



**Assessing the Market and Financial Potential of SelfMed Pill dispenser:
A Start-up Aiming to Eradicate Medication Non-adherence in Portugal**

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Dissertation presented to the Polytechnic Institute of Bragança
to obtain the Master Degree in Innovation in Products and Processes

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Bragança, November, 2022

Abstract

Non-adherence to medication is a global problem that affect half of the prescription users, resulting in suboptimal therapy outcomes and premature death. The complexity of medication is one of the primary contributing factors for it. To assist with the complex medication regimen, an automatic pill dispenser, SelfMed has been created. This study focuses on studying a future start-up company, SelfMed Lda. The company will operate in the Portuguese market and aims to increase adherence to taking medication according to medical prescription by adults over the age of 60.

The aim of this research is to evaluate the market and the financial viability of a project in Portugal called "SelfMed, your medicating partner," which aims to manufacture and market an automatic pill dispenser to healthcare organizations, companies in this sector of activity, and pharmacies (Business to Business). Thus, it is intended to demonstrate to what extent the implementation of the project is possible and capable of replacing the need for personalized care in older individuals for the purpose of managing the taking of medicines. The research was conducted using primary data collected through a questionnaire distributed to users and care institutions/companies in the referenced area. According to the analysis, ~36% of users and 40% of care companies are interested in obtaining SelfMed to simplify the complex medication management and prescription regimen for the end user.

Considering an assessment of the 6-year financial plan, a total investment of approximately €239,000 is required to launch the project, consisting mainly of basic equipment and transport, as well as supporting buildings and infrastructure, software, among others.

Based on the established assumptions, the project is commercially and financially viable, with positive results from the third year onwards and an NPV of €185,051, IRR of 23.8% and a payback period of approximately 4.47 years.

Keywords: medication intake, elderly, digital solution, marketing plan, financial plan.

Resumo

A não adesão à medicação, ou a sua toma de forma errónea traduz um problema global que afeta metade dos utilizadores com prescrições médicas, resultando em consideráveis malefícios para os cidadãos, de onde se destaca a morte prematura. A complexidade da medicação é um dos principais fatores que contribui para esta realidade. Foi face a esta problemática e com o objetivo de contribuir para a sua mitigação que foi proposto um doseador automático de comprimidos, designado por SelfMed. Assim, este estudo centra-se no estudo de uma futura empresa start-up, a SelfMed Lda. A empresa irá operar no mercado português e visa aumentar a adesão à correta toma de medicamentos, de acordo com a prescrição médica, por adultos com mais de 60 anos de idade.

O objectivo da presente pesquisa consiste em avaliar o mercado e a viabilidade financeira de um projeto em Portugal denominado "SelfMed, o seu parceiro médico", que pretende fabricar e comercializar um doseador automático de comprimidos destinado a organizações prestadoras de cuidados de saúde, empresas deste setor de atividade, e farmácias (Business to Business). Assim, pretende-se demonstrar até que ponto a implementação do projeto é possível e capaz de substituir a necessidade de cuidados personalizados em indivíduos mais velhos para efeitos de gestão da toma de medicamentos. A investigação foi realizada utilizando dados primários recolhidos através de um inquérito por questionário distribuído a utilizadores e instituições/empresas de prestação de cuidados na área referenciada. De acordo com a análise, ~36% dos utilizadores e 40% das empresas de prestação de cuidados estão interessados em obterem a SelfMed, a fim de simplificar o complexo regime de gestão e toma de medicação do utilizador final.

Considerando uma avaliação do plano financeiro quinquenal, é necessário um investimento total de aproximadamente 239.000 euros para lançar o projeto, que consiste, principalmente, em equipamento básico e transporte, bem como edifícios e infraestruturas de apoio, software, entre outros.

Com base nos pressupostos estabelecidos, o projeto é comercial e financeiramente viável, com resultados positivos a partir do terceiro ano, um VAL de €185,051, uma TIR de 23.8% e um período de recuperação do investimento de 4.47 anos.

Palavras-Chave: toma de medicamentos, idosos, solução digital, plano marketing, plano financeiro

Dedication

To,
My loving family.

Acknowledgments

Firstly, I would like to express my sincere gratitude toward my supervisors, António Fernandes Borges, and Manuel José Serra da Fonseca respectively, for their generous support, mentorship, constructive feedback, absorbing conversations and infinite patience during each stage of the thesis writing process as well as during my master's degree Programme in IPB. Their guidance enabled me in my research by showing me the right way towards the previous Demola project I did in "How to ensure the correct medication taken by elderly" in 2017 which was eventually also a topic for master's study in Innovation of Products and Process too. Besides, I am especially grateful to those who had to answer the questionnaire despite all the inconveniences.

I would also like to thank Ledamp company for helping sketch the preliminary product design, 3D printing and quote for the production. Last but not the least, I am beyond grateful for my family and friends for providing me with their endless source of support and encouraging me to accomplish my set goal to get a master's degree in Innovation of Products and Processes.

Abbreviations and Acronyms

AMA- American Marketing Association

B2B2C- Business to Business to Customer

B2B-Business to Business

B2C- Business to Customer

CAE- Classificação Portuguesa de Atividades Económicas (Portuguese Classification of Economic Activities)

CAGR-Compound Annual Growth Rate

CAPEX- Capital Expenditure

CEO- Chief Executive Officer

COGS- Cost of Goods Sold and Raw Materials Consumed

COPD- Chronic Obstructive Pulmonary Disease

EBIT- Earnings Before Interest and Taxes

EBITDA- Earnings Before Interest, Taxes, Depreciation and Amortization

EBT- Earnings Before Taxes

EOEP- Estado e Entidades Públicas (Government and public entity)

ESE- Expenditure on External Supplies

EU- European Union

EUR-Euro

FAQ- Frequently Asked Question

FC- Formal Carer

FCFF- Free Cash Flow to the Firm

GDP- Gross Domestic Product

HR- Human Resources

IAPMEI- Instituto de Apoio às Pequenas e Médias Empresas e ao Investimento (Institute of Support

IC- Informal Carer

IoT- Internet of Thing

IPB- Instituto Politécnico de Bragança

IRC- Internal Revenue Code

IRR- Internal Rate of Returns

IT- Information Technology

Lda. - Private Limited Company

LTP- Long Term Plan

MAEIs- Medication Adherence Enhancing Interventions

MEMs-Medication Event Monitoring Systems

MPRs- Medication Possession Ratios

NATO- North Atlantic Treaty Organization

NCDs- Non-Communicable Diseases

NIF- Número de Identificação Fiscal (Tax Number)

NISS- Número de Identificação de Segurança Social (Social Security Number)

NPV- Net Present Value

OECD- Organization for Economic Co-operation and Development

PB- Pay Back

PESTEL- Political, Economic, Sociological, Technological, Environmental and Legal

SME- Small and Medium-sized Enterprises

SMS- Short Message System

SWOT- Strength, Weakness, Opportunities and Threat

TSU- Trade Services Utility

USD- United State Dollar

VAT- Value Added Tax

VR- Residual Value

WTO-World Trade Organization

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Introduction

The population of Portugal has been steadily falling since 2008. In the year 2020, the number was recorded as 10.2 million. By the year 2050, it is envisioned that the population will be 9.08 million, and by the year 2099, it is predicted that the population will be further decreased to 7.01 million (*World population prospects - population division, 2021*).

Due to declining birth-rate and an increasing ageing population, the natural balance became negative in 2009 and has remained so ever since. The rise in average life expectancy is reflected in the broadening of the pyramid's top, while low birth rates contribute to the pyramid's narrowing at the base. In fact, the development of the population pyramid indicates that the Portuguese population is experiencing "double demographic ageing" (Caixa geral, 2019).

Most notably, life expectancy has risen from 73.9 years in the early 1990s to 80.8 years in 2018. Simultaneously, the percentage of people 65 and older rose to 21.8%. According to European Commission, due to demographic ageing, chronic diseases and multi-morbidity are rising fast-pace in Portugal and other European countries (European Commission, 2011).

According to World Health Organization (WHO), by the year 2030, the number of people who will be at risk for developing the chronic diseases, poor health, and dependency that often accompany advanced old age is expected to rise to its peak point ever (World Health Organization. Regional Office for the Eastern Mediterranean, 2015).

This increase of chronic diseases and multi-morbidity demands a multidisciplinary approach, that in many instances requires lifestyle changes combined with medication usage for lifetime (European Commission, 2011).

Globally, approximately 50% of adults and approximately 8% of children (aged 5-17 years) suffer from a chronic condition (Cutler et al., 2018). Non-communicable diseases or chronic diseases are responsible for 80 percent of all years spent living with a disability and 70 percent of all deaths worldwide (WHO, 2018a); Institute for Health Metrics and Evaluation (20 IHME, 2020). Yap et. al. (2016) discovered that the older adults are prone to multiple comorbidities, multimorbidity, and chronic conditions, which put them at a higher risk of not following their medication regimen as prescribed by their physicians. which leads to non-adherence to the prescription.

Non-adherence to medication affects just about half of the chronic medication users, posing significant challenges in the management of chronic diseases Khan, R., and K. Socha-Dietrich (2018). It is also associated with nearly 200,000 deaths per year in the European Union alone. On the other side, medication non-adherence also has a huge economic impact. As per European Commission (2011) data approximate annual cost of €80-125 billions are wasted because of poor adherence. Not to

mention, these are avoidable direct and indirect costs given that medication adherence has been applied (Khan & Socha- Dietrich, 2018).

In accordance with WHO, medication adherence is a crucial factor in the effectiveness and safety of medicines and is particularly critical for patients undergoing chronic treatments for non-communicable diseases. Non-adherence is also a major concern among healthcare systems world- wide. Around 50% of patients with a chronic disease do not adhere to their therapeutic regimen, making non-adherence a widespread health problem, with a significant impact on healthcare systems (WHO,2003).

To boost this research area, medication adherence has been emphasized as a key priority. Technological advances have shown a significant potential to empower patients in detecting and managing non-adherence, and to support communication with their informal and formal carers healthcare professionals and shared decision making. Therefore, one of the most important challenges is to find the best implementation strategy for integrating these advances into current or newly developed healthcare services across healthcare systems (Herdeiro et al., 2021).

The contemporary medicinal knowledge is expanding the spectrum of medication adherence in Portugal. Smart pill boxes, alerting devices that use sound and vibration, and self-management apps are just some of the new technologies that have emerged to aid in the adherence process. Delivering a product or service that meets the need of the customers in an effective price is a problem within this industry in Portugal, extensive study into the business is required for SelfMed to emerge without glitches.

This project will attempt to answer, “What are the most important factors for SelfMed to consider to be able to emerge as a start-up?” and “Prepare preliminary marketing and financial plan” to check its feasibility.

This project aims to determine the market and financial viability of SelfMed's future products and services (an automatic pill dispenser, mobile application, website, intelligent cloud, monthly medication refill services) in Portugal and the EU, based on previous studies and published journals and user data analysis.

The idea behind SelfMed is to enable patients to manage their own medication (right medication, right dosage at the right time) at home without any complication, rather than relying fully on the nursing care provided in an institutional setting or busy informal carer so that they can continue to live independently.

The rationale behind this project is to create an integrated and autonomous environment for the end-users to be able to improve medication adherence, reduce morbidity and death, and health costs related to that. The solution is a unique IoT-based smart health ecosystem consisting of the SelfMed pill dispenser, mobile application, web platform and intelligent cloud systems, combined in a service that will support the elder individual, the informal carer and the formal carer with data analysis, daily

reports, alerts/notifications, and users personalized procedures. SelfMed presents an innovative solution that is socially inclusive, in terms of functionality and adaptability to the user needs, and at an affordable price for the customer to create a holistic health solution to empower the end-users.

In this research project, the work has been divided into 7 sections. Section 1 presents a short review of the literature written on the topic of medication (non) adherence to shed light on its meaning, contributing factors, and impact both on patients as well as their formal and informal carers in terms of health and associated cost. In Section 2, the research design and methodology adopted in the process of collecting the database, describes the variables under analysis and the statistical analysis method is explained. Section 3 enlightens the empirical application, results, and discussion of the questionnaire and draws the main findings. Section 4-6 reveals the marketing plan of the SelfMed. Finally, Section 7 examines the financial feasibility of the SelfMed project in the Portuguese and the international market. The study will be completed with a conclusion and limitation and suggestions to decide either project is viable or not to make a solid business plan for a future start-up SelfMed Lda.

Section 1. Literature Review

1.1. Definition of Medication (Non) adherence

The general term “adherence” encompasses several constructs depending on when in a patient’s medication journey adherence is being measured. Medication adherence refers to the degree or the extent to which a patient acts in accordance with the prescribed interval and dose of a dosing regimen prescribed by the physician (Osterberg & Blaschke, 2005). Whereas medication persistence refers to the act of continuing the treatment for the prescribed duration (Khan & Socha- Dietrich, 2018).

Hence, poor adherence or non-adherence to medications includes patients who do not start their prescribed therapy at all, or discontinue it prematurely, or take their medications in doses or frequencies different from those recommended by the prescribing clinician (WHO,2018). When patients do not fill their first prescription, it is called primary non-adherence to distinguish it from the far more commonly studied secondary non-adherence (when prescriptions are filled, but the medication is not taken as prescribed (Khan & Socha-Dietrich, 2018).

Similarly, medication adherence is defined as the process by which patients take their medications exactly as prescribed, and it consists of three major components: initiation, implementation, and discontinuation. Medication non-adherence includes not starting treatment, implementing the regimen in an ineffective manner, or discontinuing treatment too soon (Walsh et al., 2019).

Furthermore, Dalebout et al., (2010) in the study of intentional and unintentional treatment nonadherence in patients with systemic lupus erythematosus express nonadherent patients are those who do not take their medications as prescribed by their physicians. Author further added, nonadherence factors may differ between and within patient groups.

Several authors have attempted to define adherence, and the World Health Organization's (2003) definition is one of the most used, defining it as “Medication adherence is defined as the extent to which a person's behavior-taking medication, following a diet, and/ or executing lifestyle changes, corresponds with agreed recommendations from a health care provider” (WHO, 2003, p.3).

Medication non-adherence can occur either intentionally or unintentionally. Intentional non-adherence refers to making a reasoned decision not to take a medication based on perceptions or feelings. For instance, people often become discouraged and discontinue therapy when they do not receive an immediate response. In contrast, unintentional non-adherence refers to intending to take a medication as prescribed but failing to do so for other reasons such as forgetfulness or carelessness. Studies show that non-adherence will affect patient’s- health negatively most of the time whether it is intentional or unintentional (Choi et al., 2015).

1.1.1. Factors Contributing for Medication Non-adherence

The prevalence of medication non-adherence varies considerably across conditions and patient groups. Most of the studies used different assessment methods making it difficult to compare adherence rates across health systems. Overall, among patients with various diseases (ex; diabetes, hypertension, and hyperlipidemia) 4 to 31% of patients never fill their first prescription; of those who do fill their first prescription, only 50 to 70% are taking their medications regularly (i.e., at least 80% of the time); and less than half of these patients are still continuing to take their medications within two years of the initial prescription (Khan & Socha-Dietrich, 2018).

As shown in multiple studies nonadherences to prescribed medication is a major issue in healthcare. A patient's adherence to their prescribed drug therapy is crucial for the success of their treatment, the safety of the patient, and the affordability of their healthcare. Failure to take medications as prescribed can nullify or significantly lessen their therapeutic benefit. It's been shown that many people of varying ages and diagnoses fail to follow their prescribed treatment plans. On average, patients in developed countries miss half (50%) of their prescribed long-term therapy for chronic diseases and the figure is even higher in low- and middle-income countries (75%) (Hovstadius & Petersson, 2011).

Numerous authors also had mentioned in their research findings that polypharmacy and cost are vital factors for non-adherence to medication. Polypharmacy is associated with a complex dosing scheme, and a complex dosing scheme results in nonadherence with prescribed medication (Hugtenburg et al., 2013). The cost associated with inability to afford drugs increases the risk of non-adherence and non-persistence to chronic treatment (Dodd et al., 2018).

Correspondingly, polypharmacy and high medicine costs were risk factors for non-adherence in chronic kidney disease patients too (Chironda & Bhengu, 2016). Along with that, cost-related non-adherence is a major determinant of self-reported medication under use (Kemp et al., 2010). For instance, due to the high costs of the medications in the treatment and the treatment itself, cancer survivors are more than twice as likely to not adhere to medication treatments (Zhang & Meltzer, 2015; Smith et al., 2019; Zhao et al., 2019). In addition to that, countries with the lowest out-of-pocket drug costs also have the lowest average rate of cost-related non-adherence (Kemp et al., 2010). Accordingly, countries in which there is no mandatory health insurance system also have wide internal variations in cost-related non-adherence (Hovstadius & Petersson, 2011).

In fact, “the rate of non-adherence between different age groups. Generally, the rate of non-adherence decreases with higher age. There is a minor gender differences in non-adherence; the rate of non-adherence is slightly higher for women than for men” (Hovstadius & Petersson, 2011, p.2).

Moreover, forgetfulness, illiteracy, inability to understand the reason of treatment, an absence to see the necessity of treatment, a skepticism in the treatment, and a lack of information about the consequences of treatment can all contribute to nonadherence. Failing to comply has also been linked to psychiatric issues such as depression, cognitive impairment, missed visits, and a negative doctor-patient relationship. Nonadherence can be either deliberate or accidental, depending on the specific

factor Sabaté, E. (2003). One in six individuals requires assistance remembering to take their medicine (Haase et al., 2017).

To summarize the numerous factors that influence medication nonadherence. The World Health Organization (WHO,2003) categorized the determinants of non-adherence into five dimensions and highlight them as follows: patient; medication; healthcare providers; healthcare system; and socioeconomic factors. As defined by the author reasons for non-adherence can be broadly classified into **individual factors/patient factors** which means that may affect an individual's willingness and ability to adhere to a medication schedule (mental state, physical health, demographics of patient, past medical history such as functional impairment, cognitive decline, depression, social isolation, lack of acceptance of the disease and understanding of the prescribed medication, perceived benefit-burden analysis etc.), **medication factors** (formulation and packaging, complicated drug regimen, drug handling, adverse drug effects, drug interactions, poor labelling instruction, lack of awareness of consequences for missing doses as well as cost of medication); **health care provider factors** (relationship between patient and care provider, proper communication, involvement of patients in decision making and professionalism); **health care system factors** (lack of patient education, lack of follow up, lack of medication schedule given, short duration of prescription, and lack of community nursing services to pack medications) and **socioeconomic factors** (lack of caregiver and large caregiver burden, patient living alone or lacking social network) (WHO,2003; Kardas et al., 2013; Yap et al., 2016).

1.1.2. Medication Non-adherence and its Ramifications for Health

Maintaining a steady dose of medication is pivotal for treating and preventing noncommunicable diseases (Böhm et al., 2013; Kluge et al., 2020). About half of people with long-term conditions were not adherent to their medication even before the COVID-19 pandemic (World Health Organization (WHO), 2003), which could have severe consequences for individuals' health (Chowdhury et al., 2013). In breast cancer patients, for instance, the risk of metastases, disease recurrence, and mortality rises when endocrine therapies are not adhered (Font et al., 2019; Lee et al., 2019). Appropriate adherence relies on patients having unhindered access to their medications, which could be jeopardized by the COVID-19 crisis' disruptions to healthcare services and physical distance restrictions (Ágh et al., 2021).

Patients who fail to take their medications as prescribed are at a higher risk of experiencing severe health consequences, particularly if the patients have a chronic condition such as hypertension, diabetes, or hyperlipidemia. As an example: Patients with diabetes and heart disease who did not adhere had mortality rates that were nearly twice as high as those patients who did adhere to their treatment plans (Brown & Bussell, 2011; Cramer, 2004). Likewise, patients who have decided to stop taking their statin therapy (a medication that lowers cholesterol) have a risk of heart attacks that is

three times higher than those who are nevertheless taking this medication (Maningat et al., 2013). Correspondingly, patients with chronic conditions such as hypertension, diabetes, and patients who do not adhere to their prescribed beta-blockers, used to manage high blood pressure therapy, are 4.5 times more likely to have complications from coronary heart disease than those who do adhere (Cramer et al., 2008).

Older peoples' non-adherence to medications is recognized as a worldwide public health problem. Regional and national health and care systems in Europe face this problem daily (Gøtzsche, 2014). This results in decreased therapeutic benefits for the patient, frequent hospital visits, and physician visits due to the deterioration of their medical condition, and even overtreatment of a condition (Cutler et al., 2018). This is regarded as a crucial problem in public health since nonadherence to medication results in poor health outcomes and increased healthcare costs (Lam & Fresco, 2015). To add further, the frequent issue of non-adherence to prescribed medication regimen is one that frequently results in hospitalization (Mongkhon et al., 2018). Moreover, medication nonadherence has been linked to an increase in chronic condition complications and hospitalizations (Kaul et al., 2017).

Consequently, medication non adherence negatively affects both individual and public health, it also leads to profound societal and economic consequences, such as increased morbidity, mortality, and healthcare utilization (Kardas et al., 2022). Although it is difficult to measure the number of deaths that are caused by nonadherence, the OECD has recorded an estimate that there are 200,000 premature deaths per year in the EU (Khan & Socha-Dietrich, 2018).

1.1.3. Medication Non-adherence and its Economic Impacts

Medication non-adherence imposes a significant financial burden on healthcare systems. The current body of research on the economic impact of medication non-adherence is limited and of varying quality, failing to provide adaptable data to influence health policy. The relationship between increased non-adherence and higher disease prevalence should be used to inform policymakers to avoid unnecessary costs to the healthcare system (Cutler et al., 2018; Hovstadius & Petersson, 2011). Similarly, Non-adherence also causes a significant economic waste due to unnecessary drug sales. The cost of unused medication is shared between patients and healthcare system or society in most countries (Hovstadius & Petersson, 2011).

Medication non-adherence leads to premature deaths as well as an increased use of healthcare services. Estimates suggest that it contributes to nearly 200,000 premature deaths and costs European governments EUR 125 billion annually in excess healthcare services (European Council Policymakers Debate, 2010; Khan & Socha-Dietrich, 2018). In the United States, it costs approximately USD 105 billion per year in terms of avoidable hospitalizations alone (Iuga & McGuire, 2014; Aitken & Valkowa, 2013). These estimates do not include avoidable costs of long-term care, diagnostic testing and

pharmacy costs related to therapy intensification. Broader societal costs of increased disability, reduced productivity, and sick leave are also not considered (Khan & Socha-Dietrich, 2018).

According to a study of cancer survivors in United States, 15, 002, 192 (41.9%) respondents reported cost-related medication nonadherence. It was also stated that those who had cost-related medication non-adherence had a significantly higher economic burdens, productivity loss, and limitation in functional abilities than those who did not (Lu et al., 2021). Correspondingly. for cancer survivors, although medication nonadherence might decrease pharmacy costs, it could significantly increase other costs, such as hospital costs and indirect costs. As a result of that, cost-related medication nonadherence to cancer medications has been shown to increase the total healthcare costs. Given an increased likelihood of comorbidities caused by medication nonadherence, costs for other chronic conditions may increase (Cutler et al., 2018). Encouraging medication adherence, especially in chronic conditions, has been shown to be cost effective whilst considering the increased expenditure on medications. The average cost-benefit ratios from adherence for the four conditions examined was 1:13.5 for hypertension, 1:8.4 for congestive heart failure, 1:8.6 for diabetes, and 1:3.8 for hyperlipidemia, combining the increases in pharmaceutical spending with the decreases in medical spending. Hence, an extra USD spent on medications for adherent patients with congestive heart failure, high blood pressure, diabetes and hyperlipidemia can generate between 3 to 13 USD in savings on emergency department visits and inpatient hospitalizations (Roebuck et al., 2011).

Improved medication adherence, getting people to take medicine prescribed for them is associated with greatly reduced total health care use and costs(Roebuck et al., 2011). Author further added that although improved medication adherence by people with four chronic vascular diseases increased pharmacy costs, it also produced substantial medical savings because of reductions in hospitalization and emergency department use (Roebuck et.al, 2011).

Contrary to the goal of saving money, cost-related medication nonadherence resulted in an unintended consequence of increased family health care costs, which was likely due to a variety of varying factors (Hovstadius & Petersson, 2011).

1.1.4. Techniques to Improve Adherence to Medication

There is no universal solution to the problem of nonadherence. Most of the available research relies on patient's self-reports of their own adherence to prescribed drugs. Most efforts to improve medication adherence are designed for all patients, regardless of their level of adherence. This standard procedure, however, does not seem to help the nonadherent patients either they are doing it by choice or not. Fortunately, recent literatures and research are also focused on Individualized adherence strategies. This is also made possible by modern day technologies which are convenient and user friendly. Based on research carried out on diabetic patients, improved unintentional adherence, and

enhanced refill have been shown with the use of electronic pill boxes with SMS (Short message system) reminders. Similarly, internet interventions can improve patient's medication regimen. Evidence shows that individually tailored counselling therapies that target nonadherence would be an effective strategy to assist people use their drugs as prescribed. Even though numerous medicines have a sound theoretical basis, the long-term health consequences of these treatments are unknown. It is recommended that a personalized approach be taken to promote adherence. This approach should be tailored to the specific type, root cause, and requirements of the patient (Clifford et al., 2014; Hugtenburg et al., 2013; Jimmy & Jose, 2011).

Additionally, prospective research using subjective assessment (observer and patient reported), was used to assess medication adherence in diabetic patient found in the study that pill counts, Medication Event Monitoring System (MEMS), cell-phone real-time assessment, and logbooks were advantageous for patients. Likewise in pharmacy databases, medication possession ratios (MPRs), or some derivations thereof, were utilized. Apart from that, three novel approaches (using cell-phone real-time assessment, computerized logbooks, and a questionnaire about different dosing irregularities) seemed to have provided insight on timing and dosing issues that could be useful for highlighting interventions to improve insulin adherence (Clifford et al., 2014).

Some authors have suggested that improving medication adherence might have a greater impact on health than advances in the treatment itself (Sabaté, 2003). Several reviews on the topic of medication non-adherence have been published (Nieuwlaat et al., 2014) but they focus mainly on interventions targeting patients rather than physicians. There is some evidence that interventions targeting patients can have beneficial effects on patient medication adherence. Nevertheless, all effective interventions are complex. They include combinations of components, such as patient counselling, information, behavioral support, and reminders, which are difficult to implement in clinical practice and do not lead to large improvements in adherence (Nieuwlaat et al., 2014) review studies an intervention that is relatively easy to implement in clinical practice and focuses on physicians (Zaugg et al., 2018).

In addition to that, team-based case management is already acknowledged as an effective treatment technique that improves adherence and health outcomes while potentially lowering total medical care expenditures. One of the primary tenets of patient-centered medical homes is the continuity of care provided by a single physician and their team, who treat each patient as an individual and coordinate their care across different care environments. Since the "medical home" model is new and being evaluated, its impact on health care expenses connected to drug adherence are yet to be determined (Iuga & McGuire, 2014). For instance, patient suffering from blood pressure, an effective way to get people to take their medicine are to simplify their regimen, use allied health professionals (such as in team-based collaborative care), and monitor their own blood pressure (Peacock & Krousel-Wood, 2017).

Evidence also suggests that the out-of-pocket cost of drugs is a significant determinant of medication adherence (Dodd et al., 2018). Few countries reduced medication costs to offset the economic disruption to improve adherence especially during Covid-19 period. In addition to that, allowing longer-duration prescriptions could improve access to medicine supplies, particularly for patients living in remote areas, though this needs to be balanced against the potential of supply shortages caused by "stockpiling" during the COVID-19 lockdown (Ágh et al., 2021).

Furthermore, substituting unavailable medicines could also be a viable solution to medicine shortage as the pandemic was straining the medication supply chain, to keep up with the medication compliance (Shuman et al., 2020); nevertheless, only 54% of countries reported specific efforts to manage anticipated medicine shortages. Likewise, policy initiatives to promote medication coverage and behavioral support, which includes patient education, can improve medication adherence among persons with chronic conditions (Ágh et al., 2021).

With the modern technology, mobile applications can incorporate all these strategies and personalizing them to meet an individual patients' needs and are often available for users with no cost (Dayer et al., 2013; Linn et al., 2011). As of January 2014, 90% of American adults owned a mobile phone. It's interesting to note that even when they don't hear their phone ringing or feel it vibrating, 67% of people who own mobile phones still find themselves checking for new messages, notifications, or calls (Haase et al., 2017). Forgetfulness is found to be the most often stated reason for nonadherence among patients. In a survey of 10,000 patients, forgetfulness was cited as the most prevalent cause for missing pills (24%), followed by perceived side effects (20%), high drug costs (17%), and the belief that a given treatment would have minimal effect on their ailment (14%) (Iuga & McGuire, 2014). Text alerts, Notification etc from mobile app can help to remind the patients about the medication timings and doses to comply the adherence.

Beyond psychological consequences, patient empowerment in daily practice is dependent on technology and how it is utilized (Calvillo et al., 2015). In general, 55% of smartphone owners use (Iuga & McGuire, 2014) remember to take prescriptions by sending push notifications and tracking whether or not they were taken. For this reason, pharmacists and other clinicians may advise patients to use mobile applications to help them take their medications as prescribed. However, for clinically relevant improvements to be made, research into the efficacy of applications is essential (Haase et al., 2017).

"After half a century of research in this area, several medication adherence-enhancing interventions (MAEIs) have been designed, addressing individual or multiple of these factors. A single MAEI does not solve the non-adherence problem, however, currently available interventions targeting chronic conditions may improve both adherence and clinical outcomes" (Kardas et al., 2022, p.2).

Therefore, there is no such standard for measuring how well people with chronic diseases take their medicines. Measures of adherence need to be more consistent in terms of question content, time to remember answers, and response options for self-report measures.

1.2. Definition of marketing/marketing plan

The term “marketing” is a derivation of the Latin word “mercatus” (marketplace) from Ancient Rome (Stockmeyer, 2018). “The American Marketing Association (AMA) currently defines ‘marketing’ as “the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large” (Hyman & Kostyk, 2022, abstract; American Marketing Association,2018).

Similarly, Chen (2022) defines it as an operational document that outlines an advertising strategy that an organization will implement to generate leads and reach its target market.

To reach their target segment effectively, each company develop its own marketing objectives, lay out necessary activities and fulfil with specific strategies depending on the status of the company that are outlined in a special document called Marketing Plan.

Besides, the father of marketing, Philip Kotler’s one of the classic definitions of marketing says “A marketing plan is a written document that summarizes what the marketer has learned about the marketplace and indicates how the firm plans to reach its marketing objectives. It contains tactical guidelines for the marketing programs and financial allocations over the planning period “(Kotler and Keller, 2013, p.56). Furthermore, a marketing strategy's focus shouldn't be restricted to the market if it is to yield the desired results. It needs to work well so that it can serve its intended function, which is to create, communicate, and deliver value to customers while also managing those customers' relationships in ways that are profitable for the company and its stakeholders. Based on this, SelfMed will work closely with other parts of the company to improve the customer experience across all the points of contact with its customer base, such as the store's physical design, the product's packaging, its features, the training and preparation of its staff, and its logistics and delivery systems.

1.2.1. Objectives and Importance of Marketing Plan

A marketing plan is a very important part of the small business roadmap to success. The plan drives action and points all the way Krotz (2011). Author further adds Marketing plan outlines a company's game plan and helps in identifying the target market that contains the company's best customers and perhaps the ideal customers.

It serves as a reminder of your agreement if people leave, new people join, memories fail, or circumstances cause pressure to change the givens. It also helps to explain who performs what, when and with which marketing tools. It consists of timelines and milestones that makes it easier to hold people accountable for the expansion and success of an operation resulting in reduced risks, errors, and failures. Similarly, a marketing plan assists in determining how the prior choices impacted the

company's development and growth with the help of framework for tracking development that is included with the plan. Moreover, it helps to consider both short-term and long-term marketing methods. It can be disastrous for the company's future to merely have short-term focus. Therefore, marketing plan also gives a clear vision toward a long-term goal (Develop your marketing Plan, 2021).

1.2.2. Benefits of Marketing Plan

Having a well written marketing plan can be beneficial in identifying the target market and who are the target customers for the product or service and assists in making new strategies to reach the target customers. It can help in ensuring how the product or service can benefit the target group. While encouraging existing customers to continue purchasing the product or service, a good marketing plan can be equally helpful in attracting new customers to the business. Apart from these, the marketing plan comes handy in setting goals and time frames for all the marketing activities the business will be doing in that duration. Most importantly, the marketing plan will provide a marketing budget and evaluate the return in investment. (Develop your marketing Plan, 2021)

1.2.3. Market Viability and its Importance in a Project

The ability of a market to generate profits is what is meant by the term "market viability." To decide if it is financially viable to start a business in a specific industry, a complete market viability analysis must be performed.

Considerations such as market size, target audience, and competition help businesses decide whether a certain market is worth pursuing (Estay, 2021). Accordingly, a comprehensive market study will be performed to determine the size, demand, and gap in the market so that SelfMed can fill up. Similarly, a detailed preliminary financial estimation also will be drawn to evaluate potential of business.

Because An entrepreneur's ability to judge the market potential of a new offering is crucial. Market forces are the ultimate validation of the success of an innovative product or service, so knowing whether a client will accept and pay for the project is crucial. Acceptability is defined as the "willingness and ability to pay a certain price that enables a sustainable and scalable enterprise" (Proctor et al., 2021, p.2).

1.2.4. B2B and B2C Marketing

The abbreviation "B2B" stands for "business to business." This type of companies concentrates most of their business efforts on communicating with other enterprises or organizations. Following the conventional marketing thinking, business-to-business (B2B) marketers should communicate with

business buyers on a rational level by using argumentation and education. B2C, on the other hand, stands for “business to consumer” and refers to exchanges between businesses and individual consumers. It is a word used to characterize brands that prioritize selling to individual consumers over other enterprises (*B2B And B2C Marketing – Not as Different as You Think — 1827 Marketing*, 2020). Customers make less logical purchasing decisions, according to conventional marketing thinking. Therefore, firms that market to other businesses should attempt to connect with customers on a more emotional level. Companies that operate in the B2B sector place a greater emphasis on the logic of the product as well as its features. It demonstrates that marketing communication strategies for business-to-business and business-to-consumer sectors need to be built on different presumptions to be successful. However, a focus on the customer is shared by both processes. Market communication always results in interaction between a business and its clients or customers (Rėklaitis & Pilelienė, 2019).

1.3. Definition of Financial Plan

In the business world, financial plan- entrepreneurship financial planning entails establishing the organization's monetary objectives. The notes that follow comprise a long-term company plan's strategy, financial statements, balance sheets, and cash flow. Share A financial strategy serves as the foundation for several business areas (Financial Planning: Objectives and Importance, 2022). In addition, article states that the financial strategy serves as the foundation for numerous corporate operations. It focuses on the enterprise's long-term financial growth.

Three factors are examined while establishing future objectives: past performance, revenue, and business valuation. These are essential for financial planning preparation and forecasting. The structure of a financial plan is contingent on strategy and implementation. The financial plan defines the future growth strategy. It identifies possible problems, proposes solutions, and examines ways to distinguish itself from the competitors. Furthermore, financial planning is the process of identifying how an organization can afford to achieve its strategic objectives. Typically, a business develops a financial strategy shortly after determining its vision and objectives. The financial plan details the activities, resources, equipment, and materials required to meet an organization's goals, as well as the timetable for doing so (What Is a Financial Plan for a Business? - Definition & Example, 2016).

1.3.1. Objectives and Importance of Financial Plan

Financial Plan has two main objectives to achieve. First, to ensure that funds are available whenever they are needed: The primary goal of financial planning is to ensure that sufficient funds are available in the company for various purposes such as the purchase of long-term assets, meeting day-to-day expenses, and so on.

It ensures that funds are available on time. Second, to ensure that the company does not raise resources unnecessarily: Excessive funding is just as bad as insufficient or scarce funding. If there is money left over, financial planning must make the best use of it. Keeping financial resources optimal is a significant loss for an organization.

Explaining the importance of financial plan, "Studies have shown that on average, clients with a financial plan hold 60% more advisory assets than clients without a plan". Hence, an effective financial planning helps in diminishing the vulnerabilities which can be a deterrent to the development of the organization. This aids in guaranteeing security and benefits of the organization (Hanlon, 2019, p.1).

1.3.2. Financial Viability of an Emerging Business

The term "financial viability" is used to describe a company's capacity to bring in sufficient funds to not only meet its operational expenses, but also increase its bottom line. It's a major factor that investors and lenders consider when considering whether to put money into a business. Default on debt obligations can lead to bankruptcy for a company that is not financially stable. Small and medium-sized enterprises (SMEs) are competitive when they have a stable financial foundation. SME financial viability is achieved when sufficient revenue is generated to cover fixed costs, variable costs, and interest payments, and when this growth is sustained without compromising service quality (Msomi & Olarewaju, 2021). As we are aware, SMEs are the backbone of the national economy, generating most of the employment and contributing significantly to GDP.

On the contrary, having inadequate exposure to the market before launching a business can be detrimental to its long-term viability. In her research, Koleda and Oganisjana (2015) discuss the obstacles in learning a company's financial viability in Latvia, revealing that over the last three years, the amount of liabilities of Latvian firms has exceeded equity by 200% on average, heightening the risk of bankruptcy.

Section 2. Research Methodology

2.1. Objective of the Study and Research

This research study's overarching purpose is to identify the need for a digital solution like SelfMed to combat non-adherence in Portugal and to scrutinize the existing solution for our target group in the market over time. The aim is to understand if SelfMed can be established as a start-up after evaluating the market and financial potential in the Portuguese market. To achieve set goal, primary data collection has been carried out setting following assumptions.

- Identify the prevalence of nonadherence in older adults in Portugal;
- To assess the factors that contribute to non-adherence in older adults in Portugal;
- To identify major diseases in elderly people in Portugal;
- To identify the main barriers of medication adherence in Portuguese older adults;
- To assess the inability of Portuguese older adults to take regular medications;
- To understand the interest or disinterest toward an innovative solution, SelfMed in Portugal;
- To study the market viability of the SelfMed in Portuguese market based on the survey result and draft a preliminary market plan.
- To study the financial feasibility of the SelfMed in Portuguese market based on market study.

2.2. Description of Questionnaire Formation and Data Collection

The questionnaire was developed at national level, to consult the population's receptivity to the purchase of SelfMed. A web-based, cross-sectional survey was conducted with the collaboration of numerous care institutions, healthcare providers and its users in Portugal. In addition to that, private contacts targeting regular medication users, or their informal carers are also contacted. The questionnaire was prepared using google forms and link was shared via emails, text messages, and social media to reach the appropriate group of people. To prevent unethical usage of the respondents' information, the survey was anonymous. Considering this, ethical approval was not obtained respecting the participant's (user's profile) wished to be unidentified in their responses.

The questionnaire was developed using the following domains 1) disease and medications 2) taking medications 3) patients and their formal and informal carer 4) Patient and care institutes 5) Cost associated with medications 6) Cost associated with care services 7) alternatives for medication management. 8) SelfMed ecosystem. Each domain had its own unique set of questions. As part of the process of validating the questionnaire, supervisors were asked to evaluate each question individually regarding the content, construct, and criterion validity. They were also asked for their thoughts on the overall questionnaire as well as the technical functionality of the electronic questionnaire. This was done as part of the validation process.

Following the completion of the editing process, the final version of the questionnaire consisted a total of 81 questions which was divided for "users" (which is end user as well as their informal carer, (39 questions)) and "Institutions" part for patient, their carer and formal carer's perspective respectively (42 questions). Most of the questions were multiple choice questions and others were short answer questions. The link to the questionnaire was sent by email to all participants. In the case of Care

institutions, institutions were researched with the help of Classificação Portuguesa de Actividades Económicas (CAE) and prepare a list beforehand. The invitation for collaboration email informed participants about the brief description of the project and the purpose of the study. The link of the questionnaire was also posted on social media platforms such as Facebook and LinkedIn. The average time required to answer the survey has been estimated at 5-7 minutes.

The key result of this survey is to have a deeper level of comprehension of the approaches to medication management for persons who have chronic condition and take numerous medications. Regarding this study, none of the participants' personally identifiable information was kept. The only contact information that was retained was people's email addresses, that is also for those who wished to be contacted for the test of the prototype in the future.

The questionnaire was spread in various communication channel from November 2021 to September 2022. The link to the questionnaire can be found in the appendix.

2.3. Description of Dataset

The study was conducted using primary source, quantitative data methodology, using cross sectional method that focused on a quantitative change in user's life by using or not using SelfMed. The examination process was carried out by the researcher personally, a student of the 2nd year of the master's degree in Innovation of Products and Processes as part of the curricular unit of Thesis. For this, the researcher carried out survey targeting users (final users as well as potential buyers/informal carers) and care companies that provide domiciliary or institutional based services to the patients to comprehend and contemplate the issues to analyze and evaluate the impacts SelfMed can have to elevate the quality of lives of users and minimize the resources usage. The investigation was done solely by the researcher and just address her own opinion.

First, the primary collected dataset had its origin from google form. The original data has been copied from its source to Excel sheet. Second, it was transfer to a new Microsoft Excel sheet to clean the dataset by removing gaps, unnecessary signs and symbols and changed all the necessary requirements to prepare the data for the analysis. The objective was to keep the data in a correct and more organized order for this purpose and for future use. Then the data has been used according to the demand of the study purpose. The data collected can only be used for the purpose of this research study.

2.4. Statistical Method of Data Analysis

A completeness check was conducted after the questionnaire was submitted and only complete questionnaires (regardless of the time needed for filling the questionnaire) were analyzed. After

obtaining the data, they were treated using methods of descriptive data descriptive statistical analysis with the use of an Excel spread sheet. The data analysis will be completed with the use of tables that allow to better visualise the findings.

2.5. Result of the Survey

The survey gathered a total of 102 responses, which may be broken down as follows: 72% (73) of those individuals could be categorized as either primary or secondary user, and 28% (29) of them were care institutions. The details of each question will be explained below in section 3.

Section 3. Empirical Studies and Results

Since the purpose of this study is to study the feasibility of Market and financial potential in the Portuguese market for an automatic pill dispenser called SelfMed, your medicating partner, researcher has chosen to use primary data from an appropriate group of people and target company.

This section will present the survey findings so that conclusions about the SelfMed topics can be drawn. The findings will include participant descriptive statistics and correlation with the SelfMed's market viability. The findings below are categorized into various tables based off the survey questionnaires. The questionnaire has been divided into two parts to understand respective patient's perspective and care institution's perspective for their client or business.

3.1 Clients/Users' responses

Table 1 illustrate the demographic information of respondents. We can observe that out of 102 responses only 73 patients/users responded the questionnaire. This section of. Among those 42 (57.5%) were Females and rest males (42.5%). The participants age ranged from 25 to 95. However, 46-55 tops the list with the value of 23.3% following 56-65 with 20.5%, which is also our top target group. Besides, people younger than 46 years old's interest towards product is commendable as it can influence the end-user to buy one. The profession of the respondents varied with majority employed with 29.4%, domestic worker 9.6% and professional worker and self-employed coming at around 8% followed by students at 22% and retirees at 17.8%. All the participants were from different districts/cities of Portugal: Amarante, Braganza, Coimbra, Guimaraes, Mirandela, Macedo de Canavessa, Matosinho, Montelegre, Vila Real, Porto, Maia, Vila Pouca de Aguiar, Vila Nova de Gaia, Lisbon, Torres Vedras, and Santo Tirso with majority (80%) being from northern region of Portugal. Table1 below shows the detailed demographics statistics.

Table 1: Demography of participants.

Variables	No. of respondents	Percentage	
Age	>25	14	19.2
	26-35	11	15.2
	36-45	6	8.2
	46-55	17	23.3
	56-65	15	20.5
	66-75	4	5.5
	76-85	4	5.5
	86-95	2	2.7
Gender	Male	31	42.5
	Female	42	57.5
Profession	Student	16	21.9
	Employee	22	29.4
	Domestic worker	7	9.6
	Self-employed	6	8.2
	Retired	13	17.8
	Professional worker	6	8.2
Country	Portugal	92	100

Source: Author's own elaboration using primary data from survey.

Table 2 explains diverse results were received for chronic diseases and cognitive issues. 47 percent of those with cognitive disorders have motor skills impairment, 15 percent have amnesia, and 8 percent are deaf or blind. Similarly, people with chronic disorders such as Hyper/Hypotension have a high value proportion of 45%, High Cholesterol 31.5%, Diabetes 26%, Anxiety and Depression 22% and 24.7% respectively. In addition, heart diseases accounts for 17.8%, while arthritis, osteoarthritis, and osteoporosis account for 16.4%. Similarly, respiratory, nonsteroid, and anti-inflammatory diseases impact 13.7% of the population, whereas Alzheimer, hypnotics, and blood circulation illnesses affect 6.8% of the population each. Lastly, 5.5% of the population has cancer/tumor, 4.1% suffers from Parkinson, and 2.1% has chronic obstructive pulmonary disease (COPD) and takes medications.

Table 2: Client's responses on diseases.

	Variables	No. of respondents	Percentage
Cognitive issues	Blind	1	7.7
	Deaf	1	7.7
	Motor skill disorder	6	46.2
	Development disorders	0	0
	Amnesia	2	15.4
Chronic diseases	Hyper/hypo tension	13	45.2
	Diabetes	19	26
	High Cholesterol	23	31.5
	Arthritis, osteo-arthritis, and osteoporosis	12	16.4
	Heart diseases	13	17.8
	Respiratory diseases	10	13.7
	Alzheimer	5	6.8
	COPD	2	2.7
	Parkinson	3	4.1
	Anxiety	18	24.7
	Depression	16	21.9
	Nonsteroidal anti-inflammatory	10	13.7
	Hypnotics	4	6.8
	Blood circulation	4	6.8
	Cancer/Tumor	4	5.5

Source: Author's own elaboration using the primary data collected via survey.

Table 3 shows the client's response based on the questionnaire specifics to the medication along with its administration, per day dosage, and costs associated. Majority of the participants (82.1%) take 1-5

different type of medicines, 6 to 10 tablets or capsules (66.7%), 1 to 2 time per day (~33) by themselves (~70%). There were about 28 (38.4% respondents out of 73 who needs help to take medication and total monthly cost for medication for most participants range was below €100 (~82%). Here, we can also notice that ~10% people take 6-10 types of medication, ~20% takes 11-15 pills per day, ~19% takes their medication thrice a day. To take those medication ~19% takes their family/friend's help and 61.6% (45) people don't need any help to take their medication.

Table 3: Client's responses on medication administration.

Variables	No. of respondents	Percentage	
Types of med/day	1-5	60	82.1
	6-10	7	9.6
	11-15	3	4.1
	More than 16	1	1.4
Quantity of Med	1-5	44	66.7
	6-10	13	19.7
	11-15	5	7.6
	16-20	3	4.5
	21-25	0	0
	26-30	1	1.5
	>30	0	0
Times /day	1x day	24	32.9
	2x day	24	32.9
	3x day	4	19.2
	4x day	4	5.5
	5x day	5	2.7
Who administers	Myself	51	69.9
	Care home	4	5.5
	Family/Friends	14	19.2
	Private carer/nurses	2	2.7
Need help to administer	Yes	28	38.4
	No	45	61.6
Cost of med/healthcare	>€50	41	56.2
	€51 - €100	19	26
	€101 - €150	6	8.2
	€151 - €200	1	1.4
	€201 - €250	2	2.8
	< €250	2	2.8

Source: Author's own elaboration using the primary data collected via survey.

The Table 4 disseminates the responses based on the questionnaire about residence, monthly income, medication payments, and interests in SelfMed system. Among the responses 50% lived in their private residence, 32% lived in an aged care home, and rest with family. Interestingly, none of the respondents lived in government care agency. Several respondents (78%) reported a monthly cost of living below €400 and a monthly income from job or pension below €800. Approximately 71% of participants were interested in and willing to pay for SelfMed on their own. In addition, 46% of respondents said that one

more person in their household matches their situation. In total 79% of respondents budget for healthcare is below €55 per month.

Table 4: Institutional based client's responses on method of medication administration, cost association and interest in SelfMed.

Variables		No. of respondents	Percentage
Residence	Aged care home	5	32.1
	Private residence	14	50
	Govt.care agency	0	0
Cost / Month	With family	9	19.9
	0	2	14.2
	€1 - €400	11	78.7
Earning/ Month	€401 - €800	1	7.1
	>€200	5	35.7
	€201 - €500	5	35.7
	€501 - €800	3	21.3
	€801 - €1100	0	0
Medication Administration Budget	€1101 - €1400	1	7.1
	> €15€	1	7.1
	€26 - €35	4	28.6
	€36 - €45	2	14.3
	€46 - €55	4	28.6
Responsible Payee	> €55	3	21.4
	Myself	9	64.2
	My Family	4	28.6
Interested in SelfMed	Government	1	7.1
	Totally uninterested	1	7.1
	Uninterested	1	7.1
	Neither interested nor uninterested	2	14.2
	Interested	9	64.1
Potential Interested Member	Totally interested	1	7.1
	1 Person	6	42.9
	2 Persons	2	14.3
	3 Persons	2	14.3

Source: Author's own elaboration using the primary data collected via survey.

Table 5 describes those numerous participants living in the private residences responded to having interest in SelfMed with Totally interested around 22 % and interested at 50% (72 in total). Totally uninterested and uninterested were 7% each. These results align with the responses for who helps with the medication administration, which came out to 35% being helped by Day care services and 50% being helped by Family and Friends. The earnings per month for the private residence's respondents varied and ranged from €200 to €1700. The budget for their healthcare varies but multiple responses are below €50 and more that 20% for more than €55. The table below shows the detailed responses for all the questions specific to private residents.

Table 5: Private residence's responses in medication administration methods, cost associated with it and interest in SelfMed.

Variables		No. of respondents	Percentage
Methods of med administration	Day Care Services	5	32.1
	Domiciliary services	2	14.3
	Family and friends	7	50
Interest in SelfMed	Totally interested	3	21.4
	Interested	7	50
	Neither interested nor uninterested	2	14.3
	Totally uninterested	1	7.1
	Uninterested	1	7.1
Earning / Month	>€200	2	14.3
	€201 - €500	3	21.3
	€501 - €800	4	28.6
	€801 - €1100	2	14.3
	€1101 - €1400	2	14.3
	€1401 - €1700	1	7.1
Budget for healthcare	> €15	1	7.1
	15 - €25	3	21.4
	€26 - €35	5	35.7
	€46 - €55	1	7.1
	> €55	4	28.6
Responsible Payee	Myself	11	78.6
	Family	3	28.4
Additional Interested Member	1 Person	5	35.5
	2 Person	2	14.3
	4 person	1	7.1

Source: Author's own elaboration using the primary data collected via survey.

Table 6 describes the reason towards the disinterest in SelfMed. Although there is a higher percentage of them who doesn't want SelfMed because they believe they are independent and portion of it due to high cost only 3 out of 42 respondent given reason of family help.

Table 6: User's reason for disinterest in the SelfMed.

Variable	No. of respondents	Percentage
Reasons behind disinterested in SelfMed	Independent	33
	Family help	3
	High cost	6

Source: Author's own elaboration using the primary data collected via survey.

Findings

To summarize, according to the replies gathered from patients/users, most users suffer from hyper/hypotension, high cholesterol, diabetes, anxiety, and depression and use medication for it. They often have 1-5 types of diseases and use 1-5 types of medications, 6-10 tablets, 1-2 times per day. Most patients manage their medication schedules on their own and do not feel the need for assistance. Most respondents spend €400 on living expenses and make double the money, from which they spend €100 on medications/health costs while their budget is less than €55. Most of them reside in their own homes, and a substantial amount (35.5%) rely on day care centers and other family members for medication management help. Regardless of their options to proper medication adherence, 72% are willing to buy the SelfMed to simplify their complex medication regimen not only for them but for another member at their household too. Based on the comments, SelfMed has received a favorable response from users and intends to fulfil a gap in the Portuguese market. It is apparent that SelfMed may make many users' life simpler, regardless of their living situation or family support.

3.2 Company's responses

The Table 7 below shows the responses from care institution that are engaged in providing care to the elderly people. As it stands from the responses, out of 29 total companies, majority are doing business for 5 years to 20 years, which totals to about 60 percent of the total. There were 5 companies with more than 30 years in the service. The number of clients served by these companies ranged from 1 -

160, with majority falling under 1-40 range which accounted for about 65% percent. The number of carers employed by these company range 1-100, where 81.6% has between 1-25, 10.2% has 26-50 people working for them as a (86.2%) full time staff. The responses also dive provided, whether the employees are full time or part time, are there any emergency staffs to cover for emergencies, where 72.4% responded having emergency staff to cover in case of there is a lack of staff.

Table 7: Basic information of the company.

Variables	No. of respondents	Percentage	
Years in business	Less than 5 years	1	3.4
	5-10 years	4	13.8
	10-15 years	3	10.3
	15-20 years	11	37.9
	20-25 years	5	17
	25-30 years	0	0
	More than 30	5	17
No. of clients	1-40	19	64.6
	41-80	7	23.8
	81-120	2	6.8
	121-160	1	3.4
Number of Carers	1-25	24	81.6
	26-50	3	10.2
	51-75	1	3.4
	76-100	1	3.4
Types of employees	50% part-time &50% full time	1	3.4
	100% Full time	25	86.2
	100% part time	1	3.4
	Other	2	6.8
Cover staff	Yes	21	72.4
	No	11	78.6

Source: Author's own elaboration using the primary data collected via survey.

Table 8 below explains Care institutions or companies based on their type of services. According to the data, 43.2% of them were day care center, 30.6% domiciliary service provider, 23.8% aged care service provider and only 3.4% of retired home has responded the questionnaire. The main service companied provide to its clients is medication management (~89%). To add further, 100% of the

institution-based clients' needs help manage their medication. Study also puts light about Covid-19 pandemic and its effect on company and patients. Result shows that most companies were not affected by Pandemic to provide services to their clients. They used hybrid method of domiciliary and residential based services and other used either domiciliary along with the help of family friends to manage medication for their clients or fully institutional based services to tackle it.

Study further focuses on the reasons for clients being non adherent. Responses are diverse, 30.6% of their clients lives alone and lacks helping hands, 24% suffer from cognitive impairment, 17% forgets to take them and 6% of them have difficulty understanding it. Which again links with living alone and lack of helping hands. Unlike multiple literature showed earlier in literature review only 3.4% do not take their medication due to their economic situation and same % feels all the reasons contributes to it.

Table 8: Services provided by care institutions.

Variables		No. of respondents	Percentage
Company based on their services	Aged care services	7	23.8
	Domiciliary service	9	30.6
	Day care	12	43.2
	Retirement home	1	3.4
Services company provide	Medication administration	23	78.2
	Check-up	2	6.8
	Private care	2	6.8
	Other (All of the above)	2	6.8
Effect of Pandemic in service	Provided exclusively in organization	6	20.4
	Exclusively domiciliary services	8	27.2
	Domiciliary with the help of family/friend	4	13.6
	Domiciliary and organization both	11	37.4
Pandemic and effect in med administration	Nothing changed	20	69
	Obtain medication	1	3.4

Variables		No. of respondents	Percentage
	Have employee to provide services	4	13.7
	Client not able to comprehend the medication schedule	3	10.3
	Customers are becoming skeptical about this type of service	1	3.4
Client's comfort with home visit	Yes	29	100
Client with need of medication administration	Yes	29	100
	No	0	0
Reasons for non-adherence	Lack of help/live alone	9	30.6
	Cognitive impairment	7	24.1
	Unable to understand prescription	6	20.7
	Forgetfulness	5	17.2
	Economic situation	1	3.4
	All of the above	1	3.4

Source: Author's own elaboration using the primary data collected via survey.

In table 9, we can see that 62.1% of people 100% institutional based clients require medication administration. 62% of their clients takes 6-10 types of medications and 34.5% of them takes 1-5 types of medications, 55.2% takes 3-4 times a day and 31% takes 1-2 times a day. A carer spends less than an hour to manage their per patient's medications.

It is associated with the cost of less than €350 for their patient for the service per month. In that service, over 51% obtain medications for their patients too and rest managed by patient themselves. It is visible that, pill boxes are widely used (54.4%) alternatives for medication management along with the informal carer's assistance even in the care institutions. The response seems highly positive with regards to the SelfMed proposed solution to administration of the medicine. Out of the 29 companies, 11 responded with automatic pill dispenser as an approach to administer medication and interested in

SelfMed. This accounted for about 40% interest which is significant given the number of survey participants.

Table 9: Medication management regimen and interest in SelfMed.

Variables	No. of respondents	Percentage	
Type of medications client take	1-5	10	34.5
	6-10	18	62.1
	More than 15	1	3.4
Times per day	1-2	9	31
	3-4	16	55.2
	5-6	3	10.3
	More than 6	1	3.4
Time consumption for pill management / patient	Less than 1 hour	22	75.9
	1-2 hours	5	17.2
	3-4	2	6.9
Service cost	Less than €350	26	89.7
	351-€450	1	3.4
	€451-€550	1	3.4
	More than €651	1	3.4
Prescription refill	Buy from pharmacy	15	51.7
	Patients buy themselves	9	30.6
	Protocol with pharmacies	5	17
Alternatives used for med administration	Pill boxes	16	54.4
	Family and friends	5	17
	Home visit multiple times per day	2	6.8
	In home care services	3	10.2
	Other (Pimpack)	3	10.2
Effective approach for clients	Automatic pill dispenser	11	37.4
	Video call	0	0
	Notification to carers via mobile app	4	13.8
	All of the above	7	24.1
	Other	7	24.1
Interested in SelfMed	Interested	11	39.3
	Neither interested nor uninterested	11	39.3
	Totally uninterested	4	14.2
	Uninterested	2	6.6

Variables		No. of respondents	Percentage
Smart band for reminder	Yes	17	58.6
	No	4	13.8
	May be	8	28.5
SelfMed for remote access in any situation	Totally agree	4	13.8
	Agree	15	51.7
	Neither agree nor disagree	8	27.6
	Totally disagree	1	3.4
	Disagree	1	3.4
Efficient option for med administration (patient& carer)	Dispenser	10	34.5
	Bracelet	7	24.1
	Mobile app	0	0
	All the above	7	24.1
	None of the above	7	24.1

Source: Author's own elaboration using the primary data collected via survey.

Findings

Based on the survey, responses collected from care institutions, we can draw a conclusion that more than 60% of the people use care institution services takes 6-10 types of medications, 3-4 times per day, which takes them around an hour to manage medication per patient per day. In contrast, in user case it was less medication and less frequency. Clients out of 28, who need help with medication administration, 14 lives in their private home, 9 with family and 5 in aged care home to satisfy the need. Out of those, 14 living in their private home, 10 people are interested in having SelfMed. Based in the fact, those people also have financial ability (€200-€800 earning per month) to pay for it and willing to pay for it by themselves. The cost of the medications for patient cost €350 per month. Hence, company believes that SelfMed can be an effective solution for their clients with around 40% acceptance rate and same goes for neutral. Besides, having a smart band for alert along with pill dispenser might reduce the workload off the carer to increase efficiency at workplace.

However, we cannot ignore the fact that we do also have significant number of people consider themselves independent and shows uninterest towards the SelfMed currently.

Accordingly, below in section 4 will be a preliminary marketing plan to create a roadmap for an emerging start-up SelfMed Lda.

Section 4. Marketing Plan

4.1. Executive Summary

An automatic pill dispenser is mostly used to facilitate the medication complexity, avoid past medication errors, drug abuse, non-adherence, non-compliance to the prescription aiming to reduce unnecessary hospitalization and health cost for patient and its family members. Even though, the world is gradually transforming into the tech solution, when it comes to Portugal and most of the European countries they seem to stick with old fashioned lifestyle which tends to overload family members (informal carers) and formal carer (carer, nurses) with extra work burden resulting burn out, unnecessarily expensive and for patient itself lack of privacy and expensive (in home care services) and obligation to move to aged care institution to be monitored and cared. Consequently, expensive, inefficient, and unsecure are the some of the main effects of medication non-adherence in older person. To help our valued customer save time, money, and gain peace of mind SelfMed offers an automatic pill dispenser with the capacity to store, dispense, alert and track at least a month of supply to ease their complex medication regimen safely and securely at the convenience of their private residence.

The objectives of SelfMed are to eradicate the previous repetitive medication errors, provide independency and pride back into their lives, improve the health of clients and improve the quality of lives which leads to healthy and graceful aging, peace of mind to their carer and eventually, reduce the cost of health services for an emergency admission for non-adherence to the medication regimen.

The mission of the project is to provide a simple solution to a global issue of non-adherence of medication by our elderly citizens, who is also our main target group, to use within their comfortable residential place without even necessarily having someone to help in a daily basis.

Our vision is to develop successful and profitable pill dispenser manufacturing and distributing company, aiming to provide high quality customer service and technically and digitally superior products in competitive price that meets the need of our customers, fulfilling the promises set by our company by complying the rules of legal entities of the country to achieve high customer satisfaction along with the objectives of the company nationally and internationally.

The marketing and strategic plan will analyze the industry of an automatic pill dispensers in Portugal and abroad and its demand in the market. We have carried out SWOT analysis to analyze the internal environment and external environment to find out the opportunities and threats in the industry and PESTEL to analyze the internal diagnosis.

The company will enter Portuguese market through E-marketing and digital marketing. It will have fix price. To maximize the sales and profit it will sell the product worldwide via three channels, direct sale, internet sale and licensing sale (in a long run).

The company will be funded by its sole shareholder whole year and planning to achieve breakeven in its third year and profit from fourth year onwards. To raise funding, health and technology advancement subsidies will be applied in national and international level. The company will spend certain percentages of its sales in research and development to develop the quality and functions of the product to assure the company can be competitive and have profit. We are aiming to increase net profit and economies of scale with global recognition in long run.

4.2. Company Description

SelfMed commenced in 2017 as part of the Demola North Portugal programme. The objective of Demola North Portugal is to establish a connection between enterprises and university students to develop new solutions to their daily challenges at work to increase productivity, reduce costs, and make more efficient use of existing resources. SelfMed is a solution offered to OldCare Lda., who has struggled to find the best solution for medication adherence and efficiency at the workplace to reduce the work burden, reduce unnecessary costs, and maximize the use of their time to provide superior services to their clients in their homes. The objective of the SelfMed is to provide a simple, cost-effective solution to the global problem of non-adherence to prescribed medication at the patient's residence.

SelfMed is a limited liability company that intends to launch in 2023. The company's principal CAE in Portugal will be 46690 which will permit SelfMed Lda. to Wholesale of medical equipment. The company intends to start its operations in Braganza, Portugal.

The company will provide in-home medication management that is both efficient and effective, with a particular focus on facilitating individuals who have intricate dosing requirements. The company will offer

an automatic pill dispenser that dispenses medication at the pre-programmed time. Both a sound and a light are built into the dispenser itself for alert. Similarly, a mobile application that serves as a reminder, and access to a historical adherence report. Also, monthly medication refill by qualified professionals for customers to remain compliant with their medication regimens.

Laxmi Bhandari, a young entrepreneur, is the only executive for the company. She is currently pursuing her master's degree in Innovation of Products and Processes in Instituto Politécnico de Bragança (IPB). She accomplished her bachelor's degree in International Business Management in 2019 from IPB. She has been researching as a participant for Demola North since 2017 in a "SelfMed, an Automatic Pill Dispenser" project and continues the project with determination and perseverance to market the product up to the date. Laxmi Bhandari will be responsible for the company's daily operations. In addition, the organization will require an IT professional and front office manager to provide optimum services to its clients.

4.3. Mission

SelfMed's mission is to provide a simple yet effective solution to combat medication non-adherence and non-compliance.

4.4. Vision

SelfMed's vision is to create a globally recognized pill dispenser firm that enables its users in living healthier and more independent lives.

4.5. Value Proposition

SelfMed provide simple yet effective solution to combat non-adherence and non-compliance to the medication whilst connecting patient with its carer/s within the comfort of their house. (Safety, security, serenity, reliability, affordability, accessibility, independence)

4.6. Legal Framework

SelfMed will be a limited liability company aiming to establish in 2023 as a start-up. The Company has 1 founder, Laxmi Bhandari. In Portugal Private Limited Company (Lda) is popular with foreign investors wishing to do business in Portugal. Foreigners may own all the shares in an Lda. company. Which provides a quick set-up process which is time saving and helps to get the business started immediately. There is a requirement of certain documentation that needs to be fulfilled to get registered. Following are some documents necessary for the registration purpose.

- Portuguese residency card,
- A Tax Number from the Portuguese Tax Office (NIF),
- A Social Security Number from the Portuguese Social Security (NISS)
- Prepare the articles of association,
- Reserve a name for your company.,
- Register for VAT and social contributions.,
- Open a bank account for minimum share capital and further financial transactions.,
- Apply for the necessary licenses, certificate and permits available in the medical equipment business.

All above mentioned requirements are easy to be fulfilled to open a company in Portugal. The process to register a company is also quite simple in Portugal for this type of company. There are three methods of setting up a company in Portugal. Two simplified ways (online and on-the-spot) and the

traditional method. We are hoping to choose the Online Method. Setting up online (Empresa Online) allows these types of Portuguese businesses to be set up and registered over the internet with 1-2 days for a cost of €360. An electronic certificate is required as a proof of the registration to start the company.

4.7. Marketing Environment Analysis

4.7.1. Internal Diagnosis

During an internal analysis, different aspects of our company, such as our strengths and weaknesses, are evaluated. SelfMed will be better able to concentrate on the aspect of further planning if it is aware of both the company's internal strengths and weaknesses.

4.7.1.1. Clients

We aim to supply low- to high-end customers who have to take multiple tablets each day as part of their prescription, who live alone with limited or no helping hands (the patient itself), whose family and relatives live with them or far away from them due to their personal or professional lives but are looking for a simple solution to help their loved one (informal carers), who work in care institutions and want to increase the work efficiency at work whilst also making the most of the resources they have available. Similarly, wholesale distributors who specialize in the sale of medical equipment or other related products.

4.7.1.2. Suppliers

Manufacturing companies are the main supplier of our business. We have entered a contract building process for the manufacturing of the final product with China, Canada, and Portugal. The terms of the contract are contingent on the cost benefit, quality of the product, and guarantee that the company can provide, as well as the availability of more recent technology for an upgraded version. To ensure timely delivery of our products, the shipping businesses that we work with will also be an important stakeholder in our company. In the end, distributors are an additional important product disseminator that SelfMed utilizes to penetrate and grow product availability in the market.

4.7.1.3. Partnership

Since the beginning of the project, it has been participating in various pitching and funding contests to raise money for prototype building testing. A few contests were won, and a small amount of fund was raised which will be invested to develop the project. In addition to this, the initiative has partnered with the Instituto Politécnico de Braganca (IPB) to conduct research, gain knowledge, and make use of laboratories. In addition to that, OldCare is another partner that is helping with the study of the Portuguese market, the evaluation of needs and requirements, tests, awareness sessions, and

training, as well as the dissemination of the product in Portugal and the countries that border it, to meet the demand in those countries. To add further, Moldwelt can be another potential partner that could help company for the construction of preliminary 3D prototypes, injection moulding, and finally the finished product in Portugal. In the same manner Ledlamp will be another potential partner who can prototype, manufacture, and assist us with patent writing for our innovation in the future.

4.7.1.4. Competitors

Few direct and indirect competitors exist in the market we intend to enter. Similar products are unavailable for purchase on the Portuguese or European markets. The following table illustrates the comprehensive analysis of the SelfMed's competitive landscape.

Table 10 below demonstrates an automatic pill dispenser similar to SelfMed, is a popular trend for managing complex medicine regimens while communicating with informal and informal caretakers. Based on an Internet of Things (IoT) technology, these totally autonomous devices are designed to promote active ageing. Some of them also have a mobile application to remotely alert, monitor, and track medication adherence, as well as receive early warning of any emergency. In addition, it may store up to 90 days' worth of medication, depending upon the manufacturer. Such as Hero, Medacube, Pria, Pillo, Livi, Philips, Rxpanse are some of them which are capturing the market now. A glimpse of it can be seen below on table.

Table 10: Direct competitors of SelfMed.

Features	SelfMed	HERO	PILLO	LIVI	PHILIPS	MEDACUBE
Pill dispenser	✓	✓	✓	✓	✓	✓
Pill storage	30+ days, different types	15 90-days, 10types	28 doses	15 doses	60 doses	90 days,16 types
Mobile APP	✓	✓	✓	×	×	×
Webpage	✓	✓	✓	✓	×	✓
App alerts, the moment they miss a dose	✓	✓	✓	✓	✓	✓
Caregiver notification	✓	✓	✓	✓	✓	✓
24/7 Support	✓	✓	✓	✓	✓	✓
Professional pill refill	✓	×	×	×	×	×
Early dispense	✓	✓		✓	✓	✓

Features	SelfMed	HERO	PILLO	LIVI	PHILIPS	MEDACUBE
Battery backup	24 + hours	x	6 hours	8 hours	18 hours	24 hours
Language preferences	✓	x	x	x	x	To record commands
Cost	€99.99 upfront/19.99/month	€82 initiation fee+€25/month	€246+ €8.21/month	€1231 or €82/month	€49.24/month	€1,899 onetime

Source: Author's own elaboration.

However, there are number of products and services that seemed to be trending toward improving medication adherence. Which are also indirect competitors of SelfMed. which are available in Portugal and EU. The time-honored fashion that is enjoyed all around the world is the pill organizer (pill boxes with labelled day of the week and part of the day). which are typically accessible seven days a week with sessions occurring three to four times a day. It is up to the client or their informal or official caregiver to fill it out to assist the client with organizing their prescription and taking it in the manner that was recommended. When viewed from a more favorable perspective, these containers are lightweight, portable, relatively compact in size, long-lasting (primarily composed of plastic), readily available on the market, and inexpensive. On the other hand, these pill boxes do not have any sort of locking mechanism. The medication is readily available to everybody, and it can be taken with little effort. In a similarly, there is a significant possibility that the pills will get mixed up if not open carefully. In a related manner, there is no mechanism that can remind or alert patients when it is time to take their prescription. As a result, it is nothing more than a box in which all the necessary medications have been restored and assembled for a patient to use; likewise, there is no tool to monitor whether the patient has really taken the medications. On the other side, it may come in convenient for those who remember to take their medication but struggle with dexterity and Parkinson's disease.

In addition to that, semi-automatic pill dispensers are another product that has been successfully penetrating the market. When it comes to the storage and dispense of medications, these devices have a relatively higher capacity than pill boxes do. They are powered by batteries and may emit a sound to remind patients to take their prescription at their pre-programmed time up to six times a day. Additionally, they have the capability to store medications for up to 28 days. It is attainable via internet purchase (Ex; amazon). The price of the product is approximately €150 and there are additional shipping costs, which makes it unaffordable for most of the people. Regrettably, no further interfaces have been added to it so that it can keep track of the medicine intake. Despite this, individuals with lower prescription will benefitted from it compared to pill boxes because it is locked device, and it notifies with a sound alert below Table 11 illustrates it.

Table 11: Indirect competitors of SelfMed.

Features	PILL PRO	Ezy dose Medtime	GMS Med -E-lert
Type of pill dispenser	Pill box	Pill box	Semi- automatic with alarm
Pill storage	7 days	30days	28 days
Additional service (carer notification, pill refill,)	x	x	x
Alerts to take pills	x	x	✓
Cost	€4.90	€50	€146

Source: Author's own elaboration.

Besides that, telecare services and telehealth services are another approach that has been experiencing significant growth. Additionally, it can firmly establish itself in the European market and occupy a saturated market. It became the predominant method of health management both during and after Covid-19, and it is gaining recognition on a worldwide scale.

4.7.1.5. Porters 5 Forces

The analysis of Porter's Five Forces is a framework that helps with the assessment of the level of competition that exists within a certain industry. It is extremely helpful when beginning a new business or getting into a new industry sector to have this insight. According to this model, competitiveness is not solely derived from the companies with which one competes. Instead, the level of competition in an industry is determined by five fundamental forces: the threat of new entrants, the bargaining power of suppliers, the bargaining power of buyers, the threat of substitute products or services, and the rivalry that already exists within the sector. The strength of these forces taken together is what determines the potential for profit in an industry and, consequently, the attractiveness of that industry. If all five factors are operating at high levels, practically no company in the industry generates returns on investments that are appealing. However, if the constraints are relatively light, there can be potential for higher returns. In the following paragraphs, we will examine how each force influences SelfMed and the business that it can offer to the market.

Threat of New Entrants

Currently, SelfMed is in the process of development; at this point, the designing of the product is carried out to produce a 3D model of the entire prototype so that it can be tested in a laboratory with actual customers (primary, secondary, and tertiary). Which is intended to be accomplished by the end this year. The subsequent process will be to have fully functional product and carry out field testing and validation. To successfully complete all these phases typically requires a significant amount of time,

money, attention, and other resources. As a result, the possibility of new competitors entering the industry that we are now operating in is modest, and while it is not impossible, it also won't happen very quickly. However, barriers to entry into the market may include economies of scale, a lack of large capital investments in manufacturing, marketing, and research and development, challenging government policies for approval, limited access to distribution channels, lower people's purchasing power, and medium customer loyalty. Consequently, competitors can easily overtake us if they have significant financial resources, an extensive network, well-established strategic relationships, and excellent distribution channels.

Bargaining power of Suppliers

Even though the cost of the product is highly dependent on the quality of the electrical, electronic, mechanical, and plastic components and that these costs tend to be affected by the external environment, over which medical equipment companies have less control. When importing a product, it is important to consider not only the cost of transportation but also the cost of insurance. However, the availability of numerous suppliers who supply everything from raw materials to finished products at prices that are competitive, in addition to the possibility of relocating the manufacturing plant to a more economically advantageous location in order to cut down on the costs of production and operation, all contribute to a medium level of risk in bargaining power on the part of the suppliers, unless there is an agreement in place that might contradict the situation.

Bargaining Power of Buyers

There is hardly much room for negotiation with the customer. Even though Portugal is a cost-conscious country with a basic pay of €705 (government is planning to raise to €760 from 2023) with low purchasing power there are no direct competitors that can offer the same product and services at a lower price than we can. However, customer loyalty is only minimal; if the price and quality of the service are not up to their standards, customers may choose to utilize a different approach. Since the rate of literacy has increased, and the internet has become more widespread, consumers now have a greater ability to compare items, including its characteristics, advantages, and pricing, with other options that are readily available to select the option that is most appropriate for them. Nevertheless, SelfMed is the only firm in Portugal and the EU that now provides a comprehensive answer for the problem of simple medication administration. Furthermore, the simplicity of its user interfaces, affordability and cost-effective price when compared to employing a caretaker for the same function, and absence of direct competition all contribute to a lower customer's ability to bargain for a decent deal.

Threat of Substitute Products

There is not a single automatic pill dispenser available on the market in Portugal or anywhere else in Europe as of right now. There are, however, other options available, such as medicine organizing boxes (which can be found in Chinese stores and pharmacies) and semi-automatic pill dispensers (which can be found on Amazon and eBay), which tend to solve the same problem. Hence, there is a medium risk that substitute goods may evolve over time, since each of which offers an alternate method for addressing the issue of medication management.

Competitive Rivalry

This task force examines how intense the current competition is in the marketplace. The degree to which competition is severe is dependent on the number of existing competitors as well as the capabilities of each individual competitor. In our scenario, we do encounter some indirect competition from the companies I described earlier. Nevertheless, there are currently no direct competitors selling the same product that are available on the market in Portugal or the EU as of this date. Many of our direct competitors are based in the United States, Canada, and Australia; but, due to the intricate technological nature of their products, they are not sold on the market in the European Union. Therefore, as of right now, SelfMed will be the first company to launch the automatic medication management assistance that enables patient to stay at home as well as allows to obtrusively monitor remotely with a mobile application by a family member or authorized carer to identify the need for assistance and early potential warning signs. Until now, SelfMed has been the only company that has been able to do this. As a result of this, we believe that there is still a low level of rivalry in the industry that we are going to enter with the ecosystem that we provide in comparison to the other vendors.

Considering the information stated above, it appears that entering and penetrating our product into the market will be difficult, as is typical for new enterprises. Nonetheless, with the appropriate market and sales strategy, it will be possible to capture market with its comparative advantages (integration of user data, multi-interfaces in multi-languages, exporting user reports (medication adherence report), remote control of the dispenser (update of number of pills, without needing to visit the client's house), real-time alert, alarms, and notifications, shareable device, location benefits, local products, niche market targeting, and personalized local clients).

4.7.2. External Diagnosis

An external analysis looks at the wider business environment that affects our business. In this case, PESTLE Analysis will be used to understand, and external opportunities and threat associated with our business in target market and what steps can be taken to mitigate them.

4.7.2.1. PESTEL Analysis

To gain a thorough understanding of the external environment in which the company is going to operate a PESTEL analysis is carried out. In the following, we will examine how the various factors affect SelfMed and its company.

Political

Portugal, a home of 10.27 million people (as of 2022) is a democratic, politically stable, and peaceful country. Despite Portuguese being the country's native language, English is also widely spoken and recognized as a language for conducting business. Additionally, Portugal is a secure nation that possesses excellent logistic infrastructures, relatively sophisticated communication networks, and a business climate that is welcoming. Correspondingly, it is a member of both North Atlantic Treaty Organization (NATO) and the World Trade Organization (WTO), in addition to being a member of the European Union and the single market Which works as a backdoor into a market that has 250 million people all over the world, particularly in its former colonies (Brazil, Angola, and Mozambique - the Lusophone market), and it is easy to expand. Because of this, overseas trading will become simpler, and this factor contributed to our decision to establish our company headquarters in Portugal. Furthermore, it is not hard to overlook that Portugal has been encouraging and supporting young entrepreneur by providing them with financial, material, and knowledge aid. In a similar manner, having laws and tax rules that are flexible for entrepreneurs can stimulate them to start new businesses even in a foreign land.

Economical

Portugal's economy has gradually recovered from the 2008-2013 crisis. As the economy improves, we will have more momentum to launch our company. Portugal's Gross Domestic Product (GDP) growth rate is 2.5% (2019), 7.6% (2020), 3.9% (2021e), and 4.8% (2022). (2022e). Growth in comparison to the EU-27 is 2.2%, while the EU-27 growth rate is 1.5%. Similarly, export growth in Portugal is 4.3%, whereas the EU-27 average is 3.5%. (2018-2019). Similarly, national export GDP is 44% in 2019 compared to 49% in the EU-27. Agriculture generated 2.07 percent of Portugal's GDP in 2019, while industry contributed around 18.89 percent and the services sector provided approximately 65.52 percent. Furthermore, gross fixed capital formation is 8.7% in 2018-2019, compared to 7.9% in the EU. Additionally, the unemployment rate in Portugal is 7.2 percent, compared to 7.5% across the EU-27 by

2020. In addition to that, people's purchasing power improved somewhat in 2020, from 0.57 to 0.58 USD. Moreover, according to the Ease of Doing Firm database of 190 countries, Portugal ranks 39th in terms of starting a new business with uncomplicated cross-border trading. In 2020, the average inflation rate in Portugal fell by roughly 0.12% compared to the previous year, which was 0.3%. According to the data, the overall export value of medical instruments or appliances from Portugal in 2019 was 93.6 million euros. According to Market allied research, the global automatic pill dispenser market was valued at \$2.5 billion in 2020, and is projected to reach \$5.4 billion by 2030, growing at Compound annual Growth Rate (CAGR) of 8.2% from 2021 to 2030.

Socio-demographical

The age distribution of Portugal's population in 2020 was as follows: 0-14 years: 13.58 percent, 15-24 years: 10.94 percent, 25-54 years: 41.49%, 55-64 years: 13.08 percent, and 65 years and older: 20.92%. 66.3% of the population resides in urban areas. In 2020, the population growth rate was -0.25%. The birth rate was 8.1/1000 people, while the mortality rate was 10.8/1000. Even though the death rate was higher than the birth rate, the elderly had a larger dependency ratio due to a longer life expectancy. The dependency ratio for youth is 20.3% and for the elderly it is 35.5%. In 2012, the average life expectancy in Portugal was 82.7 years, but in 2018 it was 81.32 years and expected to rise significantly. Portugal is also regarded as a country with highly qualified workers. It is conceivable since Portugal's literacy rate is higher than that of many other nations. In 2018, the literacy rate in Portugal was 96.14 percent, an increase of 1.66 percent from 2011. Which helps maintain healthy attitudes and a conscientious and prudent lifestyle in academic and everyday activities.

Technological

Technologically, Portugal has begun providing 5G steerage through the installation of fiber optic cable. This has facilitated numerous technical business sectors. There is ongoing IT development, government funding of technology, software upgrade, and technological transfer. Our technical sector becomes more innovative and desirable as a result. Similarly, technical literacy among the elderly is growing in the Covid-19 period. Likewise, the demand for tech healthcare solutions also surging. Thus, SelfMed, an IoT product, will be able to capture the Portuguese market and will be easy to further develop the product and services in the future.

Environmental

In Portugal, the government and corporate sectors are cognizant of the effects that environmental elements such as climate and weather can have. The government has established various

environmental safety regulations to emphasize recycling to reduce the negative impact on the environment and human health, and to prioritize sustainable initiatives. To maintain environmental safety and sustainability, SelfMed stresses the use of recyclable or long-lasting items and processes.

Legal

Legally, Portuguese law permits even foreigners to start their own company as a shareholder in Portugal. As Portugal is still recovering from the severe recession that occurred between 2008 and 2013, it has recently enacted flexible laws for investors to invest in Portugal with attractive incentives not only for their business but also for their permanent residency for themselves and their families. Golden visa, self-employed individuals, etc. In addition, other laws are enforced in the Portuguese corporate environment. Including intellectual property rights to safeguard IP, copyrights law, and licensing. Similarly, employment law, non-discrimination law, disability law, gender equality, customer and employee safety, and minimum wage legislation have all had a direct impact on businesses. Product and trade restrictions, health and safety standards, and compliance with EU laws and commissions are necessary for monopolies to practice equity, prioritize, and promote unbiased personnel selection decisions

To summarize, the PESTEL analysis reveals that the social component (growing aging population in Portugal and the EU, increasing life expectancy, and high dependency rate among the elderly) presents opportunities for a business such as SelfMed to expand nationally and internationally. In addition, the increasing number of senior citizens who use smart phones and the internet is also favorable for the growth and execution of the business. In addition, the opportunity and financial aid or budget allocation from the Portuguese government and the European Union to encourage and motivate young entrepreneurs to improve the quality of life of older people with assisted active ageing solutions provides more opportunities and market recognition for businesses to launch with minimal risk of failure in their early stages. However, the open and single market and swift trade border crossings pose a threat to new entrants that they will enter and dominate the market before we do.

4.7.3. Strategic Potential Analysis:

To understand the internal health of the business the SWOT analysis has been carried out. Below we can see.

4.7.3.1. SWOT Analysis

SWOT stands for strengths, weaknesses, opportunities, and threats. A SWOT analysis is a technique used in strategic planning and strategic management that can assist an individual or organization in identifying their respective strengths, weaknesses, opportunities, and threats in relation to the planning of a project or business competition. The term "situational assessment" or "situational analysis" may also be used interchangeably instead of SWOT. To evaluate the internal health of the company strengths and weaknesses are laid out to identify the advantages and disadvantages. On the other hand, opportunities and threats are external factors of the framework to analyze the external health of the company in compared to the competitors. Table 12 below demonstrates the SWOT analysis of SelfMed Lda.

Table 12: SWOT Analysis of SelfMed.

Strengths	Weaknesses
Strong partners (IPB, OldCare Lda, Ledamp)	
Reliable product for automatic pill dispensing	Lack of resources (human, capital) and funding opportunities
Easy user interface with refill service	
Options of multiple languages	New in market
Small, easily transportable	Sceptical client's behaviour
Customizable for any drug time	No previous experience
Reminder alert via sound, vibration, lights (suitable for blind and deaf people too)	
Potential market	
Opportunities	Threats
Access to advanced technology and qualified people	Entry of another competitor
Pensioners go to place	Invention of alternatives (food with medicinal effects, injection, etc.)
Increase in life expectancy	Rise in cost due to inflation
Number of ageing populations is growing steadily	New rules and regulations regarding the product and service we are offering
Government's interest to improve older adult's quality life	Purchasing power of people may change due to inflation rate
Tech literacy in older adults is growing	

Source: Author's own elaboration.

In conclusion, the SWOT analysis demonstrates that we have a robust, innovative, and comprehensive ecosystem to offer our valued customers that has not yet been established on the European market. In addition, certain partners are actively involved in identifying the needs and requirements of users, developing the products and services, and strategically implementing them to reach a bigger market. As we are relatively new to the market and lack relevant experience, it will be challenging to persuade individuals and businesses to make a purchase. However, the market need for technology-based solutions are increasing simultaneously with the ageing population and medication non-adherence. Hence, we strongly feel this is an opportunity to reach these clients by providing the appropriate solution to simplify and destress their lives.

4.8. Strategic Marketing Objectives

- To launch the product,
- Attract new clients,
- Sale at least 25 pill dispenser per month,
- Internationalization of the SelfMed,
- Increase brand awareness,
- Increase company profit.

4.9. Market Strategy

The marketing strategy of the SelfMed will be developed to contact the appropriate segment of potential customers and convert them into our clients to cater to the needs of our customer base and strategically position our company to differentiate itself from our rivals. This will be done based on the value proposition that has been established. This is explained in more detail down below.

4.9.1. Segmentation

Demographics Segmentation

We target a segment of consumers irrespective of gender, ethnicity, caste, and religion, but based on age, income, geography, way of life, values, and interests. Hence, adults aged 18 to 85 are more likely to seek out these services to enhance their overall well-being.

Geographical Segmentation

Our goal is to reach out to those in metropolitan areas who need assistance. Also, areas have a greater proportion of senior individuals than people of working age. Many senior citizens in Braganza, Alentejo, for instance, require home care. These locations will be advantageous for the organization to pursue.

Behavioural Segmentation

We target people who have a busy lifestyle yet have their loved ones to be look after at home and find it very overwhelming to balance private and professional life. Hence, people who are more drawn towards technical, digital solutions to manage their loved one's medications and want to have all the information in their fingertips. Similarly, people who have a relatively well lifestyle where they can afford to pay for the products as well as low-end people who can't afford institutional care cost just to manage their medication by themselves.

Psychographic Segmentation

For this perspective we are targeting people who normally live in a care home to fulfill the need but looking for a cost-effective way to manage it by themselves. Looking at the situation of people it can make available with add on to make it luxurious for them. For instance, personalized service, includes multiple visits of nurses to carry out check-ups and for companionship for the elderly.

4.9.2. Targeting

We have separated our target audience into three distinct user profiles, with brief descriptions of each category and how SelfMed can assist with their medication complexity provided below.

Primary End-users group

The principal users are the older adults (60 and older) and those who live alone with many chronic diseases, cognitive impairment, and a complex daily prescription regimen. We intend to offer them with an Automatic pill dispenser to store, dispense, notify, and remind them of their pre-programmed medical schedule to take the right medication, the right dosages, and at the right time. Therefore, our key end-users will have a solution to their complex drug regimen, which will ultimately improve their quality of life by enhancing their overall health. Aside from that, this can save older individuals from wasting money on caretakers and hospitals due to improper medicine administration. Therefore, regardless of their age, they can lead independent, stress-free lives with dignity.

Secondary End-users Group

The secondary end-users of this initiative are formal and informal carers, 18+ (family members of primary end-users). We strive to provide loved ones with a sense of tranquility by enabling them to monitor their loved ones from anywhere, without compromising their personal or professional lives, using mobile applications. It will help them save money and time on travel, emergency hospital visits, and hiring caretakers. As a result, they can maintain good mental, physical, and psychological health to perform their private and professional life obligations. The product's application and website will assist them in monitoring their medicine intake and taking quick action. The interfaces are easy to use, anyone with a smartphone and the ability to read and write will be able to keep track of their loved one's health and medication adherence.

Tertiary End-users Group

Tertiary end users in this project include the nursing home, insurance company, pharmacies, hospital, general practitioner's clinic, and medical equipment distribution companies. We seek to assist caregivers by optimizing their use of time and other resources.

4.9.3. Positioning

There are two types of market position for a company:

- **Perceived** - not applicable as the product has not yet been released to the public.
- **Desired** - Novelty. SelfMed will be the first fully functional automatic pill dispenser on the Portuguese market, offering not only a pill dispenser but also a whole ecosystem. Which includes the product itself, the connecting service.

As a company, we desired to be regarded as a reputable and highly recommended seller of medical equipment in Portugal and in the EU with a high level of customer satisfaction and loyalty.

Section 5: Marketing Mix

5.1. Product/service

Pill Dispenser: Self-Med is an automatic pill dispenser that provides an easy, convenient, and economical way to handle complex medical regimes 24 hours a day, seven days a week with minimal or no assistance. It has a capacity to store, dispense, alert, and remind 15 different types of medication for at least a month supply of any size and shape, multiple times a day. The dispenser also has built in light and audio to provide alert.

Mobile Application: the objective of a mobile application is to be active 24*7 to facilitate communication between a patient and their formal and informal carer using their smartphone or tablet. Such connectivity help remain connected with an ageing parent or patient, receiving notifications for missing medications and medical emergencies, and obtaining real-time medication intakes/administration and patient status.

Website: the website provides in-depth information on the products and services SelfMed will offer. Similarly, it is to understand the need and requirements of our valued customers and stakeholders to provide with excellent customer service. Aside from that, the purpose of the digital platform is to share one's knowledge to assist other users or to invite new users with complete product information and how it can improve the quality of life of people.

These both user interfaces can be used to manage all patient information, edit all data, remotely operate devices, and constantly observe and monitor medication adherence. It also enables the visualization of data collection and log reports.

Intelligent Cloud System: intelligent cloud systems combined in a service will assist the elderly, informal caregivers, and formal caregivers with data analysis, daily reports, alerts/notifications, and user-specific procedures to make the client's daily routine easier.

Services: to avoid prescription errors, SelfMed will be refilled monthly at the client's private residence by a qualified and certified carer/nurse. They will also oversee prescription refills, as well as monitoring adherence to prescriptions and editing prescriptions in the platform with the client's permission. Similarly, basic check-ups for patients will be performed throughout their visit.

5.2. Price

The pricing and sales strategy of the SelfMed will vary depending on the Business to Business (B2B) and Business to Customer(B2C) market. SelfMed aim to provide B2B services and third-party organization aim to reach end users directly.

Firstly, targeting B2B market, the businesses to which we can sell our products will be those who focuses on elderly care at home and effective medication management and administration. Our target

groups are namely, companies who sells medical devices, aged care Centre, nursing homes, pharmacies, and insurance companies. SelfMed will sell the products, pill dispenser and smart bands to these types of businesses at the cost of €499. It is a one-time price where companies own the product after paying that value.

In the B2C market, above mentioned businesses will lead business. In this market products and services will be available in a subscription method. Services will be available in packages considering the different level of need in the market. There will be 2 packages available namely, care and comfort, The care package will be for basic care for medication only with pill dispenser and its fundamental services i.e., mobile application, webpage, software, and alert to take pills in the right time. Similarly, the medication management and connection between caregiver and client. Comfort package will be more advance than care package. It includes care package and services to keep track of the medication prescription as well as add on services. Finally, companion package will have comfort package along within home care services to fulfil the need of our valued customer. These packages will be available to final customers both with initial cost of € 99.99 with minimum of 1 year of contract. B2C packages can be seen below in the Table13.

Table 13: B2C packages.

Options	Care package	Comfort package
Pill dispenser	✓	✓
Mobile app	✓	✓
Webpage	✓	✓
Software update	✓	✓
Maintenance	✓	✓
Pill refill	✓	✓
Connectivity with F/I carers	✓	✓
Pill alert	✓	✓
Reminders	✓	✓
Track adherence to prescription	✓	✓
Analgesics alert		✓
Anti-anxiety pill alert		✓
NSAID alert		✓
Hypnotic pill alert		✓
Add on services		✓
Insurance		✓
Cost /Price	€19.99	€29.99

Source: Author's own elaboration.

The description of each element explained in the box are given below:

Table 14: Description of the products and services will be offered by SelfMed.

Options	Description
Pill dispenser	An automated device which holds (30+ days' worth of tablets of different shape and sizes), dispense, alert, and remind you to take medication as prescribed. It is small and easily moveable.
Mobile app	It is to see monitor the medication intake progress, keep track of fitness, health data, stay up to date with patient's medical history and connect between carer, patient, and informal carer.
Webpage	It is a details page to promote the products and services SelfMed offers to businesses and end-users. And get detailed information and necessary help to clients.
Software update	Software update for products and services will be notified to the clients to get upgraded for better version to acquire more functionality and ease.
Maintenance	Maintenance of the pill dispensers and software to verify fully functional condition all time long.
Pill refill	Carer from Aged-care agency will fill up the dispenser every month and keep track of the medication expiry dates, low medication alert to auto fill prescription.
Connectivity with F/I carers	Via mobile application, telecare service.
Pill alert	Alert to take medication at schedule time.
Reminders	For forgotten medication to take again as well as next dose time
Track fitness activity and data	Via mobile application to keep track of steps walked each day as well as whereabouts of the patient via GPS system
Track adherence to prescription	Via mobile application to see the rate of successfully full dose taken each day
Analgesics alert	Patient will receive message to cut down on unnecessary analgesics when they are not in pain.
Anti-anxiety pill alert	Patient will receive message to cut down on unnecessary anti-anxiety medication when they do not feel the need of it.
NSAID alert	Patient will receive message to cut down on unnecessary non-steroids medication when they do not feel the need of it.
Hypnotic pill alert	Patient will receive message to cut down on unnecessary non-steroids medication when they do not feel the need of it.
Insurance/warranty extension	The insurance/warranty extension plan is for the extra security for the product for component malfunction and low- level damage (minor breakdown, easily fixable damages)
Cost /Price	The value customer pays for the product

Source: Author's own elaboration.

5.3. Place

Our products will be available for sell in the physical store which will be situated in Braganza. Similarly, it can be easily obtained online, www.SelfMed.pt for B2B customer For B2C customer, company like OldCare Lda., a care institution will rent it to the final clients with needed added services depending on the client's requirement. Our perspective partner OldCare and their website www.oldcare.pt can be used for more information regarding the procedures and frequently asked questions (FAQs). For the case of other countries in Europe, appointed distributors lists will be available in the company's website to avoid the situation of falsification and easy purchase for each country.

5.4. Promotion

Public relations and industry media will help SelfMed over-all industry awareness plans. Feature articles and product reviews will help launch awareness. Direct mail to buying and influencing groups and ads in trade and consumer target publications will help with buyer impressions.

SelfMed will work closely with physicians and home nursing professionals to design its product and services. The importance of working with physicians is well known. As an outgrowth of their Physician, Pharmacist and Home Nursing Advisory Board, SelfMed will actively recruit physicians, pharmacists and home nursing professionals with sponsored events and seminars.

SelfMed will also market products by advertising on radio, television and the Internet, advertising in a variety of print media, and mailing or emailing a broad range of direct marketing publications, such as promotional materials, catalogues, and customer newsletters. It will be divided in a phase to balance the cost as well as try new approach to reach more clients.

In the First Phase (6 months-12 months) will outset abundant advertising in the media, such as newspapers, radio stations, television, internet (Google ad, yahoo ad), social networks (Facebook, twitter, integral) etc. Also, we intend to contact them directly by email, phone calls as well as take parts in seminars and fair trade. We will also send our brochure to those who are interested in our product through mail to give extra attention to the valued customers.

In the Second Phase (13 months- 18 months): We are going to dwindle the advertising by half and do the direct customer marketing through the customer who has bought our product.

In Third Phase (19 months-24 months): we are going to focus on referral bonus strategy, branding with YouTube videos and webpages and recommendations and referral from our customers. Similarly, we sponsorship of a program in radio will be strongly considered.



Figure 1: Promotional Poster of SelfMed.

Source: Author's own elaboration.

5.5. People

People at SelfMed will be comprised of everyone directly or indirectly working to reach the business goals. At the beginning, the team will have the only founder, Laxmi Bhandari, who will take the lead on business development ideas and human resources (HR) recruitment process.

Team will be composed of customer service unit, marketing and sales unit, quality control unit, information technology unit and account and finance units. Each unit will be led by the unit heads and will have additional employees working under their supervision. People at SelfMed will be approachable. They will interact with customers for all the questions, concerns, complaints on various platforms including digital and social media.

Although people here will be skilled for the job they are assigned to do, we will have employee growth plans including regular training schedules, knowledge sharing sessions, cross-departmental training to help employees to keep up with the new market trends and technologies as well as foster upward mobility.

In summary, People, regardless of title or position, will be the 'face' of the SelfMed to the end customers. They will be involved in all aspects of the business from selling the product and services to supporting the product and the services related to the product to the end customers.

5.6. Process

SelfMed will be committed to a management approach that is smooth, efficient, and customer-friendly when it comes to making products and services available to end customers. This can only be performed by having the appropriate processes in place behind the scenes to make this happen.

SelfMed Pill Dispenser will be available to buy by paying one-time fee or on a monthly subscription after paying the fixed upfront cost of €99.99. The subscription schemes are further divided into two categories: care, and comfort. Customers can choose the desired subscription model that fits their needs. Consumers will be able to request information about SelfMed Pill Dispenser and its features using company website or making a call to SelfMed office. Interested parties will be able to visit office and get a demo of the device and entire ecosystem built around it. Similarly, the product will be available for purchase online as well as from SelfMed sales department and other sales partners around Portugal and overseas. The list of sales partners and their contact information will be available in company website.

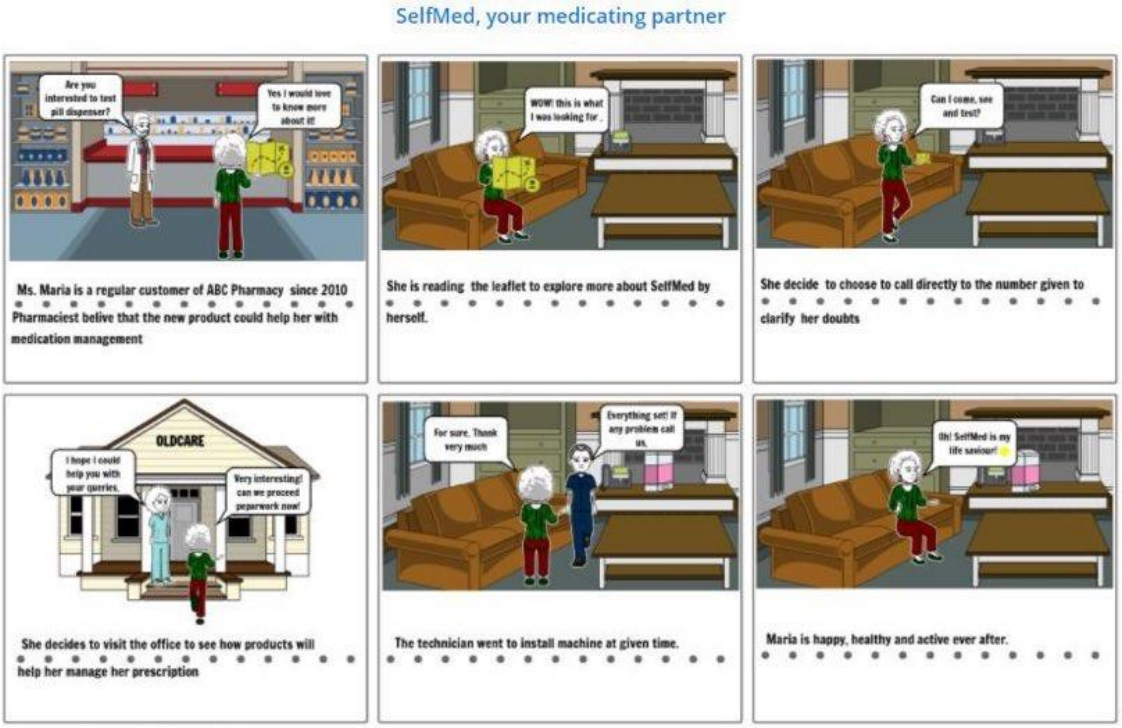


Figure 2: A Process of Awareness about the Product Targeting B2B Sale.

Source: Author's own elaboration.

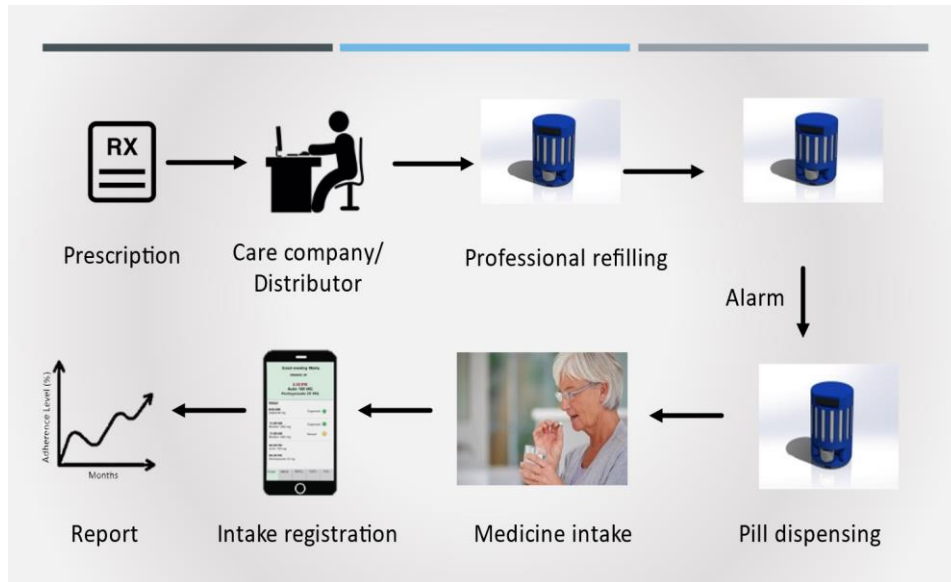


Figure 3: How SelfMed Service Works with B2C/B2B2C.

Source: Author's own elaboration.

5.7. Physical Evidence

Physical evidence provides tangible cues of the quality of experience that a company is offering. SelfMed will have a modest office space where clients and customers can be walk-in with or without appointments and discuss the business with employees or representatives. Company also will have a strong online presence with its website and mobile applications that can be used for information, enquiries or even managing the medications by the end users. Proof of business such as Company Registration certificates, business operation permits, Organization chart, Employee Qualifications and Degrees and associated partner information will be put on display in office as well as website. Business cards, Letterheads, Brochures etc. will be used in day-to-day business communications. Prospect customers, if interested in SelfMed pill dispenser, can do a demo of our device and its ecosystem during their visit at our office location.



Figure 4: Visiting Card of the CEO.

Source: Author's own elaboration.



Figure 5: Sample Letterhead of SelfMed.

Source: Author's own elaboration.



Figure 6: 7P's of Marketing for SelfMed.

Source: Author's own elaboration.

Section 6: Operation Plan

An operation plan has been created to achieve the strategic marketing objectives. To attain such goals, various activities will be devised and carried out to improve the product, place, pricing, and promotion sector. The estimated budget for completing such projects is also shown in the table below.

6.1. Short term objectives and actions

Short-term planning is usually considered to take 12 months or less to accomplish. They are steppingstones that aid in the achievement of long-term goals. SelfMed considers launching a product and attracting customers to be short-term goals. The organization will require multiple activities to accomplish this, which will also help to reach long-term goals.

We intend to launch our product during the first semester of company formation and sale at least 120 machines locally. In the first-year company will only work for 6 months as it will form in the middle of the year 2023. To achieve this, assistance of the marketing and creative departments, the company will carry out various promotion plans such as communication campaigns, social media campaigns, and discounts and limited sales to enter the market and evaluate consumer reactions to the product and services. Similarly, awareness campaigns aimed at patients, their informal/formal carers, and businesses, as well as mass media campaigns, will be carried out to determine which groups of people we truly resonate with. Also, to assess whether people are aware of the underlying issue (in our case, non-adherence) for them to take an action (buy SelfMed to be adherent). In addition to that, SelfMed aims to sponsor some programmes related to medication adherence to spread awareness in a larger group of people. Similarly, a wide media campaign will be initiated, and people's genuine experiences and recommendations will be used as advertisement, awareness, and persuasion to encourage others to consider SelfMed. Furthermore, attending appropriate trade fairs, events, can assist with forming commercial partnerships on a national and international scale.

6.2. Long term objectives and actions

Increased revenue is one of the long-term goals of SelfMed's cost analysis. Our goal is to sell at least 25 pill dispensers each month, and then steadily boost sales through expansion into international markets. Additionally, licensing and franchising opportunities will be examined as potential means by which the company can expand its operations into worldwide markets. In addition, the organization will make use of networking opportunities and will initiate the process of contract formation with distributors. For SelfMed to maintain operations, the company plans to sell at least one thousand pill dispensers to each of its distributors. As soon as the company can meet its target objectives, it will commence to take advantage of economies of scale and work on reducing overall the cost price of

product to benefit from higher profit returns. In addition, bulk buyers will be given a portion of the profit to encourage more sales, which is another goal of a company. All these tasks will be completed with the cooperation of the teams responsible for business development, financial management, and legal affairs.

Long-term objectives of SelfMed consists of increase sales. We intend to sell at least 25 pill dispensers per month and gradually increase sales via internationalization. Also, licensing and franchising will also be considered to promote internationalization of the company. Additionally, company will take advantage of networking and start forming contract with distributors. SelfMed aims to sell at least 250 pill dispensers to its distributor to sustain. When the company can keep up with the target objectives, company will take advantage of economies of scale and work on reducing the cost price of product to be benefitted from higher profit returns where bulk buyers will be shared the part of the profit to encourage more sales, which is another objective of a company. All these actions will be carried out with the help of business development team, financial team, and legal team.

6.3. Chart of Operation Plan

The operation chart, which is illustrated below in Table 15, shows how the predetermined marketing goals will be accomplished with the assistance of a variety of activities that the company plans to carry out within the allotted amount of time and with the assistance of various departments.

Table 15: Operation plan of SelfMed.

Objective	Action	Marketing-Mix Variable	Responsible	Period of implementation	Budget
1 – Launch a product	A1 – communication campaign	Promotion	Marketing Department	1 st Semester	€ 10000(for A1, A2&A3)
	A2- Discounts and limited sales	Promotion	Marketing Department	1 st Semester	
	A3- Social media campaign	Promotion	Creative team	1 st Semester	
2- Attract new clients	B1- Awareness programme	People	Creative Team	1 st semester	€4000(For B1, B2 &B3)
	B2- Mass Media campaign	Promotion	Creative Team	1 st semester	
	B3- Testimonies in the platform and recommendations	Product Service and	Technical Team	2 nd Semester	
3 – Increase	C1- Partnership with distributors	Place	Business Development	2 nd Year	€ 4000(For

Table15: Operation plan of SelfMed continuation.

Objective	Action	Marketing-Mix Variable	Responsible	Period of implementation	Budget
Sales			Team		C1, C2, C3 &C4)
	C2- attend events (fair trade, health hub/cluster)	Promotion	Business Development Team	1 st Year	
	C3- Mass media advertisement	Promotion	Marketing And Creative Team	1 st Semester	
	C4- Economies of scale (reduce cost)	Price	Finance and Operational Team	2 nd Year onwards	
4- Internationalization	D1-Partnership with international distributors	Place	Business Development Team	1 st year	€ 4000 (For D1, D2, D3 &D4)
	D2- Licensing	Place	Legal and Business Development Team	3 rd Year	
	D3- IP transfer	Product	Legal Advisory Team	3 rd Year onwards	
	D4- Franchising	Place	Business Development Team	4 th Year onwards	
5- Increase brand awareness	E1- Sponsorship	Promotion	Finance Team and Marketing Team	2 nd Year	€ 4000(For E1, E2, &E3)
	E2- Social media	Promotion	Marketing and Creative Team	1 st Year	
	E3- Social/health contribution towards society	Promotion	Finance Team	3 rd year	
6- Increase company profit	F1- Sale at least 25 machine per month	Product	Business Development Team	1 st year	€ 4000 (For F1, F2 &F3)
	F2- Contract with distributors with minimum 250 units sales per year	Product	Business Development and Legal Team	2 nd year	
	F3- Increment in commission for large sales and discounts	Promotion	Business Development and Finance team	1 st year	

Source: Author's own elaboration

6.4. Budget

The year 2023 is the target launch year for the new business that will be known as SelfMed. Since this is a new company with only one founder will be handling it (at least for the time being), the company will make every effort to cut costs as much as it can. Despite this, there is always a cost associated with entering and reaching the market. Therefore, the company plans to spend a total of 30,000 Euros to meet the goals it has established for itself. To lessen the strain on the company's finances, the company envisions applying for the proper funding as well as local and international grants.

To sum up after analyzing the internal and external health of the business via PESTEL and SWOT analysis, comparing the strengths and weaknesses of the competitors to identify the differentiation, to achieve set objectives, the operation plan must be executed strategically to provide quality service and value to the customer and increase sales, profit, and stability to the company.

Customers will be SelfMed's top priority while developing their business strategy, which places a strong emphasis on that role. This plan is going to be designed to answer the issues that the customers are having. Concerns may include the pricing strategy, the marketing of products, the promotion of the organization in a business environment, the after sales service, the introduction of new systems, the provision of online sales services, and other customer services. In addition to that, this strategy will place a strong focus on the internal structure of the organization, the recording of financial statements for the business, the location of the business, the competitors, and the construction of robust distribution channels to establish a well-known brand name.

The following section will provide an explanation of the financial element of the project after an analysis of the marketing objectives and strategy to bring the product into the market. The investment necessity, its sources, the inflows and outflows of the business, profit and loss, and the project's financial potential will all be evaluated in this section as part of the process of determining whether a project is financially viable.

Section 7: Financial Plan

Financial planning is one of the challenging tasks in the business. Because it is the first thing any investor, lender, project manager, manager will see and decide to go forward with the plan or cancel the plan. As it is said money is the fact. It is a fact, which can be understand by many people easily. While doing the financial planning to establish our business in Portugal, we must consider the capital we have, how we can raise more fund if we need and most importantly where we are going to spend how much. Here we are going to mention the topic which are going to be mandatory in the starting phase of the any business.

To analyze the financial feasibility of SelfMed, a free template from Instituto de Apoio as Pequenas e Médias Empresas e ao Investimento (IAPMEI) is used. The project evaluation tool gives business owners and enterprises the capacity to examine and test the profitability of new investments, and it provides them with two exploitation timeframe options: 5 years and 10 years. This tool gives the ability to enable the structuring of a company idea or investment project; to facilitate the examination and analysis of the profitability of new investments; to promote communication and negotiation with stakeholders, in particular lenders. SelfMed used 6 years' timeframe in its analysis. The template is only available in the local language, which is Portuguese. Below the important part of the financial plan/analysis will be translated in English and explained briefly with the help of tables extracted from financial plan.

7.1. Assumptions

The company's primary CAE will be 46690, wholesale of medical equipment. The company will begin its operations in the middle of 2023. This means that the corporation will only run for 183 days in 2023 but will operate 365 days per year from 2024 until 2028.

The projected inflation rate is 5% in 2023, 4% in 2024, and 3% annually from 2025 to 2028, which is demonstrated below on Table 16. Similarly, the employee compensation will increase by 5% annually from 2024 to 2028. Additionally, the taxation requirements necessary to operate a business in Portugal will be strictly adhered to. In terms of company treasury, it is expected to contain a maximum of €20,000 with a rate of return on excess above €20,000 of 0.5%, although a minimum of €8,625.00 is required for emergency purposes.

In addition to a bank loan, the company will be financed by its creator and her family, friends, and fools. Its proportions will be 70% e 30% respectively. To add further, it is estimated that at least 80% of the subscriptions will be renewed by the customers each year. That is, if we sell 120 pill dispenser subscriptions in the first year, 80% of those users, or 96 people, will maintain their subscriptions for another year to increase customer retention. The price of the product will also reflect the current market.

SelfMed will be the owner of the product, and a manufacturing firm will subcontract by SelfMed to manufacture it. Therefore, to save money on the assembly line and other human and material resources, the product will be supplied to the company in a ready-to-use state. Which will be sold B2B with the help of distributors. Additionally, the company estimates to give 5% commission to its distributors.

Table 16: Assumptions for SelfMed.

Product/services	2023	2024	2025	2026	2027	2028
Inflation rate (%)	5	4	3	3	3	3
Staff remuneration growth rate (%)	-	5	5	5	5	5

Source: Author's own elaboration based on IAPMEI's financial plan template.

In terms of working capital, the average sales receivable time from customers is anticipated to be 15 days, inventory duration is anticipated to be 5 days to save money on warehousing as well as avoid extra production and damage, whereas the typical payables period is 45 days. Generally, it should be longer than receivables to provide the company with additional time to generate positive cash flow to cover its payables.

7.2 Investment

The following Table 17 outlines the required investment needs that SelfMed must make to launch and maintain its operations in Portugal. In the following, we can see that a corporation will require a tangible fixed asset with a value of 180,000 Euros in a variety of business-related contexts. A corporation plans to invest €30,000 on the building and development of the company office and warehouse to make it appealing to our valued customer and convenient for the private use of the company and its workers. In a similar manner, an allocation of € 85,000 will be set aside in the budget for the company's fundamental equipment, which will be used to cover the cost of stationery goods (printing papers, pen, pencil, erasers), kitchen equipment (microwave, coffee machine, kettle) equipment for healthcare and first aid box and other miscellaneous products for day-to-day use in the office. In addition to other immovable assets, for the company to carry out its daily operations. In a similar manner, a contribution of €40.000 will be made toward the purchase of light equipment and administrative equipment. Such as desktop, computers, computer hardware, printers, telephones, mobiles tables and chairs for administrative purpose.

In addition, a sum of €25,000 thousand euros will be spent on the buying of transport equipment in the form of a car and a van to assist the daily travel, purchase, and delivery of the products and services. Furthermore, the corporation will require an investment of 29,000 Euros in an intangible asset, which may comprise industrial property applications and computer software. In addition to that, 30,000 will be allocated for marketing under other intangible assets. To summarize, to start a business, an investment of €239,000 is required from the potential investors/supporters.

Table 17:Necessary investment for SelfMed.

Description of investment	of Tax	Year amortization	of 2023
Tangible Assets	Fixed 0.00%		180,000
Land and natural resources	0.00%	-	
Buildings & other constructions	23%	10	30,000
Basic equipment	23%	8	85,000
Light equipment		4	40,000
Transport equipment	23%	4	25000
Intangible Assets			29,000
Other intangible Assets			30,000
VAT			48,070
Invest in fix capital (CAPEX)			239,000

Source: Author's own elaboration based on IAPMEI's financial plan template.

7.3. Sales Projection

Table 18 below demonstrates that the company aims to sell the pill dispenser at the price of €499 in 2023. Currently, rate of inflation is at the rate of 5% in first and 4% in second year and 3% each in subsequent year until 2028. As a result of that, the price will rise to €519 in 2024, €535 in 2025, €551 in 2026, €567 in 2027, and €584 in 2028. The sales projection of the company for national market for 2023 is 120 pill dispensers and in it aims to increase 20% in 2024 with the quantity of 288 pill dispenser. In 2025 the company hopes to sell 331 units with 15% rise in sales. Similarly, 364 in 2026 and 383 in 2027 with 10% increase and 5% increase respectively. Additionally, care and comfort packages will be sold in the ration of 60% and 40% in all years with the value of €2 and €6 each respectively per month in national and international market for subscription. The subscription cost will also increase along with the inflation rate.

In the case of SelfMed, company will start internationalization from 2nd year of its business targeting neighbouring countries, (Ex; Spain, France Italy) in the EU. Hence, it is estimated that company can sell 216 units in 2024, 248 units in 2025, which is 20% higher than the first year, 273 units in 2026 and 287 units in 2027 with the increment of 15% and 10% respectively. The projection for subscription packages stays as same ratio as above for now. As a result, selling pill dispensers and subscriptions will bring in a total revenue of €59,880 for SelfMed in the year 2023, €149,460 in the year 2024,

€177,036 in the year 2025, €200,582 in the year 2026, €216,929 in the year 2027, and €223,437 in the year 2028 for SelfMed.

Even though, the product's manufacturing costs are 50.9% of the sales price, the enterprise projects making a gross profit of 49.1% on each unit it sells locally and internationally.

Table 18: Sales projection of SelfMed in national and international market and turnover.

Product/Service	2023	2024	2025	2026	2027	2028
National Market	-	-	-	-	-	-
Pill dispenser (QT)	120	288	331	364	383	383
Price (€)	499	519	535	551	567	581
Sales growth(%)		20	15	10	5	
Care service(QT)	72	245	444	662	892	1,121
Price(€)	2*6(12)	25	26	26	27	28
Comfort service (QT)	44	150	271	405	545	685
Price(€)	6*12 (72)	75	77	79	82	84
Int'l Market	-	-	-	-	-	-
Pill dispenser(QT)	0	216	248	273	287	287
Price(€)	499	519	535	551	567	581
Sales growth(%)	-	-	20	15	10	-
Care services(QT)	-	130	279	443	615	787
Price(€)	-	25	26	26	27	28
Comfort service(QT)	-	86	186	295	410	525
Price(€)		75	120	124	127	131
Total turnover (€)	59,880	149,460	177,036	200,582	216,929	223,437

Source: Author's own elaboration based on IAPMEI's financial plan template.

7.4. Human Resources

The following Table 19 illustrates some of the diverse types of human resources that are required, as well as an estimate of how much it would cost to hire them in the market for SelfMed. The company's operations will be managed by its founder, Laxmi Bhandari, who will also be credited with holding the position of manager at the business. However, because she possesses a diverse range of abilities and a set of skills, the corporation will utilize her as a versatile worker to save money in human resources. Aside from that, the company will require commercial personnel for sales, operational staff to oversee and execute overall company operations, and technical staff to assist customers in times of need and

with any questions they may have. In the first year, the company will only work 6 months with only 1 staff. For which, it will need €14,284 to pay the salary. In the second year it will need €69,971 to pay 3 employees, in the third year it will need €73,470, in the fourth year it will need €118,827, where company is growing and will be able to employ 5 employees and in the fifth and sixth years it will need €124,769 and €130,656 correspondingly with the same number of staff.

Table 19: Human resources of SelfMed.

Position	2023	2024	2025	2026	2027	2028
Manager	1	1	1	1	1	1
Administrative						
Commercial		1	1	1	1	1
Operational		1	1	3	3	3
Manager	1500					
Administration	800					
Commercial	1000					
Operation	900					
Food subsidy	5	578	3,804	3,994	6,685	7,020
Social security	3,649	17,368	18,236	29,286	30,750	32,287
TSU	2,494	11,870	12,464	20,015	21,016	22,067
TSU contributor	1,155	5,498	5,773	9,270	9,734	10,220
Total (€)	14,284	69,971	73,470	118,827	124,769	130,656

Source: Author's own elaboration based on IAPMEI's financial plan template.

7.5. Costs of External Supplies

Table 20 below illustrates the costs of external services a company will use during the period of 2023-2028. These are the operational costs that company needs to pay on a monthly or yearly basis. The costs are divided based on variable and fixed costs. A variable cost is a business expense that varies in relation to a company's output or sales volume. Variable costs grow or fall based on a company's production or sales volume; they increase as production rises and decrease as production falls. In contrast, Fixed costs are those expenses that remain constant regardless of a company's output. These expenses are typically unrelated to the specific business activities of a corporation. The prices shown in this table exclude those for raw materials, packaging, salaries, machines/equipment, and office supplies rather in subcontracts, special services, materials for office and stationeries, energy and fluid, transportation costs, and other various services company might need in its daily operation. The expenses for the external services will amount to € 21,611 in 2023, € 51,800 in 2024, € 55,375 in 2025, € 58,631 in 2026, € 61,294 in 2027, and € 63,133 in 2028. It is evident from the metrics that costs are rising as the company expands.

Table 20:Expenditure on external supplies and services of SelfMed.

Descriptions	2023	2024	2025	2026	2027	2028
Total ESS	21,611	51,800	55,375	58,631	61,294	63,133
FSE VAT	4,677	11,305	12,109	12,839	13,432	13,835
Subcontracts	630	1,310	1,350	1,390	1,432	1,475
Subcontracts	630	1,310	1,350	1,390	1,432	1,475
Specialised Services	7,404	22,251	24,939	27,282	29,005	29,875
Specialised Works	945	1,966	2,025	2,085	2,148	2,212
Publicity and Advertising	630	1,310	1,350	1,390	1,432	1,475
Surveillance	315	655	675	695	716	737
Fees	1,260	2,621	2,699	2,780	2,864	2,950
Commissions	2,994	13,078	15,491	17,551	18,981	19,551
Maintenance and Repairs	1,260	2,621	2,699	2,780	2,864	2,950
Materials	315	655	675	695	716	737
Tools and Utensils	189	393	405	417	430	442
Electricity	945	1,966	2,025	2,085	2,148	2,212
Fuels	1,260	2,621	2,699	2,780	2,864	2,950
Water	189	393	405	417	430	442
Travel and Lodging	1,575	3,276	3,374	3,476	3,580	3,687
Freight Transport	1,890	3,931	4,049	4,171	4,296	4,425
Rents and Rentals	2,520	5,242	5,399	5,561	5,728	5,899
Communication	788	1,638	1,687	1,738	1,790	1,844
Insurance	1,134	2,359	2,429	2,502	2,577	2,655
Notary Expenses	63	131	135	139	143	147
Cleaning, Hygiene and Comfort	630	1,310	1,350	1,390	1,432	1,475
Other Services	1,260	2,621	2,699	2,780	2,864	2,950

Source: Author's own elaboration based on IAPMEI's financial plan template

7.6. Income Statements

The Table 21 below displays an estimated interpretation of SelfMed's income statement for the years 2023-2028. This demonstrates the amount of money that should be coming into the firm depending on the anticipated revenue from sales as well as the major costs that must be incurred to keep the business operating. According to the numbers, the company will have a negative net income during its first two years of operation, but it will begin to turn a profit in the third year and every year after that. The company ended the first year with a negative net income of -€41,284, and the second year with a negative balance of -€29,520. Following that, the state of the company's finances will improve, and it will be able to realize a profit in each of the years that will follow of €26,237, €45,682, €94,822, and €132,720 respectively. The business begins to generate a gradual and regular income from the value in its third year. This behavior in the first two years of activity is because fixed costs are too high, and the company's activity is unable to support them. In other words, in these two years the company worked below its sales critical point. However, after 2025 the net results are already satisfactory.

Table 21: Estimated income statement of SelfMed.

Description	2023	2024	2025	2026	2027	2028
Sales & Services	62,472	289,591	373,475	451,805	521,522	576,395
Cost of goods sold, and raw material consumed	(30,480)	(133,137)	(157,700)	(178,674)	(193,236)	(199,034)
ESE	(21,611)	(51,800)	(55,375)	(58,631)	(61,294)	(63,133)
Personnel Costs	(14,284)	(69,971)	(73,470)	(118,827)	(124,769)	(130,656)
Other Income	-	-	21	230	487	887
EBITDA	(3,903)	34,683	86,951	95,901	142,709	184,460
Depreciation and Amortization	(24,204)	(48,408)	(48,408)	(39,242)	(21,950)	(13,825)
EBIT	(28,107)	(13,725)	38,542	56,659	120,759	170,635
Interest and Similar Costs	(13,177)	(15,795)	(10,541)	(7,906)	(5,271)	(2,635)
EBT	(41,284)	(29,520)	28,001	48,753	115,489	167,999
Tax	-	-	(1,764)	(3,071)	(20,667)	(35,280)
IRC	-	-	(1,764)	(3,071)	(20,667)	(35,280)
Net result	(41,284)	(29,520)	26,237	45,682	94,822	132,720

Source: Author's own elaboration based on IAPMEI's financial plan template.

7.7. Balance Sheet

The following Table 22 presents an estimated version of SelfMed's balance sheet for the years 2023 through 2028. It details the assets, liabilities, and owner's equity of the company during the aforementioned time period. The company will start with €41,716 share equity and €108,835 loan from bank. In this section, we observe that the entire value of the company's non-current assets, which are assets that cannot be converted into cash within the next year, is €189,893 in the year 2023, and that this value is gradually declining. On the other hand, the current assets, which can be turned into cash values totaling €61,465 in 2023, and values are increasing from 3rd year onwards. Which explains the overall assets the company holds. On the other side, the company's current liabilities total €125,807 in year 2023 ups and downs can be seen in the values. Likewise, its non-current liabilities total €108,835, which is reducing annually. In addition to equity, the value reaches €276,358 in the year 2023, and it is anticipated that it will continue to fluctuate. Although, in the first two years of operation, the company experiences a deficit of €41,284 and €29,520, beginning in the third year, the results begin to turn a profit. Moreover, the company's assets are growing while its liabilities are slowly decreasing, which attracts investors to put their money into the business.

Table 22:Balance sheet of SelfMed.

Asset	2023	2024	2025	2026	2027	2028
Non -current assets	189,893	151,947	114,024	80,562	59,430	46,465
Tangible fixed assets	165,063	135,188	105,313	75,438	53,688	40,063
Intangible assets	49,733	31,200	12,667	3,300	3,100	2,900
Other financial investments	97	559	1,045	1,824	2,643	3,502
Current Assets	61,465	43,679	140,857	224,306	336,174	266,095
Inventories	835	1,824	2,160	2,448	2,647	2,726
Customers	6,316	13,487	17,345	20,960	24,172	26,693
EOEP	45,689	4,242	586	-	-	-
Cash and bank deposits	8,625	24,126	65,922	117,449	197,486	306,755
Total Assets	276,358	210,626	205,037	221,419	283,736	382,639
Shareholders' Equity	41,716	33,533	59,770	105,452	200,274	333,086
Share capital	83,000	83,000	83,000	83,000	83,000	83,000
Supplementary capital contributions	-	21,337	21,337	21,337	21,337	21,430
Retained earnings	-	(41,284)	(70,804)	(44,567)	1,115	95,937
Net result	(41,284)	(29,520)	26,237	45,682	94,822	132,720
Non-current liabilities	108,835	108,600	72,400	36,200	-	-
Borrowings (LTP)	108,835	108,600	72,400	36,200	-	-
Current Liabilities	125,807	68,493	72,867	79,767	83,462	49,553
Suppliers	16,154	27,991	31,849	35,660	38,123	39,271

Asset	2023	2024	2025	2026	2027	2028
EOEP	1,523	3,624	3,805	6,607	7,655	8,755
Financing raised (PA)	108,130	36,200	36,200	36,200	36,200	-
Total Liabilities	234,642	177,093	145,267	115,967	83,462	49,553
Total Equity + Liabilities	276,358	210,626	205,037	221,419	283,736	382,639

Source: Author's own elaboration based on IAPMEI's financial plan template.

7.8. Cash Flows and Financing

Table 23 below income and expenditure statement explain the incomes from all the areas that entered the company, and all the expenditure company has been doing throughout the year, and cash flow statement, which track how cash flow in and out of a company. It reflects the cash impacts of revenues, expenses, capital investments, financing, and other items. Below, we can observe that the operating cash flow has a negative value in its first year but starts to turn positive from second year onwards. This number represents the cash company bringing in into its operating environment of SelfMed which is also called free cash flow.

Table 23: Cash flow statement of SelfMed.

Description	2023	2024	2025	2026	2027	2028
+ EBIT	(28,107)	(13,725)	38,524	56,659	120,759	170,635
- Taxes	(2,767)	(3,317)	(3,978)	(4,732)	(21,774)	(35,833)
+Depreciation and Amortization	24,204	48,408	48,408	39,242	21,950	13,825
-Variation Working Capital	(35,164)	47,904	3,836	3,583	284	(309)
Operating Cash Flow	(280,833)	79,270	86,809	94,752	121,220	148,317
Residual Value						22,829
FCFF with VR	(280,833)	79,270	86,809	94,752	121,220	171,146
Perpetuity						2,811,832
FCFF in perpetuity	(280,833)	79,270	86,809	94,752	121,220	2,960,149
Discount factor - WACC	1.00	0.95	0.90	0.86	0.81	0.77
FCFF discounted VR	(280,833)	75,298	78,328	81,211	98,691	132,357
FCFF discounted accumulated VR	(280,833)	(205,535)	(127,207)	(45,996)	52,695	185,051
FCFF discounted perpetuity	(280,833)	75,298	78,328	81,211	98,691	2,289,246
FCFF discounted accumulated perpetuity	(280,833)	(205,535)	(127,207)	(45,996)	52,695	2,341,940

Source: Author's own elaboration based on IAPMEI's financial plan template.

7.8.1 Evaluation

After conducting a review of SelfMed's financial status during the past six years, the Table 24 below provides evidence regarding the company's continued sustainability. Since SelfMed is going to be a start-up company and has plans to launch its operations in the middle of 2023, we will conduct a viability analysis with residual value. The company's Net Present Value (NPV) at the completion of the 6 years is calculated to be €185,051 and its internal rate of return (IRR) is calculated to be 23.8%. This value was determined based on the result of a computation. The internal rate of return, also known as the IRR, is an essential measure for determining whether a project is viable. The idea behind it is straightforward: to calculate an annual return, it simply considers all the flows (purchases, sales, revenues, expenses, and taxes). Companies now have an easier time comparing different projects and making sound choices about where to invest their money. As a result, it is a financial indication that should be prioritized above all others as a decision support tool before making any investments. When it comes to our situation, the internal rate of return being at 23.8% indicates that for every €1 that is invested in a project, the investor will receive a return of 23.8 cents, which is equal to €1 and 23.8 cents. Which is considered a decent level of return for a start-up firm such as SelfMed, and which indicates that a company can be sustainable if the plan can be implemented as mentioned above. In addition, the business plans to repay its debt in approximately 4 years and 5 months and 19 days, and at the end of the year, it will have a residual value of €22,8279.

In conclusion, after examining a variety of financial accounts (income statement, cash flow statement and balance sheet), SelfMed project is one that merits financial investment. The project has the potential to generate a profit beginning in its third year of operation and continuing forth.

Table 24: Viability analysis of SelfMed.

Viability analysis	With Residual Value	With Perpetuity value
Net Present Value (NPV)	185,051	2,341,940
Internal rate of return (IRR)	23.8%	76%
Payback (PB) (Year/s)	4.47	4.47
Residual value (€)	22,829	(Capex+FM in last year of investment)
Perpetuity value (€)	2,811,832	

Source: Author's own elaboration based on IAPMEI's financial plan template.

7.9. Risk Analysis

The analysis carried out above was based on assumptions, and there is no guarantee that they will materialize in the future. In this sense, it is necessary to analyse the risk of the company in the face of variations in these same assumptions. That is, the productivity and profitability at the company are both susceptible to being influenced by a wide variety of internal and external factors. Considering this, we have conducted a risk assessment of SelfMed to determine the nature of the issue and devise solutions to the problem as appropriate. Below, we can see the most sensitive and less sensitive indicators that affect the sustainability of company.

7.9.1 Sensitivity Analysis:

The purpose of a Financial Sensitivity Analysis, which is also known as a *What-If* analysis or a *What-If* simulation exercise, is to predict the outcome of a particular action when that action is carried out under a specific set of circumstances. The Financial Sensitivity Analysis is carried out within a set of boundaries that are predetermined based on the independent variables that are used in the process. In the case of SelfMed, sensitivity analysis can be studied to understand the effect of changes in price, cost of goods sold, human resources, external service costs and quantity.

As we can see from the sensibility analysis, the investment presents unfavourable indicators when the quantities decrease more than 20%, keeping the price constant in Table 25 below.

The following analysis is fundamental to determine the sensitivity of the investment to variations in the estimated variables. Thus, in the sensitivity analysis it is assumed that the variables change in an isolated way, which rarely happens. But its elaboration allows determining which variables cause greater variation in the result of the project, that is, the variables to which the project is more sensitive.

Table 25:Sensitivity analysis of quantity sold.

Quantity	NPV	IRR	PB
0	185,051.27 €	23.83%	4.5 years
-25%	- 49,842.55 €	-0.17%	-
-20%	4,338.87 €	5.77%	6.0 years
-15%	52,111.95 €	10.73%	5.5 years
-10%	96,594.15 €	15.24%	5.1 years
-5%	140,841.95 €	19.59%	4.8 years
0%	185,051.27 €	23.83%	4.5 years
5%	229,228.77 €	27.97%	4.2 years

Quantity	NPV	IRR	PB
10%	273,254.04 €	31.98%	4.0 years
15%	317,298.09 €	35.92%	3.7 years
20%	361,245.34 €	39.75%	3.5 years
25%	405,157.21 €	43.49%	3.4 years
30%	449,094.14 €	47.18%	3.2 years
35%	493,057.19 €	50.85%	3.1 years
25%	405,157.21 €	43.49%	3.4 years

Source: Author's own elaboration based on IAPMEI's financial plan template.

The sales margin, as shown in Table 26, is less sensitive to variations. In other words, with an increase in the cost of goods sold and materials consumed of 25%, which corresponds to a decrease in margin of the same value, the investment still shows positive indicators, although very small.

Table 26: Sensitivity analysis of cost of goods sold.

COGS	NPV	IRR	PB
0	185,051.27 €	23.83%	4.5 years
-25%	338,416.72 €	38.41%	3.6 years
-20%	307,901.23 €	35.62%	3.7 years
-15%	277,289.46 €	32.75%	3.9 years
-10%	246,602.01 €	29.81%	4.1 years
-5%	215,913.58 €	26.86%	4.2 years
0%	185,051.27 €	23.83%	4.5 years
5%	154,141.62 €	20.78%	4.7 years
10%	123,214.41 €	17.70%	4.9 years
15%	92,106.13 €	14.58%	5.2 years
20%	60,864.14 €	11.42%	5.5 years
25%	29,637.42 €	8.29%	5.7 years

Source: Author's own elaboration based on IAPMEI's financial plan template.

Investment is also less sensitive to variations in personnel costs. An increase of 40% in personnel expenses will cause an IRR of 11% which would still accept the project although with a considerable risk, as can be seen in Table 27.

Table 27:Sensitivity analysis on cost of personnel.

Cost of personnel	NPV	IRR	PB
0	185,051.27 €	23.83%	4.5 years
-40%	313912.9366	36%	3.7 years
-35%	297813.2055	34%	3.8 years
-30%	281717.1043	33%	3.9 years
-25%	265624.6351	31%	4.0 years
-20%	249535.8001	30%	4.1 years
-15%	233450.6014	28%	4.2 years
-10%	217369.0411	27%	4.2 years
-5%	201220.8852	25%	4.4 years
0%	185051.2725	24%	4.5 years
5%	168885.2008	22%	4.6 years
10%	152734.4287	21%	4.7 years
15%	136588.8969	19%	4.8 years
20%	120446.9107	18%	5.0 years
25%	104257.8326	16%	5.1 years
30%	87988.66198	14%	5.2 years
35%	71729.95116	13%	5.4 years
40%	55491.92872	11%	5.5 years

Source: Author's own elaboration based on IAPMEI's financial plan template.

Even less sensitive to variations are the ESE's where a 40% increase in ESE's, the project presents an IRR of 17% as shown in Table 28. That is, the reduction in IRR, compared to the normal value, is 27% when the ESE increases by 40%.

Table 28:Sensitivity analysis on external services expenses.

External Services Expenditures	NPV	IRR	PB
0	185,051.27 €	23.83%	4.5 years
-40%	248435.5551	30%	4.0 years
-35%	240528.8977	30%	4.1 years
-30%	232624.319	29%	4.1 years
-25%	224721.8203	28%	4.2 years
-20%	216821.4028	27%	4.2 years
-15%	208923.0676	26%	4.3 years
-10%	200973.6141	25%	4.3 years
-5%	193016.9031	25%	4.4 years
0%	185051.2725	24%	4.5 years
5%	177087.6132	23%	4.5 years
10%	169133.2022	22%	4.6 years
15%	161184.6997	21%	4.7 years
20%	153238.1699	21%	4.7 years
25%	145293.614	20%	4.8 years
30%	137346.5781	19%	4.9 years
35%	129397.2976	18%	4.9 years
40%	121436.7994	17%	5.0 years

Source: Author's own elaboration based on IAPMEI's financial plan template.

In Table 29, it is presented the crossing of two variables, considered sensitive for the investment, which are the quantities with the COGS. Thus, if the quantities decrease 25% and the profit margin increases 10% the investment is still profitable with an IRR of 6.1%, although with high implementation risk.

If the company sees its profit margin decrease by 25% it will have to increase its quantities sold by 20% to maintain the same IRR level of around 22%.

Table 29: Sensitivity analysis between quantity and COGS.

		Cost of goods sold												
		23.83%	0	-25%	-20%	-15%	-10%	-5%	0%	5%	10%	15%	20%	25%
Quantities	0%	23.8%	38.4%	35.6%	32.7%	29.8%	26.9%	23.8%	20.8%	17.7%	14.6%	11.4%	8.3%	
	-25%	-0.2%	13.7%	11.3%	8.8%	6.1%	3.0%	-0.2%	-3.4%	-6.8%	-10.3%	-14.0%	-17.9%	
	-20%	5.8%	19.0%	16.5%	13.9%	11.3%	8.7%	5.8%	2.5%	-0.8%	-4.3%	-7.9%	-11.6%	
	-15%	10.7%	24.1%	21.5%	18.9%	16.2%	13.5%	10.7%	8.0%	4.7%	1.2%	-2.4%	-6.0%	
	-10%	15.2%	29.0%	26.4%	23.6%	20.9%	18.1%	15.2%	12.4%	9.5%	6.3%	2.8%	-0.9%	
	-5%	19.6%	33.8%	31.0%	28.3%	25.4%	22.5%	19.6%	16.7%	13.6%	10.6%	7.5%	3.9%	
	0%	23.8%	38.4%	35.6%	32.7%	29.8%	26.9%	23.8%	20.8%	17.7%	14.6%	11.4%	8.3%	
	5%	28.0%	42.9%	40.0%	37.1%	34.1%	31.1%	28.0%	24.8%	21.6%	18.4%	15.2%	11.9%	
	10%	32.0%	47.4%	44.3%	41.3%	38.3%	35.2%	32.0%	28.8%	25.5%	22.1%	18.8%	15.4%	
	15%	35.9%	51.7%	48.6%	45.5%	42.4%	39.2%	35.9%	32.6%	29.2%	25.8%	22.3%	18.9%	
	20%	39.7%	56.1%	52.9%	49.6%	46.4%	43.1%	39.7%	36.4%	32.9%	29.4%	25.8%	22.2%	
	25%	43.5%	60.3%	57.1%	53.7%	50.3%	46.9%	43.5%	40.0%	36.5%	32.9%	29.2%	25.5%	
	30%	47.2%	64.5%	61.1%	57.7%	54.3%	50.7%	47.2%	43.6%	40.0%	36.3%	32.5%	28.8%	
	35%	50.8%	68.7%	65.2%	61.7%	58.2%	54.5%	50.8%	47.2%	43.4%	39.7%	35.8%	31.9%	
25%	43.5%	60.3%	57.1%	53.7%	50.3%	46.9%	43.5%	40.0%	36.5%	32.9%	29.2%	25.5%		

Source: Author's own elaboration based on IAPMEI's financial plan template

7.9.2 Scenario Analysis

Since in a company the variables rarely vary in isolation, through scenario analysis it is possible to simulate various possible pessimistic, optimistic, and most probable scenarios.

By analyzing Table 30 the most probable scenario presents quite satisfactory indicators assuming that quantities increase by 5%, the cost of goods sold decreases by 5%, staff costs increase by 5% and the external services costs decreases by 3%. With this scenario, the investment presents a NPV of 250.117,42 euros, an IRR of 30% and a payback (PB) period of about 4 years.

Table 30: Scenario analysis between quantity, COGS, cost of personnel and ESE.

Scenario Summary	Indicators	Current Values:	Pessimistic	Optimistic	Neutral	Probability
Changing Cells:	Quantity	0	-0.2	0.15	0	0.05
	COGS	0	0.2	-0.05	0	-0.05
	Cost of personnel	0	0.2	-0.1	0	0.05
	ESE	0	0.2	-0.1	0	-0.03
Result Cells:	PayBack	4.5 years	-	3.4 years	4.5 years	4.1 years
	IRR	23.83%	-24.10%	43.51%	23.83%	30.07%
	NPV	185,051.27 €	- 237,674.25 €	400,371.19 €	185,051.27 €	250,117.42 €

Source: Author's own elaboration based on IAPMEI's financial plan template.

Following an analysis of SelfMed's investment statement, cost of human resource statement, cost of external services statement, income statement, balance sheet, cash flow statement, viability check and risk analysis from 2023 to 2028, it was determined that the company incurred a loss in each of its first two consecutive years. Nonetheless, it will start generating a profit in the third year onward. Consequently, it has been determined that the company's overall financial health appears to be gradually improving.

Conclusion

As we mentioned in the beginning of the research project, the question that "What are the most important factors for SelfMed to consider in order to be able to emerge as a start-up?" will be attempted to be answered by this project. and "Prepare a preliminary plan for marketing and finances" to determine how feasible it is. Because the purpose of this research is to evaluate the financial and commercial viability of the automatic pill dispenser called the SelfMed in Portugal with the end purpose of eliminating the amount of people who don't take their medications as prescribed. To determine the feasibility and effectiveness of the market, primary data were gathered in the form of a questionnaire and then descriptively examined, one response at a time. The process of data collection has been broken down into its component parts and detailed in Section 2.

Since non-adherence is a worldwide issue, and it is prevalent among Portuguese population. The reasons however are surprising from what was already identified in the literature review. In our study, majority of the respondents were found to be affected by hyper/hypotension, diabetes, high cholesterol, anxiety, and depression. For which they take various kind of medications, high in quantity and multiple times a day. Similarly, various factors are present and contribute for non-adherence to medications such as: living alone with no one available for help, cognitive impairment, unable to understand the prescription, forgetfulness, and economic situation respectively.

The approach to tackle the non-adherence problem has been stated as pill boxes, pill pack and family friend's assistance to better organize their medication. The alternative being practiced for medication management reflects on the necessity of a simplified medication management among patients, family members and the care institutes. As the research focuses on eradicating medication nonadherence with the help of an automatic pill dispenser, SelfMed ecosystem, question regarding needed and interest towards SelfMed was evaluated. The major finding regarding the need, majority of users don't need medication administration support. only 38.4% agrees on needing some help to manage their medications mentioned on Table 3. On contrary, 100% of institutional based patient needs help with a medication administration referring Table 8. Not ignoring the fact, institutional based clients are found with more diseases and medication intake need than of the private residence clients. Similarly, out of those agreed 38.4% only ~36 % willing to have SelfMed (Table 4 and Table5 combined and calculated based on total users (73)). In the case of institution, ~40% (Table 9 shows interest in having it for their clients). Observing relatively low favorable results than expected, it can be assumed that many respondents might be reluctant to product like SelfMed because of its unavailability of its any direct competitor in Portugal and in the EU market. Additionally, deciding a product never seen or heard of might have affected in respondent's decision making. It can also visible that, Portugal has more of a traditional way of looking after people, where minimal technology has been used. Also, fact that medication non-adherence is a niche market, which can't be forgotten. Hence, from all this we can imagine the psychology of Portuguese market. Which again assist us in better promote the novel

product into the market. Although, tech-based solutions are in trend Portugal seems to be lagging to meet them either personally or in industrial based.

Even though, the percentage of interested people are not that high currently, there is no guarantee that it won't be tomorrow. Product like SelfMed does have a risk due to its breakthrough innovation in the Portuguese market.

Considering the emerging tech-based start-up its marketing plan has been outlined carefully. The same has been adapted for financial plan to determine the financial viability. Section 4- 7 explains the details of emerging company's marketing and financial plan. In terms of finance, the project has a NPV of €185,051.27, that is, after remunerating all equity and borrowed capital at an average rate of 4.7% per year, a surplus of €185,051.27 is obtained. This NPV was determined on the assumption that in 6 years (2028) the investment will have a residual value of €22,829 In terms of profitability, the investment produces an IRR of 23.8% and a payback period of approximately 4 years 6 months as per Table 24.

Taking into consideration all the data collected and presented in the study, marketing plan and financial plan SelfMed is viable from marketing and financial perspective. Also, looking from a broader perspective, Portugal is part of EU, which makes it easier to access and capture larger market share as ageing population, medication intake, non-adherence to prescribed medication, cost associated for quality care is not strange for EU as well. On top of it, SelfMed solves the global issue of non-adherence to the medication.

On another perspective, the size of the respondents who are already interested in product and service only with the concept of it emphasizes the need for such technology that is lacking in our health industry.

Consequently, from the study we concluded that our findings indicate that ecosystem like SelfMed to improve medication adherence are worth consideration by care companies and care institutions as well as patients/users, as long as intervention costs do not exceed the patient's estimated budget and has simple user interface that attract client's willingness to buy. In this sense and considering the feasibility indicators mentioned above, we are of the opinion that the project should be implemented.

Since there are a few relevant studies based on Portuguese data, this study relies heavily on data from American and European studies. I, as a researcher believe that this work will be useful to other students who want to conduct additional research in Portugal in the same area. To add further, action research like this can also be helpful for end-users/patient itself, their informal carer, formal carer, care companies, care institutes, policy makers and other stakeholders to spread awareness about the non-adherence and ways to improve it, increase efficacy and efficiency and save money in avoidable costs.

Limitation and suggestion

This study is not devoid of shortcomings. However, researchers have viewed this not as a limitation rather than as an opportunity to enhance their research in future investigations. In a country like Portugal, with a current population of 10.27 million, the sample size of 102 people (73 users and 29 businesses) is relatively modest. However representative in many aspects, the data cannot be extrapolated to the population of Portugal. In addition, the study was conducted solely via online survey, so it is possible that the responses for the primary end-users were fictitious unless they filled out the survey directly, and vice versa. Due to a lack of observation and experience with consumers, it is also impossible to disregard the fact that online surveys may contain both honest and misleading responses. In particular, the questionnaire has limitations due to the way it was conducted, which excludes clients without internet, smartphone/computer at home, and education. Which ultimately do not meet an "inclusion criterion," the initiative hopes to reach to carry out credible study. Furthermore, it was entirely online from the company's standpoint, allowing them to answer the inquiry based on their business interests rather of the patient's true desires. Finally, people's reluctance to respond to a questionnaire hindered a researcher's ability to study the problem's root cause and obtain more responses, as well as conduct an observational study, informal/formal interview, and focus group to gain a deeper understanding of the problem of non-adherence and how it affects patients, their formal and informal caregivers, physicians, and the government to develop an effective and cost-efficient solution.

However, a short survey with fewer precise questions along with observational study, formal informal interview and focus group will be advisable for any future studies to compare the findings and collecting better responses.

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Appendix

Questionnaire:

https://docs.google.com/forms/d/1LHycTI-qOwOdJgKdGbeaXo_dD7khgmCV0AzDgwRtFo/edit

Note: All the questions from questionnaire are used in section 2 (in the Table form).