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Value Chain Analysis as a Support for Sustainable Management: An Application to Villa Oeiras Project by CMO

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Master's in Management of Services and Technology

Supervisor:

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ISCTE Business School-IUL

September, 2021

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**BUSINESS
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RESUMO

Nos dias de hoje existe uma consciência cada vez maior em relação às questões ambientais. O uso excessivo de recursos está a criar problemas ambientais a nível global, como as mudanças climáticas, espécies em vias de extinção e falta de recursos naturais, o que levou à criação de vários acordos entre nações. Esses acordos não só abordam as questões acima mencionadas, como também têm o objetivo de criar um marco para o aprimoramento das políticas regionais e dar melhor suporte às áreas com recursos¹ culturais intangíveis e tangíveis. As empresas estão a seguir metas sustentáveis para ajudar a si mesmas e ao meio ambiente. A indústria do vinho não é uma exceção, visto que a globalização está a mudar o cenário competitivo internacional desta indústria. Neste momento, várias organizações estão totalmente dedicadas à sustentabilidade da produção de vinho no que diz respeito à sua onipresença cultural no tempo e também ao surgimento de novos modelos de negócios na indústria do vinho.

Este *in-company project* tem como objetivo analisar a sustentabilidade da cadeia de valor do Villa Oeiras, acompanhando várias organizações globais sustentáveis e implementar técnicas que possam conduzir a uma produção e comercialização mais sustentável. O projeto terá como foco os três pilares da sustentabilidade, que são o Económico, o Ambiental e o Social.

O Villa Oeiras é um projeto público gerido pela Câmara Municipal de Oeiras, cujo principal objetivo é a preservação do vinho de Carcavelos e da sua Denominação de Origem Protegida (DOP).

Este estudo foca-se na construção de uma cadeia de valor visual onde os Objetivos de Desenvolvimento Sustentável (ODS), que se enquadram no projeto Villa Oeiras vão ser identificados e priorizados. Para atingir esses objetivos, um *benchmarking* de técnicas sustentáveis será conduzido. Os resultados deste *benchmarking* serão apresentados como um plano de implementação para um projeto mais sustentável e juntamente com os resultados que se esperam deste estudo, culminam no objetivo principal deste estudo que é criar um modelo sustentável que possa melhorar a cadeia de valor do Villa Oeiras.

Palavras-chave: Sustentabilidade, Cadeia de Valor, Indústria do Vinho, Objetivos de Desenvolvimento Sustentável, Benchmarking.

Códigos de Classificação JEL: Q01 (Sustainable Development); M11 (Production Management); O13 (Agriculture • Natural Resources • Energy • Environment • Other Primary Products).

¹ Os humanos relacionam-se com seu meio ambiente por meio de sua cultura, portanto, os aspetos culturais do meio ambiente - por exemplo, usos culturais do meio ambiente natural, como a agricultura tradicional, o meio ambiente construído e as instituições sociais humanas - obviamente devem ser considerados.

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ABSTRACT

Nowadays there is an increasing awareness regarding environmental issues. The excessive use of resources is creating global environmental problems such as climate change, species' endangerment, and lack of natural resources, which led to the creation of several agreements between nations. These agreements not only tackle the issues mentioned above, but also try to create a framework to improve the regional policies and provide better support for areas with intangible and tangible cultural resources². Companies are following sustainable goals to help themselves and the environment. The wine industry is not an exception, undergoing rapid and radical changes as the forces of globalization alter the international competitive landscape of this industry. Now several organizations are totally dedicated to the sustainability of wine production as regards to its cultural ubiquity in time and as the emergence of new business models in the wine industry.

The present work aims to analyse the sustainability of the Villa Oeiras' value chain, following several global sustainable organizations and to implement technics that can lead to a more sustainable production and commercialization. The project will focus on the three pillars of sustainability, that are the Economic, Environmental and Social.

Villa Oeiras is a public project managed by Câmara Municipal de Oeiras, where the main goal is to preserve Carcavelos wine and its Protected Designation of Origin (PDO).

This study focusses on the construction of a visual value chain where the Sustainable Development Goals (SDGs) that fit with Villa Oeiras project are going to be identified and prioritized. To achieve these goals, a benchmarking of sustainable techniques will be conducted. The results of this benchmarking will be presented as an implementation plan for a more sustainable project that, along with the results that are expected from this study, will culminate in the main goal of this study that is creating a sustainable model that can improve Villa Oeiras value chain.

Keywords: Sustainability, Value Chain, Wine industry, Sustainable Development Goals, Benchmarking.

JEL Classification Codes: Q01 (Sustainable Development); M11(Production Management); O13(Agriculture • Natural Resources • Energy • Environment • Other Primary Products).

² Humans relate to their environment through their culture, so the cultural aspects of the environment – for example, cultural uses of the natural environment such as the traditional farming, the built environment, and human social institutions – obviously must be considered.

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GLOSSARY OF ACRONYMS

ANDOVI: Associação Nacional das Denominações de Origem Vitivinícolas

AVA: American Viticultural Area

CE: Circular Economy

CMO: Câmara Municipal de Oeiras

CSWA: California Sustainable Winegrowing Alliance

CVRA: Comissão Vitivinícola Regional Alentejana

DMOGAH: Direção Municipal de Obras, Gestão Ambiental e Habitação

DPO: Denominação de origem Protegida

EEPA: European Enterprise Promotion Awards

EU: European Union

GRI: Global Reporting Initiative

hl: Hectolitres

hl: Hectolitres

INE: Instituto Nacional de Estatística

IPW: Integrated Production of Wine Scheme

KWh: Kilowatt-Hour

Mhl: Million Hectolitres

NUTS: Nomenclatura das Unidades Territoriais para Fins Estatísticos

PDO: Protected Denomination of Origin

PSVA: Programa de Sustentabilidade dos Vinhos do Alentejo

SDG: Sustainable Development Goals

SME: Small Medium Enterprises

SWNZ: Sustainable Winegrowing New Zealand

TBL: Triple Bottom Line

UN: United Nations

UNGC: United Nations Global Compact

USA: United Nation of America

V.IV.A: Valutazione dell’Impatto della Vitivinicoltura sull’Ambiente

WBCSD: World Business Council for Sustainable Development

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CHAPTER 1. INTRODUCTION

1.1 Context and motivation

In 2020, August 22nd marked Earth's overshoot day, which means that, from this day until the end of the year 2020, the resources used by humanity cannot be replenished naturally by the planet. Due to this significant issue that puts the lives of future generations at risk, many companies and institutions are making an effort to reach goals defined by nations or environmental organizations.

Companies are trying to become more sustainable, not only because of this sustainable trend but mainly because they realize that sustainability also equates to efficiency. Thus, one way for firms to adjust to a turbulent business environment is to change their business model to better fit the industry's new competitiveness and consumer demands. A business model can be defined as a value chain framework in which a company operates to create sustainable competitive advantages. It identifies a strategic set of activities that firms perform to benefit customers and to achieve profitability. This applies to the Wine Industry, from the largest winery to small producers that serve a specific niche market. The wine industry has been becoming more sustainable in the past years; now, wine production companies see corporate sustainability as a social and environmental responsibility, and a competitive advantage.

With the help of the wine community, this sector is becoming more sustainable worldwide, and there are already several specialized institutions and organizations just focused on wine sustainability that encourage stakeholders to take part in sustainability development. It is important to consider that stakeholders play an important role in sustainability programs and that their contribution is crucial to developing any type of program regarding sustainability. This engagement with stakeholders is essential to carry out further analysis, that help organizations identify their relevant sustainability aspects (Bellantuono et al., 2016). Each stakeholder should be involved in the firm's organizational activities, with a specific and clear goal (Greenwood, 2007).

1.1.1 Portuguese Wine Industry

In 1756, the Marquis of Pombal created Companhia Geral da Agricultura, an enterprise designated to create appellations. This association was the one to start certifying the wine from the Douro region as having distinguishing qualities compared to other regions. Since then, appellations have been adapted all over the world under different names, abbreviations, and rules, to respectively organize their country's production. For instance, nowadays, while the United States uses *American Viticultural Area* (AVA), EU countries use *Protected Designation of Origin* (PDO), in Portuguese *Denominação de Origem Protegida* (DOP).

Portugal is considered an historical wine producer, and, through the years, this beverage has become one of the most relevant socio-economic activities. The vineyards represent 14% of the country's total planted area and, 6% of this corresponds to the wine industry total productions (INE, 2018). Portugal is the 5th biggest European wine producer, producing 5.3 million hectolitres, falling short just behind Italy, France, Spain, and Germany (Statista, 2018). Portugal is composed of fourteen wine regions, which include thirty-one Protected Denominations of Origin (PDO). The project Villa Oeiras belongs to Carcavelos PDO, represented on Figure 1.1 by region 16. Region 16 is the smallest wine region in Portugal, located within the areas of Oeiras and Cascais.

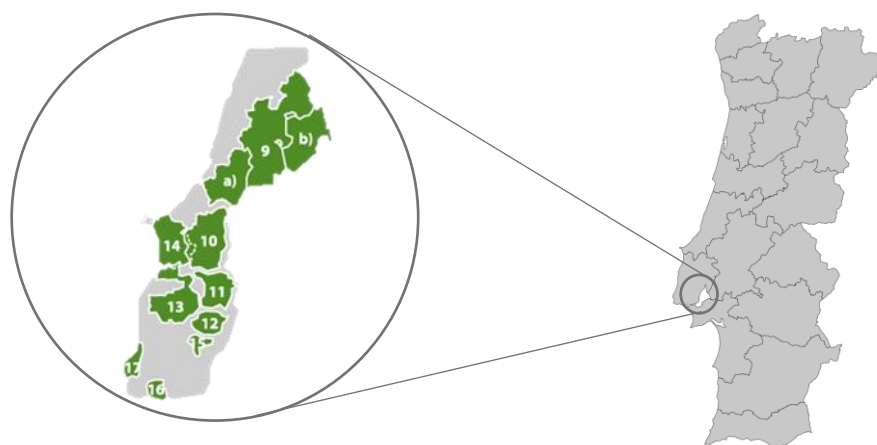


Figure 1.1 - PDO Lisbon region Wines

In Portugal, 88% of beverage companies are wine companies, of which 99% represent Small Medium Enterprises (Lourenço, 2017). However, wines produced in the Metropolitan Area of Lisbon are not the most relevant. In 2019, this region had the second smallest production with only 517 538 hl compared with other NUTS II areas (INE, 2018). Still, when making a comparison by regions, Lisbon is considered the second largest wine region of the country after the Douro region. Despite this, the Lisbon region is known to produce wines par excellence, being among the most awarded in international competitions³.

1.1.2 The importance of SME in local economies

Small and medium enterprises (SMEs) play a key role in the economy of the European Union (EU), with 99% of the total of the number of businesses being represented by these enterprises (Mrva & Stachová, 2014).

According to Marková (2003), countries with a higher portion of SMEs show higher stability and living standards, and Portugal is no exception to that. In 2018 there were around 1 million SME's, 42

³ In 2020, in the *Concours Mondial de Bruxelles*, considered one of the most prestigious contests in the world and one of many in which producers from the region are present, 39 wines from the Lisbon Region were awarded, and where Rabo de Gala 2018 conquered the Grand Gold Medal

581 being small enterprises (Pordata, 2021a). In the same way, in the wine industry, SMEs represent 70% of the volume of wine businesses, with Large Companies corresponding only to 0.8%.

These companies constitute an important role in the economic development of any country, and they also contribute to regional economic development by creating new jobs, providing investment opportunities, forming economic capital, and having sustainable economic growth. Consequently, SMEs are recognised as the engine of society's development and contribute socially and economically and are crucial for regional competitiveness (Mrva & Stachová, 2014).

In addition, a research made in Poland by Arent et al. (2015) showed that SME's are considering the green dimension of sustainable development as the second most important on firms' strategies.

The project analysed in this study is not an SME since it is a public project owned by the municipality; however, it is managed like a small enterprise due to having between 10 and 50 employees. Similarly, to SME's, the Villa Oeiras Project has been an important part of the local economy, creating several jobs every year and investing in the region.

1.1.3 The case of Villa Oeiras

Carcavelos wine began its production in the 18th century. Initially, the vineyards were privately owned and grown by the 1st Marquis of Pombal, on his property in Oeiras.

Due to his power as prime minister, the marquis created a regulation where Carcavelos' wines could be blended with wine from the Douro region; this regulation had to be created because Carcavelos was against Wine regions' demarcation rules (Robinson & Harding, 2015).. This wine was known worldwide as Lisbon wine or "Calcavella" (Terras de Portugal, 2017), and soon after, the region was demarcated. Eventually, due to the urbanisation of the area, the production declined until the Villa Oeiras project revived the vineyard, maintaining the area's history.

Nowadays, there are only three Carcavelos' wine producers, that are: Villa Oeiras, Quinta dos pesos and Quinta da Bela Vista. These three producers are part of the Confraria de Carcavelos; this Confraria aims to study, promote, value and defend the Carcavelos' wine PDO.

The project Villa Oeiras is located in Adega Casal da Manteiga, Estação Agronómica, Oeiras, where 12.5 hectares of vine are planted. Since 2001 the project is owned and managed by an organic unit of Câmara Municipal de Oeiras, denominated as Núcleo de Gestão do Projeto da Vinha e do Vinho Villa Oeiras.

Villa Oeiras is a fortified wine with a 18.5% alcohol volume and enriched with Lourinhã brandy. There are only four fortified wines in Portugal: Porto's, Madeira's, Moscatel de Setúbal and Carcavelos.

Presently, Villa Oeiras commercializes two types of Carcavelos' wine, one of 7 and another of 15 years, which means that the wine ages 7 or 15 years in wood. The production amounts to 46 thousand litres on average per year, with 11 thousand being bottled. This wine is exported to six different

countries, with the most significant external market being USA, yet it is expected to enter in two more markets next year. However, the biggest market continues to be national. This wine has been awarded over the years, having been awarded in 2021 with three 'Great Gold Medals' in the Wine Cities Competition (Oeiras Valley, 2021). The breakeven of the project is expected to be reached in three years. The project has survived since 2001 due to public capital.

In 2022 Villa Oeiras expects to start an olive oil brand and a service of enotourism. The project's primary goal is to preserve Carcavelos' PDO that exists since 1908 and engage the community in its production.

1.2 Problem, aim and Research questions

The problem that will be addressed in this study is the lack of frameworks for assessing the sustainability of the value chain in SMEs in the fortified wine sector. Therefore, this present work aims to analyse the sustainability presented by a particular SME case, the Villa Oeiras project and, consequently, create a sustainable business model that fits the Villa Oeiras' value chain. The analysis will be based on the three pillars of sustainability known as the Triple Bottom Line (TBL), which integrates economic, social, and environmental dimensions into sustainable development. Nowadays, sustainable consumption, efficient management of natural resources, and poverty eradication have become part of the pillars of the TBL concept, which, in turn, are framed in the Sustainable development Goals created by the UN. So, the assessment of Villa Oeiras' sustainability should consider, amongst the 17 goals defined by the UN, the ones which will form the basic guidelines for the development of this in-company project. Therefore, Villa Oeiras' value chain will be evaluated in accordance with the three dimensions of sustainability with the guidance of the 17 SDGs.

This study aims to analyse the lack of efficiency and sustainability that the project Villa Oeiras presents now, not only in the economic scope but also in the social and environmental ones.

Through interactions with practitioners and the review of relevant literature, this work is expected to identify the company's issues, causes, resources and capabilities, and iteratively define the requirements for creating a sustainable management model. Based on these requirements and insights from the review of existing literature, we hope, with this model, to create a kind of sustainable certification that could improve the project's economic health. Moreover, it can also open doors to new markets that value sustainability at the moment of the purchase decision. This study/model can also be further used as a good practice example by other SMEs in the wine sector in the same situation as Villa Oeiras.

Thus, the research questions that will guide this study are as follows:

RQ1: Is Villa Oeiras a sustainable project?

RQ2: If not, how it can become one?

RQ3: How can sustainability initiatives improve Villa Oeiras' value chain?

To address these questions, several objectives will be outlined, such as:

- Describing the value chain of the project.
- Defining which sustainable goals need to be reached.
- Prioritize the Sustainable Goals that need to be implemented or improved in the project.
- Select sustainable techniques through benchmarking and develop a plan to implement these techniques.
- Measure the impact of the present study conclusions application in Villa Oeiras' value chain.

1.3 Theoretical contribution, managerial and social implications

In 2018, the global wine industry produced 292 million hectolitres (mhl) of wine, with European countries being among the major producers. Portugal holds the 11th position in the world ranking of wine producers, with a production of 6.1 mhl (OIV, 2019).

The wine industry has been related to environmental concerns such as water consumption and greenhouse gases emission (Cholette & Venkat, 2009). Due to these concerns and other issues related to the rise in wine consumption, and consequently, with its production, sustainability institutions and programs were created.

The initial lever for spreading these institutions/programs worldwide was when the Lodi Winegrape Commission from California launched an Integrated Pest Management Program, which was considered the “foundation” of sustainable winegrowing programs. Since 1992, several guidelines and programs with this same goal in mind have been defined by institutions and organizations around the world.

The most significant programs in the world are the “California Sustainable Winegrowing Alliance” (CSWA) in California, USA, the Sustainable Winegrowing New Zealand (SNWZ) and the “Integrated Production of Wine Scheme” in South Africa (IPW) (Szolnoki, 2013).

However, all these programs have different objectives and focus. The Lodi program is mainly focused on the Lodi region, while producers of all California's regions can use CSWA. Alternatively, SNWZ can be applied in all New Zealand, similarly to IPW that can be used in all of South Africa. Also, the certification of wineries varies from program to program, as well as the existence of different levels of certification (Santiago-Brown et al., 2014).

In Europe, sustainability has also been a widespread and dominant element for international wine conferences and events. In Italy, the second most dominant world wine producer, the issue of sustainability in the wine sector was included among the topics of the international event “Vinitaly 2013” (the major Italian fair in the wine sector). Italy also created/implemented several sustainability

programs, such as Tergeo, Magis, SOStain, V.I.V.A. (“Valutazione dell’Impatto della Vitivinicoltura sull’Ambiente”) Sustainable Wine, ECO-Prowine, Ita.Ca/Gea.Vite, Vino Libero (Santiago-Brown et al., 2014). Being part of an association like this guarantees a sustainable seal and opens doors to new markets.

In Portugal there is only one program dedicated to wine sustainability: Programa de Sustentabilidade dos Vinhos do Alentejo (PSVA). It was created by Comissão Vitivinícola Regional Alentejana (CVRA), an organization committed to wine production’s sustainability that operates in the Alentejo region. This program supports Alentejo wine producers, improving the region’s wine industry’s environmental, social, and economic performance. However, this region represents only around 24% of the total mainland wine production (INE, 2018). Nevertheless, it is important to denote that this program won the European Enterprise Promotion Awards (EEPA), an initiative created by the European Commission that aligns with the priorities of the Europe 2020 strategy, which promotes good practices related to entrepreneurship (Vinhos do Alentejo, 2019).

Taking what was previously mentioned into consideration, it is now an appropriate moment to briefly define which are the theoretical contributions, managerial and social implications of the project “Value Chain Analysis as a Support for Sustainable Management: An Application to Villa Oeiras Project by CMO”.

This project intends to fill the gap that exists in Portugal regarding the models of sustainable management policies in the fortified wine sector, targeting the producer and the stakeholders in the value chain. The development and preliminary testing of an innovative conceptual model constitute a theoretical contribution. Regarding research, this project is expected to define a relevant inquiry process to study sustainable practices in SME of the wine sector, focusing on the Villa Oeiras project, and relate them with both suitable Sustainable Goals and the value chain of the project. Concerning the managerial viewpoint, the obtained conceptual framework or model will redefine the existing policies towards environmental protection, associating economic activity with the preservation of natural resources and social welfare. Thus, in addition to the improvement and visibility that this study will give to Villa Oeiras, it will also provide better conditions to the community and future generations.

CHAPTER 2. LITERATURE REVIEW

This chapter will review several concepts related to sustainability in the wine industry and the concept of sustainable value chain analysis. The analysis of consumer preference for more sustainable products will be made to understand the impact of their choices on the commercialization of wine worldwide and in Portugal. Finally, the scope will be narrowed to the drivers of sustainability guidelines and reporting models adopted by companies, with the aim of assessing and reporting their sustainability, as well as a benchmarking tool, which is also used in these guidelines.

This literature research aims to find and define the gap in literature associated with value chain analysis in the wine production sector. With this research, hopefully this gap would be fulfilled and offer support for a sustainable management in the wine industry.

2.1 Sustainable Value Chain Analysis

Michael Porter first introduced the concept of a value chain in 1985 that, as the name implies, represents a linked set of value-added activities. Porter's view was that a firm alone could not achieve a competitive advantage, so he adds to the chain many discrete activities in designing, producing, marketing, delivering, and supporting products and services. Overall, final consumers are the ones to define what constitutes value in a product or service (Slater & Naver, 1992).

To analyse any value chain, there is a diagnostic tool called the Value Chain Analysis (VCA). This tool is used to support the process of continuous improvement at the chain level. The VCA focus on three key areas: (i) Operations alignments and information flow (Intra-firm to inter-firm/chain to external stakeholders); (ii) Systems and Value creation (cost/waste reduction, consumer and customer value, and shared value), and (iii) Governance (Fearne et al., 2012).

The flow of information concerns the flow in the value chain from final consumption through to primary production and input suppliers and vice versa. This analysis outlines how inclusive, transparent, and responsive the information flows are in the chain. This issue is significant for stakeholders since they make decisions based on the information flows received.

The second key area is the perception of value creation by the final consumer at each value chain stage. This matter is about understanding how many production and processing activities add value or how much investment is being made in these critical activities.

The last key area concerns relationships, such as those established with other companies and the internal organisational commitment (Taylor, 2005), and the power relationships that determine how financial, material, and human resources are allocated and flow within a chain.

Value chain analysis requires a mapping to record and analyse the contribution of the different chain actors and their relationship. The recognition of the interactions within a value chain helps to understand which factors influence positively or negatively the chain (Zamora, 2016).

With VCA it is possible to direct the attention of various stakeholders to initiatives that can improve the value chain at different stages. Thus, this tool can also be an effective catalyst for change.

In summary, Taylor (2005) defines VCA as a multidimensional assessment of the performance of value chains by analysing information flows, product flows, chain control and the management.

Another tool for measuring the value chain is the Life Cycle Analysis (LCA), or cradle to grave analysis; this is an analytical tool used for quantifying the environmental impacts in the supply chain operations (Camilleri, 2008). The LCA is an overall view of different environmental actions, from the extraction of natural resources to the production and distribution of energy through using, reusing, recycling, and final disposal of a product. This analysis tool is classified as a comparative tool and not an evaluation tool. Its main goal is to help decision-makers compare environmental impacts and choose the adequate course of action.

VCA and LCA are diagnostic tools that can stimulate behavioural change amongst multiple stakeholders in the value chain (Soosay & Fearne, 2011).

Finally, these two tools create the Sustainable Value Chain Analysis (SVCA) used to determine the value that final consumers associate to the activities that contribute to polluting emissions and the consumer's perception of the value of the changes made in the processes/products attributes (Barua et al., 2021). Similarly, to the first one, this assessment is done for all stages in a value chain; however, in this one, the environmental impact is measured.

SVCA applied to the wine industry allows for a full diagnostic, facilitating a more effective allocation of resources. It identifies opportunities both for the development of the material flow, from grape to glass, and for creating value through co-innovation.

2.2 Sustainability concept in the wine industry

Sustainability is one of the most important topics of the century, and it is driving the transformation of entire industries, having found its way into all scientific disciplines (Fandel et al., 2021).

According to Warner (2007), the word "sustainability" has diverse definitions that it holds a shadow of ambiguity. For example, Kuhlman & Farrington (2010) defined sustainability as maintaining a state of well-being over a long, perhaps even an indefinite period.

Sustainability has been seen and defined as a concept based on different economic, ecological and equity-principles concerning intragenerational and intergenerational equity (de Bruyn & van Drunen, 1999). In this sense, authors Kuhlman & Farrington (2010) also mentioned that the term "well-being" mostly corresponds to the social and economic dimensions of the 'triple bottom line', associated with sustainability and the environmental dimension.

This concept has become a big tendency these days due to the incorporation of environmental policies that lead to a better and fairest management of resources mainly due to the implied respect for human resources. The possibility of this new management can also lead to economic growth.

Consequently, corporate sustainability becomes a primary goal in the life of a healthy company, which can be defined as satisfying the needs of a firm while also considering future generations. The firm's concept here refers to direct and indirect stakeholders, such as employees, clients, community, investors, etc. (Dyllick & Hockerts, 2002).

Ohmart (2008) claimed sustainability is even more complex when it comes to agricultural sustainability. Likewise, to general sustainability, there is not a universal definition of sustainable agriculture.

Creating a common understanding of sustainability is decisive for producers as well as for the entire wine industry. This common understanding is necessary, first for effective and beneficial consumer communication (Szolnoki G., 2013), but also to reduce the uncertainty associated with the presence of a wide range of certifications and sustainability labels on the market (Corbo, 2014).

In early 2000, the California Association of Winegrape Growers (CAWG) and the Wine Institute formed a committee to develop a winegrowing program to be implemented in different USA states. This group defined *sustainability* as: "Growing and winemaking practices that are sensitive to the environment (Environmentally Sound), responsible for the needs and interests of society-at-large (Socially Equitable), and economically feasible to implement and maintain (Economically Feasible)" (Dlott et al., 2006, p. 2).

On the other hand, Sustainable Winegrowing New Zealand (SWNZ) defines *sustainability* as delivering excellent wine to consumers in a way that enables the natural environment, the businesses and the communities involved, to thrive (Renton et al., 2002).

So, wine industry sustainability can be seen, but not exclusively, as an attempt to use organic products in vineyards, however, if necessary, agrochemicals should be used to protect the crop. In addition, this concept also entails the reduction of water and energy consumption in both the vineyard and the cellar. Consequently, there is an upfront investment for these initiatives being done, but they may take years to recoup (Gilinsky et al., 2016).

Wine production sustainability is mainly seen as the process of reducing residues and resources' utilization in the elaboration of the wine. Therefore, there must be adequate management of these resources, such as water and energy efficiency, both in vineyards and wineries.

Overall, sustainability is becoming an important concept in people's minds ever since climate change became a reality. It is this new mindset that results in the engagement of the wine industry in sustainability worldwide. Evidence of this factor is the vast literature and the increase of academic journals related to this matter. Besides, the involvement in sustainability of different countries is

becoming noteworthy, which is mainly seen through the rise in associations created to ensure sustainability in the winemaking process. The most significant barrier that needs to be broken is the change in traditional winemaking processes, carried out through practices with hundreds of years of tradition.

2.3. Consumer Preference of Sustainable Wines

According to Seo et al. (2016), the market ratio of sustainable products is gradually increasing due to events such as environmental pollution, the increasing number of health-related issues and crises related to product safety. As a result of these events, consumers have changed their behaviour towards purchasing sustainable products; other studies already show that sustainable products have a competitive advantage over conventional products. The sustainable purchase intention presented by the consumer gives way to the concept of green purchase, which refers to the possibility of consumers purchasing certain products in accordance with environmental needs. Nowadays, companies are taking several steps to support green life campaigns, to increase public awareness on the prospect of purchasing environmentally friendly products. (Keni et al., 2020) A sustainable certification usually gives consumers confidence in the product's value or safety.

Sustainable certification can also open doors to new external markets. In the EU, consumers who care the most about this matter in the moment of purchase decision are the Austrians, Germans, and Luxembourgers (European Commission, 2013). In 2017, Austria and Germany were part of the top 15 consumer ranking per capita of wine, falling to 5th and 10th place, respectively. Germany is also the biggest importer of wine in the world (Aurand, 2018). These indicators justify how companies should invest in these markets when they have sustainable wine.

As said before, wine is no exception to this sustainable preference, and more certifications of wine sustainability appear every year. One tool used for showing consumers a certification are eco-labels. According to Riskos et al. (2021) ecolabels are considered a remarkable marketing and advertising tool that informs contemporary consumers about the green traits of a product. Yet Sogari et al. (2017) also claims that price, grape variety, sensory properties, and brand are still considered the most important factors when purchasing wine but admits that new attributes like sustainability are growing in importance.

Vecchio (as cited in Tait et al., 2020, p. 1091) analysed the importance of environmental characteristics in wine through experimental auctions; his conclusions are that consumers have a willingness to pay (WTP) for sustainability wine attributes. However, even if some studies show that consumers appreciate the idea of sustainable wine, there is still no evidence for what really motivates this belief.

In 2017, the Wine Market Council (WMC) did a survey to determine which generation drinks more wine; the council defined “high-frequency” drinkers as those who consume wine several times per week. This portion of drinkers is responsible for 90% of all wine consumption in the USA. The generational breakdown results that came out in 2017 indicate that from all 896 high-frequency drinkers surveyed, Baby Boomers (people born between 1946 and 1964) lead the percentage of wine consumption with a total of 41%, while Generation X (people born between 1965 and 1968) represents only 18% of this consumption and Millennials (people born between 80’s and the 00’s) 26% (WMC, 2017).

This study also shows that USA Millennials are drinking more imported wine than all the other generations.

Moreover, a study made in California, USA, affirms that Millennials have a higher willingness to pay for sustainable wines than other generations. These indications help us understand how producers can implement sustainability strategies to increase attention regarding specific consumers. This study implicates that wine producers should promote wine sustainability outcomes for Millennials since this generation values these outcomes more than consumers belonging to Generation X or Baby Boomers’ generation, which will bring them a more significant return on investment (Tait et al., 2020).

Finally, Sogari et al. (2017) also confirms that consumers’ environmental involvement could increase through broadcasting information related to the environmental commitment of the winery, which for the target market, millennials, would be best done through social media. This means that social media increases sustainability awareness in the wine industry and influences consumers’ buying behaviour regarding wine.

2.4. Drivers to implement sustainability guidelines in the wine industry

The wine industry is less seen as “polluting or dirty” than other sectors, such as the chemical one (Gabzdylova et al., 2009). However, the engagement in sustainability by wine producers and vine growers has been rising; this phenomenon is caused by different factors, such as environmental concerns.

The wine industry is facing several environmental issues and challenges. A study made by Fraga et al. (2016), shows how climate changes that arise from global warming will change the wine produced in Portugal. According to this study, there will be a warmer climate in the future, which could change the colour and the taste of the grapes therein grown, and consequently, the quality of the wine produced. Also, these environmental issues will have different impacts in different regions. For regions that already present warm climates (e.g. Alentejo, Douro), climate change may endanger the balanced ripening of grapes and the sustainability of the existing varieties and styles of wine (Fraga et al., 2016). This becomes even more important when we consider that these two regions significantly impact the

national economy. One example of this importance is that, in 2015, Alentejo Region corresponded to 53% of Portuguese wine's exportations (Lourenço, 2017).

Another factor that drives sustainability is the pressure that institutions and stakeholders exert on the global wine industry. This pressure comes from governments and environmental groups, and it should be stressed that the interest in green products is increasing. There is also a need and higher commitment for exportation from countries with strong attention for "sustainable products".

Managers' values, entrepreneurs' motivations, and employees' environmental attitudes can also be considered as important drivers to guide the wine industry towards sustainability guidelines, given the fact that the sector is mainly constituted by SMEs, and there is a frequent coincidence between ownership and management (Corbo, 2014).

To sum up, Gilinsky et al. stated in 2016 that sustainable wine business is being crafted around the world, fulfilling the industry's biggest driver, which is leaving the land in better shape for the next generation.

2.5 Sustainability reports

The quest for a sustainable development is one of the biggest societal challenges ever (Block et al., 2018). Besides, in his study, Dahl (2012) claims that there is urgency in addressing all sustainability issues and the potential of value-based indicators to guide the sustainability efforts of all stakeholders at an individual, national, and global level.

Consequently, in the last two decades, various independent and government organizations developed various reporting mechanisms and indices (Svensson et al. 2016). Moreover, Ebert and Welsch (2004) stated that measurability and comparability are two relevant index characteristics that report environmental performances. Nevertheless, most of the current indices are not satisfactorily relevant. In the past, academics have focused on developing frameworks and models for sustainability (Ansari & Kant, 2017). However, many of them only highlighted the environmental aspects of sustainability, somehow ignoring the previously mentioned triple bottom line (Klewitz & Hansen, 2014), and failing to address at least one pillar during their effort to generate sustainable solutions.

Even so, most companies create sustainable initiatives that fit their business model. The companies committed to sustainability publish an annual report to account for their various stakeholders' economic, social, and environmental information. Worldwide, these reports are usually based on the guidelines presented by Global Reporting Initiative.

GRI is an international organization founded in 1997 that assists firms, governments, and other organizations, allowing them to understand and communicate their impacts on climate change, human rights, and corruption. The GRI seeks to make sustainability reporting comparable to financial reporting in terms of rigour and verifiability.

However, some authors (Moneva et al., 2006) criticize the GRI due to gaps in its structuring, such as the inappropriate integration of economic, environmental, and social dimensions. GRI fosters a set of indicators instead of instilling businesses with the values needed to change their mentality and seek sustainable development. Besides this factor, this study also stated that GRI accepts reports without restrictions such as a clear definition of boundaries, development of integrated indicators or even the attachment of an independent third-party assurance statement. Consequently, the result is lessening sustainability.

Alternatively, in 2015, the United Nations (UN) launched the Sustainable Development Goals. These goals' primary objective is to help organizations thrive while meeting global purposes such as ending poverty, inequality, unrest, and environmental stress. SDGs are composed of 17 goals and 169 targets.

Due to the implementation of these SDGs, three institutions (UNGC, GRI and World Business Council for Sustainable Development (WBCSD)) launched *The SDG Compass* which guides companies on how they can align their strategies and measures and manage their contribution to the accomplishment of the SDGs.

The UNGC and GRI also posted a guide to help organizations include SDGs into their corporate report, called *Integrating the SDGs into Corporate Reporting: A Practical Guide* (GRI & UNGC, 2017). This guide aims to help companies of all dimensions prioritize which SDG targets should be acted on and reported, set business-related objectives, and measure and report on progress made.

According to a study made by the Governance & Accountability Institute, Inc. (2018), the beverage sector is reporting more about some issues, such as *Gender Equality (SDG 5)*, *Affordable and Clean Energy (SDG 7)*, *Decent Work and Economic Growth (SDG 8)*, *Industry Innovation and Infrastructure (SDG 9)*, *Sustainable Cities and Communities (SDG 11)*, *Responsible Consumption and Production (SDG 12)*, *Quality Education (SDG 4)* and *Climate Action (SDG 13)*; than others, such as *Life on Land (SDG 15)* and *No Poverty (SDG 1)*. In comparison with other sectors, this sector is more attentive about all issues related to the SDGs.

2.6 Sustainability Benchmarking

Over the years, various definitions of Benchmarking appeared. Patterson (1996) claimed that Benchmarking was a tool that could be used to help a company improve continuously by learning how other companies successfully carry out their processes, including an estimation of their operational processes and the identification, study, and adaptation of the best practices presented by them. At the same time, Camp (2006) stated that Benchmarking was a method of establishing the existing projects and plans for productivity based on the industry's best practices that aimed to improve performance.

Benchmarking was first introduced as a management method in 1979, when the firm Xerox, which is known worldwide as the inventor of the photocopier, decided to investigate its rival Fuji. Xerox top managements examined not only their technical achievements but also their innovations in management. This experience allowed Xerox to reduce costs and increase productivity and efficiency. Since then, benchmarking has become part of Xerox's business strategy, and many other companies have adopted this experience (Kozak, 2004).

Erdil & Erbiyik (2019), affirm that Benchmarking contributes to the competitive advantage of a company, while it is also a continual measurement that compares the in-company activities, processes or methods with those of other companies. Unfortunately, there is no "universal guide" for applying effective benchmarking under any conditions and in any field of activity. Taking over the benchmarking methodology by an experienced leader with the related specificities does not guarantee success for any other organization.

Overall, organizations these days seek tools to evaluate sustainability performance and recognise and reward good practices. To overcome this challenge, the development of Benchmarking programs has been used; Benchmarking programs are a structured and systematic way of carrying out evaluations against benchmarks, often coupled with specific organisational or policy goals.

Benchmarking sustainability programmes define a specific reference point and evaluate sustainability policies, practices, and tools against it. This way, benchmarking programs provide users with comparable information about the entities assessed that allow users to choose between them (ISEAL Alliance, 2019).

CHAPTER 3. METHODOLOGY

This chapter aims to present this in-company project' methodological approach and the tools used to accomplish our goals by addressing the research questions.

3.1 Research Context

As already mentioned, the present work intends to analyse the degree of sustainability present in the project Villa Oeiras and create a sustainable business model that fits Villa Oeiras' value chain, making the project competitive, adopting improved environmental and ecological practices. The objective is to analyse and assess the current or short-term methods practised by Villa Oeiras regarding the elaboration of a business model that fits the value chain, reduce the ecological footprint, and impact of their processes on the environment.

Research development can use qualitative, quantitative, or mixed data. Qualitative data is mainly exploratory, allowing a deeper understanding of theory, opinions, or ideas. When the sample size is small and segmented, the methods used to obtain qualitative information pass as group discussions, individual or observational interviews. Quantitative information is obtained through numerical data and is subsequently converted into statistical information that demonstrates the study's trend that should be performed. The data collection can be conducted through personal or online interviews, surveys on various platforms and observation. Mixed data can also be obtained through a combination of these two sources of information. This research had a qualitative methodological approach by collecting information based on bibliographic reviews and an empirical quantitative study using a questionnaire. Quantitative research allows for the testing of ideas and data analysis, using numbers and statistics, to make "predictive generalizations" beyond the information obtained. Thus, the research presented in this in-company project employs many research methods designs that integrate the analysis of the company' reports and quantitative (questionnaire) components.

This research takes place on the "Núcleo de Gestão do Projeto da Vinha e do Vinho Villa Oeiras". In addition to seeking clarification for the research questions presented, this research also aims to understand what SDGs the different stakeholders of the project Villa Oeiras recognise as the most appropriate considering the project's sustainability.

3.2 Research Design

First, the Villa Oeiras project was selected as the focus of research for this in-company project. Then, a company survey was designed including a 20 queries questionnaire, aiming to understand:

- I. The usual operations and processes applied in the company that could have environmental and socio-economic impacts, according to the Sustainable Development Goals (SDGs).
- II. The concerns raised by stakeholders involved daily both in the business and in the value chain.

This research design aims to create a sustainable business model that fits Villa Oeiras' value chain. However, this could only be achieved after understanding how the value chain's stakeholders are/could be positioned according to the sustainable needs and obligations that companies must have today to adapt their business processes and methodologies to sustainability.

3.3 Questionnaire development and Survey

After observing the activities in the winery to understand the project itself in a field research, a quantitative method of research was carried out. After these observations, data collection was obtained through the application of a questionnaire created on *Google Forms*. This questionnaire, named "Análise da Sustentabilidade da Villa Oeiras" was distributed physically and online and was composed and answered in Portuguese since all the participants were Portuguese.

To summarise the work field research, Figure 3.1 depicts the six different phases that led to the application of the questionnaire elaborated.

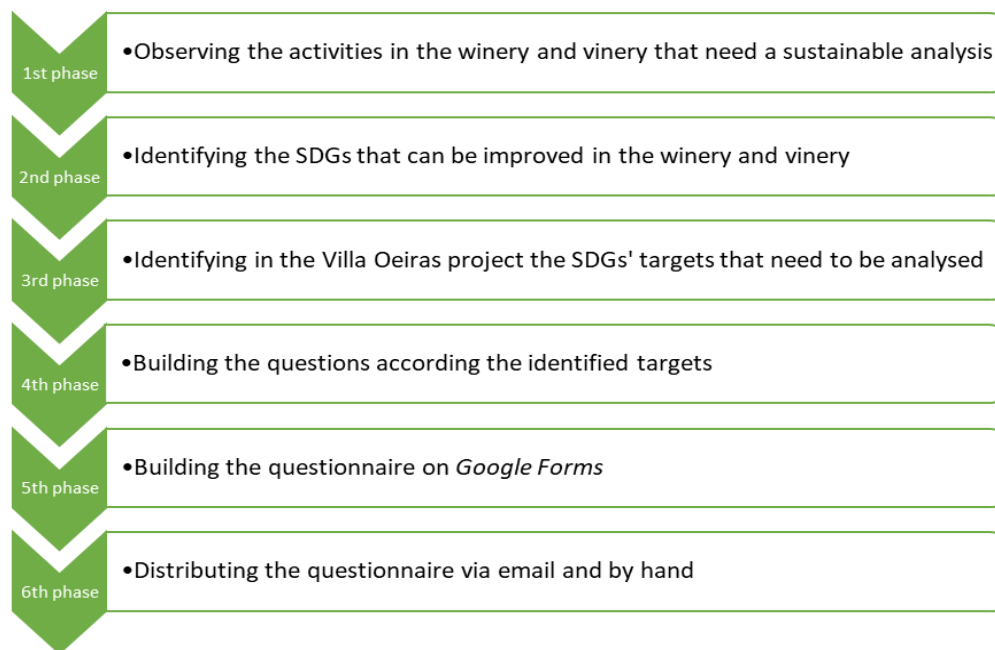


Figure 3.1 - Phases to build up and distribute the questionnaire

The 1st phase lay on field observation in the Villa Oeiras complex during the curricular internship. The attendance made it possible to analyse the various activities of the winery and vineyard and the attention that employees and the project itself currently give to sustainability. In the second and third phases, the focus is on understanding and identifying which SDGs and its targets need to be developed by this project. The information gathered from informal conversations with the workers and managers was necessary to look for some (un)sustainable practices and to identify if it was a way to improve the winery and vinery using SDGs targets. Finally, the aim of 5th and 6th phases was to create the questionnaire and distribute it.

The questionnaire primary data was obtained from easy answering closed-ended questions.

This research tool has two sectors, the first one regarding a brief socio-demographic characterisation of the population surveyed, such as gender, literary abilities, and type of contract. The second sector questions follow the Sustainable Development Goals (SDGs) and address the environmental and socio-economic impacts of the Villa Oeiras project.

To evaluate the respondents' opinion, attitudes, and behaviour, a Likert scale was used in each question to measure attitudes using response options that vary from one extreme to the other concerning the degree of agreement associated with a given affirmation. In contrast to a simple "yes or no" question, a Likert scale allows for the determination of the level of agreement. This scale is the most used tool in educational and social sciences research (Alexandre et al., 2003).

For the comprehension of all the respondents, the questionnaire presented a simple, direct, and impartial language. The most complex and personal questions were asked last to avoid a respondents' defensive attitude. Finally, the questions also followed a logical order (Kotler, 2000).

3.4 Data Collection

Data collection relates to the process of preparing and collecting data. In this instance, the data was collected in various ways, namely, literature review, local observation, a questionnaire, and strategic conversations.

3.4.1 Sample Specification

According to the Business Dictionary, in statistics, a sample is a limited number of observations collected from the chosen population, and conclusions regarding the whole population can be taken. Still, defining the sample size in this study was tough, mostly reliant on various factors and constraints.

To identify potential questionnaire respondents for this research, purposive sampling was used. Following this approach, individuals were chosen based on a certain set of criteria: (i) they had to be stakeholders of the company and (ii) following the SDGs' guide, where it is explained that surveys must be done to three groups of stakeholders, namely, the affected stakeholders, the expert stakeholders and finally, the internal stakeholders.

Engagement with affected stakeholders is the most important criteria. It is essential to understand the actual impacts on people linked to the company's operations and value chain and assess the severity of these impacts. The affected stakeholders, in this case, are the collaborators that belong to the operational area. However, when compared to these operational stakeholders, internal ones can have different inputs due to the company's management knowledge; the internal stakeholders are the collaborators who handle the administrative part. Some expert stakeholders are not affected by or

work directly with the project. Still, due to their professional path, they can be more sensitive to issues presented by this work. These stakeholders are service providers that work in different wineries.

The sample was constituted by adult participants, aged 22 to 52, all directly related to the project, being either stakeholders or Villa Oeiras' employees. The main challenge in implementing the survey was the limitation of the sample due to the small number of existing stakeholders, which was less than 30, hampering the representativity of the obtained data.

3.4.2 Primary data

The questions that composed the questionnaire distributed online were based on personal observation (that happened during the curricular internship) and were made according to the United Nations' publication *"SDGs Step 1: Defining priority targets of the paper Integrating the SDGs into Corporate Reporting: A Practical Guide"* (GRI and UNGC, 2017). The data was collected from October 2020 to December 2020. The questionnaire and its answers are available in [Appendix A](#).

This personal observation led to the choice of which SDGs and targets had the most significant impact on the daily activities done in Villa Oeiras (Table 1.1). These goals and targets were addressed in the questionnaire.

Table 1.1- SDGs and its targets addressed in the questionnaire.

Questions	SDG's	Target
4	2 - Zero Hunger	2.4 Ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production
5	3 - Good Health and well-being	3.5 Reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being
6	3 - Good Health and well-being	3.5 Reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being
7	5 - Gender Equality	5.5 Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life
8	6 - Clean Water and Sanitation	6.3 Improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials
9	6 - Clean Water and Sanitation	6.3 Improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials
10	6 - Clean Water and Sanitation	6.4 Substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity
11	7 - Affordable and Clean Energy	7.3 Double the global rate of improvement in energy efficiency
12	7 - Affordable and Clean Energy	7.2 Increase substantially the share of renewable energy in the global energy mix
13	8 - Decent Work and Economic Growth	8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation
14	8 - Decent Work and Economic Growth	8.5 Achieve full employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value
15	9 - Industry Innovation and Infrastructure	9.4 Upgrade infrastructure to make them sustainable, with increased resource-use efficiency

16	11 - Sustainable cities and communities	11.6 Reduce the adverse per capita environmental impact of cities
17	11 - Sustainable cities and communities	11.7 Provide access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities
18	12 - Responsible Consumption and production	12 Ensure sustainable consumption and production patterns
19	12 - Responsible Consumption and production	12.2 Achieve the sustainable management and efficient use of natural resources
20	12 - Responsible Consumption and production	12.4 Environmentally management of chemicals and all wastes throughout their life cycle, in a
21	12 - Responsible Consumption and production	12.5 Substantially reduce waste generation through prevention, reduction, recycling and reuse
22	13 - Climate Action	13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
23	15 - Life and Land	15.3 Combat desertification, restore degraded land and soil

3.4.3 Secondary Data – Financial data

The secondary data was obtained via analysis of financial reports provided by the financial services of Câmara Municipal de Oeiras, which was based on costs and revenues from the year 2020. The revenues that will be displayed in [Appendix C](#) come from sales from “posto 41”, “posto 43” and “posto 49” that represent the three ways/places where it is possible to buy Villa Oeiras wine. At the same time, the costs correspond to employees’ salaries, machinery’s costs, water and energy’s costs, materials for the Winery and Vineyard and finally, services for the Winery and Vineyard.

3.5 Procedures for Data Analysis

A quantitative analysis of the primary data was made to extract the information for this study. The analysis of the questionnaire is divided into two parts: a descriptive analysis and inferential analysis.

Concerning the population’s level of education, a descriptive analysis was made through the Pearson correlation coefficient. The main goal of this determination is to understand if there is a correlation between opinions about the sustainability of the project and education.

This correlation coefficient (r_{xy}) was named after an English mathematician and biostatistician, Karl Pearson. This bivariate correlation can be overly sensitive to outliers and aims to measure the existence and strength of a linear relationship between two variables. If the outcome is significant, we can conclude that a correlation exists. The Pearson correlation was used to analyse ordinal variables, such as education.

According to Cohen (1988), an absolute value in “r” of 0.1 is classified as small; an absolute value of 0.3 is classified as medium, and 0.5 is classified as large.

The cross-tabulation analysis was used to analyse the relationship between nominal and ordinal values. This analysis is used to describe the relationship between two categorical variables under a cross-tabulation form. Here, the categories of one variable determine the rows of the table, and the categories of the other variable determine the columns. The cells of the table contain the number of times that a particular combination of categories occurred. The "edges" (or "margins") of the table typically contain the total number of observations for that category. Therefore, this analysis is used to see the relationship between for example, the gender and the respondents' opinion in the Gender Equality matter.

All these relationships were measured with the help of the program IBM SPSS STATISTICS 26.

To conclude the analysis performed on the questionnaire, an analysis of inferential statistics was assigned to be developed by implementing a Hypothesis Test allowing to conclude about Villa Oeiras project' sustainability. The null hypothesis⁴ (H_0) and alternative hypothesis⁵ (H_1) chosen were:

H_0 = *The initiatives of the Villa Oeiras' project are not promoting sustainability*

H_1 = *The initiatives of the Villa Oeiras' project are promoting sustainability*

This hypothesis test will provide some insight to the first research question presented (section 1.2):

RQ1 - *Is Villa Oeiras a sustainable project?*

If the answer is inconclusive or negative the second research question will be asked (see section 1.2):

RQ2 - *If not, how it can it become one?*

To address this second research question, a descriptive analysis will be made through the total mean of answers given in the questionnaire from questions 4 through 23 (Table 4.10).

As regards the third research question (see section 1.2):

RQ3 - *How can sustainability initiatives improve Villa Oeiras' value chain?*

This last research question will be considered along with support from the financial data collected from the CMO financial services if the two previous research questions are answered negatively. This financial data will support the creation of a value chain that will lead to the conclusion of if new sustainable initiatives will improve the Villa Oeiras value chain.

⁴ The null hypothesis (H_0) is a statement about a population parameter that is assumed to be true.

⁵ An alternative hypothesis (H_1) is a statement that directly contradicts a null hypothesis by stating that the actual value of a population parameter is less than, greater than, or not equal to the value stated in the null hypothesis.

CHAPTER 4. RESULTS ANALYSIS

In this chapter, the three following sections introduce, step by step, the outcomes of the methodology implemented in this project. Firstly, the output of the sample characterisation is presented (Research step 1). Then, and as previously stated, the Villa Oeiras' sustainability study and the related SDGs will be addressed regarding performance and its impact on economic and environmental sustainability, while also considering the logistics performance. A descriptive analysis was performed, to show if there are any correlations between gender, type of contract and education, towards the respondents' opinion concerning the sustainability of the Villa Oeiras project. The collected data is treated statistically through version 26 of the SPSS software. This analysis will allow for the mapping of the SDGs along the value chain (Research step 2). However, due to the pandemic, the sample to which the questionnaire was applied was somewhat small, this could hamper the hypothesis test analysis (see section 3.4.1) After this step, it was expected to apply an inferential analysis to meet a hypothesis test, which will allow us to know whether the Villa Oeiras project is sustainable as a whole or not. Finally, sustainable initiatives and solutions to improve the performance of operations in Villa Oeiras are going to be proposed (Research step 3).

4.1 Research step 1 - Sample Characterization

This study was limited to individuals that are stakeholders of Villa Oeiras, making up a purposive sample. Three types of stakeholders were admitted (See section [3.4.1 Primary Data –Questionnaire](#)), the affected ones, the expert ones, and the internal ones. The data collected about the respondents included gender, level of education and work contract. The following graphs illustrate this same data. From the 23 respondents, 13 respondents were women (56,6%), and 10, men (43,5%), as seen in Figure 4.1.

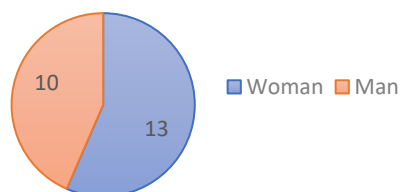


Figure 4.1 – Villa Oeiras Respondents Gender proportion

To access the education level of the respondents, it was asked about their highest completed level of education. As shown in Figure 4.2, most of the respondents had a bachelor's degree, three respondents only attended basic school (13% of the sample), whereas 6 finished high school (26,1% of the sample). Concerning higher education, 8 respondents finished their bachelor (34,8% of the sample)

and six people continued their studies: 2 finished a post-graduation and 4 finished their master's. None of the respondents had a doctorate degree.

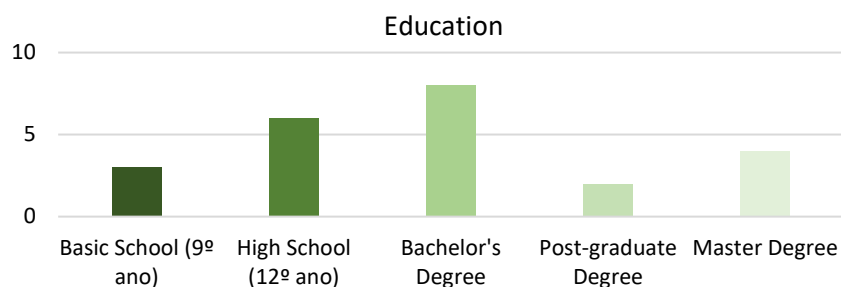


Figure 4.2 – Villa Oeiras Respondents Education

In Table 4.1, respondents' education level was evaluated by the mean, median and mode. This statistical analysis revealed that the mean of education of the respondents is the Bachelor level⁶. Admitting that all respondents are active stakeholders in the project, most of them have a higher degree of education when compared to the national level of schooling, where only 21,2% of the active population has a higher degree of education (Pordata, 2021b).

Table 4.1 – Education analysis Mean Median and Mode

Education		
N	Valid	23
	Omitted	0
Mean	2,91	
Median	3,00	
Mode	3	

Regarding contract type, Figure 4.3 shows that more than half of the respondents have an opened-ended contract (65,2% of the sample), two respondents are doing an internship, one respondent has an uncertain term contract, and another has temporary work contract.

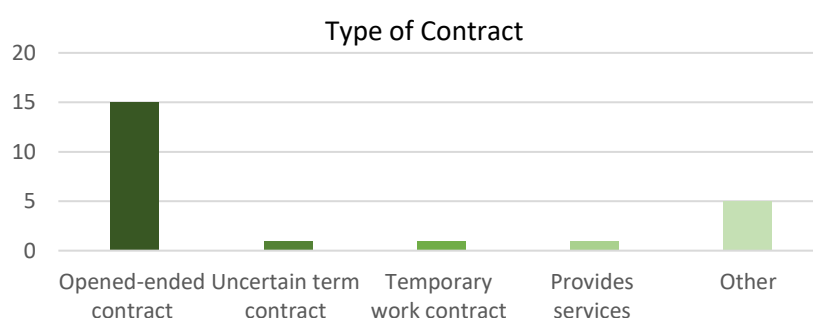


Figure 4.3 - Type of stakeholder's Contract with Villa Oeiras

⁶ Considering: 1- Basic School (9ºano); 2- High School (12º ano); 3 – Bachelor; 4 – Post Graduate Degree; 5 – Master's degree; 6- Doctorate Degree

Some stakeholders do not have a defined contract type with Villa Oeiras, so the survey show us that one respondent only provides services, and another person inquired is unemployed. Finally, two respondents are students (8,7% of the sample). Thus, this questionnaire will be mostly answered by people who know the project in depth.

4.2 Research step 2 - Villa Oeiras sustainability study

4.2.1 Sample Characteristics correlation with Villa Oeiras Sustainability

In this part of the data analysis, the Contingency table analysis or Cross-tabulation analysis and Pearson correlation coefficient were used through IBM SPSS 26 to see if there is any relation between the sample and the opinions given about the project's sustainability.

Bellow, the statistical analysis of the questions will present the most significant importance regarding the different variables presented.

4.2.1.1 Gender

Concerning the variable gender, the most significant queries to be analysed are questions 7 and 14, which are:

(7) Does the Villa Oeiras project promote the full and effective participation of women and equal opportunities at all levels?

(14) Can the Villa Oeiras project guarantee decent work for all women and men, including young people and people with disabilities, and equal pay for work of equal value, respectively?

These two questions contemplate targets 5.5, and 8.5 of the SDGs, namely: "Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic, and public life" and "By 2030 achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value", respectively. Overall, 69.6% of the respondents fully agree that the project promotes women's full and effective participation and equal opportunities at all levels. Moreover, the answers reveal full employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value.

The analyses of the relationship between gender and gender equality are presented through Cross-Tabulation (Table 3). None of the female respondents disagrees with the statement delivered by question 7, as shown in Table 4.3, which is a good indicator of gender equality in the project. Besides, most of the respondents agree.

Table 4.2 - Cross-Tabulation Gender * Question 7 (SDG 5.5)

Counting

		Question 7 (SDG 5.5)			Total
		Totally Disagree	Partially Agree	Totally Agree	
Gender	Female	0	4	9	13
	Male	1	2	7	10
Total		1	6	16	23

On the other hand, the responses given to question 14 were more dissenting, than those from the previously analysed question. Nevertheless, 52,2% of the respondents agree with this question (Table 5), which is also a good indicator for the project.

Table 4.3 - Cross-Tabulation Gender * Question 14 (SDG 8.5)

Counting

		Question 14 (SDG 8.5)				Total
		Totally Disagree	Partially Disagree	Indifferent	Partially Agree	Totally Agree
Gender	Female	1	1	2	3	6
	Male	1	0	0	3	6
Total		2	1	2	6	12

While analysing the answers to these two questions, it was observed that the respondents mostly think that Villa Oeiras is an inclusive project.

4.2.1.2 Education

The first relation that is worthy of analysis is the one between Education and question 4, which regards the SDG 2, more specifically SDG target 2.4 that indicates the following: “by 2030 ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters, and that progressively improve land and soil quality”. With this in mind, the 4th question asked to the participants was:

(4) Do the initiatives of the Villa Oeiras project promote sustainable food production systems and the implementation of resilient agricultural practices that increase productivity and production, that help to maintain ecosystems, that strengthen the capacity to adapt to climate change?

Displayed in Table 4.4 is the Pearson correlation between the level of Education of the respondents and SDG 2.4 in Villa Oeiras Project.

Table 4.4 - Pearson Correlation: Education vs Question 4

Correlation		Education	Question 4 (SDG 2.4)
Education	Pearson Correlation	1	,427*
	Sig. (2-tailed)		,042
	N	23	23
Question 4 (SDG 2.4)	Pearson Correlation	,427*	1
	Sig. (2-tailed)	,042	
	N	23	23

*. The correlation is significant at the 0.05 level (2-tailed).

Table 4.4 shows us that the correlation between Education and SDG target 2.4 presents a positive low degree of correlation (0.427), which means that if the level of education increases, the level of agreement increases too. The Sig. (2-Tailed) value of this relationship is 0.042, and since this value is less than 0.05, it allows us to state that there is a statistically significant correlation between the level of education and the opinion of the respondents regarding question 4.

For instances, a person with a higher degree of education, such as a master's degree is more likely to agree that the initiatives of the Villa Oeiras project promotes sustainable food production systems and the implementation of resilient agricultural practices that increase productivity and production.

The next relation to be presented is between Education and question 5, that iterates:

(5) Do the initiatives of the Villa Oeiras project reinforce the prevention and treatment of substance abuse, including the use of narcotic drugs and the harmful use of alcohol?

This question refers to SDG target 3.5, that aims to strengthen the prevention and treatment of substance abuse, including narcotic drugs and the harmful use of alcohol (Table 4.5).

Table 4.5 - Pearson Correlation: Education vs Question 5

Correlation		Education	Question 5
Education	Pearson Correlation	1	,556**
	Sig. (2-tailed)		,006
	N	23	23
Question 5 (SDG 3.5)	Pearson Correlation	,556**	1
	Sig. (2-tailed)	,006	

N	23	23
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**. The correlation is significant at the level 0,01 (2-tailed).

Table 4.5 shows a strong positive correlation between these two variants exists which, in other words, means that the higher the level of education, the higher is the agreement to the statement: “The Villa Oeiras project initiatives strengthen substance abuse prevention and treatment, including narcotic drug abuse and harmful alcohol use”. However, 39% of the respondents disagree with this statement, thus making this one of the most critical points of the project's sustainability (Figure 4.4).

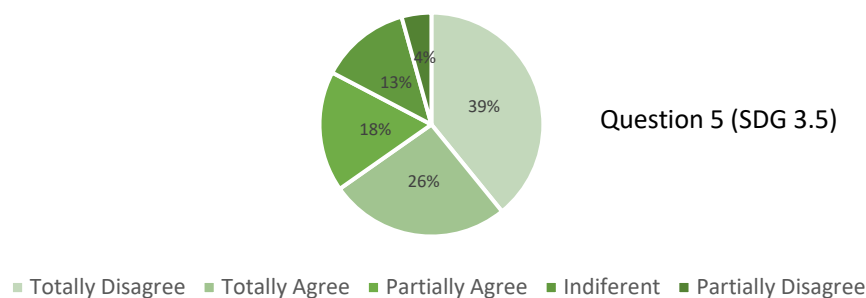


Figure 4.4 - Answers to Question 5

Another significant correlation is the level of education and question 16, that states:

(16) Does the Villa Oeiras project create initiatives to improve air quality and manage other wastes?

Some of the initiatives that were discussed are as follows: The development of operational procedures to reduce waste dispersion; Sorting of solid waste for recycling, or recovery of valuable products (consider all the existing possibilities for reuse and recycling before forwarding to landfill); Training actions on best waste management practices; Ensure the bulk purchase of materials, to reduce the need of packaging materials; or decrease the use of road transport.

Again, the Pearson correlation shows that the higher the level of education, the higher the level of agreement, with a strong significant correlation between the two variables (Table 4.6).

Table 4.6 -Pearson Correlation: Education vs Question 16

Correlation		Education	Question 16 (SDG 11.6)
Education	Pearson Correlation	1	,510*
	Sig. (2-tailed)		,013
	N	23	23
Question 16 (SDG 11.6)	Pearson Correlation	,510*	1
	Sig. (2-tailed)	,013	

N	23	23
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*. The correlation is significant at the 0.05 level (2-tailed).

4.2.1.3 Type of Employment Contract

When discussing the type of employment contract, the most important relationship to analyse is the relationship of the affected and internal stakeholders and their negative opinion about the project. Analysing all the answers given by the “Open-Ended Contract” respondents, it can be seen what needs to be improved in the project, according to the opinion of the affected and internal stakeholders. It is essential to analyse the answers of these respondents because they deal with the project daily. However, they can be misleading because people tend to be reluctant to change, especially when it comes to the way they do their job.

Table 4.7, points out the relation between the respondents and question 12, which dictates:

(12) Does the Villa Oeiras project use renewable energy?

The presented results show that most of the respondents disagree with SDG target 7.2, that iterates “increase substantially the share of renewable energy in the global energy mix by 2030”.

Table 4.7 - Cross Tabulation Type of Employment Contract * Question 12 (SDG 7.2)

Counting		Question 12 (SDG 7.2)					Total
		Totally Disagree	Partially Disagree	Indifferent	Partially Agree	Totally Agree	
Type of Employment Contract	Open Ended Contract	9	1	1	2	1	14
	Contract of Indefinite Duration	1	0	0	0	0	1
	Temporary Work	0	0	0	1	0	1
	Provision of Services	0	0	0	1	0	1
	Other	2	0	1	1	1	5

Table 4.7 reveal that 54.5% of the respondents totally disagree with the statement “The Vila Oeiras’ project uses renewable energy”. Additionally, this disagreement includes 10 out of 14 effective workers, which enforces the conclusion that the project does not use renewable energy.

Another significant relation to be analysed is the one between question 4 and the effective workers’ opinion, which, similarly to the previous analysis, indicates a negative opinion, with 34.8% of the total population of respondents totally disagreeing and 9 out of 15 workers disagreeing with the statement presented by this question.

Table 4.8 – Cross Tabulation Type of Employment Contract * Question 4 (SDG 2.4)

Counting		Question 4 (SDG 2.4)					Total
		Totally Disagree	Partially Disagree	Indifferent	Partially Agree	Totally Agree	
Type of Employment Contract	Open Ended Contract	6	3	2	3	1	15
	Contract of Indefinite Duration	0	0	0	1	0	1
	Temporary Work	0	0	0	0	1	1
	Provision of Services	0	0	0	1	0	1
	Other	2	1	0	1	1	5
	Total	8	4	2	6	3	23

Finally, it is also relevant to analyse the relationship between question 9 and all employees’ opinions of the project.

(9) Are Villa Oeiras project’s employees encouraged to recycle and reuse?

The relation of these two variables can be seen in Table 4.9, revealing that 43,5% of the entire population inquired totally agrees with the statement presented by this question, which can be assumed as a good indicator for the functioning of the project.

Table 4.9 — Cross Tabulation Type of Employment Contract * Question 9 (SDG 6.3)

Counting		Question 9 (SDG 6.3)				Total
		Totally Disagree	Partially Disagree	Indifferent	Partially Agree	Totally Agree

Type of Employment Contract	Open Ended Contract	1	1	1	5	7	15
	Contract of Indefinite Duration	0	0	0	0	1	1
	Temporary Work	0	0	0	1	0	1
	Provision of Services	0	0	0	1	0	1
	Other	0	1	0	2	2	5
Total		1	2	1	9	10	23

In the results presented in Table 4.9, displayed above, 13 out 16 employees agree with the statement that concerns SDG target 6.3.

4.2.2 Villa Oeiras' sustainability

In this chapter, the approach made in order to study the sustainable initiatives in Villa Oeiras is similar to an hypothesis test. This approach based on the answers given in the questionnaire, and its goal is to answer the first research question: *Is Villa Oeiras a sustainable project?*

The Hypotheses test is used for testing a hypothesis related to a specific parameter in a population, using data measured in a sample. In hypothesis testing, or significance testing, a hypothesis is tested by determining whether a sample statistic could have been selected if the hypothesis regarding the population parameter was true.

There are two different statements to confirm their veracity(section 3.4):

(The initiatives of the Villa Oeiras' project are not promoting sustainability) $H_0: \mu < 4$

(The initiatives of the Villa Oeiras' project are promoting sustainability) $H_1: \mu \geq 4$

The null hypothesis (H_0) is a statement about a population parameter that is assumed to be correct, and it is the hypothesis to be tested. Similarly, our statement considers that the initiatives of Villa Oeiras Project do not promote sustainability, and we will test whether the value stated in this hypothesis is likely to be true. In hypothesis testing, data are collected to show that the null hypothesis is false, while the alternative hypothesis (H_1) reply to the opposite (in our case, the statement about initiatives of Villa Oeiras Project that promote sustainability). This alternative hypothesis states what we think is wrong about the null hypothesis.

The logic of hypothesis testing is rooted in an understanding of the sampling distribution of the mean. Considering the small sample size and the firm purpose to address the second research question, the criteria used to verify the veracity of the statement called null hypothesis (H_0) veracity were the total mean of the answers 4 through 23. If the average of the answers is less than 4 (these

numerical values were given for statistical purposes)⁷ the null hypothesis is valid. If not, the alternative hypothesis is the valid hypothesis.

Through IBM IPSS 26, it was possible to compare the means obtained from all the answers from questions 4 to 23, with results being presented in the following Table 4.10.

The table shows the means to all the opinion questions. The only questions that have a mean equal to or higher than 4.0 values are questions 7, 9, 14, 17, 18 and 23, with the total mean of the opinion's results being 3.4 values, which allows for the conclusion that the alternative hypothesis H_1 is unable to refute the null hypothesis, and so, H_0 remains as an explaining hypothesis, regarding the first research question

Table 4.10 - Response Means vs Questions

Question	N	Mean	Standard Deviation	Standard error of the mean
4	23	2,65	1,526	0,318
5	23	2,87	1,714	0,357
6	23	3,39	1,438	0,300
7	23	4,57	0,896	0,187
8	23	3,57	1,441	0,300
9	23	4,09	1,125	0,235
10	23	3,13	1,546	0,322
11	23	3,00	1,595	0,333
12	23	2,27	1,549	0,330
13	23	3,96	1,296	0,270
14	23	4,09	1,276	0,266
15	23	3,48	1,563	0,326
16	23	3,00	1,537	0,321
17	23	4,35	0,935	0,195
18	23	4,27	1,279	0,273
19	23	3,57	1,562	0,326
20	23	3,35	1,526	0,318
21	23	3,43	1,502	0,313
22	23	3,57	1,409	0,294
23	23	4,30	1,020	0,213

Nevertheless, it is necessary to note that failure to reject H_0 does not mean the null hypothesis is true. There is no formal outcome that says "accept H_0 ." It only means that we do not have sufficient evidence to support H_1 . Thus, in light of this, we must consider that the initiatives of the Villa Oeiras project are not promoting sustainability.

⁷ A short note to recall that the answers to questions 4 to 23 from the questionnaire follow a Likert scale where each answer was given a numerical value for statistical purposes. For instance: 1 - Totally Disagrees, 2 - Partially Disagrees, 3 - Indifferent, 4 - Partially Agree and 5 - Totally Agree.

Whatever the question in the questionnaire, values from 1 – 3 corresponds to a null or indifferent stakeholders' perception quest about sustainability initiatives at Villa Oeiras, while values from 4 – 5 corresponds to a positive stakeholders' perception about the sustainable initiatives at Villa Oeiras project.

Despite this, it is also important to refer that the questions 4, 5 and 12 show a strong disagreement opinion, which can be a worrying factor for the project's sustainability. The questions mentioned above correspond to the following queries:

- (4) Do the initiatives of the Villa Oeiras project promote sustainable food production systems and the implementation of resilient agricultural practices that increase productivity and production, that help to maintain ecosystems, that strengthen the capacity to adapt to climate change;*
- (5) Do the Villa Oeiras project initiatives strengthen substance abuse prevention and treatment, including narcotic drug abuse and harmful alcohol use; and*
- (12) Does the Villa Oeiras project use renewable energy?*

The data analysis regarding questions 4, 5, and 12 indicates that the Villa Oeiras project presents some sustainable areas that match SDGs targets. In addition, there are areas where some effort is already being made, such as gender equality (question 7 and 14), allowing the access of the community to a safe, inclusive, and accessible green public space (question 17), combats desertification and promotes the restoration of degraded lands and soils (question 23), uses recyclable bottles (question 18) and encourages employees to recycle and reuse (question 9). However, the Villa Oeiras project needs to improve in other areas, which means that it is not entirely sustainable at the moment.

The answers given to questions 6, 8, 10, 11, 13, 15, 19, 20, 21 and 22 shows that it is necessary to work on the following situations: (i) release of chemical waste and waste management, (ii) efficiency of water/energy consumption, (iii) innovation, (iv) sustainable infrastructures, (v) efficient management of natural resources, (vi) implement of initiatives to reuse, recycle, and reduce and (vii) implement initiatives that lead to conciliation of climate problems such as global warming. Even so, through the answers obtained to questions 4, 5 and 12, it can be verified that certain areas still require a higher level of work to turn this project into a sustainable one. Overall, these last three questions show that almost no work is being done to promote sustainability in these areas by Villa Oeiras.

4.2.3 SDGs targets to improve

Overall, our results point to some SDGs that need to be improved in Villa Oeiras project, particularly those with a higher rate of negative responses, such as SDGs 2, 3 and 7. These findings indicate that the SDGs addressed in the present work, already presented in Table 1.1, had a greater frequency of “strongly disagree or partially disagree” responses in the survey. However, the SDGs targets that had a significant percentage of answers like “Indifferent” or “Partially agree” cannot be discharged since they are also a Sustainable Development Goal to be improved. Because of the different levels of urgency and importance to improve the different SDGs – already referred in Table 1.1 – an “Eisenhower Matrix” or “Eisenhower Decision Matrix” will be displayed (Table 4.11). According to Mfondoum et al.

(2019), the Eisenhower method helps classify and plan the tasks relatively to their Urgency and Importance.

Table 4.11 - Eisenhower Matrix

	URGENT	NOT URGENT
IMPORTANT	• SDG 2.4 • SDG 3.5 • SDG 7.3 • SDG 7.2	• SDG 6.4 • SDG 9.4 • SDG 11.6 • SDG 12.2
NOT IMPORTANT	• SDG 12.4 • SDG 12.5 • SDG 13.3 • SDG 3.9	• SDG 5.5 • SDG 6.3 • SDG 8.3 • SDG 8.5

The SDGs targets classified as “Important” and “Urgent” tasks are those with the highest priority level and should be attained as soon as possible. Moreover, the targets classified as “Important” but “Not Urgent” should be seen by the project as long-term goals and tasks due to their importance and should be scheduled to an opportune moment and completed later.

On the other hand, the “Not Important” but “Urgent” targets must be delegated to other professionals like the operational team. Then, finally, there are the “Not Important” and “Not Urgent” targets, which are the ones that do not need attention since there is no need for them to be improved.

In summary, the present work will focus on creating initiatives that lead to the achievement of Urgent and Important targets within the Villa Oeiras’ universe. Some of these targets are listed below:

- I. To ensure sustainable food production systems and implementation of resilient agricultural practices that increase productivity and production and help maintain ecosystems (SDG target 2.4);
- II. To strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol (SDG target 3.5); and
- III. To improve energy efficiency and increase the consumption of renewable energy (SDGs targets 7.2 and 7.3).

4.2.4 Villa Oeiras’ Value Chain

In this section, an analysis of the Villa Oeiras’ *value chain* will be presented. A value chain is defined, according to Porter, as the activities that take place within a company needed to deliver a valuable product to the market. The value chain is divided into two different activities, Primary activities, and

Support activities. The primary activities are Inbound Logistics, Operations, Outbound Logistics, Marketing, Sales and Customer Service. At the same time Support activities include Technology Development, Firm's Infrastructures, Human Resources Management and Procurement.

This value chain aims to understand how efficient a business is and what can be improved. In this section, the Villa Oeiras project will be reviewed and analysed by activities, which will help determine if the project is financially sustainable and how far each activity contributes, or not, to the sustainability of the project.

The Villa Oeiras' value chain was built based on the financial data of 2020 provided by the CMO financial department. The data and calculations that led to the final percentages displayed in Figure 4.5 can be found in [Appendix C](#).

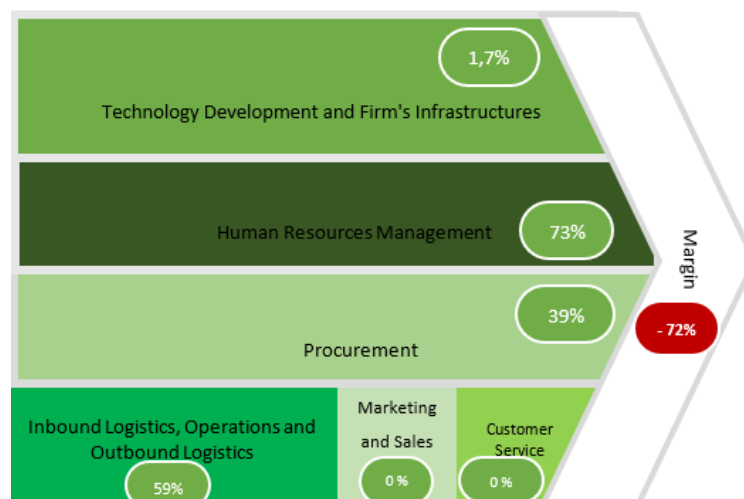


Figure 4.5 – Villa Oeiras' Value Chain

To briefly explain the Villa Oeiras' value chain, we stress that the technology development and Firm's structure refers to the investment in machinery and water and energy resulting from machinery work. Human resources management refers to the employees' salaries annually, and procurement activity includes various elements. Finally, the Inbound Logistics, Operations and Outbound Logistics Specialized corresponds to Winery and Vineyard services. However, the financial department could not provide costs for Marketing, Sales and Customer Service activities, but it was indicated that they were insignificant, corresponding to nearly 0%.

Overall, the Villa Oeiras project is not financially sustainable, with a negative margin of 72%, with human resources and Operations being the most significant enhancers for this result. Nevertheless, some activities show high costs, and the sales department can be the biggest problem regarding this

factor since the project only had a turnover of 307 488,78 € in 2020. Also, Marketing, Sales and Customer Service costs are nearly 0%, which is not a good indicator since marketing could boost sales.

Seemingly, this project was not expected to have a positive margin, as it is in its early years. There is also the additional factor that the financial data analysed belonged to an atypical year due to covid-19. Francisco Mateus, president of *Associação Nacional das Denominações de Origem Vitivinícolas* (ANDOVI), refers that 61% of the country's 1716 wine companies sold less in 2020, estimating losses of more than 100 million euros, due to the covid-19 pandemic (Lusa, 2021). Much of this decrease was due to the closure of hotels and restaurants. The low adhesion of the population and tourists to these services also had an influence. Moreover, Carcavelos' wine has a higher price than other wines, which can be another factor for this drop in sales since people tend to cut into items considered a luxury in times of crisis. Another factor is that this wine is a convivial wine, usually bought for important events or dates. Due to the pandemic, people avoided socializing and celebrating events with their family or friends.

The following sections identify the areas that can negatively or positively impact the value chain, and the initiatives that may do so. To do this, the Villa Oeiras project will be detailed through a visual supply chain, which will help to understand the percentages shown in the value chain described above (Figure 4.5).

4.2.4.1 Mapping the SDGs along the value chain

The SDGs' Practice Guide recommends building a high-level map of the value chain to identify areas with a high probability of positive or negative impacts on SDG issues. This mapping process should consider both current impacts as well as future impacts. This map will help to evaluate the impact that the Villa Oeiras' value chain project already has on SDGs.

As seen in section 4.2, the urgent and important SDGs targets to improve are 2.4, 3.5, 7.2, and 7.3 (recall Table 1.1). This sub-chapter will present these targets as having a positive or negative impact on the value chain, as seen in the map depicted in Figure 4.6.

This map should help Villa Oeiras understand if the initiatives to develop and apply increase or minimize the promotion of sustainable food production systems. These initiatives enable the implementation of resilient agricultural practices that increase productivity and production, which help maintain ecosystems and strengthen the capacity to adapt to climate change (SDG target 2.4).

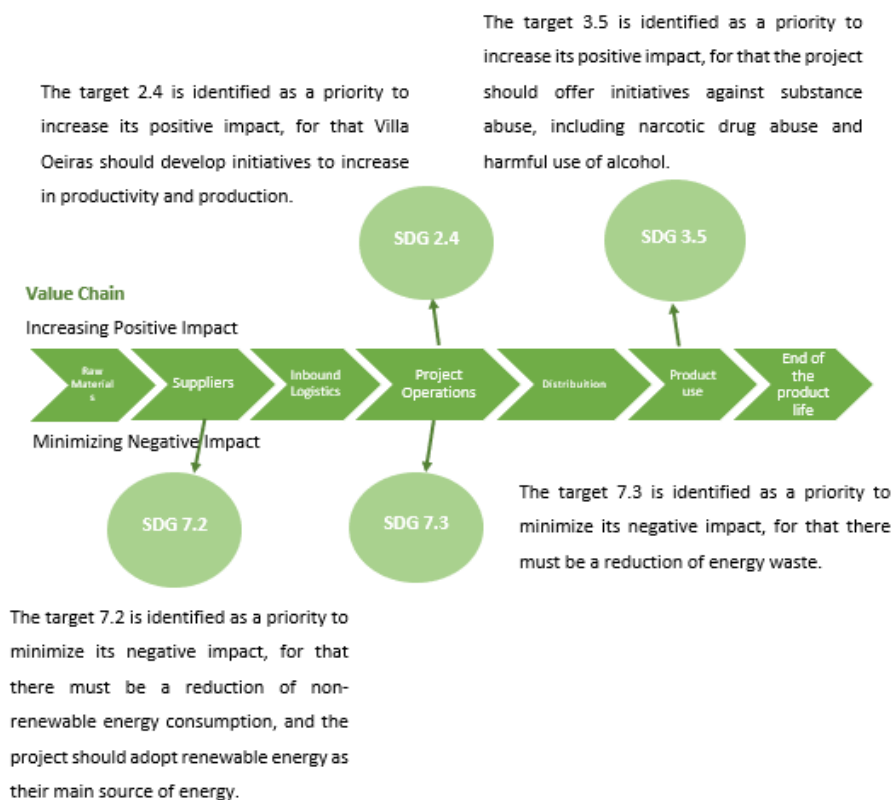


Figure 4.6 - Mapping SDGs targets regarding Villa Oeiras' value chain

Moreover, this map reveals if the initiatives of the Villa Oeiras project reinforce the prevention and treatment of substance abuse, including the use of narcotic drugs and the harmful use of alcohol (SDG target 3.5). Finally, investment and promotion initiatives on renewable energy could be achieved via investment in their renewable energy installations (SDGs target 7.2 and 7.3) This map gives guidelines to the Villa Oeiras project.

4.3 Research step 3 - Villa Oeiras' Supply Chain sustainability analysis and Solutions proposal

This chapter will describe the implementation process, such as the sustainability initiatives chosen through benchmarking. However, to better understand these initiatives impact, the Villa Oeiras' supply chain will be studied and then related to the Value Chain presented before.

4.3.1 Villa Oeiras' Supply Chain

Câmara Municipal de Oeiras is divided into 87 organic units, and the Villa Oeiras project is part of Núcleo de Gestão do Projeto da Vinha e do Vinho Villa Oeiras, which is part of the Direção Municipal de Obras, Gestão Ambiental e Habitação (DMOGAH).

In terms of human capital, Villa Oeiras has 8 employees in the operational part, 3 in the administrative and commercial part and 2 in the eno-tourism part. It also counts with several service

providers, such as an Oenologist, a Viticulture Engineer and a specialized team that takes care of harvest and pruning.

The headquarters for this project are located at Estação Agronómica, Oeiras, where the entire productive and administrative process is carried out. The Marquês de Pombal Palace winery is also used to support the wine stage.

The Núcleo de Gestão do Projeto da Vinha e do Vinho Villa Oeiras has acquired, throughout the years, several types of equipment for the smooth running of the project and production efficiency. The most important are indicated in [Appendix D](#).

The supply chain of Villa Oeiras is relatively simple compared to other big brands of Portuguese Wine. To better understand the operations of the project, its supply chain is depicted in Figure 4.7.

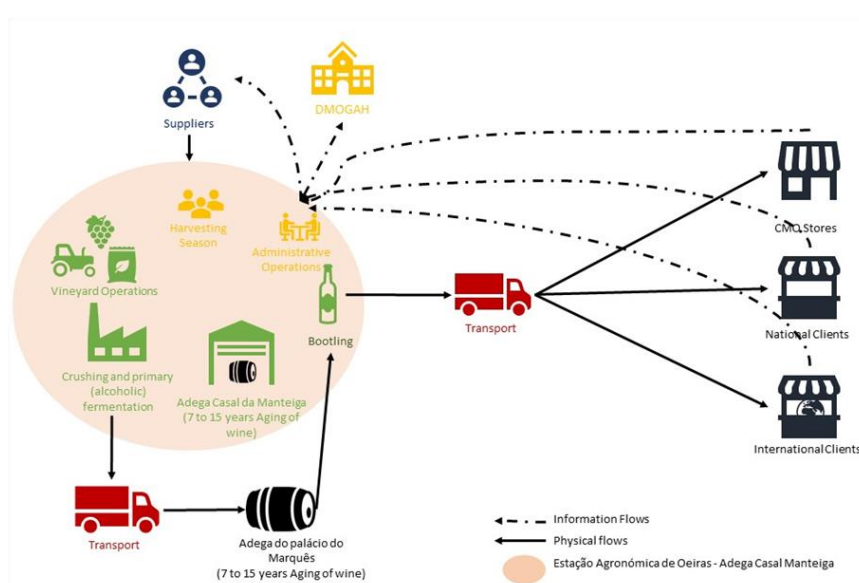


Figure 4.7 - Villa Oeiras' Supply Chain

The centre of production, where the vineyard operations are done, is found in *Estação Agronómica de Oeiras*, where *Adega Casal da Manteiga* is located. There are two main phases in these operations, harvesting and pruning, that are executed mainly by the external specialized team. The resident team takes care of other activities such as sulphates application and the daily inspection of pest control; this team does not need to irrigate the vines, as the rain does all the irrigation needed.

Moreover, operations like crushing and primary fermentation are also done by the resident operational team, which also controls the ageing of the wine with the help of a specialized oenologist. This aging happens in *Adega Casal da Manteiga* and *Adega do Palácio do Marquês*. These two wineries are designed function without artificial air conditioning, which corresponds to significant energy savings. Finally, the same team takes care of the manual bottling and manual labelling.

The office is where all administrative and commercial operations are performed with permanent contact with DMOGAH and other CMO departments since the project requires authorization from

these departments. After the bottling process, the bottles are shipped to different clients, either national or international, by an external company responsible for road transport. In Portugal, these bottles can be bought in CMO stores such as *Loja da Confraria dos Enófilos do Vinho de Carcavelos* and, occasionally, in fairs and short-term stores in shopping malls. These bottles can also be found in different supermarkets and online wine stores.

4.3.2 Sustainability Initiatives and proposing solutions to improve the performance of operations in Villa Oeiras.

As revealed in [section 4.2.3](#), four sustainable goals should be developed urgently to improve the project's sustainability (Table 4.11). These four sustainable goals are related to sustainable agriculture, ensuring healthy lives & well-being, and energy consumption.

Several initiatives will be proposed for implementation, to improve and develop the project's sustainability of the project regarding the points referred above. These initiatives were chosen through Benchmarking, a process that consists of searching for the best management practices of an entity in a given industry, leading to superior performance. With this in mind, the best National and European references were consulted.

4.3.2.1 Promote sustainable agriculture (SDG target 2.4)

In this sub-chapter, initiatives already taken by PSVA to reach/with the intuit of reaching SDG target 2.4 of the United Nations will be explored. This target addresses sustainable food production systems and the implementation of resilient agricultural practices that increase productivity and production, help maintain ecosystems, strengthen the capacity of adaptation to climate change, extreme weather, drought, flooding, and other disasters and progressively improve land and soil quality.

To understand what companies can do to reach the several SDGs targets and goals defined by the United Nations, a guide called “Business Reporting on the SDGs: An Analysis of the Goals and Targets” (GRI & UNGC, 2017) was published. According to this guide, possible relevant business actions to help achieve SDG target 2.4 are:

- To undertake risk assessments on natural hazards and climate change of their operations and supply chain and integrating disaster risk management into corporate strategies and goals. This implies more investment in environmental protection and the improvement of resilience to environmental hazards and resource scarcity through their operations and throughout their supply chain.
- To develop and implement corporate climate adaptation goals and strategies aligned with public adaptation efforts and address community risks in the business' operating locations.

Conserve, protect and enhance natural resources, improve resource efficiency, and harness the ecosystem services' potential benefits.

- To educate employees on sustainable food consumption through training, counselling, and other workplace programs.

Specific initiatives should be adopted to reach this SDG target. Similarly, other wine companies like Sogrape Group, considered that Portugal's biggest and most successful wine company, the Villa Oeiras project, should embrace an integrated production. This means adopting a sustainable international viticulture scheme, proposed, and regulated by IOBC – International Organization for Biological Integrated Control. This scheme combines respect for the environment with an economic activity that is both profitable and durable.

Another initiative that this project should carry out are actions made to promote biodiversity. According to PSVA, to promote biodiversity, the project should apply a cover crop in the vine. This action will allow for soil erosion control while improving soil structure, which occurs due to the release of valuable nutrients for the vines through the decomposition of cover crop constituents. Other advantages presented are water infiltration, allowing for adequate moisture levels and enhanced mobility of agricultural machinery.

Evidently, an application of Circular Economy (CE) is needed to promote sustainability in the vineyards. PSVA also adopted this sustainable initiative, and according to them, a "CE is a strategic concept based on the reduction, reuse, recovery and recycling of materials and energy. It replaces the end-of-life concept of the linear economy, with new circular flows of reuse, restoration, and renovation, in an integrated process. The CE is seen as a key element in promoting the decoupling of economic growth and increased resource, consumption, a relationship hitherto seen as inevitable".

Nowadays, CE is a concept promoted by the European Union (2013) and several other national governments, including China, Japan, Canada, Sweden, and Finland, the United Kingdom, France, the Netherlands, and several companies worldwide. However, CE's concept and practice have been almost exclusively developed and conducted by professionals, such as policymakers, companies, consultants, business associations or foundations (Korhonen et al., 2018).

In the European Union, fostered by the Circular Economy Action Plan (CEAP, 2020), wineries are currently engaged in Circular Economy practices. In terms of regeneration, there is an excellent utilisation of waste products. Therefore, the capacity of regeneration in this sector is remarkable. While waste products and losses are generated, these by-products, materials, and residues are reintroduced into new production chains through effective circularity, either in a technical cycle or a biological cycle (Sehnen et al., 2020). Regarding sharing, if several ventures provide services to other

closer regions, these actions allow them to optimise their productive capacity and to earn extra income from shared infrastructures, machinery, and even equipment investment.

Finally, an initiative that gets along with the CE initiative is composting. The Portuguese legislation defines composting as the fertilizing material that results from the controlled decomposition of organic waste, obtained by a composting process or by anaerobic digestion followed by composting.

Baiano (2021) affirms that wine making produces a large amount of organic and inorganic wastes. According to this author during cultivation and harvesting, about 5 tonnes of solid waste per hectare per year are generated. In the production process, wineries generate globally around 13 million tonnes of solid waste, consisting of seeds, skins, and stems per year. In the Villa Oeiras project, most of the waste generated by the winemaking process is organic and can be composted for direct use in vineyards, landscaping, or commercial composting operations.

4.3.2.2 Ensure healthy lives and promote well-being for all at all ages (SDG target 3.5)

As analysed before, SDG target 3.5 should be addressed, due to the negative answers obtained in the survey to question 5: “Do the initiatives of the Villa Oeiras project reinforce the prevention and treatment of substance abuse, including the use of narcotic drugs and the harmful use of alcohol?”.

According to the “Business Reporting on the SDGs: An Analysis of the Goals and Targets” guide, it is possible to figure out what can be done to increase the positive impact of this target on the Villa Oeiras Project. Examples are educating employees on the effects of narcotics, drugs, and alcohol, including the effects of substance abuse, and offer support for those who have questions or require help due to addiction or abuse. Furthermore, when business activities involve such substances (either in their operations or in the supply chain), such as beverage organizations like Villa Oeiras, companies should follow the “do not harm” principle and ensure that their products are produced with suitable instructions, care information or guidance on the consumption of such substances, to mitigate the risk of abuse or overconsumption.

Several wine associations and companies are already implementing initiatives to reach this SDG target. One example is the Sogrape group that publicly supports and is part of the program “Wine in Moderation”. Villa Oeiras must be part of this program since it aims to encourage responsibility and moderation in the consumption of wine as a cultural and social norm and inspire healthy lifestyles by preventing and reducing alcohol abuse and its related harm (Wine in Moderation, n.d.)⁸. This program also provides different online tools to educate consumers and professionals, improve professionals’ wine skills while motivating actions that will provide consumers with the necessary life skills to make informed choices and enjoy wine moderately and responsibly, compatible with a healthy lifestyle.

⁸ <https://www.wineinmoderation.eu/pt/>

Along with this, the Sogrape group also published a letter of social responsibility called “For a healthy consumption of wine”, where it pledges to carry out specific initiatives:

- Assumes the commitment to communicate a lifestyle that calls for moderate wine consumption, avoiding promotion or advertising that encourages abuse or misuse by consumers and discourages consumption by young people under 18, pregnant women or people with health problems.
- Adheres to the European Wine Communication Codes - EU Transparency Register.
- Implements internal measures of good practices, establishing self-regulation in marketing and sales, including training of respective teams and information on moderation and responsibility for wine consumers visiting their visitor centres and other facilities.
- Provides specific information on wine and health on the various websites, and links to other websites on the consumption of healthy wine.
- Commits to using the phrase "Be responsible. Drink with moderation.", with a minimum size of 33% on the most significant side, preferably horizontally, thus facilitating its reading and interpretation.

It is important to note that Villa Oeiras is not part of any association that prevents alcohol abuse, and neither does it have any initiative to improve this social matter. Likewise, it does not even have a sign or sentence that incites people to drink with moderation on their products. Very few items are mandatory in the wine labels according to the European regulation for wine labelling (Regulation EU No. 1308/2013), such as category of the grapevine product, designation of origin, actual alcoholic strength by volume etc; as a consequence of this lack of guidance there is a discrepancy between the consumer demand for information regarding the impact of wine consumption on both human health and the surrounding environment and the information supplied (Baiano, 2021).

This goal is currently a big issue for the brand that needs to be solved. However, at the time of its resolution, the brand will reach this aim and become more socially sustainable, but it will also help improve its image in the consumer eyes.

4.3.2.3 Energy - increased use of renewable energy use (SDG target 7.2) and improvement in energy efficiency (SDG target 7.3)

Many energy systems are used in the wineries, such as refrigeration, pumping and compressed air, and horizontal technologies, such as lighting or hot water production.

In the EU-28 countries, from 1990 to 2014, an analysis of the energy's final use was done (Bertoldi et al, 2016). In this analysis, the industrial sector was identified as one of the major electricity consumers, with 1 million GWh, about 25.9% of the total of electricity consumption. Small and

medium-sized enterprises (SMEs) are generally driven by economic reasons to implement energy efficiency strategies, which leads to decreases in energy costs and increases in the company's competitiveness.

In the EU's winemaking sector, electricity represents the primary energy source with 92%, followed by fossil sources such as gas, diesel, and fuel oil (8%). A total energy consumption of around 1.750 million kWh per year demonstrates that the wine production sector is highly energy intensive.

An energy audit represents a powerful tool to evaluate energy consumption in wine production in these conditions and to identify possible energy-saving actions. To define the attributes of a good quality energy audit, the European Commission published the BS EN 16247 energy audit standard (CEN, n.d.). This standard allows for an understanding of how to carry out high-quality energy audits, provide requirements, standard methodology and how to define the output of energy audits. It is generally applicable to all types of companies and sectors, and all kinds of energy and their uses.

Concerning the winemaking industry, most of the electricity used goes to refrigeration for fermentation cooling, cold stabilization, and cold storage. The rest is mainly used for compressed air, hot water or for pumping and bottling line motors, although compressed air demand is highly variable from winery to winery. Enclosed areas for storage and processes also require lighting, and many of them are cooled.

In this subchapter, and regarding SDGs targets 7.2 and 7.3, the energy consumption of *Adega Casal da Manteiga* is going to be addressed since it is the cellar in which all the primary operations take place, that needs to adopt specific initiatives that will help to achieve the targets in question. For this purpose, benchmarking will be used.

To understand what and how companies can improve the energetic condition, the guide "Business Reporting on the SDGs: An Analysis of the Goals and Targets" (GRI and UNCG, 2017) reports were consulted once again, looking for possible relevant business actions that could help achieve SDGs targets 7.2 and 7.3. According to this source, initiatives in investing in and promoting renewable energy could be achieved by financing their renewable energy installation while monitoring and reporting the amount of energy produced, purchased, and consumed. This holds both for direct operations and through the supply chain. Overall, reducing energy consumption in their operations, includes heating and cooling technology, efficient lighting, efficient electrical appliances, fuel-efficient vehicles, and choosing or building energy-efficient buildings and obtaining sustainability certification for buildings.

Villa Oeiras project uses electricity and other types of energy due to the vehicles acquired through the years, such as a B-segment car mainly for commercial purposes, one truck for transportation of goods, and two tractors that consume fossil fuel. The acquisition was made without considering the CO₂ emissions for petrol, petrol turbo and diesel-fuelled vehicles. Nevertheless, much of the energy consumed is electric energy, owing to the electric equipment necessary for the winery's operations.

The most relevant machines are the: Pneumatic press, Vacuum System Press, wine fermenter type Vinimatic (s.d.), destemmer, grape receiving lines and an Impeller pump. These pieces of equipment are mainly used in the vintage season. Thus, an energy consumption peak is always expected in the harvest month. Other non-operative processes also require energy, including energy for the building and other miscellaneous administrative or maintenance applications, such as illumination mainly done through fluorescent lamps. However, this technology is not the most efficient and it's beginning to decrease its popularity (Lakhani et al., 2013).

As already revealed by the stakeholders in the survey, Adega Casal da Manteiga shows poor energy efficiency performance. To confirm this opinion, an indicator between the average of hectolitres produced and electricity consumed (between October 2019 and September 2020) was calculated. This indicator allowed for the verification that the winery has a 67 kWh/hl consumption, which was calculated with data available by CMO. In [Appendix B](#) the consumption of electric energy is discriminated.

According to the "Efficient Wineries Handbook from tesla" (Fuentes-Pila & Garcia, 2014), a cellar's average electrical consumption is around 11 kWh/hl. However, it should be noticed that this relationship can be very different from cellar to cellar, and previous studies demonstrated that electrical consumption could vary from 3 kWh/hl to 25 kWh/hl. Furthermore, the winery size is a factor that influences consumption: larger installations (production greater than 50,000 hl/year) have electricity consumption values of around 4 kWh/hl, while smaller facilities (production below 25,000 hl / year) present consumptions of around 16kWh/hl (Malvoni, 2017). However, previous studies have shown that even cellars with similar characteristics (same dimension, same type produced) can have very different consumption. In addition, energy consumption in cellars present a seasonal pattern (Carroquino, 2017).

There are two types of initiatives to reduce electricity consumption. One concerns initiatives that can be applied immediately and involve less investment, which is associated with behavioural measures linked to the employees' behaviour and habits. These are called measures without initial investment or with reduced investment since the rational and more efficient use of energy is associated with a reduction of waste resulting from the consumption of resources.

The other initiative concerns measures with some initial investment. These include investing in highly efficient equipment or investing in increasing the efficiency of existing ones. Here, we present several advised initiatives by the EU in the tesla program that Adega Casal da Manteiga should adopt:

- I. Exchange presses for decanter centrifuges

In wine production pressing grapes is one of the key processes, so consequently, in this project, one of the most significant energy uses are the presses. In Adega Casal da Manteiga this process is

done with a pneumatic press or a mechanical one. However, there is an alternative: using a decanter centrifuge. The centrifugal force presents certain advantages over the mechanical process: the separation of solid particles is better, which reduces subsequent treatments. There are centrifuges decanters with a capacity of 50 ton/hour. In addition, the use of this equipment can reduce the number of transfers, which reduces the energy consumption needed in pumping.

Despite this, there is no data on the degree of energy savings achieved with this technology; an estimative is also complicated since several processes are involved (e.g. pressing and pumping).

II. Exchange fluorescent lamps for LED lamps

In Adega Casal da Manteiga most lamps used are fluorescent. This technology is starting to become outdated, and it is less efficient than LED technology. This newest technology has a longer life span (more than 50,000 hours), less maintenance and saves up to 75% of energy. The luminous flux is around 10,000 lumens (for 110 W) and 20,000 lumens (for 210 W).

III. Implementation of condenser batteries for reducing reactive power:

Many electrical receivers, such as motors, consume reactive energy, paid in the electric bill. This reactive energy consumption can be avoided by using capacitor batteries, available in virtually all power categories (EDP, n.d.). Frequently these batteries are installed next to the main electrical panel in a centralized equipment that globally compensates the reactive power of the entire installation. In this case, about a gain only in economic savings, reactive energy compensation is beneficial for saving energy in the electricity grid, but not in the installation itself.

IV. Solar thermal energy for heating water

Hot water is used for the day-to-day life of employees in the cellar and for all the disinfection of the materials necessary to produce Carcavelos' wine, especially the cleaning of barrels. To reduce the energy wasted in water heating, the best option is to use high-efficiency solar panels equipped with a high transparency glass (greater than 92%) and copper absorbers with a selective treatment (TINOX) with maximum yield values of 75% and a heat transfer coefficient of $2.9 \text{ W/m}^2/^{\circ}\text{C}$. The energy savings that can be achieved depend on the solar radiation present in the area. Everyday savings vary between 50 - 70%, depending on the climate and the need for energy. This measure will contribute mainly to SDG 7 that is "Affordable and Clean Energy", specifically target 7.2: "By 2030, double the global rate of improvement in energy efficiency".

Reaching goal 7 will help in reducing some negative impacts since "energy is the dominant contributor to climate change, accounting for around 60 per cent of total global greenhouse gas emissions and indoor air pollution from using combustible fuels for household energy, causing 4.3 million deaths in 2012, with women and girls accounting for 6 out of every 10 of these" (United Nations, n.d.).

4.3.3 Implementation plan

The initiatives proposed throughout section [4.3.2](#) cannot be applied to the Villa Oeiras project all at once. Therefore, this section will describe an implementation plan for the initiatives presented above, to be carried out throughout the next year.

In this next year, Villa Oeiras should take small steps in *Promoting sustainable agriculture, Ensuring healthy lives and promoting well-being for all at all ages* and *Energy efficiency/reduction* so that later it can continue to implement more sustainable initiatives.

At the beginning of this implementation, the theme *Ensure healthy lives and promote well-being for all at all ages* should be the first one to be addressed. By becoming part of the project “Wine in Moderation”, Villa Oeiras can show to their employees and the community that this project will take into account people’s health and well-being. In addition, the main goal of “Wine in Moderation” is to strengthen responsibility and moderation in the consumption of wine as a cultural and social norm and to inspire healthy lifestyles. Being part of this program will eventually shape the ideas of those who work at Villa Oeiras to more sustainable and more beneficial ones. This program also provides online education to consumers and professionals, to improve wine professionals’ skills while inspiring consumers to make informed choices and enjoy wine moderately and responsibly, compatible with a healthy lifestyle. The project must continue to invest in the well-being of those around it, not only to transform the community into a healthier and more informed community but also for others who seek this lifestyle to be a part of it.

The next step is taken into the theme of *Promoting sustainable agriculture*. The project should start to study an application of CE to promote sustainability in the vineyards. At the same time, it must apply cover crops in the vine to encourage biodiversity in the vineyards.

Finally, the last topic is *Energy efficiency/reduction*. In terms of improving this topic in the Adega Casal da Manteiga, it is understandable that some of the initiatives presented in section [4.3.2.3](#) are difficult to apply within the next year. The main reasons are the high costs and high bureaucracy needed to successfully achieve these initiatives since the project belongs to Câmara Municipal de Oeiras. Due to this fact, the first step should be to do an energy audit, a powerful tool to evaluate energy consumption in wine production. After this process, simple actions can be applied, like the exchange of the existing fluorescent lamps for LED lamps and the use of condenser batteries to reduce reactive power.

All these initiatives should be implemented during the 1st semester of the year 2022. For better planning, a Gantt chart is presented in Figure 4.8.

Tasks	January	February	March	April	May	June
Weeks	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Present the sustainable project to all employees						
Participate in the program "WineinModeration"						
Apply Circular Economy (CE) practices in Villa Oeiras						
Apply cover crop						
Book Energy Audits						
Exchange Flurescent lamps to LED lamps						
Implementation of condenser batteries for reducing reactive power						
Plan the next steps for the Villa Oeiras sustainable plan						

Figure 4.8 - Gantt Chart of the implementation plan

The implementation of the other initiatives presented will be planned exclusively by the administrative operations of the Villa Oeiras project since there are more extensive investments involved. However, even though the initiatives shown in this Gantt chart seem simple, they can also be challenging to implement since it is a public project, and that's why these simple steps require six months to implement.

4.3.4. The impact of new initiatives in the Value Chain

The new initiatives proposed to be implemented in the Villa Oeiras project will firstly impact the preservation of resources for future generations, minimizing the waste of resources by the project. In addition, this will improve the project's image for the community where it is inserted.

All these initiatives will have a direct impact on the different activities of the value chain. In the previous chapter (section [4.3.2.1](#)), several initiatives were proposed, such as promoting biodiversity, controlling soil erosion, and applying CE practices in the wine chain production, such as the reduction of waste disposal by its treatment and recovery and the best use of all resources at all stages of the value chain.

These initiatives will have a widespread impact on the value chain and directly impact the primary activities of Inbound Logistics and Operations (Figure 4.5). These initiatives can reduce the need for Specialized services for the Vineyard every year and make the operations more efficient, leading to lowering the negative contribution of 59%. Other initiatives were presented to reduce traditional energy consumption and shift to renewable energy consumption ([section 4.3.2.3](#)). This change slightly influences the primary activity Outbound Logistics, namely in the storage process, and strongly impacts two secondary activities of the value chain: Technology Development and Firm's Infrastructures (Figure 4.5) that are now contributing with 2% for the negative margin.

Lastly, it is possible to improve the image presented by the wine and the Villa Oeiras. Introducing the initiatives of Promoting sustainable agriculture and having a more efficient consumption of energy also guarantees a healthy lifestyle, promoting well-being at all ages of their community (section [4.3.2.2](#)). Furthermore, when Villa Oeiras implements initiatives, such as educating their employees on the effects of narcotics, drugs, and alcohol and commits to using the phrase "Be responsible. Drink with moderation", it contributes to a healthier lifestyle in consumers and in the community where Villa Oeiras is inserted.

The new proposed initiatives will go to the heart of sustainability, the Triple Bottom Line (TBL), which integrates economic, social, and environmental dimensions into sustainable development. The initiatives advantages are diverse, namely:

- I. At the social level, the initiatives proposed led to the existence of healthier people that are more aware of the risks of alcohol consumption;
- II. At the economic level, they led to a reduction of energy consumption;
- III. At the environmental level, the initiatives proposed promote biodiversity and soil quality, which allows for this project's longevity. However, the advantages of these new initiatives do not stop here since there is also a significant impact on the brand's image. When Villa Oeiras starts to adopt the proposed sustainable initiatives, its image will be improved for the consumer. Potentially it will draw the attention of new sustainable aware consumers and even to completely new markets, which can boost sales and lead to a less negative margin in the value chain.

CHAPTER 5. CONCLUSIONS

5.1 Considerations about findings

This section will demonstrate that the outcomes discussed in the previous chapters are directly associated with other cases already studied in literature.

The results obtained in the study focus on the implementation of sustainable initiatives in SMEs. In this specific case the scope of sustainable agriculture, well-being of the community and the efficient consumption of energy initiatives is addressed. Somehow these results are recognized in other projects and already reported in the literature, which means that the outcomes are consistent with the context that has been investigated.

One of the research outcomes is the necessity of sustainable agriculture initiatives in the project. In various studies, authors proved this necessity. Hanson & Hendrickson (2009) claims that it is necessary to develop sustainable agriculture systems and systems that are ready to changes, for the survival of 21st century agricultural companies.

Another result obtained was the urgency of an intervention on the social level of the project, more specifically on the well-being and health of everyone around the project, since the project was identified as a promoter of substance abuse, including narcotic drug abuse and harmful alcohol use. The literature states that social sustainability has a positive impact on SME's financial performance. Masocha (2019) suggests that the SME managers that consider social sustainability practices potentially enhanced the financial performance of their small firms. Also, a positive and significant correlation was established between social sustainability and customer satisfaction performance in SMEs, which leads to the outcome already drawn. Social sustainability leads to an improvement in the project's brand image.

Finally, the last result that showed a great urgency and importance to be deepened was the efficient energy consumption. This conclusion is in accordance with several studies already carried out in SMEs about energy sustainability. Following LaRocco (2003) once stated that SMEs initiatives are very effective, and these initiatives are a way to tackle energy waste and energy poverty, SMEs can contribute to an overall energy solution.

The results of the present work lead us to the study of Trigo et al., (2021) where the authors conclude that, in order to produce sustainably, the finest use of available natural and human resources must be made, which can be accomplished by integrating both ecosystem services and human capital, reducing and balancing the use of external inputs, redesigning efficient systems using a regenerative approach, and enhancing social capacities.

Overall, the outcomes of this study go according to Gilinsky et al., (2016) which concludes "By implementing a 'sustainable' strategy in the wine industry, future generations can benefit from growth, long-term profitability, and continuing success of the wine industry for years to come".

5.2. Addressing the research questions

This in-company project aimed to study the sustainability of Villa Oeiras and, therefore, create a sustainable business model that fits the projects' value chain. To reach this goal, it was necessary to answer the three research questions presented in section [1.3](#).

Research Question 1 intended to conclude whether the project was sustainable. To answer this question, two Research Steps were built. The first one was a Sample Characterization of the survey ([section 4.1](#)), the second one was the study of project' sustainability ([section 4.2](#)). This research steps analysis concludes that Villa Oeiras is not entirely sustainable and needs to improve some aspects in the TBL scope.

Since the answer to the first question was negative, Research Question 2 was addressed. Then, the question about how Villa Oeiras can become a sustainable project, concluded to Research Step 3, "Villa Oeiras Supply Chain and Solutions proposal" ([section 4.3](#)). Here, the chain was analysed and resulted in the identification of the main initiatives to improve the project's sustainability and also to reach the identified SDGs. As a consequence of RQ 2 – the search for initiatives to promote sustainable agriculture, ensure healthy lives, promote well-being for all ages and switch to green energy consumption – new practices were proposed. The initiatives touch on the three major sustainability points, namely: Environmental, Social and Economic.

As the initiatives touch on essential sustainability points of the project, they impact the value chain, which consequently answers Research Question 3, "How can sustainability initiatives improve Villa Oeiras' Value Chain". The initiatives will help to positively brunt the primary activities of Inbound Logistics and Operations. This means that they can reduce the need for Specialized services for the Vineyard every year and make the operations more efficient, leading to lowering the negative contribution of 59% for the margin. Other consequences are also expected of these initiatives, such as preserving resources for future generations, and reducing the waste resources produced by the project. This model can help improve the project's image for the community where it is inserted and generate more sales, which contributes for lowering the existent negative margin.

Overall, this study makes a deep analysis of what can be improved, adopting initiatives already implemented in large wine manufacturers and in large wine associations that focus on sustainability. This new sustainable management will have an impact on all stakeholders and may even open doors to new markets. Combining the awards that this wine has recently won and a brand-new sustainable image, we believe that the Villa Oeiras project will potentially grow.

5.3. Relevance and Contribution: Final remarks

This study aims to bring a scientific contribution to the sector of small producers of fortified wine since the results enlighten the changes that Villa Oeiras Project must undertake to achieve sustainability. Moreover, when considering the contribution this project gives to the winemaking practice, the resulting business model, accomplished by the implementation plan made of the initiatives presented (Figure 4.8), could be adapted to other companies. Thus, a replica of this analysis can be applied easily, without resorting to high costs, and used by other wine producers and other producers making a valid contribution to sustainability in the agri-food value chain. Allied to this, it is worth mentioning that our study may impact the community's social welfare since it is possible to apply this framework to the business itself and the surrounding community.

Additionally, our research contributes to advancing the knowledge of wine sustainability, which is still scarce in Portugal, even though Portugal is one of the biggest producers of wine world-wide.

From the theoretical and scientific point of view, this study reveals the lack of frameworks to analyse the sustainability of a SME value chain considering the three great pillars of sustainability and focusing on these equally.

To conclude, a final significant result of this project in specific probably regards the identification of initiatives that, if applied, can improve the project at a social, environmental, and economic level.

5.4. Limitations and Suggestions

The limitation of this research regards the number of respondents to the questionnaire, which was only 23. This issue concerns the specificity of the theme since only stakeholders who know the project in-depth could respond. As the project is new and works on a small scale, no more stakeholders are available to participate. According to Gill et al. (2010), the more significant the sample, the lesser the likelihood of biased findings. So, despite the conclusions and results, it is necessary to consider this limitation.

Consequently, as a suggestion, the scenario and frame built throughout this in-company project should be a starting point for sustainable evaluations of larger projects than Villa Oeiras' one.

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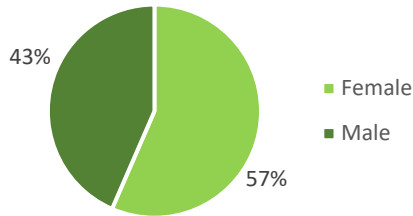
Appendix

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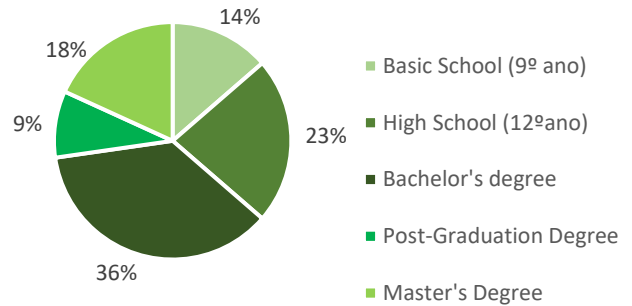
Appendix A

Sample Characterization (Questions 1 to 3)

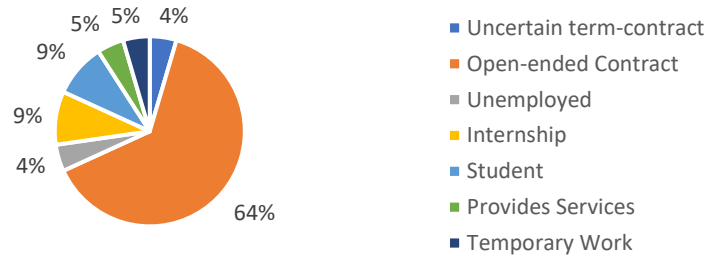
1. What is your gender?



2. What is your highest completed level of education?

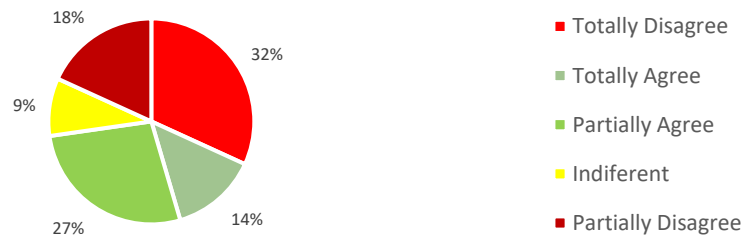


3. What is your type of contract?

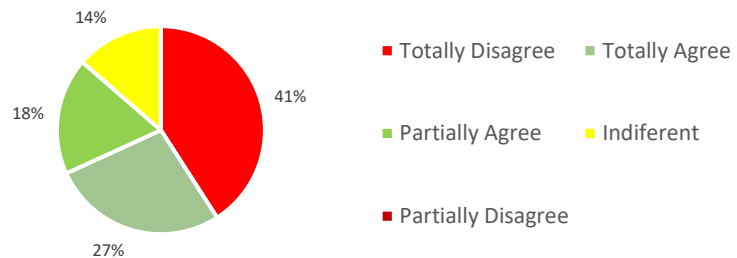


Villa Oeiras sustainability study (Questions 4 to 23)

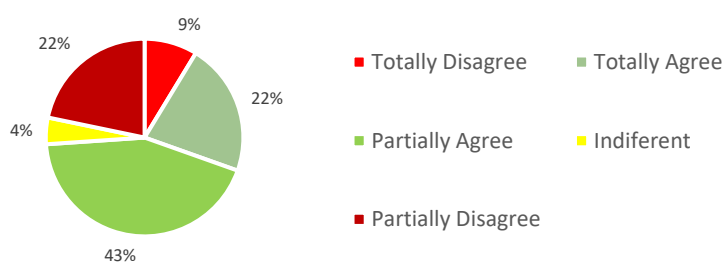
4. The initiatives of the Villa Oeiras project promote sustainable food production systems and the implementation of resilient agricultural practices that increase productivity and production, that help to maintain ecosystems, that strengthen the capacity



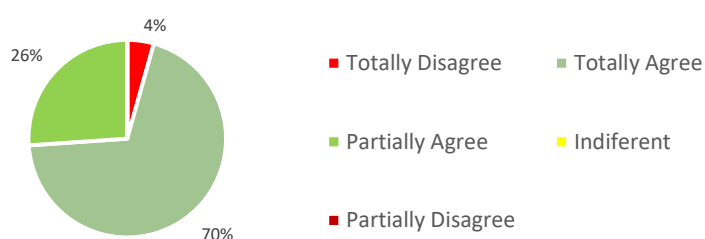
5. The initiatives of the Villa Oeiras project reinforce the prevention and treatment of substance abuse, including the use of narcotic drugs and the harmful use of alcohol?



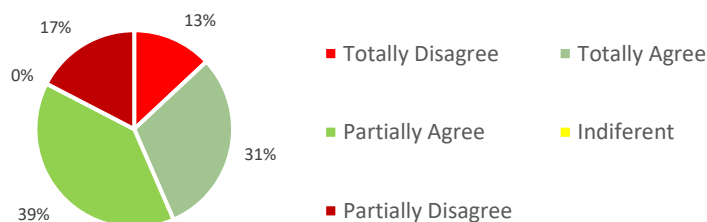
6. The Villa Oeiras project promotes a reduction in the use of dangerous chemicals and the proliferation and contamination of air, water and soil



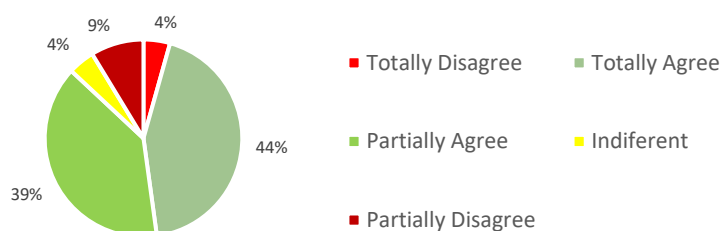
7. The Villa Oeiras project promotes the full and effective participation of women and equal opportunities at all levels?



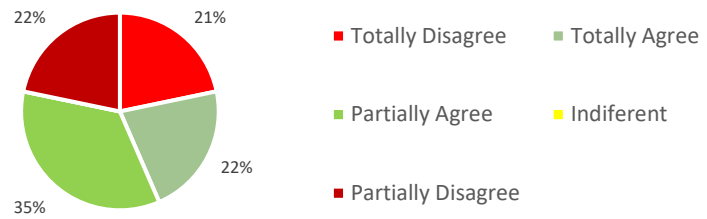
8. Did the Villa Oeiras project create initiatives to eliminate dumping and reduce the release of chemicals and hazardous materials?



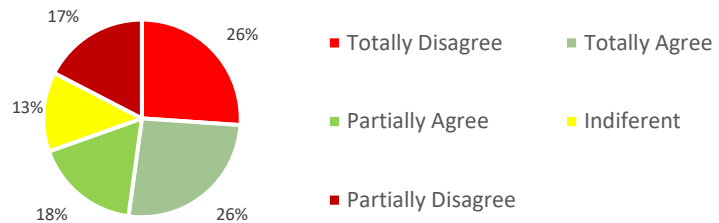
9. Are Villa Oeiras project employees encouraged to recycle and reuse?



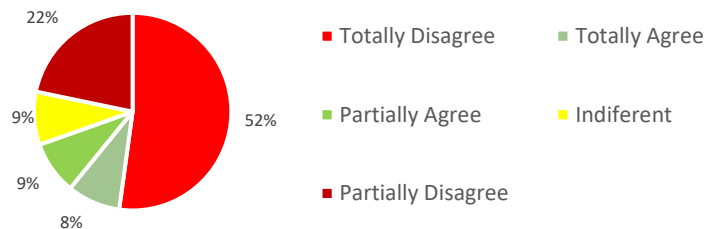
10. Does the Villa Oeiras project promote efficient water use in all sectors, such as reusing water used for washing, monitoring water used and its quality?



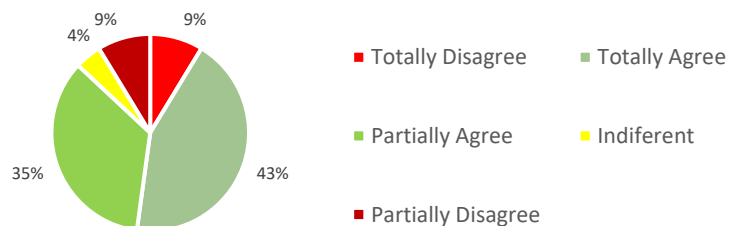
11. The Villa Oeiras project promotes initiatives aimed at improving energy efficiency, such as an energy audit



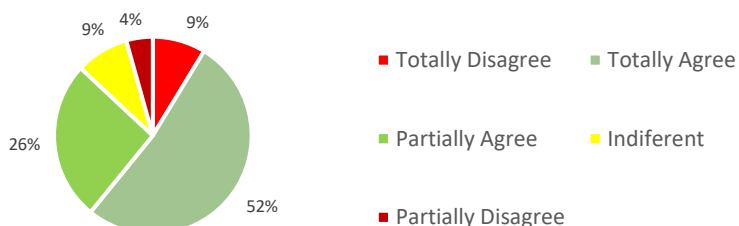
12. Does the Villa Oeiras project use renewable energy?



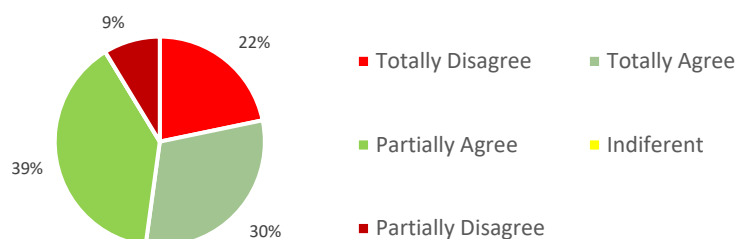
13. Does the Villa Oeiras project promote development initiatives that support productive activities, job creation, entrepreneurship, creativity and innovation?



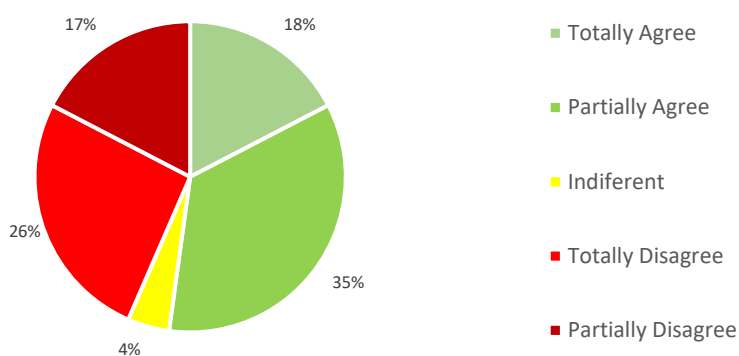
14. Can the Villa Oeiras project guarantee decent work for all women and men, including young people and people with disabilities, and equal work of equal value?



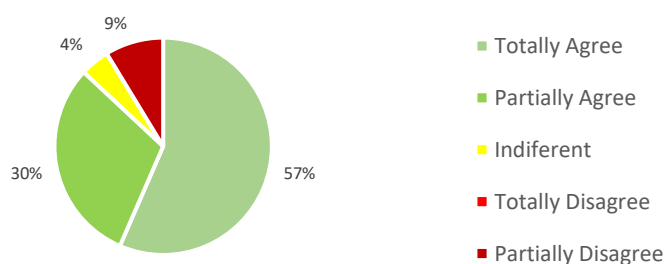
15. Has the Villa Oeiras project updated the infrastructure to make it sustainable, with greater efficiency in the use of resources and greater adoption of clean and environmentally friendly technologies and industrial processes?



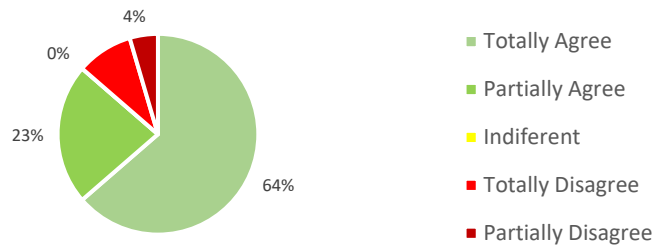
16. Does the Villa Oeiras project create initiatives to improve air quality and manage other waste? For example, the development of operational procedures to reduce waste dispersion; Sorting of solid waste for recycling, or recovery of useful products (co



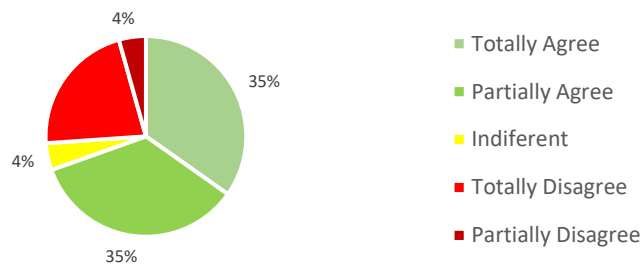
17. The Villa Oeiras project provides access to the community, to a safe, inclusive and accessible green and public space, especially for women, children, the elderly and people with disabilities?



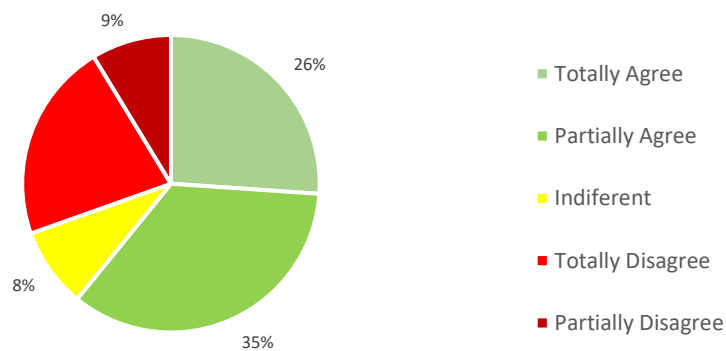
18. Are the packaging used to bottle Villa Oeiras wine recyclable?



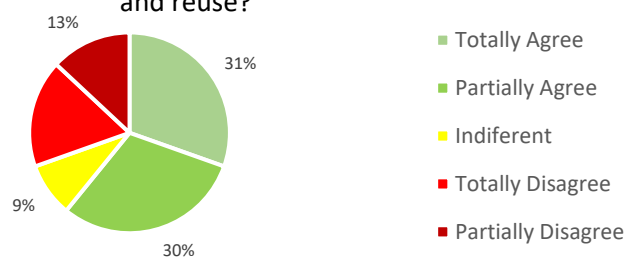
19. Do you believe Villa Oeiras has a sustainable management and efficient use of natural resources?



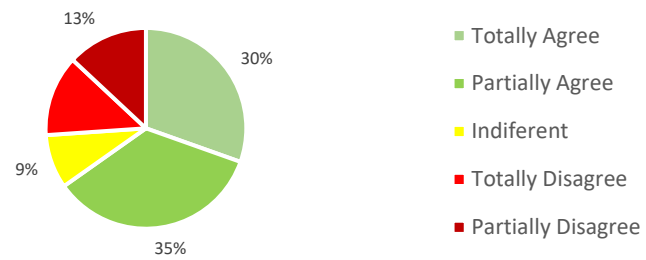
20. Do you believe that the Villa Oeiras project manages environmentally healthy management of chemicals and all residues throughout their life cycle in accordance with the agreed international structures and reducing their release to air, water and soil?



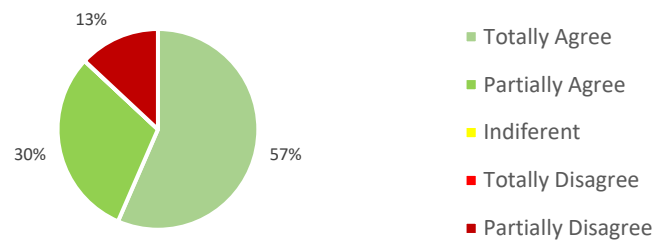
21. Are the employees of the Villa Oeiras project able to substantially reduce the creation of waste through prevention, reduction, recycling and reuse?



22. In the Villa Oeiras project, is there an awareness among employees of climate change, adaptation and impact reduction?



23. Does the Villa Oeiras project combat desertification and promote the restoration of degraded lands and soils?



Appendix B

Price kWh EDP Energy	0,1481 €/kWh
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2019		EUROS	KW
November	22/10/2019 a 21/11/2019	498,77 €	3368
December	22/11/2019 a 21/12/2019	442,53 €	2988
Total 2019		941,30 €	6356
2020			
January	01/01/2020 a 21/01/2020	247,20 €	1669
March	22/02/2020 a 21/03/2020	321,34 €	2170
April	22/03/2020 a 21/04/2020	336,58 €	2273
May	22/04/2020 a 21/05/2020	301,09 €	2033
July	22/05/2020 a 21/06/2020	292,07 €	1972
August	22/07/2020 a 21/08/2020	334,95 €	2262
September	22/08/2020 a 21/09/2020	1 291,03 €	8717
Total 2020		3 124,26 €	21096
Total		4 065,56 €	27451

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Appendix C

Activities	Total	Margin
Technology Development and Firm's Infrastructures	5 376,39 €	1,7%
Wine-growing equipment	1 184,49 €	
Water Consumption	1 067,64 €	
Energy	3 124,26 €	
Human Resources	225 000,00€	73%
Annual Salaries	225 000,00€	
Procurement	118 418,42€	39%
Various materials for the Winery and Vineyard	118 418,42€	

Activities	Total	Margin
Inbound Logistics, Operations and Outbound Logistics	180 451,60€	59%
Specialized services for the Winery and Vineyard	180 451,60€	
Marketing and Sales	- €	0%
Customer Service	- €	0%

Activities total costs	529 246,41€
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Revenues	
Sales from Posto 41	34 686,42 €
Sales from Posto 99	61 549,00 €
Sales from Posto 43	211 253,36€
Total	307 488,78€

Margin €	- 221 757,63 €
Margin %	-72%

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Appendix D

1. Choice table



2. Elevation Mat



3. Grape Destemmer



4. Grape Crusher



5. Pneumatic Press



6. Vacuum press



7. Vinimatic



8. Stainless steel deposits



9. Cold system

10. Oenological pump



11. Flowmeter



12. Compressor



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