to have “management indicators” to the “performance assessment”. With a continuous follow-up of key performance indicators (KPI), it’s possible “to increase the efficiency of the decision-making process” (Burlea-Schiopoiu & Ferhati, 2021), having real time information it allows CP to have a much closer management of every aspect of their daily issues. In a similar dimension, related to the previous one by the need of having up-to-date information, there’s the Stock management (“real time update of stock”) that is also a common concern as it takes a long time to manage, since the reception of orders (“archaic and takes us a long time”) to the live update after sales, and also the invoices payment (“invoices payment management”). This way, its automation “creates additional time for pharmacists to provide pharmaceutical care and other pharmaceutical services to patients and customers”(Ali, 2011). To solve this problem a suggestion by a respondent was “installing a sensor in boxes to the automatic refill”. “Through these and other strategies it’s possible to improve the commercial performance and rentability, generate rotation and liquidity, and create new business opportunities” (Pedro, 2015).

To reassert the difficulties for adopting digital innovations, two respondents stated what maybe a barrier to that: “the time is scarce”; “aging population”.

Interview Results

It was possible to understand that the higher the level of adoption, the higher was the concerns expressed on management strategic needs and less on the daily operations. Naturally, the concerns were also there but the main focus was on the bigger picture as well. Also, how lower was that level, the higher was the focus on the community response, mainly focused on the ANF solutions, and also the satisfaction with that association.

Diffusion of Innovations

The questions in this part of the interview were focused on finding what the main drivers for adopting Digital Innovations would be, and how the pharmacists acknowledge about those innovations.

Here, the motivation focus was undoubtedly on the following topics: “take the most out of the collaborators”; efficiency (innovating “undifferentiated” tasks); profitability. Here it was possible to perceive the five characteristics of innovations: Relative advantage (“raise more sales”; “consumer does a lot of research before and thus we need to have an important role to not to lose to competitors”); Compatibility (“the concern has been in the public, in the client”); Complexity (“I would be going deep into this if I was not this old.”); Observability (going to fairs of the sector which are “divulcation channels where we can see the innovations working”); Trialability (interview with more than one CP, has first tried the innovation in one CP and as it worked, they adopted it for another one).

To acknowledge about innovations the main channels mentioned were: ANF; pharmaceutical companies/salespeople; interaction with other pharmaceuticals; and also fairs.

Digital Transformation

In this part, there were two different parts: one more related to the importance of the customers in the DT and, another related to the challenges resulting from it.

Regarding the first part, it was consensual that customers are in the centre of the adaptation of the CP to the DT. One interviewee stated that “CP who find ways to alleviate

their [customers] pain, that reduces the time they are losing, and with the improvement of the internal processes, will be keener on innovating, searching for solutions to simplify their work.”. Others mentioned the need to adapt to their needs, even with the concern of not introducing too much digital innovations that could “inhibit the older customers, which is the largest portion of clients”, which was complemented by another: “there’s a need to reduce the distance and time dispensed by the clients because the population is getting older and older and there is less mobility”.

About the second part, the most mentioned challenge (as it was observed in the survey) was the integration in a national health network with focus on the access to medical data, direct and easier communication with medical doctors and patients, “automatic renewal of the chronic prescription by pharmacies”, “real-time availability of products”, have a wider variety of services to provide (“having more response of services”). However, one mentioned this would only work if there were “more autonomy” and “trust from one to side to another”. With this solution, it’d “allow much more challenging jobs for pharmacists, who would see their skills being more useful”. Besides this challenge, the synergy between physical and digital is also mentioned as “it implies a big cost to take the customer inside the pharmacy” but the importance of the advisory service can’t be underestimated because CP “are selling a service” and “don’t charge anything for that but the loyalty of the customer”.

As additional challenges mentioned by interviewees, there were the following ones: “optimization of manual procedures”; difficulty in recruiting pharmacists (which “may be a way of making people focus on changing that workforce for robots/computers”); online training as a way of improving teams’ conditions; difficulty of entering the sector; analysis of financial parameters.

There were some interesting challenges as the isolation of population, the low remuneration of pharmacists, the low margins and profitability of pharmacies, the difficulty in the supply of medicines that can’t be related to the digital part but are affecting the daily life of the pharmacies and keeping them away from innovation.

Description of the CP community

All of the interviewees considered that CP are very innovative, “an example”, and some stated that they could be more innovative if it was not for “financial issues”. Also, some said that there are too strict rules.

It was stated that the incentives to innovation are mainly through community (European Union) funds and that the Portuguese government could improve this part, mainly through financial support, tax incentives and, “raising margins”, but also through “communication with other health professionals”.

There were some barriers identified: bureaucracy, “interpretation of legislation”, elderly population, collaborators resistance to innovation.

Future Solutions

As future solutions there were many identified besides the ones in the survey: “enrich the start-ups universe around the pharmacy services” (allied with the opening of systems); “faster access to information”; vending machines; automatic renewal of chronic prescription.

The key findings of the interviews may be found in the Attachments, under the chapter *Interviews Key Findings*.

Discussion

Challenges

The challenges resulting from the DT studied were present in the concerns of the survey respondents, the most urgent one is the “Need for an integrated Health Network”. From the interviews, it was possible to relate a challenge mentioned to the DT: the difficulties in recruiting pharmacists. The introduction of digital technologies indirectly influences job satisfaction (Limbu et al., 2014). The job satisfaction is positively associated with the work interestingness derived from digitalization, even though there might be a moderate negative impact when it increases the time pressure derived by digitalization. It has a higher importance on the “interestingness of work, productivity, and autonomy relatively for young workers than for older ones” (Bolli & Pusterla, 2022). Even though there’s room for improvement of digital health education in pharmacy schools (Mantel-Teeuwisse et al., 2021), it seems that younger workers are more adapted to the DT than older ones, like the results of this study show that Earlier adopters are younger than later ones.

Community Pharmacies' Innovativeness

Results showed that CP perceive themselves as innovative. However, using the framework of Rogers’ Diffusion of Innovations in Organizations, due to the small size of the CP, the low organizational slack, the management centralization, and the low system openness, we’d conclude that CP are not considered innovative.

This way, as SMEs, CP’s innovative performance is influenced by the organizational learning capability, and to encourage the less centralized rise of innovation, the enterprise should encourage employees’ ideation process, and managers to encourage problem-solving creatively and innovatively (Gomes & Wojahn, 2017).

Besides this, the fact that CP are small, and the ownership is limited to a maximum of four, it encourages the affiliation to purchasing-groups or cooperatives of CP.

Communication Channels

The results show that Earlier Adopters rely more on Groups of Pharmacies than Later Adopters, revealing a much higher percentage of responses indicating them as preferred Communication Channel.

These purchasing-groups are particularly important in the decline of expenses (Safaei et al., 2018). From the interviews, we see that purchasing-groups or cooperatives have a role in the development of digital solutions to their associates. Besides that, trainings are provided⁴ to practitioners.

Purchasing-groups are innovation-enablers by concentrating services such as the negotiation with suppliers or the development of digital technologies, achieving economies of scale that allow their specialization and a reduction of costs for each group affiliate, while the introduction of digital innovations is potentiated inside the CP. Thus, purchasing-groups have a positive impact in the level of innovation adoption.

Regulatory Policies

As studied, and added by some interviewees, there are very strict regulations about the sector. There's no openness to include new services besides the ones stipulated by INFARMED.

This way, as the services supplied by the CP don't vary much, there's not much differentiation among them. When this occurs, there's not much competitiveness between CP in terms of services. This would be important to “overcome organizational inertia and foster creative thinking” (Porter & Van Der Linde, 2017).

The administrative price reductions and respective lower margins lead CP to the need of selling other products or providing other services that provide higher margins.

The regulatory policies, to encourage innovation, should “create the maximum opportunity for innovation and leave as little room as possible for uncertainty” (Porter & Van Der Linde, 2017).

⁴ As an example, the biggest Portuguese purchasing group provides trainings.
<https://www.grupo.nossafarmacia.pt/?AspxAutoDetectCookieSupport=1>

Future Solutions

There were plenty of different suggestions on possible future digital solutions made by the respondents and interviewees. Some were related to the customer service (integrate networks; patients follow-up; chronic prescription automatic renewal); others to the sales methods (vending machines; online sales); and, finally a few were related to the daily management of the CP (need of KPIs; stock management).

When analysing these suggestions, their impacts would be considered mostly in the micro level of analysis, except the sales methods that would be a meso level (Appio et al., 2020). Respondents did not suggest disruptive innovations, with an impact on the ecosystem of the CP, but rather sustaining innovations. However, the disruption is a process and these small-scale innovations can have a big impact in the long-term (Christensen et al., 2015). If an individual takes the step to start developing and experimenting, the innovation may take its time to be adopted by others as staying with the old one may be more profitable in the short-term. Thus, there's the need to allow disruptive products to appear in the market, and provide the conditions for their adoption, and the innovative mentality must be present.

Limitations and Future Work

The survey had a sample of respondents very focused on the North of Portugal. According to the Census of 2021, this region represents 35% of the total population residing in Portugal. This value is yet far from the 52% of this study but it's not a very relevant difference as it was possible to extrapolate the analysis to a nationwide study. However, it can be a future work effort to have more means of communication of the survey to get a higher geographical distribution.

As the survey was in an online platform it may have been an obstacle to Laggards and that may be the reason to have very few individuals from that level. It does not allow a very in-depth analysis of the Laggards' perspective; however, it proves the low proneness by this level to work with digital tools. To get these individuals to respond, it'd be necessary to have a survey directly made in person in CP.

Another limitation identified was that there were respondents that owned more than one CP, which may have caused biases in some answers. However, the tendency noticed during interviews is that, in these cases, when there's an innovation adopted successfully in one, it'll eventually be adopted in another, what shows that the individual is innovative and will respond based on the most innovative one. Future work should include a question to understand how many CP the respondent represents.

Finally, it was planned to have two individuals per level of innovation adoption, but no Laggards showed their availability; only one Late Adopter answered positively to the contact to an interview; one of the two innovators that gave their contacts accepted an interview, while two of each of the two remaining levels accepted the interview. It'd bring more discussion, nonetheless the interviews were very enriching. Two of the respondents also worked in the administration of a cooperative of CP, which allowed to have that perspective.

Recommendations

Community Pharmacies

CP need to rethink the role of the pharmacist and make it attractive again as there's a growing dissatisfaction among pharmacists and there's a growing concern with the recruitment of pharmacists to CP, as many are choosing different career paths. The percentage of "undifferentiated" or "redundant" tasks is too big, thus the role becomes unappealing. This way, the introduction of technologies may help solve the problem. On the one hand, it'd be possible to end those repetitive tasks and make them inexistant or, at least, more challenging. On the other hand, this would be a kick-off for the introduction of more digital innovations which could release the pharmacists for other tasks, and it would be possible to create "value and take the most out of them".

To keep up with the growing integration of digital technology it'd be important to provide adequate training to older pharmacists, who usually struggle with DT.

Pharmacy Associations

In Portugal, ANF is responsible for *Sifarma*, the software that allows the management and processing of orders, which is a closed program and doesn't allow the integration with different programs (Mota, 2004). If this would be an open-source program, it could lead to the growth of the ecosystem around CP and with a bigger supply of solutions to provide different and better services.

A campaign of sensibilization of CP managers to the importance of innovation is also required.

Besides that, it's also needed a strong and organized mobilization to require for integrating a combined health network in Portugal, which must be done collectively.

Policy Makers

In Portugal, there's a dependence of the CP on the government's incentives and policies. This way, the rise of the price margins of the medicines may be a policy that could result in different ways: it may turn the Portuguese market into a more attractive one to be supplied; and it may also provide a better financial condition for the CP that could then focus more on the innovation.

Besides this, the need for an integrated National Health Network can be a very effective way of improving the Healthcare system nationwide, with impacts on many other agents. The regulation should be clearer and provide more room to innovation, and inclusion of more services.

Industry and companies

There's a big opportunity in the market to innovation management related companies that can provide diagnosis on the CP, help them focusing on innovation and optimize processes. This would help provide a different view on the CP's struggle with DT and have specialized people on the innovation.

Conclusion

In a very regulated sector, with many SMEs, and with a rising problem of job dissatisfaction, the impact of the DT was particularly significant. This way, many challenges were posed to the CP.

Through an online survey, it was stated that CP consider the need for an integrated Health Network as the most important challenge, to have a greater knowledge about the patient. The synergy between physical and digital, and the integration of more digital tools are also considered relevant.

Portuguese CP perceive themselves as innovative, however there are some constraints that may indicate the opposite. Their main Communication Channel is ANF, with whom they have a big dependence about innovations. The heavy regulation may pose as a problem to innovation.

The Rogers' Diffusion of Innovations model had a big coverage on this study and by the survey respondents' perception it's shown that it's possible to apply this theory to organizations through the distribution of individuals among level of adoption of innovation, the motivation to adopt innovation (characteristics), and the statements that were tested (chapter *Personality and Communication Characteristics per level of Innovation*).

This way, it opens the possibility of applying this model to organizations. It was possible due to the centralized model of management of SMEs, as CP, in their manager/leader and the survey allowed to extrapolate the respondents' perceptions to place the organization into their characteristics.

Despite the increasing interest in DT in the Healthcare sector, there's still room for new literature, there are still some gaps in the study of the impact of the digitalization on the pharmacists' job satisfaction and their adaption to digital-based jobs. Also, there are still gaps on the analysis of the impact of DT on pharmacies. In the future, studies should focus on the CP sector and the importance of Health regulation policies on the innovation in CP.

References

- Abernathy, W. J., & Utterback., J. M. (1978). Patterns of Industrial Innovation. In *Technology review* (Vol. 80, Issue 7, pp. 41–47).
- Abreu, F. (2013). *Farmácia comunitária, Relatório de estágio*.
- Aguiar, A. P. (2015). *Gestão da farmácia orientada para a maximização sustentada do valor*. 1–164.
- Ali, A. K. (2011). Inventory Management in Pharmacy Practice: A Review of Literature. *Archives of Pharmacy Practice, Vol. 2*(Issue 4), 151–156.
- Almeida Simões, J., Figueiredo Augusto, G., Fronteira, I., & Hernández-Quevedo, C. (2017). Portugal: Health Systems in Transition. *European Observatory on Health Systems and Policies, 30*(9), 1–184. <https://www.dgs.pt/portal-da-estatistica-da-saude/diretorio-de-informacao/diretorio-de-informacao/por-serie-842723-pdf.aspx?v=11736b14-73e6-4b34-a8e8-d22502108547%0Ahttps://www.sns.gov.pt/wp-content/uploads/2019/10/CNCSP-Relatório-Final-2019.pdf%0Ahttps://>
- Ângelo, A., Barata, J., & Santos, A. P. M. (2020). Projecting the community pharmacy into home health care: An IS perspective. *Proceedings of the International Conference on Electronic Business (ICEB), 2020-Decem*, 265–274.
- APOGEN. (2022). *Medicamentos Genéricos pouparam 479 milhões de euros em 2021* (p. 2022).
- Appio, F. P., Frattini, F., Milano, P., Bari, P., & Torino, P. (2020). *Digital transformation and innovation management: a synthesis of existing research and an agenda for future studies*. 1–36. <https://doi.org/10.1111/jpim.12562>
- Bastos Martins, D. (2021). *Os 4 elefantes na sala...da transformação das farmácias*. Diário de Notícias. <https://www.dn.pt/opiniao/os-4-elefantes-na-sala-da-transformacao-das-farmacias-14166648.html>
- Bolli, T., & Pusterla, F. (2022). Decomposing the effects of digitalization on workers' job satisfaction. In *International Review of Economics* (Vol. 69, Issue 2). Springer Berlin Heidelberg. <https://doi.org/10.1007/s12232-022-00392-6>
- Burlea-Schiopoiu, A., & Ferhati, K. (2021). The managerial implications of the key

- performance indicators in healthcare sector: A cluster analysis. *Healthcare (Switzerland)*, 9(1), 1–20. <https://doi.org/10.3390/healthcare9010019>
- Christensen, C. M., Raynor, M. E., Rory, M., & McDonald, R. (2015). What is disruptive innovation? *Harvard Business Review*, 93(12), 44–53. <https://hbr.org/2015/12/what-is-disruptive-innovation>
- Correani, A., De Massis, A., Frattini, F., Petruzzelli, A. M., & Natalicchio, A. (2020). Implementing a Digital Strategy: Learning from the Experience of Three Digital Transformation Projects. *Review, California Management Berkeley, U C*, 62(4), 37–56.
- Ebert, C., & Duarte, C. H. C. (2016). Requirements Engineering for the Digital Transformation: Industry Panel. *Proceedings - 2016 IEEE 24th International Requirements Engineering Conference, RE 2016, October 2017*, 4–5. <https://doi.org/10.1109/RE.2016.21>
- Elton, J., & O’Riordan, A. (2016). *Healthcare disrupted: Next generation business models and strategies*. John Wiley & Sons.
- Faherty, U., & Stephens, S. (2016). Innovation in micro enterprises: reality or fiction? *Journal of Small Business and Enterprise Development*, 23(2), 349–362. <https://doi.org/10.1108/JSBED-11-2013-0176>
- Farminveste M&A Department. (2021). *ANF Group | Summary. June, 2020–2021*.
- Félix, J., Ferreira, D., Afonso-Silva, M., Gomes, M. V., Ferreira, C., Vandewalle, B., Marques, S., Mota, M., Costa, S., Cary, M., Teixeira, I., Paulino, E., Macedo, B., & Barbosa, C. M. (2017). Social and economic value of Portuguese community pharmacies in health care. *BMC Health Services Research*, 17(1), 1–12. <https://doi.org/10.1186/s12913-017-2525-4>
- Gabryelczyk, R. (2020). *Has COVID-19 Accelerated Digital Transformation? Initial Lessons Learned for Public Administrations*.
- Gatwood, J., Hohmeier, K. C., & Brooks, I. M. (2019). Beyond the reminder: The next steps in pharmacist-driven, mHealth patient engagement. *Journal of the American Pharmacists Association*, 59(2, Supplement), S21–S24. <https://doi.org/https://doi.org/10.1016/j.japh.2018.10.003>
- Godin, B. (2010a). “ Innovation Studies ”: The Invention of a Specialty (Part II).

Innovation, 8, 1–47.

- Godin, B. (2010b). “Innovation Studies”: The invention of a speciality (Part I). *Project on the Intellectual History of Innovation Working Paper*, 7, 1–47.
- Gomes, G., & Wojahn, R. M. (2017). Organizational learning capability, innovation and performance: study in small and medium-sized enterprises (SMES). *Revista de Administração*, 52(2), 163–175. <https://doi.org/10.1016/j.rausp.2016.12.003>
- Hanelt, A., Bohnsack, R., Marz, D., & Marante, C. A. (2021). *A Systematic Review of the Literature on Digital Transformation : Insights and Implications for Strategy and Organizational Change*. July. <https://doi.org/10.1111/joms.12639>
- Infarmed. (n.d.). *Abertura de nova farmácia*.
<https://www.infarmed.pt/web/infarmed/entidades/licenciamentos/farmacias/abertura>
- Kanavos, P., Schurer, W., & Vogler, S. (2011). *The pharmaceutical distribution chain in the European Union : structure and impact on pharmaceutical prices The Pharmaceutical Distribution Chain in the European*.
- Kraus, S., Schiavone, F., Pluzhnikova, A., & Invernizzi, A. C. (2021). Digital transformation in healthcare: Analyzing the current state-of-research. *Journal of Business Research*, 123, 557–567. <https://doi.org/10.1016/j.jbusres.2020.10.030>
- Leal, M. (2014). *O Farmacêutico em Farmácia Comunitária Experiência Pessoal e Profissional*. 221.
- Limbu, Y. B., Jayachandran, C., & Babin, B. J. (2014). Does information and communication technology improve job satisfaction? The moderating role of sales technology orientation. *Industrial Marketing Management*, 43(7), 1236–1245. <https://doi.org/10.1016/j.indmarman.2014.06.013>
- Mantel-Teeuwisse, A. K., Meilanti, S., Khatri, B., Yi, W., Azzopardi, L. M., Gómez, J. A., Gülpınar, G., Bennara, K., & Uzman, N. (2021). Digital health in pharmacy education: Preparedness and responsiveness of pharmacy programmes. *Education Sciences*, 11(6). <https://doi.org/10.3390/educsci11060296>
- Marques, A. (2022). Farmacêuticos comunitários, onde andam? *Público*, 1.
- Marques, I., & Ferreira, J. (2020). Digital transformation in the area of health:

- systematic review of 45 years of evolution Digital transformation in the area of health: systematic review of 45 years of evolution. *Health and Technology*, 10(3), 575–586. <https://doi.org/10.1007/s12553-019-00402-8>
- Martins, H. (2020). Digital Healthcare Systems. *HealthManagement.Org The Journal*, 20(4), 290–293.
- Mckinsey. (2020). *The digital-led recovery from Covid-19: Five questions for CEOs*. <https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-digital-led-recovery-from-covid-19-five-questions-for-ceos>
- Mota, P. I. (2004). *Análise da Aplicação Informática SIFARMA*. 1–7.
- Ordem dos Farmacêuticos. (n.d.). *A farmácia Comunitária*. Ordem Dos Farmacêuticos. <https://www.ordemfarmaceuticos.pt/pt/areas-profissionais/farmacia-comunitaria/a-farmacia-comunitaria/>
- Ordem dos Farmacêuticos. (2020). *Utentes reconhecem valor das farmácias durante a pandemia*. Ordem Dos Farmacêuticos. <https://ordemfarmaceuticos.pt/pt/noticias/utentes-reconhecem-valor-das-farmacias-durante-a-pandemia/>
- Orlikowski, W. J. (2000). *Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations*. 11(4), 404–428.
- Patel, K., & McCarthy, M. P. (2000). *Digital Transformation: The Essentials of e-Business Leadership*.
- Pedro, M. (2015). *A Importância da Gestão de Stocks na Farmácia Comunitária : Tendências Atuais*. 30.
- Pita, J. R., & Bell, V. (2016). A farmácia em Portugal nos últimos 30 anos. Algumas reflexões sobre a farmácia de oficina ou comunitária. *Debater a Europa*, 15, 197–215. https://doi.org/10.14195/1647-6336_15_11
- Pordata. (2021). *Quantos são os estabelecimentos farmacêuticos?* <https://www.pordata.pt/Portugal/Farmácias+número-153>
- Porter, M. E., & Van Der Linde, C. (2017). Toward a new conception of the environment-competitiveness relationship. *Corporate Environmental Responsibility*, 9(4), 61–82. <https://doi.org/10.1257/jep.9.4.97>

- Ramos Ferreira, B. (2016). *The Evolution of Community Pharmacy in Portugal The Case of Grupo Holon. March*.
[https://repositorio.ucp.pt/bitstream/10400.14/20361/1/MSc Dissertation .pdf](https://repositorio.ucp.pt/bitstream/10400.14/20361/1/MSc%20Dissertation.pdf)
- Reis, J., Amorim, M., Melão, N., & Matos, P. (2018). Digital transformation: A literature review and guidelines for future research. *Advances in Intelligent Systems and Computing*, 745, 411–421. https://doi.org/10.1007/978-3-319-77703-0_41
- Rodrigues, A., Batel Marques, Francisco Lopes Ferreira, P., & Raposo, V. (2005). *Estudo do Sector das Farmácias em Portugal*.
- Rogers, E. M. (1983). *Diffusion of Innovations* (Third). Collier Macmillan Publishers.
- Safaei, A. S., Heidarpoor, F., & Paydar, M. M. (2018). Group purchasing organization design: a clustering approach. *Computational and Applied Mathematics*, 37(2), 2065–2093. <https://doi.org/10.1007/s40314-017-0439-8>
- Santos, D., & Novais Santos, J. (2020). As Farmácias Comunitárias na Pandemia COVID-19: Alianças Estratégicas em Contexto de Incerteza. *Revista Portuguesa de Farmacoterapia*, 12(1–2), 53–55.
- Schwarz Müller, T., Brosi, P., Duman, D., & Welp, I. M. (2018). How Does the Digital Transformation Affect Organizations? Key Themes of Change in Work Design and Leadership. *Management Review*, 29(2), 114–138.
<https://www.jstor.org/stable/26491473>
- Teixeira Diniz, I. (2020). *Satisfação Profissional de Farmacêuticos Comunitários : Relação com o seu Percorso Académico e Profissional Experiência Profissionalizante na Vertente de Farmácia*.
- Treiblmaier, H., & Filzmoser, P. (2009). *Benefits from using continuous rating scales in online survey research H. Treiblmaier and P. Filzmoser Forschungsbericht SM-2009-4. December 2009*.
- Trott, P. (2017). Innovation Management and new product Development. In *Innovation Management and New Product Development*.
- Yoo, Y., Henfridsson, O., & Lyytinen, K. (2010). The new organizing logic of digital innovation: An agenda for information systems research. *Information Systems Research*, 21(4), 724–735. <https://doi.org/10.1287/isre.1100.0322>

Attachments

Questionnaire Structure in English

Author (year)	Theory/Main idea	Topic	Question	Answer Type
Rogers (1984)	"The adoption of an incompatible innovation often requires the prior adoption of a new value system"	Compatibility	My Pharmacy is considered innovative by the customers	Continuous Rating Scale
			The services provided by CP have a lot to win with the adoption of technology. (*)	Continuous Rating Scale
			My Pharmacy's service improved since we started using more technology innovations	Continuous Rating Scale
			Pharmacies could be more innovative.	Continuous Rating Scale
	"The easier it is for individuals to see the results of an innovation, the more likely they are to adopt. Such visibility stimulates peer discussion of a new idea"	Observability	Other CP seemed interested in innovations when they saw me using it.	Continuous Rating Scale
			I would have no difficulty in telling other CPs about how innovations are like.	Continuous Rating Scale
			I adopt more rapidly innovations that I saw being adopted by other pharmacies.	Continuous Rating Scale
	"Whether an individual perceives the innovation as advantageous. The greater the perceived relative advantage, the more rapid its rate of adoption is going to be"	Relative Advantage	When I adopt a new technology, I do it so that I can get advantage over others	Continuous Rating Scale
			Adopted Innovations offered me real advantages over the way I used to do.	Continuous Rating Scale
	"In general, new ideas that are simpler to understand will be	Complexity	I had no difficulty understanding how Innovations technically worked.	Continuous Rating Scale

	adopted more rapidly than innovations that require the adopter to develop new skills and understandings."		The team of the pharmacy where I work had no difficulty adopting it	Continuous Rating Scale
	"An innovation that is trialable represents less uncertainty to the individual who is considering it for adoption, as it is possible to learn by doing."	Trialability	I like being able to try out an Innovation before deciding whether I like it or not.	Continuous Rating Scale
			I take the necessary time to test a possible technological innovation.	Continuous Rating Scale
	"Diffusion occurs within a social system, because the social structure of the system affects the innovation's diffusion in several ways."	Social System	Pharmacies' Community is very open to innovations	Continuous Rating Scale
			The community where my Pharmacy is inserted is very eager to innovations	Continuous Rating Scale
	"The means by which messages get from one individual to another. The nature of the information-exchange determines the conditions under which a source will or not transmit the innovation "	Channels of Diffusion	What are the main channels to acknowledge about innovations?	Multiple Option
Hanelt et al. (2019)	"Organizational change that is triggered and shaped by the widespread diffusion of digital technologies. Such a view enables us to potentially explain the phenomenon of DT and its management in	Digital Transformation	How can Portuguese CP develop programs to encourage continuous improvement and technological innovation adoption programs? (*)	Open Question
			How do digitalized customer preferences and social practices shape the design of business models and products across contexts?	Open Question

	business practice by drawing on the robust and diversified knowledge base relating to organizational change and innovation"		An integrated health network is essential for the future of Pharmacy	Continuous Rating Scale
			DT can have a positive impact on the daily management	Continuous Rating Scale
			Do you think that the Pharmacies can get a good digital presence over external competitors	Continuous Rating Scale
			The synergy between Physical and Digital is one of the biggest challenges of DT to CP	Continuous Rating Scale
	In coordination with ANF, with the aim to understand what the preferred solutions would be to implement in Community Pharmacies	Digital Services	The online presence brought more people to your Pharmacy	Continuous Rating Scale
			Do you believe that your Pharmacy's DNA has changed/will change because of the Digital Transformation?	Continuous Rating Scale
		Digital Solutions	Which digital solution/functionality do you think is missing to optimize your operations?	Open Question
		Communication (**)	How would you prefer to communicate digitally with your clients?	Order
		Pharmacy Characterization	For how long my CP has social network profiles:	Multiple Option
			For how long my CP has a website:	Multiple Option
			How much online sales represent in the total of sales of the CP where I work:	Multiple Option
			To which region does my CP belong:	Multiple Option
			In what demographic environment is my CP inserted:	Multiple Option

		Pharmacist/ Manager Characterization	I'd rather wait for others to adopt first technological innovations	Continuous Rating Scale
			I like to adopt innovations prior than others	Continuous Rating Scale
			I try to keep up with the potential new innovations in the sector	Continuous Rating Scale
			I thrive on uncertainty	Continuous Rating Scale
			I have a natural high level of motivation	Continuous Rating Scale
			Age	Multiple Option
			Level of Education	Multiple Option
			Job	Multiple Option

Table 5 - Questionnaire Structure in English

(*) These questions were integrated in the questionnaire at the beginning of its propagation, however ANF asked to remove these in order to shorten its length. The responses of those won't be considered to the clusters' definition but the open questions' answers will be used.

(**) The question regarding Communication were asked by ANF to be included in the questionnaire, however that topic is out of the scope to this dissertation, so they won't be analysed here.

Questionnaire in Portuguese

Introdução: Este inquérito insere-se no âmbito de uma tese de mestrado em Gestão na Católica Lisbon School of Business and Economics cujo tema é "Os desafios decorrentes da Transformação Digital nas Farmácias nos próximos 10 anos". Assim, com este questionário pretende-se estudar como funciona a difusão das inovações nas farmácias em Portugal e quais são os principais canais de difusão das mesmas. O preenchimento deste inquérito demora, em média, 7 minutos. Desde já, muito obrigado pela sua disponibilidade.

Avalie, de que forma, a declaração pode ser relacionada consigo ou com a farmácia onde trabalha: (Sendo 100 o nível máximo)

A farmácia onde trabalho é vista pelos seus utentes como inovadora.

Na farmácia onde trabalho, os serviços melhoraram assim que houve adoção de inovações tecnológicas.

As farmácias poderiam ser mais inovadoras do que são.

Table 6- Compatibility Block of Questions in Portuguese

Avalie, de que forma, a declaração pode ser relacionada consigo ou a sua farmácia:

Outras colegas ou farmácias mostraram-se interessados em inovações quando me viram a utilizá-las.

Não tenho qualquer problema em contar a outras farmácias acerca das inovações que a farmácia onde trabalho adotou.

Adoto mais rapidamente inovações que eu vi serem adotadas por outras farmácias.

Table 7- Observability Block of Questions in Portuguese

Avalie, de que forma, a declaração pode ser relacionada consigo ou com a farmácia onde trabalha:

Quando adoto uma inovação tecnológica, faço-o com a intenção de ganhar vantagem em relação à concorrência.

As inovações tecnológicas adotadas permitiram que ganhasse reais vantagens relativamente à forma anterior de realizar tais tarefas.

Table 8- Relative Advantage Block of Questions in Portuguese

Avalie, de que forma, a declaração pode ser relacionada consigo ou com a farmácia onde trabalha:

Eu não tive dificuldade em perceber como funcionam as inovações tecnológicas adotadas.

Na farmácia onde trabalho, não houve dificuldade na adoção da inovação tecnológica pela equipa.

Table 9- Complexity Block of Questions in Portuguese

Avalie, de que forma, a declaração pode ser relacionada consigo ou com a farmácia onde trabalha:

Eu gosto de testar uma inovação tecnológica antes de a adotar e de a apresentar à equipa.

Demoro o tempo que for necessário a testar uma possível inovação tecnológica.

Table 10- Testability Block of Questions in Portuguese

Avalie, de que forma, a declaração pode ser relacionada consigo ou com a sua farmácia:

As Farmácias em Portugal são muito abertas à Inovação.

A comunidade em que a farmácia onde trabalho está inserida aceita e espera inovação da nossa parte.

Table 11- Social System Block of Questions in Portuguese

Qual é o principal canal para tomar conhecimento acerca de inovações tecnológicas sobre Farmácias: Outros Farmacêuticos (1); Internet (2); Grupos de Farmácias (3); ANF (4); Outro meio (5).

De que forma é que as preferências dos consumidores de cariz digital (e as práticas sociais relacionadas) impactam no Modelo de Negócio e nos comportamentos de consumo?

Avalie, de que forma, a declaração corresponde à sua visão acerca da comunidade das Farmácias:

A existência de uma rede integrada de saúde (com os demais agentes de saúde) é essencial para o futuro das farmácias.

A Transformação Digital pode ter um impacto muito positivo na gestão diária da Farmácia. Por exemplo, conhecer melhor os clientes, programas de gestão de relação com consumidores, etc.

As Farmácias podem ter uma presença digital melhor face a concorrentes externos.

A sinergia entre o físico e o Digital será um dos maiores desafios das Farmácias decorrentes da Transformação Digital.

Acredito que a presença digital da farmácia onde trabalho trouxe mais consumidores.

O ADN (de proximidade) da farmácia onde trabalho foi alterado devido à Transformação Digital. Se a resposta for positiva, por favor indique se essa Transformação foi positiva ou negativa.

Table 12- Digital Transformation Block of Questions in Portuguese

Table 13- Digital Services Block of Questions in Portuguese

Que solução digital/funcionalidade é que pensa fazer falta para otimizar a sua operação?

Ordene de que forma preferiria comunicar digitalmente com o seu cliente. Opções: Chat para comunicação em real time (1); Cross-selling de serviços adquiridos (3); Follow-up automático (2); Outro (4).

Há quanto tempo a farmácia onde trabalha tem perfis nas redes sociais? Opções: Não tem (4); Há mais de 1 ano (3); Há mais de 5 anos (2); Há mais de 10 anos (1).

Há quanto tempo a farmácia onde trabalha tem um website? Opções: Não tem (4); Há mais de 1 ano (3); Há mais de 5 anos (2); Há mais de 10 anos (1).

As vendas online na farmácia onde trabalha representam que percentagem? Opções: 50% ou mais (1); Até 25% (2); Até 10% (3); Não tem (4).

Em que região se insere a Farmácia onde trabalha? Opções: Grande Lisboa (1); Grande Porto (2); Alentejo (3); Algarve (4); Açores (5); Madeira (6); Norte (7); Centro (8).

Em que tipo de meio se insere a Farmácia onde trabalha? Opções: Urbano (1); Suburbano (2); Rural (3).

Avalie, de que forma, a declaração pode ser relacionada consigo ou com a farmácia onde trabalha:

Eu prefiro esperar que outros adotem as inovações tecnológicas antes de mim.
Eu gosto de adotar inovações tecnológicas antes dos demais.
Eu procuro estar sempre por dentro das novidades do setor e das potenciais inovações.
Eu gosto de trabalhar num contexto de incerteza.
Eu tenho naturalmente um nível de motivação elevado.

Table 14- Characterization of Respondents Block of Questions in Portuguese

A minha faixa etária é: Opções: 20-30 (1); 31-40 (2); 41-50 (3); 51-65 (4); 65+ (5).

Qual o seu grau de escolaridade? Opções: Licenciatura (1); Mestrado (2); Doutoramento (3); Frequência de ensino superior (4).

Qual a sua função na Farmácia? Opções: Diretor Técnico/Gestor (1); Farmacêutico (2); Técnico (3); Outra (4).

Muito obrigado pela resposta ao inquérito. Caso esteja disponível para responder a uma entrevista individual, por favor, faculte o seu e-mail e/ou contacto telefónico abaixo.

Clustering values resulting from the Sum of Square method

BLOCK OF QUESTIONS	NUMBER OF ITERATIONS	CLUSTERS	VAR. 1	VAR. 2	VAR. 3	NUMBER OF INDIVIDUALS
COMPATIBILITY	3	Innovator	90	96	94	29
		Early Adopter	79	87	82	42

		Early Majority	69	73	76	39
		Late Majority	52	62	85	33
		Laggard	24	34	72	11
OBSERVABILITY	2	Innovator	98	86		16
		Early Adopter	82	92		45
		Early Majority	67	71		41
		Late Majority	46	84		32
		Laggard	9	56		20
RELATIVE ADVANTAGE	2	Innovator	97	96		26
		Early Adopter	85	83		33
		Early Majority	69	75		36
		Late Majority	50	87		44
		Laggard	15	79		15
COMPLEXITY	3	Innovator	98	83		34
		Early Adopter	84	84		43
		Early Majority	74	60		37
		Late Majority	50	64		30
		Laggard	16	13		10
TESTABILITY	3	Innovator	96	92		51
		Early Adopter	88	60		46
		Early Majority	70	60		21
		Late Majority	44	58		16
		Laggard	26	18		20

Table 15- Distribution of respondents per level of Innovation and by group of questions

Survey Respondents' Online Presence Characterization

	Social Network	Website		Online Sales
Does not have	6	73	Does not have	90
0-1 Years	6	9	Up to 10%	55
1-5 Years	52	37	Up to 25%	2
5-10 Years	67	21	Up to 50%	0
10+ Years	18	9	50% or higher	1
Did not answer	5	5	Did not answer	6
	154	154		154

Table 16- Pharmacies Online Presence Characterization

Survey Results

Statement	Level of Innov. Adoption	Average	Minimum	Maximum	Std. Deviation
1	Innovator	61	9	99	27
	Early Adopter	70	25	100	16
	Early Majority	70	21	100	21
	Late Majority	61	9	100	28
	Laggard	27	20	40	11
2	Innovator	74	5	100	31
	Early Adopter	73	20	100	18
	Early Majority	73	32	100	18
	Late Majority	67	10	100	24
	Laggard	56	40	72	16

Table 17 - Distribution of Responses about Social System

Levels	Question 1	Question 2	Question 3	Question 4
Innovator	97	87	77	93
Early Adopter	91	90	84	91
Early Majority	84	86	83	86
Late Majority	85	88	86	84
Laggard	91	73	67	78
Grand Total	88	88	83	88

Table 18 - Average response to DT statements per Level of Innovation Adoption

Interview 1: Early Majority

Function: Technical Director

Region: North of Portugal

Demography: Urban

Age: 51-65

Interview was presential

Time: 1 hour

Question 1: What are the main motivations to adopt Digital Innovations?

R: The main objective is to minimize the errors, on the other side, the idea is also to take the most out of the collaborators, if we can replace routine tasks with automatic procedures, we are making value and take the most out of them. Innovations such as the registration of assiduity made by a machine or a chip, which later can be made automatically by the accounting team; or the integration of robots in the inventory management, for whenever there are problems of missing a medicine box, for example. The errors would be minimized because the robot would control all the stock, when something gets in or out, allowing a monitorization of the collaborators' task of replacing boxes. A company should be concerned of innovating every possible procedure, mainly the routine ones, as it'd make it much more interesting for the people working there. For the collaborator the task becomes a friction factor as they could be facing much more demanding ones. There are plenty of tasks that are undifferentiated, so anyone could do it, so a machine can do it as well.

Question 2: How does the diffusion of innovation works in the CP where you work? Is there space for innovation inside the team?

R: Every information about software/hardware related to innovation that we receive from companies that work in those fields are passed to the collaborators. Most of the information is received by e-mail from ANF, and the related company Glintt. We receive plenty of information such as medicines reposition; customer service; expiry dates management; innovative product/medicines. If there are products/medicines that are no longer efficient and there are others that may replace them, we choose the second because we need to adopt the second, which will be very important to the Public. The process of Innovation is a whole process, and the Pharmaceutical Industry is a great example of an innovative one (we've seen how the Covid-19 were produced in a record-breaking time). If there's a new product, its process of innovation is only complete whenever it is adopted. And there's a natural predisposition to be against the risk, and innovation takes risk, not the one of not being successful but the one where people may be against it and do not react well when facing an innovation.

Question 3: As you mentioned ANF and Glintt as motors of the Innovation diffusion. How do you describe the encouragement of innovation adoption in Portugal? Whether it may be made by the Government or ANF, or any other entity.

R: One is an Enterprise association and the other is a Digital company, and those are the main partners in that aspect [Digital Innovation]. Government rewards Innovation in programs such as Portugal 2030; Portugal 2020 or Plano de Recuperação e Resiliência, but the question is “what makes you adopt an innovation?”. How is it possible to motivate one to adopt or search for Digital Innovations despite all the daily management concerns? What I think is you do it for economic reasons (to improve the bad economic results). I remember, for example, the Online Sales, that are also financed by the Government, but most of us do not take advantage of it because we’re still stuck in the idea of the “Old Pharmacy”, where people look for us, but that paradigm will change in the next years, and Pharmacies will need to adopt it as people are looking for this solution more and more, not only books and travels but also medicines and their first thought will be to search it online, mainly young people. There are plenty of people in management positions that are still in the inertia to adopt innovations, like the process of going to the gym: we know this is good for us but there’s the need for the first step. Recently, I heard a sentence that was related to this: “Changing for companies is a big challenge, but if they don’t change, it’ll be their death”. As the Community Pharmacy business is protected by the government, Innovation is not one of the biggest concerns of CP management.

Question 4: From the 6 challenges mentioned in the Questionnaire, which one do you consider the most important?

R: The synergy between the Physical and Digital. As I told you, the Human Resources and the whole CP management, including the robotization, may be well defined instead of having someone counting minutes. The matter of having medicines at the warehouse or back office, it takes a long time to go pick up one while serving customers. We could have better results if we get to innovate internally. Anyway, having Online Sales wouldn’t be very difficult, with real time monitoring of the stocks. One of the things that takes us a long time is picking up phone calls, and many are very simple and frequently asked, if we had an online form, it could solve the problem automatically and would let us save some time.

Question 5: Do you think there is any challenge to add to the ones above?

R: I would include one, that is not Digital or Innovative, the booking of orders by patients. The home deliveries are very important and the ones who don't have it may face a loss against competitors. As Portuguese population is getting older and living more time, their mobility to go the Pharmacy becomes lower, and there's this way a higher demand for home deliveries, and thus this is one of the biggest challenges for the sector. If we could automate the booking orders by, for example, having a robot picking the medicines, pack them and price them, and we'd only need to deliver them, it'd be a whole innovative structure. The only thing we're doing innovatively is the registry of ins and outs of medicines, everything else is routine. This is a huge challenge because we're all in the comfort zone and there are not many incentives to innovate, maybe only Competitiveness could guarantee that. For example, at night, it does not make sense to be looking for the Pharmacy making the night shift to be buying only an aspirin. Probably, vending machines would solve that problem. In Pharmacies, besides the administrative part where you get all the papers, the invoices, the suppliers you worked with in a computerized way, everything else is made manually and like as it was performed 30/40 years ago. Naturally, there were some improvements in the software, for example, but there were not many changes. This study can be important as an external stimulus for innovation in the Pharmacies. The lack of people wanting to work in pharmacies may be a way of making people focus on changing that workforce for robots/computers. With the lack of time and availability to think about Innovations, there could be a company responsible for making the diagnosis of the CP and then make a proposal for innovating the company based on KPIs. For us inside the CP it's difficult to be thinking outside our framework and sometimes it's important to have someone from the outside.

Question 6: Do you think there's an Innovative mentality in the universe of CP in Portugal?

R: If we look at the general Portuguese Economy, I'd we are innovative but if we look to other countries we're behind.

Question 7: What do you suggest to encourage innovation adoption?

R: Maybe the tax incentives. For example, if we'd adopt digital innovations, we'd have a discount in the VAT or any other tax. I don't know if ANF has any prize for that, but that wouldn't be the most encouraging. Trainings can also be a solution as we have credits for trainings.

Question 8: Do you feel there's any barrier or obstacle to adopting innovation in your CP or region?

R: In general, customers appreciate Innovation. I admit there are Pharmacists that are very eager to innovating because they're fed up with performing routine tasks, but generally we're against risk. As Innovation requires an investment, it may scare some people because of that. But people are not against innovation, that's for sure. There are some people that due to their tasks, are risk averse, and it may take some work to learn new ways of working, but they are statistically irrelevant. I'd say there are no barriers to Innovation.

Question 9: What examples do you have of Digital Innovation in your CP?

R: Besides the internet pages, the booking of orders being made via Whatsapp are an important Innovation that we do it for 2/3 years. People call us much less than they did 3 years ago. Another Innovation that's very important: the ticket dispenser. That's a big mess having a lot of people waiting, some go outside to check if their car is well parked and when they come back in, they don't know their place in the line. When it was introduced, with the digital screen, people are less stressed because they know their place and are much more relaxed and pay much more attention to the products in display. Another automated process is the cash machine, today we don't need to be doing the calculations for the change as it returns it automatically. This is a big gain of time. We can get a lot beyond still.

Question 10: You mentioned Online Sales as an important solution in the future. Besides this, do you have any other relevant one to suggest?

R: In terms of processes to be automated digitally, the most important is the Online Sales as people can do it through their cell phone and receive the product in 1 or 2 days at home. Mainly for people with any physical limitations, this could be a huge development. It can also be a great communication channel between CP and the patients/customers, whether that could be about products, services or even schedules changes or night shifts.

Interview 2: Late Majority

Function: Undisclosed

Region: North of Portugal

Demography: Rural

Age: 65+

Interview was made via mobile phone

Time: 50 minutes

Question 1: What are the main motivations to adopt Digital Innovations?

R: The Innovation is extremely important. We're in the Digital era, where we have lots of advantages. Nowadays, we can perform almost any activity from anywhere far from the place it occurs. Fortunately, in Portugal there are room for many start-ups and a great entrepreneur mentality. In the Pharmacy sector, an interesting innovation is Online Sales, this is the future of the sector with the pharmacies closer to the population. I would be going deep into this if I was not this old. Anyway, I'm extremely in favour of Digital Innovation in the Community Pharmacy sector.

Question 2: How does the Diffusion of Innovation works in the CP where you work? Is there space to innovate in the CP?

R: Most of the innovations I get to know is mostly through reading articles. However, most of the information that I get is through magazines, newspapers, and TV. Another important channel is the interaction with pharmaceutical companies that have a very relevant role in the innovation in the sector. Either through what they inform us about, but also through the interactions they promote with other pharmacists. Their role is crucial to the promotion of innovation. Finally, the role of the team is also essential as the innovation management is made as a whole and so they show an innovative way of facing their challenges. Mainly one collaborator that has an extremely innovative posture and he doesn't even have a bachelor's degree. He helped me build the informatic system around the pharmacy almost 30 years ago.

Question 3: What's the importance of the clients in the Digital Transformation?

R: My CP is located in a rural area, in the centre of a town but many clients come from villages around because there are not many pharmacies here. This way, there's a need to reduce the distance and time dispensed by the clients because the population is getting older and older and there is less mobility. Thus, there's the need to innovate some relevant things and for that the Pharmacies should integrate the National System and we know that is feasible because it was done during the Covid-19 pandemic.

Question 4: From the 6 challenges mentioned in the Questionnaire, which one do you consider the most important?

R: There are many relevant ones. But as I said in the previous question the integration in a national and more broadly integrated network is crucial. It'd allow to have a more direct communication with the patients and other healthcare units and allow the pharmacies to have an even more close and important role of proximity. It happens a lot of times, elderly patients who do not have a mobile phone still come to the pharmacy with prescription in paper. This way, it wouldn't be possible to automatically renew these patients' chronic prescriptions. Also, the Online Sales seem to be a very relevant challenge.

Question 5: Do you think there is any challenge to add to the ones above?

R: As a generational issue, young people nowadays are educated in a more abundant way and because of that are less interested in working hard and being at the counter. This way, there are many young pharmacists that are no longer interested in working at a Community Pharmacy and that can be a huge challenge. Besides that, the Covid-19 pandemic isolated the population and CP must enhance their role of proximity.

Question 6: How do you describe the encouragement of innovation adoption in Portugal? Whether it may be made by the Government or ANF, or any other entity.

R: ANF had a very relevant role in the digital transformation in the 1980's with a president that made us grow a lot: João Cordeiro. Also, as I said before the pharmaceutical companies are extremely important for us and so the Government should value them and encourage CP to improve their customer service. Some years ago, CP were known for being at the population's disposal, with excellent feedback. Nowadays, that feedback is decreasing and that may be because we don't need to be always available to the public.

Question 7: Do you think there's an Innovative mentality in the universe of CP in Portugal?

R: Yes, CP are very innovative and there were plenty of people that helped CP to be this way. Fortunately, in Portugal there are plenty of insightful people however we [Portuguese people] should be more moralized and more ethical.

Question 8: What do you suggest to encourage innovation adoption?

R: We're inserted in the European Union and here we have plenty of good examples. The Government is very supportive but, as I said before, should be more focused on helping struggling pharmacies and reward pharmaceutical companies.

Question 9: Do you feel there's any barrier or obstacle to adopting innovation in your CP or region?

R: No, I don't feel any. People in general are open to innovation and like to watch it.

Question 10: What examples do you have of Digital Innovation in your CP?

R: There are many examples. First, in a national view, there's an amazing innovation: the paperless prescription. It's amazing how, it seems like a miracle that the patient nowadays doesn't need to go to a hospital, for example, to get their prescription. Through mobile phones, everything can be done. Nowadays, there are plenty of information available. For example, today I could monitor all the sales indicators, which I don't. However, it's remarkable the amount of information we can use to improve our services.

Question 11: Do you have any suggestions for future Digital Solutions or innovations to the Pharmacy sector?

R: In my point of view, the most important thing would be the automatic renewal of chronic prescription by CP. This could be independent from the prescription through mobile phones. If we know that it's a chronic prescription and the patients will need it for more time than the medicines' box brings, why don't we just automate it through the CP? There are many people with disabilities that don't have much mobility and need to go to the healthcare centre to get the extension of the prescription. Sometimes, their relatives replace them and are the ones who go to the healthcare centre. This way, for this there's clearly not the need to meet in person to extend the prescription. As a workaround, I'd suggest that we'd be able to deliver the medicines even before people get their prescription, and they'd pay only their part of the medicines. This would just be a workaround, but it takes a lot of seriousness and organization.

Interview 3: Early Adopter

Function: Co-Owner and Technical Director

Region: North of Portugal

Demography: Urban

Age: 41-50

Interview was presential

Time: 40 minutes

Question 1: What are the main motivations to adopt Digital Innovations?

R: As a Technical Director and Manager, when I hear Innovations, I think about efficiency and improvement of processes, for example the robotization of pharmacies that allow a better control of expiry dates, in the stock management, in time economy as we get to have our collaborators more focused on tasks that make a difference. Overall, we expect to have a better management of the pharmacies' processes and, of course, more profitability. Right now, we're moving one of our pharmacies to a different location and there we're making it totally robotized, it doesn't need an operator to validate the boxes and put them in their respective place. Now, it makes everything automatically. When we think of this, we recall that there may be less one workstation, but we have the maintenance costs. This way, what we're trying to be more efficient and decreasing the time of customer service at the counter. There are plenty of redundant tasks such as organizing the medicines in shelves. We [the CP] are facing a huge challenge, it's being very difficult to maintain collaborators, mainly pharmacists, who study 5/6 years and then what they do is to stow medicines which may be very demotivating. Solving this with the robotization, which is still very expensive, is the future of CP. In our case, we're having a "Pharma drive" [drive-in] with stepways that take the medicines to the operator (there an at the counter) and also to the vending machines that we're installing. At these machines, we can't sell non prescript medicine because legally there must be an operator in the transaction, this doesn't make any sense because through the internet they can buy them without any human interaction. This should change.

Question 2: How does the Diffusion of Innovation works in the CP where you work? Is there space to innovate in the CP?

R: I get to know new products and other new technologies through two different ways: first, my husband is also a pharmacist, who has a Post-Graduation in Innovation and Technology and is an enthusiast about that; second, there are companies such as Glintt that approach us with innovations. Besides that, every time I pass by a CP, I'm curious to see how it's working, and I also follow some foreign social network pages that talk a lot about these kinds of innovations.

Question 3: What's the importance of the clients in the Digital Transformation?

R: I'm not sure if it's the clients or the circumstances. The Covid-19 pandemic changed a lot the people's mindset. Before that I had already had a website and a pick-up service, where people pay previously and just need to come, take the respective ticket and pick up their medicines, as we also have some parking easiness, we had a service where people

call a given phone number and we deliver their order to the car (which would help a lot, for example, people with low mobility). At that time, we had a few clients that used these services. When the pandemic hit, there was a boom in these services, fortunately I had already the structure. Through those times, infected collaborators were working from home as they were call-centre workers. In two months, around 60% of the sales were through these channels. Since then, we have clients that got used to that and so we instated these services and they don't come in the pharmacy for a long time. The clients want as much convenience as possible they would park inside the pharmacy if possible because they want to be served as fast as possible (through various reasons: either because they are sick, have a kind in the car, have low mobility...). Thus, these cases to facilitate people's lives were made due to the people and the circumstances that propitiate them.

Also, the ticket dispenser system is also very important as the client is much calmer inside the CP when has the ticket in his hand. This is such a simple technology which has a huge impact in people as some come in an anxiety mood and with the ticket they are distracted and are calmer.

Question 4: From the 6 challenges mentioned in the Questionnaire, which one do you consider the most important?

R: I'd say the integration in a national health network. I'm a bit sceptical about the online sales because either they are in a big group or else they don't earn a lot with online sales, they have one just to match clients' needs. But I have this feeling about them because what we're providing is a service, not a product, and in the online channel I still didn't find the best way to handle it. There are many sites, such as Barkyn [dog food], which does not have very competitive prices, but they integrate a lot of services smoothly and that's why they grow. In our case, we don't use the same name for the website as we'd eventually have different prices (online and in-store), and clients would compare them. The future of pharmacies, for me, is about having more response of services, and that would only be possible if we're integrated in the SNS. As much more we'd be considered a basic health unit, which they need because it's a chaos, we could have a much more important role in the health services. We have the professionals to do it. Things as the bacterial infections, any pharmacist could do a diagnosis for the first few days, until the patient has an appointment with a medical doctor. We're not medical doctors but we can do a first triage and provide a first supports. The integration would allow much more challenging jobs for pharmacists, who would see their skills being more useful. CP could

also grow. And we saw the impact that the Covid-19 testing in CP had in the SNS. We're full responsible for buying tents, hiring nurses, and so on, and it started to work overnight. There must be an openness from their system, and we could input information from the services we provided to the patient.

Question 5: Do you think there is any challenge to add to the ones above?

R: I see a lot of challenges. One of them is already being seen: the availability of products, and from what we can see from the economy, it's expected to worsen. There are many difficulties in the supply chain, and I see that with some concern. Also, the internal organization may change, mainly in the remuneration part. The mean salary in Portugal starts to disappear and approach to the minimum salary. With the inflation, and mainly the increase in gas prices, it's expected that our margins decrease. Our main difficulties will be, for sure, getting the medicines and support the structure with an increase of the salaries that must improve too. Some innovations demand a huge investment, so that will also be affected.

Question 6: How do you describe the encouragement of innovation adoption in Portugal? Whether it may be made by the Government or ANF, or any other entity.

R: I don't know any incentive from ANF. ANF is very important to unify us all, even in the operative system, which is not perfect. Comparing to Spain, we're much more advanced technologically. And ANF is very important in that. But, for example, for the robotization I don't know any incentive. Sometimes there are programs for determined regions but overall, there are still not many.

Question 7: Do you think there's an Innovative mentality in the universe of CP in Portugal?

R: The new generation of owners show much more eagerness to innovate. Now I believe the not adoption of innovation is more related to financial issues than anything else. There's a boom in pharmacies with online businesses. Some have internationalized, and are selling to countries abroad, which show they're innovative. Some colleagues are extremely innovative. I remember one that received an innovation award 4 years ago for making deliveries with drones, in the countryside. I believe most of the pharmacists have the will to innovate, and don't do more because they can't.

Question 8: What do you suggest to encourage innovation adoption?

R: If there were more programs from the government to finance with lower interest rates it'd help pharmacies. Usually, CP have a careful appearance and invest in renovating their spaces. However, only after a certain level of revenues, it's worth to invest in the robotization for example.

Question 9: Do you feel there's any barrier or obstacle to adopting innovation in your CP or region?

R: Sometimes collaborators have a certain disregard over innovations, and we need to be careful if we start to be too much dependent on technology, that's a risk. From the client's side, I don't think there's any barrier. In general, they appreciate innovation.

Question 10: What examples do you have of Digital Innovation in your CP?

R: The robotization and the connection to the vending machine; the lockers system where we put the medicines previously asked and then they're able to pick it up any time they want; the online sale with the pick-up system; the deliveries (integration with companies such as Glovo); online sales. Outside my CP, there are many people going beyond such as the drone example. There are also pharmacies ultra-specialized in the individualized preparation of medication (for senior homes, for example), with robots, to prevent overdose, for example. This is also important to understand the needs for extension of the prescription. There are medicines that have only pills for 28 days, and we know that the prescription should be to 30 days, there's this gap that it's clear that the patient needs an extension of the prescription. Unless there are any exams that counter indicate the usage of chronic prescriptions, the renewal should be done automatically, without the need to meet the doctor. We should facilitate as much the patients' lives because they have it hard enough in the SNS and there are already technologies for that, but it needs a trust from one side to the other, which I believe it doesn't exist yet.

Question 11: Do you have any suggestions for future Digital Solutions or innovations to the Pharmacy sector?

R: The most urgent one is the integration in a national health network and the automatic renewal of prescriptions (which we did during the Covid-19 pandemic). Also, I trust a lot in the robotization of pharmacies and I believe it will be a factor of distinguishing some pharmacies from others, it will decrease errors and even for patients it'll be interesting.

Interview 4: Early Adopter

Function: Owner and Technical Director

Region: North of Portugal

Demography: Urban

Age: 51-65

Interview was presential

Time: 40 minutes

Question 1: What are the main motivations to adopt Digital Innovations?

R: Attract new customers, mainly that age gap that has not much loyalty to the pharmacies but have a greater sensibility on the digital and that are influenced and are always looking for new products and better prices. It's also important to help in the operations management: stock, supply, time management, all the areas of management.

Question 2: How does the Diffusion of Innovation works in the CP where you work? Is there space to innovate in the CP?

R: I get to know innovations through companies that show their new products. They usually invite me to go to Expofarma⁵, where I get to see the new innovations working. Often, I bring the ideas to the pharmacy and part of the team cheers and the other shows some obstacles. Also, the ANF is an important channel.

Question 3: What's the importance of the clients in the Digital Transformation?

R: They're the focus in every decision taken by the pharmacy. Of course, it's important to please and challenge the collaborators but the focus must be on the customers. In digital matters, the biggest impact is on that age gap that I mentioned before. For example, I was checking on solutions for the queue management and the decision that I took was based on the customer's preferences, because, from my experience in banks, for example, using tickets raises some issues with older clients, which is the majority. This way, we can't advance and create constraints on the customer's experience in the pharmacy. This could actually inhibit the older customers, which is the largest portion of clients. We can't just advance on innovations without thinking about the customers.

Question 4: From the 6 challenges mentioned in the Questionnaire, which one do you consider the most important?

⁵ Fair that reunites agents of the pharmaceutical market with a special focus on Community Pharmacies, it takes place in Portugal. (<https://www.expofarma.pt/sobre/>)

R: As I mentioned in the survey, the integration in a National Health Network with other healthcare agents. Besides CP, hospitals, healthcare centres, medical doctors. It'd be extremely interesting to perform an electrocardiogram in the CP and instantly send the results to the medical doctor that can interpret it. This would also have costs for pharmacies but it'd much easier when integrated in the SNS. Another important topic would be the renewal of chronic prescriptions. That's one of the ANF's guidelines for next year. We're lacking the patient's historical data. If I'm in the nightshift and the patient is not a regular customer, we don't have that information. Sometimes, that person is taking the prescription for their relatives and don't know exactly what medicines they are taking, which can be an issue with generic medicines.

Question 5: Do you think there is any challenge to add to the ones above?

R: I think that providing online training would be very beneficial for everyone. We have mandatory training times and we'd gain a lot if they'd be made online: time, travels,...It already exists, it's not an innovation but it's beneficial as it can attract more people.

Question 6: How do you describe the encouragement of innovation adoption in Portugal? Whether it may be made by the Government or ANF, or any other entity.

R: There are fiscal incentives that can lower the impact of the investment, which would allow CP to grow, have a better service. ANF encourages it a lot. They let us know about innovations, which is very important. They always had a huge impact on the Portuguese CP. For so long, the Portuguese CP were a reference in innovation and services, in Europe. It was mainly encouraged by ANF. The operative system (*Sifarma*) belongs to the ANF. They could help by lowering the prices for innovations, outside ANF we can find lower prices, even though the quality may not be the same.

Question 7: Do you think there's an Innovative mentality in the universe of CP in Portugal?

R: Yes, but there used to be more than now. The profitability is not as higher as before so there's not the same amount of money to invest as there were before.

Question 8: What do you suggest to encourage innovation adoption?

R: I think that there's no lack of will, but when the liquid results are low, we need to wonder about where that is going to be invested. In Portugal, there's no update on the

prices of medicines so our country is getting lower shares on the supply of those medicines.

Question 9: Do you feel there's any barrier or obstacle to adopting innovation in your CP or region?

R: The complex legislation may be considered a barrier as the interpretation of legislation is not clear, there were ambiguous interpretations and for a slight change in the name of a service we could get a huge fine for that. It depends on the interpretation. There are many bureaucracies that need to be met and it's very frustrating to be checking all that instead of focusing on other things, because it makes that the adoption of innovations may take much longer than it could, because there's no consensus on the interpretation of those legislations and bureaucracies.

Question 10: What examples do you have of Digital Innovation in your CP?

R: We have an online store being developed; an automatic cash machine; social network pages. I'm also studying the possibility of installing a robot in the warehouse.

Question 11: Do you have any suggestions for future Digital Solutions or innovations to the Pharmacy sector?

R: The online sales can be extremely relevant. Also, the vending machines, in certain areas, can be important, mainly with products related to milk for babies and sexuality related products. But it depends on the areas.

Interview 5: Early Majority

Function: Technical Director

Region: Centre of Portugal

Demography: Rural

Age: 51-65

Interview was via mobile phone

Time: 1 hour and 45 minutes

Question 1: What are the main motivations to adopt Digital Innovations?

R: The main Concern is with the public and also with the collaborators, and with me. This is a very fatiguing job, and we need to be in the frontline to be competitive. The innovation must bring us added value: financial and motivational and these are the parameters to adopt innovations anywhere. We adopt new services so that we don't get too

accommodated and make the CP more dynamic. It can't be only the place of the medicines, trying to motivate people and shake the team.

Question 2: How does the Diffusion of Innovation works in the CP where you work? Is there space to innovate in the CP?

R: Most of the CP are associated to ANF. Generally, these innovations come from ANF (or Glintt), mainly via e-mail. It depends on where a CP is located, in our case, as we're located in a village, we always acknowledge it through the same channel. CP in cities may have access to different channels.

Question 3: What's the importance of the clients in the Digital Transformation?

R: We need to understand where we're inserted. We can't make a revolution if the social system doesn't keep up with that. Where I am, the younger customers already use many digital technologies but they're a small part of the population. Their parents aren't that adapted. For example, we have much less success when we communicate campaigns through Facebook than we do when using Text Messages, which is a bit outdated. This way, we have an older population, so we have managed the expectations. It depends a lot on the technology literacy.

Question 4: From the 6 challenges mentioned in the Questionnaire, you considered the "need for an integrated health network" as the most important. How does it apply to your CP?

R: This is a problem that has been thought for a long time. Now, there's the problem of data protection. This solution would allow to have access to the prescription history and provide much more services. I have a case that a person called me today to get some advisory about a pain who they suffered. The pharmacist was the first person to be contacted in this case. I indicated that that person should go to the hospital. This is the role of the pharmacist, but we do it by intuition. In northern countries, there's a higher integration and so they have more access to information and can provide better solutions. We're healthcare professionals, have bachelor's degrees that are really complete. We could be a good asset for the network of continued care to the National Health System. The CP hasn't been given the importance it could have had as it's the entry point to the healthcare. People come to meet us and then we indicate where they should go. As you can see, we [Portugal] are having a lot of problems in the healthcare services, and that's because the policies taken aren't working. During the Covid-19 pandemic, CP have

performed COVID-19 tests, which were financed by the government. They earned a lot but if the service was provided by the SNS the costs would have been much higher. Because in the CP's case, the financed value was limited. What we see is that the SNS is in a bad position. The government doesn't know where to go, in terms of policies. But CP know their direction, because if they don't, they go bankrupt. CP have better results with much less resources. That's a reflexion worth to have. There are about 7000 references (of medicines) and about 1000 are sold out. Medical doctors don't know which are sold out because the Operative System doesn't communicate that. There's a gap between availability and the prescription, there's no articulation. It's very difficult to communicate with medical doctors. We have a big problem of supply. Portugal is one of the three European cheapest countries in terms of medicines. I know it's related to the economy but, as we don't have a strong industry of producing medicines we depend on foreign companies/countries, who, naturally, choose to sell in countries with higher prices. In certain periods, it's important to have a shock reduction on the prices, but they can't be maintained like that for long periods. The new Health Minister proposed the recently the automatic renewal of chronic prescription but there are plenty of corporate interests that don't allow it to advance, as there are many suspicions. We've been having problems of recruiting people because they, naturally, want to be paid accordingly but it's very difficult to match the expectations. There are Health units that are paid according to what the patients buys, this isn't the right incentive. The paperless prescription was a good breakthrough. It was introduced about 8 years ago and it has 21 characters, whose reading takes a long time. With the technologies nowadays, it'd be possible to improve it and send a QR code, for example.

Question 5: Do you think there is any challenge to add to the ones above?

R: The real-time information may be a big help. But if I don't have autonomy, it won't be helpful. There should be real-time communication between healthcare agents. Online Sales are very relevant, but it can't be the motor of the CP. In the sale of non-prescribed medicines there are some that have impact on other pathologies. There's always room for advisory. This may be the future but we're vulgarizing the sector and the medicines.

Question 6: How do you describe the encouragement of innovation adoption in Portugal? Whether it may be made by the Government or ANF, or any other entity.

R: The system is very closed in the interactions with other professionals. The government doesn't recognize the importance of the pharmacists. Everything is very centred in

ANF/Glantt, it's very difficult to enter the market. However, they are very important because they are the ones negotiating with government and they represent over 2700 CP. We're dependent on them as the payments we receive from government is through them. CP aren't autonomous to innovate, we need ANF, who innovates. For example, the paperless prescription was a partnership between ANF and the SNS. Nowadays, people can't manage the number of medicines they pick up because of the paperless prescription, we can't let go of the pens yet. Portugal has an aging population and so we need to provide a lot of clarifications because of problems related to the lack of medicines, for example. It takes us time from other tasks. We have lots of information, but we can't analyse anything. Most of the analysis that I do are financial ones, to see if what we are doing is sustainable. If we don't think critically about the information, we can't do anything with it, so the digital is a good solution but that's not all. We have an invoicing system is more than 60 reports, if I analyse them all, I'm not with the customers. It's necessary to have common sense to take the best out of the technology, with collaborations between all agents.

Question 7: Do you think there's an Innovative mentality in the universe of CP in Portugal?

R: There has always been. 30 years ago, our pharmacy had 2 computers in the middle of a small village, we were some of the first ones. CP are an example of innovation. We have everything but at the end, they don't let us do anything. I don't want to get to the point where I must make the decisions only based on financial aspects. We need to keep innovating, which we do. What we feel is that we have hi-tech, but we can't use for anything. With the low prices, we need to manage with focus on financial aspects. CP and Banking were the first business sectors to get fully informatized. We could participate in some studies, for example, in collaboration with the industry.

Question 8: What do you suggest to encourage innovation adoption?

R: First, it's necessary to define a strategy about the role of CP, not throwing money at us. There's no lack of technology in CP, but there must be a plan so that we know towards what we are working and evolving.

Question 9: Do you feel there's any barrier or obstacle to adopting innovation in your CP or region?

R: At first, when innovating, there's some suspicions about the customers, but then there's a big acceptance of that. And then it inverts, and there's the demand for that innovation to other CP. There needs to be some collaboration between professionals, but I find resistance, mainly, from Medical Doctors. There's a too strict view from INFARMED. There are rules that don't make sense, for example, Ben-U-Ron 1g can't be sold without prescription but there's no problem on selling the 500mg version. Also, it's crucial to have all the instruments to have a laboratory to create compounded medicines, but that doesn't encourage the specialization of the CP. I never built it, and I buy from a CP that is specialized in it but when there are inspections that is the first topic to check. I have a lot of doubts about the Online Sales. It should be only a complement, because there's no space to advisory and there may raise some problems.

Question 10: What examples do you have of Digital Innovation in your CP?

R: Measuring biochemical parameters; a TV with advertisement; device for analysis of hair and skin; computers: with control of the prescription to raise, interactions, consult patients' history. All of our innovations are limited to the regulation.

Question 11: Do you have any suggestions for future Digital Solutions or innovations to the Pharmacy sector?

R: I belong to the administration of one cooperative of CP, and one of our goals is to innovate the portal that we have, so that we get faster access to the information. That way it'd more intuitive and faster to provide the best information to the patients.

Interview 6: Innovator

Function: Technical Director

Region: North of Portugal

Demography: Rural

Age: 41-50

Interview was made via mobile

Time: 45 minutes

Question 1: What are the main motivations to adopt Digital Innovations?

R: Nowadays, there are some digital innovations that are adopted as it's fashion: people start to see a trend, one CP starts to develop the DT and the others follow them. When I

talk about DT, it's not only software but also hardware, and future devices. In my opinion the decisions should be based in two pillars: if it brings more profitability, raise more sales; on the other side, if it reduces some costs: omnichannel approach of the point of sale, creating the digital interface to have one more touchpoint between the physical and the digital. Nowadays, consumer does a lot of research before and thus we need to have an important role to not to lose to competitors. The research is not only about price but also about the product itself, actually price is the second part of the choice. Also, the cost I mentioned means that, after I adopted the technology, how can I have less costs performing the same thing I did today. There, the CP is a combination of 3000 small enterprises that have a lot to grow, as there is a lot of inefficiency in the back office. In my opinion, ANF doesn't look at it with the due attention.

Question 2: How does the Diffusion of Innovation works in the CP where you work? Is there space to innovate in the CP?

R: It depends a lot on the manager. Innovation is not only adopting technology is also improving current processes. I need to reinvent processes, for example: when we introduced the pick-up of online sales, we did in order to accelerate the sales process inside the pharmacy. We wanted to make that the customer take the least time possible inside the CP, sometimes we create solutions just based on simple ones so that it can alleviate the customer's pains. We get to this solution by searching the customer needs to fulfil.

Question 3: What's the importance of the clients in the Digital Transformation?

R: Who is focused on the customer must fulfil the promise that has with the client. CP who find ways to alleviate their pain, that reduces the time they are losing, and with the improvement of the internal processes, will be keener on innovating, searching for solutions to simplify their work.

If we look at the customers' journey, if CP find a way to let customers know that they have the product they are looking for, ready to be delivered, they'll be much more satisfied. We need to find ways to make the same job but in an easier way.

Question 4: From the 6 challenges mentioned in the Questionnaire, you considered the "synergy between physical and digital" as the most important. How does it apply to your CP?

R: In my point of view, given the entrepreneurial structure of CP, it takes a huge cost to create the content needed for customers to find the best information to take the customer into the CP. I see Innovation and technology as only facilitators of the customer journey. At this moment, it's not the point where customer gets the product delivered to their home, but where they go to the CP and pick-up the product with some inputs from the pharmacist. It's difficult to say it's going to negatively impact the proximity DNA of the CP, but the pharmacist needs to keep that DNA. If CP is turned into a portal, it'll be replaced by an online one. But if we add value, with empathy and advisory, we get ways to reach everyone. The physical spaces aren't going to disappear because there's a huge challenge to online stores in the time the product gets to the consumer, as in physical it's immediately. We aren't selling a service because we aren't charging for it, we are selling a relationship. The only thing we charge is their loyalty.

Question 5: Do you think there is any challenge to add to the ones above?

R: I would say the optimization of manual procedures. Nowadays, we still issue manual invoices. CP manage what they need to provision manually. The supply chain is incredibly good. Two years ago, suppliers used to deliver products four times a day. Now, it's twice a day. This way, I can afford to be inefficient, because if I don't have the products now, I'll get them later today. This is the opposite incentive to innovation. If we'd need weekly provisions as supermarkets, we would be more cautious.

Question 6: How do you describe the encouragement of innovation adoption in Portugal? Whether it may be made by the Government or ANF, or any other entity.

R: ANF has impact in two different ways: the first is the POS used by the CP, which is the choice of about 90% of them; in the other hand, they have been helping in improving the online sales. So far, the focus has been on the interaction with the client and not on the reduction of costs on CP.

Question 7: Do you think there's an Innovative mentality in the universe of CP in Portugal?

R: I think there is, at least in part of the CP, who try to reinvent themselves and create new ways of getting to the client, like the Portuguese entrepreneur. But sometimes CP wait for ANF to do it for them. There are many restrict rules to follow, if we didn't respect them, we could be doing much more than what we do right now.

Question 8: What do you suggest to encourage innovation adoption?

R: In terms of management, I'd suggest Glintt to facilitate the communication with external systems, it'd allow small enterprises to search for new ways to work with the patients. In terms of healthcare, the government should help on the integration of systems and potentiate the exchange of information between healthcare agents. This way, we could be preventing more diseases or get new discoveries.

Question 9: Do you feel there's any barrier or obstacle to adopting innovation in your CP or region?

R: The barrier that I find is the resistance to change, usually from collaborators, mainly the older ones, until they find out that innovation helps them. Besides that, customers generally find themselves very interested in new innovations when they see them and thus adopt them.

Question 10: What examples do you have of Digital Innovation in your CP?

R: Right now, we have the following ones: quick purchase portal, self-service device connected to a robot which will facilitate the access to a great variety of products without the contact with a person, pharma-drive (drive-through). What I'd like to add was to give a more autonomy to customers to buy without the need of going to the counter, through interfaces without the intervention of the pharmacist.

Question 11: Do you have any suggestions for future Digital Solutions or innovations to the Pharmacy sector?

R: The evaluation of performance, from the customer, about our service, which is very difficult to have. It's essential to have the customers' inputs. CRM is also very important. It'd be interesting to know the customer before they entered the CP, it could be through different interfaces. The booking of services in CP. Also, the enrichment of the universe of start-ups around the CP would be very interesting to potentiate innovation. The communication between systems could bring insights into the business that could change a lot of things we do right now. We don't have many ways of encouraging data mining as the system is very closed. However, the system has information very well structured to provide a good service to the customer. Then, we don't have information structured to make decisions about forecasting, buying, selling, where the business is going, or it takes too much work. That system involves much work to understand and Glintt also developed a consultancy business around it.

Interviews Key Findings

Dimension of Analysis	Domain	Key Findings
Diffusion of Innovation	Motivation of Innovation	<ul style="list-style-type: none"> • Customer-oriented innovation • Minimize errors • Optimize undifferentiated processes • Higher Profitability • Take the best out of the collaborators
	Communication Channels	<ul style="list-style-type: none"> • ANF/Glantt • Reading articles • Interaction with Pharmaceutical companies • Other Pharmacists • Fairs • Groups
Digital Transformation	Importance of Customers	<ul style="list-style-type: none"> • Find ways to alleviate Customers' pains • Adapt to Customers' needs • Too much Digital Innovation can inhibit Customers • Need to reduce the distance between CP and Customer • Concern with the ageing population
	Challenges	<ul style="list-style-type: none"> • Integration in a National Health Network to improve the services and communication • Synergy Between physical and Digital, which implies a big cost to the CP • Optimization of Manual Procedures • Difficulty in recruiting pharmacists • Difficulty entering the sector • Analysis of Financial Parameters • Isolation of the Population
Description of the CP Community	CP's Innovativeness	<ul style="list-style-type: none"> • Every interviewee agreed that CP are innovative, and an example
	Incentives	<ul style="list-style-type: none"> • Community funds • Financial support/tax incentives needed • Margins are too low
	Barriers	<ul style="list-style-type: none"> • Bureaucracy and legislation • Elderly population • Collaborators Resistance
Future Solutions	Digital Solutions	<ul style="list-style-type: none"> • Enrich Start-ups around CP • Opening the system • Faster access to information • Vending machines • Automatic Renewal of Prescription

Table 19- Interviews Key Findings