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Drivers that lead companies to adopt environmentally sustainable measures

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“A sense of the fundamental decencies is parcelled out unequally at birth”

F. Scott Fitzgerald in *The Great Gatsby*

Dedication

This work is dedicated to my mother, Helena, and grandmother, Rosa, who are the most devoted, loving and hardworking people I know, who always stayed by my side, gave unconditional support, and without whom this would never be possible.

Aknowledgements

I want to thank all my family, especially my brother, João, mother, Helena, and grandmother Rosa, but also everyone who took a decisive part on my definition as a person, my father, José, and deceased grandparents, Maria e João, e José.

I thank my friends, companions in “war” for all times and needs, for the unprecedented support and belief.

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Resumo

Até à Revolução Industrial, no século XVIII, a atividade humana não teve grande impacto no meio ambiente. A partir daí, porém, o rápido crescimento da industrialização começou a afetar o planeta. Desde esse período, a população cresceu exponencialmente bem como as suas necessidades; mais produtos/mercadorias começaram a ser fabricados para atender e capitalizar os níveis crescentes de procura, a agricultura intensificou-se, e o consumo/produção de energia seguiu a tendência, causando um aumento nas emissões de gases com efeito de estufa, um uso desregulado dos recursos naturais e a destruição geral do ambiente natural.

Na segunda metade do século XX, os investigadores alertaram o mundo de que o modelo económico era prejudicial para o meio ambiente, as temperaturas estavam a subir, os recursos usados sem nenhum critério e a camada de ozono estava a ser destruída. Agora, no século XXI, com décadas de registos, a comunidade científica sabe que, se uma alternativa para o atual modelo económico não for adotada em breve, as consequências serão desastrosas. Como o tecido empresarial está bem estabelecido, a mudança de abordagem relativamente ao impacto no meio ambiente torna-se num processo de longo prazo, não apenas porque exige uma mudança nos processos de fabricação, mas também um grande investimento monetário. No entanto, algumas empresas estão a agir e a apresentar resultados.

Tendo em consideração as ideias anteriores, é necessário entender o que move e leva as empresas a adotar medidas ambientalmente sustentáveis e em que princípios e ideias se baseiam para esta nova abordagem. Para o efeito, foi realizada uma revisão da literatura sobre vários conceitos importantes e foram analisados os relatórios de sustentabilidade de duas grandes empresas portuguesas. Os resultados sugerem que o cumprimento da legislação é o principal fator ou instrumento, mas a criação de novo valor e dar resposta às procuras dos clientes, relativamente à sustentabilidade também se torna importante.

Palavras-chave

Sustentabilidade, Drivers, Legislação, Economia Circular, Caso de Estudo

Abstract

Up until the Industrial Revolution, in the eighteenth century, human activity did not have a great impact on the environment. From that point on, however, the great growth of industrialization has taken its toll on the planet. Population has exponentially grown, since that period, and so have their needs; more products/goods are manufactured to meet and capitalize demands, agriculture became intensive with the energy consumption/production following the trend, causing an increase on the GHG emissions, a carefree use of natural resources and the overall destruction of the natural world.

In second half of the twentieth century researchers warned the world that the economic model was harming the environment, temperatures were rising, resources were being used without any criteria and the ozone layer was disappearing. Now, in the 21st century, with decades of data in record, the scientific community is sure that, if an alternative for the current economic model is not adopted soon, the consequences will be catastrophic. Because the business role is well-established, changing its approach to the environment becomes a long-term process, not only because it requires a change on manufacturing processes, but also a big investment, nonetheless some companies are taking action and presenting results.

Having the previous ideas into consideration, it is necessary to understand what moves and drives companies into adopting environmentally sustainable practices and supported in what type of principles and ideas. To address this purpose, a literature review was performed on several important concepts and the reports on sustainability of two big Portuguese companies were analysed. The results suggest that legislation compliance is the main driver or instrument, but the creation of new value and response to costumers demands on sustainability is also important.

Keywords

Sustainability; Drivers; Legislation; Circular Economy; Case Study

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List of Abbreviations

CCP	Critical Control Point
CE	Circular Economy
CEN	European Committee for Standardisation
Cenelec	European Committee for Electrotechnical Standardisation
CF	Carbon Footprint
CoC	Chain of Custody
CS	Case-study
EC	European Commission
EEA	European Economic Area
EEA	European Environment Agency
EF	Ecological Footprint
EJC	Environmental Justice Commission
EMAS	Eco-Management and Audit Scheme
EnU	Environmental Union
eq/year	Equivalent/year
ESD	Effort Sharing Decision
ETSI	European Telecommunications Standards Institute
EU	European Union
EU ETS	European Union's Emissions Trading System
FSC	Forest Stewardship Council
FSSC	Food Safety System Certification
GHG	Greenhouse gas
GJ	GigaJoule
GPW	Green Public Works
GT	Gigaton
HACCP	Hazard Analysis and Critical Control Point
IFS	International Featured Standards
IPQ	Instituto Português da Qualidade
ISO	International Organization for Standardization
kGoe	Kilogram of oil equivalent
LULUCF	Land use, land – use change and forestry
M ³	Cubic meter
MCPFE	Ministerial Conference on the Protection of Forests in Europe

MMR	Monitoring Mechanism Regulation
Mtoe	Million Tonnes of Oil Equivalent
NECPs	National Energy and Climate Plans
PaMs	National Policies and Measures
PEFC	Programme for the Endorsement of Forest Certification schemes
QMP	Quality Management Principles
SDG	Sustainable Development Goals
SE	Sharing Economy
SFM	Sustainable Forest Management
UN	United Nations Organization
WF	Water Footprint
WWTP	Wastewater Treatment Plant

1 – Introduction

After centuries of exploitation, the planet is crashing down, temperatures are rising, as are the sea-levels, resources are nearly depleted, water is scarce, and social inequalities are spreading. However, economy does not seem to be slowing down, world's GDP has been consistently rising over the past decades, although is not consistently or evenly distributed. This environmentally blind creation of capital, where raw materials are extracted, transformed, sold, used and then discarded (linear economy), puts us all at risk, and, ultimately, at the verge of extinction.

Being so, new economic models, incentives for their transition, with innovation-based approaches are needed. This work aims to identify the main drives that lead an organization to adopt environmentally sustainable measures, with a focus on Portugal's reality which includes the roles of important institutions such as the European Union and the United Nations.

It is well-established that this transition requires a significant amount of investment in the short-term, mainly in new technologies, on highly educated human resources or scientific research, which may cause bankruptcy fears, and consequently delaying the adoption of the most needed measures. Studying and highlighting the benefits, not only environmental but also economic, of adopting environmentally sustainable practices is urgent in order to find the best and less harmful – in an economic perspective – way of changing the economic paradigm. It might not exist one miraculous solution, one that solves all problems and answers to all questions, but instead a set of different approaches (i.e. circular and sharing economies), that once combined offer a wide-spectre alternative for companies.

In Portugal, nearly 30% of all country's emissions are caused by only 10 big companies, which are a minority in the Portuguese business market, but also have more financial resources and higher capacity, not only to assess its impact on the environment, but also to mitigate it. Two big Portuguese companies' (not included on the top 10 polluters) reports on Sustainability will be analysed; from there and a literature review, possible drivers are identified. Usually, compulsory/regulatory requirements are the main instruments used to “force” a company to respect the established limits.

2 – Research objectives

The objective of this research is to investigate and bring to light which are the main drivers influencing the environmental behaviour of companies?

3 – Literature Review

This chapter will consist of a literature review, where some fundamental aspects regarding the environment will be explored. Starting with a historical contextualization of the human influence and role on the environment, the research will then focus on current issues and possible solutions to ease and/or stop its destruction. In that regard, and giving the importance and power of European Union, its approach to the issue of climate change will be also explored, Union's established policies, measures, systems and targets, but also new ones which were presented this year (2020) such as the EU's Green Deal 2020. A dissonant perspective regarding this deal will also be exposed with the "Green New Deal for Europe", which calls EU for stronger and more stringent measures.

Furthermore, the current economic model will be discussed, as well as some alternatives, specifically the Circular Economic Model and Sharing Economy.

Finally, the drivers for the adoption of environmentally sustainable measures by companies found in the literature will be contextualized and explained.

3.1 – The Environment

The book "*Climate Change in Human History*" states that prior to the Industrial Revolution in the eighteenth century, human activity did not have a great impact in the environment, this, however, all came to a change in 1712 when the first steam machine appears in England and the demand for coal drastically increased. Technology continued to be improved and with the advent of gasoline-powered engines (1861), followed by the invention of four-stroke internal combustion and high-speed engines (1876 and 1885, respectively), a high demand for oil became a reality. Several scientists such as Fourier, Tyndall and Arrhenius began to study the effects of these fossil fuels. The first described the role of the atmosphere in heating the planet (1824); Tyndall declared water vapor and CO₂ as strong absorbers of heat (1859); then in 1904 Arrhenius argues that the increase in CO₂ by industry could increase the temperature of the atmosphere nevertheless other scientists have dismissed this hypothesis. A shift on these views began in the 1950's when current CO₂ levels were measured in Hawaii, showing a concentration of 315ppm (previous concentrations were estimated in the range of 285ppm in 1850 and

300ppm by the eve of World War I). In 2016 the concentration of CO₂ in the atmosphere had already increased to a worrying 400ppm. Moreover, in 1850 the CO₂ emissions in the United Kingdom were at 123 metric tons, by 1900 this figure had raised to 420 metric tons, a more than 240% increase. In 2011, China emitted around 9511 metric tons of CO₂ into the atmosphere, being the biggest emitter in the world (Lieberman & Gordon, 2018). Overall, the carbon emissions increased by 16 times between 1900 and 2008 (Hoekstra & Wiedmann, 2014).

To quantify the impact of human activity in the environment and raise awareness the term “Footprint” was created, it measures how much of the available capacity within the planetary boundaries is already consumed (Steen-olsen, Weinzettel, Cranston, Ercin, & Hertwich, 2012), for each footprint there is a maximum sustainable level, as an example, the Carbon Footprint (CF) should be between 18-25 Gt CO₂-eq/year and as of the year 2010 it was placed between 46-55 Gt CO₂-eq/year (equivalent/year), a much higher figure than the accepted sustainable maximum. Other main Footprints are the Ecological (EF) and Water (WF) (Hoekstra & Wiedmann, 2014).

Attending to the above, the United Nations (UN) developed a program stating that a Sustainable Development can only be achieved with the combination of the following seventeen parameters/goals: “no poverty, zero hunger, good health and well-being, quality education, gender equality, clean water and sanitation, affordable and clean energy, decent work and economic growth, industry, innovation and infrastructure, reduced inequalities, sustainable cities and communities, responsible consumption and production, climate action, life below water, life on land, peace, justice and strong institutions, partnerships for the goals”. These goals are not legally binding, meaning that they are not of forced adoption. It is then clear that a sustainable development must be set not only on economic pillars but also on social ones with the collaboration, at a global level, of all interested parts (United Nations, 2015).

Being so, the main objective of this work is to determine, through an analysis of the current literature and two companies’ sustainability reports and declaration, which factors act as a drive to companies when it comes to the adoption of environmentally sustainable measures/practices.

Table 1 – UN’s Sustainable Development Goals

UN’s SUSTAINABLE DEVELOPMENT GOALS			
1 – End Poverty	2 – Zero Hunger	3 – Good Health and Well Being	4 – Quality Education
5 – Gender Equality	6 – Clean Water and Sanitation	7 – Affordable and clean Energy	8 – Decent work and economic growth
9 – Industry, innovation and infrastructure	10 – Reduced Inequalities	11 – Sustainable cities and communities	12 – Responsible Consumption and Production
13 – Climate Action	14 – Life Bellow Water	15 – Life on Land	16 – Peace, justice and strong institutions
17 – Partnerships for the goals			

Source: <https://sustainabledevelopment.un.org/?menu=1300>

3.2 – European Union’s policies, measures and targets

3.2.1 – European Union’s Actions

UN is not the only official entity interested in reducing Humanity’s impact in the environment, the European Union (EU) is also undertaking actions to do so, having defined as a target to reduce the domestic Greenhouse gas (GHG) emissions by 40% in 2030 (European Environment Agency, 2017a). In this context, EU created, in 2009, the “2020 climate & energy package” with targets and measures for 2020 which included a 20% cut in GHG emissions (from 1990 levels), 20% of EU energy coming from renewables and a 20% improvement in energy efficiency (Kulovesi, Morgera, & Muñoz, 2011). In 2014 another package was approved by the European Council, the “2030 climate & energy framework” that includes targets for the period between 2021 and 2030, which are:: to cut of at least 40% in GHG emissions (from 1990 levels), at least a 32% share for renewable energy and a 32.5% improvement in energy efficiency (European Commission, 2014).

On November 28, 2018, the European Commission (EC) presented a long-term strategy vision for a “prosperous, modern, competitive and climate-neutral economy by 2050”, this is also in line with the Paris Agreement objective to avoid the global temperature to increase by more than 2°C (European Commission, 2018a).

In order to achieve these goals, all the EU Members were encouraged to define their own national targets, supported by efficient and transparent measures and policies

on key sectors such as housing, agriculture, waste and transport (excluding aviation). By the end of 2018 the Member States must to submit their first drafts on National Energy and Climate Plans (NECPs) which should include climate and energy objectives and policies planned to achieve the 2030 goals (European Environment Agency, 2017a); as of 2017, 1513 policies or measures were reported by Member States, most of the climate change mitigation policies targeted energy-related GHG emissions, a switch to low carbon fuels or electric vehicles and their energetic efficiency, were primarily economic or regulatory instruments (energy efficiency standards). Additionally, 26% of reported actions were not directly related to a specific EU policy or requirement; this subject will be further discussed (European Environment Agency, 2017b).

On April 23 2009, the annual GHG emissions targets for Member States for the period 2013 to 2020 was established and approved by the European Parliament, these goals include emissions from transports, buildings agriculture and waste, which are not present in the EU ETS - Effort Sharing Decision (**ESD**) (European Environment Agency, 2018a). Then, on March 30 2018, a new regulation was again approved by the same entity, this time regarding the binding annual GHG emission reduction by Member States from 2021 to 2030 to meet the commitments taken under the Paris Agreement (European Parliament and European Council, 2018)

According to the EEA's report "Trends and Projections in Europe 2018: Tracking progress towards Europe's climate and energy targets", the reduction in GHG emissions may fall short of the 40% reduction goal by 2030, reaching only an unsatisfactory 32%, in this context, further measures must be taken into action.

By the end of 2018, the 2020 targets were still achievable, even though the progress towards the three main targets was decelerating due to rising in energy consumption, however, by the end of 2019, some of targets were already no longer reached (European Environment Agency, 2019). In 2017, GHG emissions had increased by 0,6% compared to the previous year, when emissions reached a 22,4% reduction below 1990 levels. This means that, between 1990 and 2017, GHG emissions inside EU decreased 21.9%, a figure that makes possible to meet the 20% reduction target by 2020 (20%).

Summing up, it seems that the targets can be met in the EU, however, at each Member State level it may not be true. By 2016, 15 Member States were considered to be on track to meet all of their three national targets for 2020, then in 2017, preliminary estimates indicated that the number of MS on track had decrease by 6, to 9.

Regarding only the GHG emissions, the scenario is slightly better, since annual GHG emission targets under the **ESD** for 2016 were met by 22 Member States (28). However, the number of MS which met the target in 2017 decreased to 18, explaining the

overall increase in GHG emissions in said year. The share of renewable energy only increased by 0,4% in 2017 when compared with 2016's figures, and represented a 17% share in gross final energy consumption; this means that the progress in the distribution of renewable energy slowed down and the risk of not fulfilling the goals set for the energy sector in 2020 increased (European Environment Agency, 2018c).

Another report, this time regarding the “National policies and measures (PaMs) on Climate change mitigation in Europe in 2017”, states that approximately four fifths (77%) of the previously reported PaMs were already implemented or adopted. However, in previous years, and probably because of the economic recession and the austerity policies, these measures decreased. Most of the reported PaMs were implemented at a National level, and the biggest contributors considering each individual Member State were the UK, France and Italy, whose savings measures for 2020 contribute with 39% of the EU' total. Moreover, the energy supply and energy consumption sectors represent around 62% of the total emissions saving within the reported measures. As stated above, 1513 PaMs were reported, and from these it is verified that 400 (26%) did not have a direct link to an EU policy, some of them present a slight increase from 2015. Moreover, it is expected that PaMs which are related to the Renewable Energy Directive will have the biggest impact on emissions by 2020 (European Environment Agency, 2018b).

In the case of Portugal, this Member State submitted 42 single PaMs (Table 2), being most of them reflected mainly on the Transport (19) and Energy Sectors (17) (European Environment Agency, 2018b). As seen above, these Policies and Measures are included on the NECPs, and, once again, in this case they were divided into 7 categories described (a few) in the following table as specified in the **Portuguese Integrated National Energy and Climate plan 2021-2030** submitted by the Portuguese Government (Direção Geral de Energia e Geologia, 2018):

Table 2 – Some measures of the Portuguese Integrated National Energy and Climate Plan 2021-2030
(taken from the Portuguese Integrated National Energy and Climate plan 2021-2030)

Sector	Measures
Electricity production sector	<ul style="list-style-type: none"> - “Promote the decarbonization of the electricity production system, including the closure of coal-fired power plants by 2030.”; - “Accelerate the production of energy from renewable energy sources, with greater focus on solar.”; - “Stimulate in the national production of advanced biofuels through the use of waste and endogenous resources.”; - “Optimise, simplify and revise the legal and regulatory framework for licensing.”; - “Create a favourable regulatory environment for participation by new market players, including local energy communities.”; - “Promote electrification in all sectors.”.
Transport and mobility	<ul style="list-style-type: none"> - “Traditional fossil fuels are being gradually replaced by electricity, biofuels and H₂, and electrification will take place in most means of transport.”; - “Increase demand for mobility will be met both by more public transport as well as by generalized individual shared electric and/or autonomous transport.”.
Services and residential buildings	<ul style="list-style-type: none"> - “Extensive electrification of services accompanied by solar thermal for heating water and predominance of heat pumps for heating spaces.”.
Industry	<ul style="list-style-type: none"> - “Electrification and use of biomass.”; - “Reduction in emissions will be at a lower rate than in other sectors. The sector does not depend only on technological solutions, but also on changes to current business models and capacity for innovation in low-carbon processes, products and services.”; - The digitalization of processes, products and resource management in industry (Industry 4.0) will contribute to greater efficiency and the decarbonization of the sector.”.
Waste and wastewater	<ul style="list-style-type: none"> - “Collection of biowaste and priority in biological treatment with the production of compost.”.
Agriculture	<ul style="list-style-type: none"> - “Reduction in the use of synthetic nitrogen fertilisers.”; - “Expansion of biological agriculture, conservation and precision agriculture will allow emissions to be reduced from animal effluents and fertilisers.”.
Land use, land-use change and forestry	<ul style="list-style-type: none"> - “Significant reduction in areas affected by forest fires.”.

Source: (Direção Geral de Energia e Geologia, 2018)

3.2.2 - European Union’s Green Deal 2020 and the “Green New Deal for Europe”

By the end of 2019, the new European Commission presented a Green Deal, where around one trillion euros were invested in a socially just environmental transition, laying on the following 11 main premises:

- 1) Finance the transition;
- 2) Just transition (no one is left behind);
- 3) Mobilise research and foster innovation;
- 4) Increase EU’s Climate ambition for 2030 and 2050;
- 5) Supply clean, affordable and secure energy;
- 6) Mobilise industry for a clean and circular economy;
- 7) Build and renovate in an energy and resource efficient way;
- 8) A zero-pollution ambition for toxic-free environment;
- 9) Preserve and restore ecosystems and biodiversity;
- 10) Fair, healthy and environmentally friendly food system;
- 11) Accelerate the shift to sustainable and smart mobility.

The Commission intends to “transform the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use” (European Commission, 2019).

Based on this, the European Commission will propose the first climate law by March 2020

Some institutions have a different view from the EU, stating that the Union’s Deal does not actually deal with the challenges that climate change offers and that more stringent measures are necessary. Following that idea, a Green New Deal for Europe, with more demanding goals and guidelines was proposed. Its authors defend that it is a “comprehensive policy package” which comprises the creation of three different institutions: Green Public Works (GPW), Environmental Union (EnU) and the Environmental Justice Commission (EJC) (table 3), and presents a policy checklist for each of these institutions to apply (GNDE, 2019).

Table 3 – Summarizing the “Green New Deal for Europe”

Institution	Main Purpose
Green Public Works (GPW)	An “investment programme to kickstart Europe’s just transition”

Institution	Main Purpose
Environmental Union (EnU)	A “package of legislation to align policies with the scientific consensus”
Environmental Justice Commission (EJC)	An “independent body to research, monitor, and advise EU policymakers”

Source: (GNDE, 2019)

3.3 –The current economic model

According to Wagner Gernot and Martin Weitzman in their book “Climatic Shock – The economic consequences of a Hotter Planet”, the simplest and most credible solution for the climate calamity is to establish a price on Carbon through taxation or a Cap-and-Trade system (Wagner & Weitzman, 2015), arguing that this provides an incentive for the stakeholders to reduce emissions in a cost-effectively way (Boyce, 2018). However, carbon is not the only concern regarding the environment, thus, many scholars argue that there is also a need to change the way our current economic system works, promoting a shift from the current linear model to a circular one. In the following sections these aspects will be explored.

3.3.1 – Sharing Economy

The concept of Sharing Economy (SE) is rather simple to understand. It represents an economic model where sharing assets among groups of people is preferred over owning them (Ryu, Basu, & Saito, 2019). However, initially it was not considered an economic concept, having its origins based on “not-for-profit” activities, only recently it was considered a business opportunity where companies, like Uber and Airbnb, take a fraction of the sharing fees to obtain profit (Cheng, 2016). In 2010, in their book “*What’s mine is yours*”, Rachel Botsman and Roo Rogers, conceptualized 3 features for SE: 1) Product Service Systems; 2) Redistribution Markets; 3) Collaborative Lifestyle. The concept, as a whole, “involves individuals exchanging, redistributing, renting, sharing, and donating information, goods, and talent, either organizing themselves or via commercial organization by social media platforms”. With this view of SE, some authors state that this lifestyle will disrupt traditional economic models and consumerism, reinforcing social equality and contributing to reduce resource use (Heinrichs, 2013).

According to (Curtis & Lehner, 2019), the SE, is becoming an important pattern in consumer behaviour, growing extremely, and surpassing other markets. Moreover, it

is expected that SE's business volume will have increased to 335 billion US\$ by 2025, knowing that it was around only 15 billion US\$ in 2015 (Cheng, 2016).

Over time, the concept diverged into various terms such as “collaborative consumption”, “access economy”, and “peer economy”, having all in common the usage of products with low or without the costs of ownership, and consequently reducing waste from excessive production and consumption. The fact is that, for example, car sharing may contribute to reduce the total number of cars owned, increase car efficiency, and consequently reduce environmental impacts of car production (Ryu et al., 2019).

According to Ritter and Schanz (2019) cars are a particular concerned issue, since they are idle 95% of the time and being accessible through online sharing services would significantly reduce the number of vehicles needed (Ritter & Schanz, 2019). However, the current situation is that sharing does not influence in a positive way the idling capacity of existing vehicles.

In this context, many view the SE as a particularly helpful way to combat excessive waste and production, therefore, an important contributor for a transition to sustainability and circular economy, where not only economic values are at stake but also social ones by offering cheaper access to services (Ritter & Schanz, 2019). However, the effect of sharing economy on sustainability and circular economy remains under studied. According to Ritter and Schanz (2019) this fact results from three reasons: i) the “variety, flourishing and constantly changing of practices” under SE; ii) the situation where companies or organizations engaged in these practices do not consider themselves as part of it; and iii) the pragmatism of stakeholders which choose not to impose criteria on what in fact is the SE. Moreover, some authors affirm that the potential sustainability aspects of SE are nothing but co-benefits associated with the sharing practice, and that what's in consumers mind are the self-benefits which can be taken from the SE practice (Curtis & Lehner, 2019).

In a communication (2016) from the European Commission to several European entities, the EC stated that SE could contribute to EU's “sustainability agenda and to the transition to the CE” (Beretta, 2016).

There is in fact a potential in SE to generate a more sustainable way of consumption practices, but it deserves more studies, and a strong, well accepted, and academically validated definition of SE (Curtis & Lehner, 2019). It is also important to notice that although it should be thoroughly studied, the SE alone cannot fulfil the total need for a more sustainable society (Heinrichs, 2013).

3.3.2 – Circular Economy

“Substituting the end-of-life concept with restoration”

(Sassanelli, Rosa, Rocca, & Terzi, 2019)

The current economic system is described as linear, meaning that natural resources are extracted, transformed, consumed and then disposed after usage, generating waste (Talman-gross & Fischer, 2016). The exhausting usage of some reserves of important elements and minerals will contribute to its depletion within the next 50 years (Camilleri, 2019). In this context the Linear economy contributes to damage the environment and promotes social inequality at a global level (Millar, Mclaughlin, & Börger, 2019),

The concept of Circular Economy, proposed by the Ellen MacArthur Foundation in 2013, is often seen as a better alternative to this linear model (Farooque, Zhang, Thürer, & Qu, 2019), and consequently to various issues regarding sustainability without the compromising of the economy (Lieder & Rashid, 2016), thus gaining increased attention among scholars and policymakers (Geissdoerfer, Savaget, Bocken, & Jan, 2017). This, however, requires a paradigm shift from the traditional economic model, (Abadia, Carvalho, Homrich, & Galv, 2018), as this kind of system is not viable for the planet which has finite resources and a limited capability to absorb the generated waste (Fern, Gonzalo, & Soto-o, 2019).

Different definitions for the CE are being discussed, from an eco-industrial development perspective, CE, is seen as the realization of closed loop material flow in the whole economic system (Geng & Doberstein, 2010), it can then be broadly described as “an economy in which the generated waste can re-enter the economic cycle as a resource”, hence closing a loop. This means that “the value of products, material and resources is maintained in the economy for as long as possible, and the generation of waste is minimised” (Talman-gross & Fischer, 2016). The purpose is to eliminate wastes, retain the value of products and materials, making a transition for the use of renewable energies and to disregard toxic chemicals (Sassanelli et al., 2019), moreover, biological ingredients or nutrients will, under CE, be safely returned to the environment, enhancing the biological capital (Farooque et al., 2019).

However, despite of the beneficial environmental impacts, the implementation of this circular system is very complex since a superior design of the current linear business models (BM) is needed, meaning that innovative BMs and design practices, along with a different logistic methods and technologies adoption are of great urgency and importance (Sassanelli et al., 2019). Therefore, various authors try to elaborate a Circular Supply Chain Model (CSCM), which is the integration of circularity into Supply Chain

Models; this implies the involvement of all stakeholders (manufacturers, service providers, consumers and users), which is made possible with the collaboration of other organizations within and out of the sector where one or more companies restore the waste's value of another's company waste. Farooque et al (2019) gives the example of recycled PET bottles which can be used for construction as isolation for house walls.

As part of the stakeholders, consumers have also an important role in the transition towards the CE through campaigns and sustainability education target to them (Farooque et al., 2019). Regarding the companies' collaborators and managers, and also consumers, the more aware and educated about sustainability they are, the easier it is to implement new CE measures and practices, meaning that companies should recruit and select such type of employee to enhance their odds of a successful transition (Charbel et al., 2019).

Some CE practices can be implemented at micro-level considering an individual company, such as Eco/Green designs, green procurement, cleaner production and end-of-life management based on the 3Rs Principles (reduce, reuse, recycle) (Farooque et al., 2019). Moreover, Fern, Gonzalo and Soto-o (2019), proposed some operational principles (table 4), divided into three categories: i) Target Operational Principles, which come directly from CE's theoretical goals (...), ii) Core Operational Principles that although not directly derived from the previously goals, are vital to achieve them (...), and iii) Transversal Operational targets which contributes to promote the success of the first two (...) (Fern et al., 2019).

Table 4 - Ways in which a company may reduce their impacts on the environment

Repair	Repairing its parts, the life of products extends;
Recondition	Overhauling a product allows an extension of its life;
Remanufacture	Having new products based on old ones;
Reuse	A product should be design in a way that is possible to use numerous times;
Recycle	Conversion of products into raw material to be used in another or the same product;
Reduce	Reduce the use of raw material without compromising the quality of the product (new, sustainable versions).

These very important steps have also a great impact on a company's competitiveness, since there is a reduction in the consumption of resources, being energy one of them (Farooque et al., 2019). Camilleri et al, (2019), corroborate Charbel et al, (2019) and state that businesses should adopt some systems, at a management level, to

adequate their activities and reduce their environmental negative impacts, as showed in the table (5) (Camilleri, 2019).

Table 5 – CE oriented Operational Principles and respective Practical Strategies

Operational Principles		Practical Strategies
Target Operational Principles (2)	Adjust inputs to the system to regeneration rates	<p>Substitute non-renewable by renewable inputs (e.g., bio-based materials, renewable energy);</p> <p>Substitute renewable materials with low regeneration rates for other with faster regeneration rates;</p> <p>Adjust taxes and subsidies of technology, products and materials based on their resource regeneration rates;</p> <p>Save energy and materials (i.e. improving energy efficiency, resource productivity, virtualizing products, etc.);</p> <p>Foster renewable mobility (i.e. walking, bicycle, renewable fuels, etc.);</p>
	Adjust outputs from the system to absorption rates	<p>Substitute materials and processes which produce technical outputs by those which produce biological outputs;</p> <p>Substitute processes for those with lower waste generation rates (i.e. more eco-efficiency processes);</p> <p>Adjust taxes and subsidies of technology, products and materials based on their waste generation rates;</p>
Core Operational Principles (3)	Close the system	<p>Separate biological and technical wastes properly;</p> <p>Remanufacture products and components;</p> <p>Promote and improving downcycling, recycling and upcycling of wastes (i.e. logistics, take-back systems, technology, etc.);</p> <p>Promote energy recovery by converting waste into heat, electricity or fuel;</p> <p>Promote Extended Producer Responsibility;</p>
	Maintain resource value within the system	<p>Interconnect stages (i.e. redistributing second-hand goods);</p> <p>Promote industrial symbiosis (i.e. establishing standards, cascading, by-products, etc.);</p> <p>Increase durability (i.e. practical guides for reparability, preventive and corrective maintenance, repurposing, etc.);</p> <p>Reduce obsolescence (i.e. updating software);</p>
	Reduce the system's size	<p>Inform consumers properly (i.e. eco-labelling, product labelling, product declarations, etc.);</p> <p>Expand the Extended Consumer Responsibility;</p> <p>Promote functional service economy and sharing economy (i.e. collective mobility);</p> <p>Promote green procurement (i.e. local products, season products, etc.);</p> <p>Adjust selling doses to consumer doses;</p>

Operational Principles		Practical Strategies
Transversal Operational Principles (2)	Design for CE	Eco-design (i.e. optimizing packaging, improving durability, etc.); Design transparent, reproducible and scalable products to build the same products in other places based on local resources; Think about practical utilities and consumer preferences (customization/made to order); Design new business models and strategies; Design new methodologies to guarantee a continual improvement; Design projects to promote sustainable development and circular economy;
	Educate for CE	Adjust educational curricula to the current challenges; Promote knowledge, skills, capabilities and values that ensure the proper performance of circular economy; Promote habits and individual actions in favour of circular economy.

Source: (Fern et al., 2019)

It is clear that CE can only be an effective alternative to the current economic model if applied to all levels of society, hence, a solely application at a micro-level is not viable, so an interaction within the firm/sector and inter-firm/sector has to be strongly present, this corresponds to the meso-level of implementation; lastly, in order to create a system that involves everyone, it must be applied at a macro-level, meaning that society as a whole should be involved in the transition towards a CE, making it a sustainable “well-oiled machine” (Fern et al., 2019). Having all of this into consideration, the following three main theoretical aspects can then be considered when a transition towards CE is in sight: i) the minimization of raw materials’ inputs and outputs of waste, ii) the resource value should be kept for as long as possible within the system, and iii) the products should be reintegrated into the chain when they reach the end-of-life (Fern et al., 2019).

Although many researches are being performed and published, a knowledge gap still exists regarding the integration of CE into practical businesses, however, it is accepted that it helps improve environmental along with economical performances (Farooque et al., 2019), as an example, it is expected that “European-based economies could improve their productivity by 3%, have costs savings of €600 billion a year and increase €1.8 trillion in other economic benefits by 2030” (Charbel et al., 2019).

Such transition to CE requires a transformation in business models, supply chain configurations, product design, the investment in new technologies (Farooque et al., 2019), the intervention of Governments and policy makers (with new policies and incentives, such as regulations for performance assessment), and placing mutual responsibility towards, not only businesses, but also consumers (change in consumer patterns through an eco-education of the public) (Camilleri, 2019).

3.4 – Cap-and-trade system and European Union’s Emissions Trade System (EU ETS)

A cap-and-trade system consists of a purchase of carbon which allows to establish a limit (cap) amount of CO₂ emission for industries (Boyce, 2018). Companies that reduce their emissions can sell or trade their unused ones and lower their total amount of emissions allowed for the next year. If companies surpass their allowed limit, they have to buy new permits, the buying price is higher than the selling one, therefore over time and as a consequence, investing in clean technology becomes cheaper than buying permits (Matisoff, 2010).

In 2005, EU established the world’s first International Emissions Trading System (EU ETS) which accounts for over three-quarters of the international carbon trading; it is expected that the emissions covered by the ETS will be 21% lower in 2020 than they were in 2005, moreover, by 2030 emissions will have a decrease of 43% (European Commission, 2020) On the next section this program will be further explained.

According to the European Union in 2016, the activities which had the high fuel consumption were the Energy and Transport ones, representing 26,9 and 21%, respectively, of the total (European Commission, 2018b), and in 2018, coal plants represented nearly 15% of EU’s total GHG emissions, almost as much as the entire road transport sector (21%) (Flisowska & Moore, 2019).

In 1995, EU produced 174,9Mtoe of hard coal and imported 76,4Mtoe, representing a dependency on the exterior market of 29,7% and two decades later, in 2016, its production dropped to 51,4Mtoe (a 29,38% decrease). Although hard coal consumption within EU also decreased between those years (from 257,5Mtoe in 1995 to 159,2Mtoe in 2016), the dependency on the exterior markets increased to 61,2% (to 97,5Mtoe) (European Commission, 2018b). In the same year, 2016, nearly three fourths (3/4) of solid fuel imports came from Russia (30%), Colombia (23%) and Australia (15%), this is too risky since 75% of imports are from just three different external partners, representing a threat to EU’s energy supply stability (Eurostat, 2018).

As stated above in 2005, EU initiated a Carbon Market System, it consists of four (4) phases (Table 6); the first one began in 2005 and ended in 2007, the second phase occurred from 2008 until 2012, currently (2019), the program is in its third phase which began in 2013 and will finish in 2020; finally, the last phase will initiate in 2021 and terminate in 2030. Several gases and sectors are included in the program: carbon dioxide (CO₂) from power and heat generation, power intensive industry sectors (oil refineries, steel works and production of iron, aluminium, metals, cement, lime, glass, ceramics, pulp, paper, cardboard, acids and bulk organic chemicals), and civil aviation; nitrous

oxide (N₂O) from the production of nitric, adipic and glyoxylic acids and glyoxal; Perfluorocarbons (PFCs) from aluminium production (European Commission, 2015b). Therefore, the Trade system covers the Energy Sector and large industries by limiting “emissions from more than 11,000 heavy energy-using installations and airlines (applied only to flights between airports within in the European Economic Area (EEA))”, subsequently covering around 45% of EU’s GHG emissions (European Commission, 2020).

In the context of EU’s Trade System, the cap corresponds to the number of allowances put in circulation over a trading period which quantify the GHGs that may be emitted by the industries covered. As an example, in 2013 the cap for emissions from stationary installations was set at 2.084.301.856 allowances (European Commission, 2018c) (table 6).

Table 6 - EU ETS cap from 2013 to 2020

Year	Annual Cap	Annual Aviation allowances put into circulation
2013	2 084 301 856	32 455 296
2014	2 046 037 610	41 866 834
2015	2 007 773 364	50 669 024
2016	1 969 509 118	38 879 316
2017	1 931 244 873	38 711 651
2018	1 892 980 627	38 703 971
2019	1 854 716 381	
2020	1 816 452 135	

As a consequence of these programs, the price of carbon has been rising, costing, to this date (2019), more than 27€ to emit a tonne of CO₂, five times more than in 2016, which makes the generation of electricity through coal significantly expensive. Since the price of Renewable Energy keeps falling and the price of carbon rising, it is then expected that it’ll be cheaper to produce energy through Renewables than to operate in the existing coal capacity in every EU Member State by 2020 (Flisowska & Moore, 2019).

Table 7 – European Union’s Emissions Trade System¹

Phase	Time Period	Key Features and Prospects (4 th Phase)
First Phase	2005-2007	<ul style="list-style-type: none"> - Only CO₂ emissions from generators and energy-intensive industries; - Practically all allowances were given for free; - The penalty for non-compliance was €40/tonne.
Second Phase	2008-2012	<ul style="list-style-type: none"> - Lower cap on allowances (6.5% lower than in 2005); - Iceland, Liechtenstein and Norway joined the program; - Nitrous oxide emissions were included by some countries; - Free allocation fell to about 90%; - Actions were held; - The penalty for non-compliance increased to €100/tonne; - Businesses were allowed to by international credits.
Third Phase	2013-2020	<ul style="list-style-type: none"> - Auctioning as the default method for allocating allowances; - More sectors and gases included; - 300 million allowances set aside in the New Entrants Reserve to fund the deployment of innovative renewable energy technologies and carbon capture and storage.
Fourth Phase	2021-2030	<ul style="list-style-type: none"> - Increase the pace of annual reductions in allowances to 2.2% as of 2021; - Continuing the free allocation of allowances as a safeguard for the international competitiveness; - Ensuring that the rules for the free allocation determinacy are focused and reflect technological progress; - Provide help (through funding mechanisms) so that the industry sector can meet the innovation and investment challenges.

After the end of Phase One (2007), a price on carbon had been put, a free trade in emissions allowances across EU created and the Infrastructures needed were established (European Commission, 2015a).

3.5 – Drivers for the adoption of environmentally sustainable measures by companies

Although some factors may delay the adoption of concrete measures, there are also some which have the opposite effect, like the long-term cost savings (Farooque et al., 2019) on resources and energy due to a more efficient operational use (Camilleri,

¹ (https://ec.europa.eu/clima/policies/ets/pre2013_en) - Phases 1 and 2
(https://ec.europa.eu/clima/policies/ets_en) – Phases 3 and 4

2019), an improved brand image, regulatory compliance and increase interest from investor, that result from their adoption (Farooque et al., 2019).

Fern, Gonzalo and Soto-o, 2019, state that at a macro-level, legislation poses as the main instrument to be considered to incentive companies (Fern et al., 2019) in that way institutions and governments should support the transition with the use of regulation, taxes and subsidies which drive producers to comply with the established policies and guiding principles (Camilleri, 2019). On table 8, a summary of the identified drivers is shown.

Table 8 - Summary of Identified drivers

Identified Drivers in Literature
Long-term cost savings
Improvement of brand image
Regulatory/legal Compliance
Attract Investors interest
Increase in the firms' operational efficiency (resource use)
Support provided by Governments and Institutions
Regulation, taxation, or subsidization of producers to comply with regulatory policies

Sources: (Farooque et al., 2019), (Camilleri, 2019), (Fern et al., 2019)

4 - Methodology

The main objective of this research is to investigate which drivers are influencing the environmental behaviour of companies.

According to Perry (1998) and Rowley (2002), a case-study approach is appropriate when the boundaries of a phenomenon are not only unclear but also there is no control over behavioural events. In this research, the boundaries (GSCM practices which may deeply influence SC performance) are still relatively vague. To this end, two cases were analyzed as the means to identify a set of variables within a chosen SC, so as to further refine the research methodology for future investigation as well as to explore the theoretical framework proposed in the previous section.

Yin (2002) states that case studies can be exploratory, descriptive or explanatory. Because there is little empirical evidence, it is too early to develop testable hypotheses, and therefore this research is exploratory in nature.

To answer the research question, the methodology chosen for this work is the case study, it aims to analyse the environmental data and other factors corresponding to the activity of two big Portuguese' companies - Grupo Amorim and Delta Cafés.

Both companies explore natural resources, the first one has coffee as its main raw material, and the second one, cork. Although the companies operate in different sectors, they were chosen because, not only integrate the same legal system, that has an important influence on decision making, but also because of the great availability and quality of the environmental data which can be crossed to make inferences, regarding the subject.

All of the information will be gathered through the analysis of the companies' sustainability reports/declarations, information provided online on their websites, published studies, and international protocols. Since both reports refer to the activity in 2018, the data will be compared to the year before, 2017. Most tables and figures were adapted from the reports, others were taken directly from them, and, in those cases, that will be indicated. The divulgation methods are different, *Corticeira Amorim* chose to incorporate all data and information, environmental and social, in one report – Sustainability Report (Corticeira Amorim, 2019) -, Delta, instead, decided to report the environmental performance in a document denominated *Declaração Ambiental* (Delta Cafés, 2019) and all social targets and achievements on a different one named *Relatório de Sustentabilidade* (Delta Cafés, 2018).

On chapter 5, which will picture the case studies', the information will be provided through 1) text and 2) figures and/or tables when analysing quantitative data to obtain a higher level of comprehensibility of the text.

To better understand and contextualize the parameters analysed in each company, Certifications, what they consist of and why they are important, the scope of GHG emissions in an industrial context and the legislation on which the companies should base their environmental demonstrations, will be further explained. This allows to cross the theoretical information with the quantitative data provided by the companies and to get conclusions.

Table 9 – Methodology Summary

Case Studies	Research Topic/Question	Main Data Sources	Other Sources
2	Drivers for the implementation of sustainable measures	Sustainability Reports/ Declaration	- Legislation - Web Sites - International Protocols
- <i>Corticeira Amorim</i> - <i>Delta Cafés</i>	Which are the main drivers influencing the environmental behaviour of companies?	- Declaração Ambiental (NovaDelta, 2018) - Relatório de Sustentabilidade 2018 (Delta Cafés, 2018) - Relatório de Sustentabilidade 2018 (Amorim, 2018)	- Portuguese and European Legislation - Standardization web sites and guides - GHG Protocol

4.1 – Standardization

According to the European Union on its 1025/2012 Directive on European standardisation (emended by Directive (EU) 2015/1535 of the European Parliament and of the Council of 9 September 2015) “the primary objective of standardisation is the definition of voluntary technical or quality specifications with which current or future products, production processes or services may comply. Standardisation can cover various issues, such as standardisation of different grades or sizes of a particular product or technical specifications in product or services markets where compatibility and interoperability with other products or systems are essential.” Moreover, the directive recognizes the role of standardization as an instrument to address current problems and to create a marketing advantage: “standards can contribute to helping Union policy address the major societal challenges such as climate change, sustainable resource use, innovation, ageing population, integration of people with disabilities, consumer protection, workers’ safety and working conditions. (...) the Union could create a

competitive advantage for its enterprises and facilitate trade, in particular for SMEs, which account for a large part of European enterprises.” EU recognizes three different organisms which create and/or adopt the Standards within its boundaries: the European Committee for Standardisation (CEN), the European Committee for Electrotechnical Standardisation (Cenelec) and the European Telecommunications Standards Institute (ETSI). Although Standards are of voluntary adoption, and countries can transpose them into their own normative system, granting that the EU is informed of their different and/or adopted systems, this requires a flexible flow of information between EU and its member states to ensure all systems (national and European) do not conflict .

With regard to the environment, the directive is clear: “Standards should take into account environmental impacts throughout the life cycle of products and services”.

In line with EU, the Portuguese Institute of Quality (IPQ), which is the entity responsible for the coordination of the standardization process in Portugal states that Standardization is an “activity designed to establish dispositions for common and repetitive use, in order to obtain an optimum degree of order”; and that “Standards are documents which are the result of a consensus, approved by a recognized Standardization Organism, that establishes rules, guides or characteristics of products/services, based on scientific, technical or experimental knowledge” with the purpose to optimize communal benefits. Moreover, standards are a mean of assurance to clients that the products/services they acquire have quality and respect for human rights, the environment, and that they are safe (IPQ, 2020a).

If a Standard is national - in this case Portugal- it is identified by the letters NP, if it is transposed from an EU directive, it is identified with NP EN. On the other hand, if an European standard is adopted from an international organization (i.e. ISO), then transposed to a Portuguese standard, it is identified as NP EN ISO (i.e. NP EN ISO 9001).

IPQ also declares that Standards are of voluntary adoption, however they can become mandatory if referred on a legal diploma, contract or if they become a *de facto* standard (wide use but without an official status). The adoption benefits pointed out by the Portuguese organism are various:

- Assures that products, equipments and systems are safe;
- Reduces errors;
- Reduces costs;
- Allows manufacturers to comply with the legislation;
- Ensures compatibility and interoperability;
- Reflects knowledge (research, development and innovation);
- Promotes a common technical understanding;
- Facilitates contractual acts;

- Facilitates the entry into new markets (IPQ, 2020b).

Various organizations develop Standards, one of them is the International Organization for Standardization which developed the most widespread management system in the world – ISO 9001 for quality management

Standardization Organizations do not certify companies or other entities, they only develop and publish Standards and its requirements. In order to be certified a company must be audit by independent organisms which verify if said entity complies with the Standard, meaning that all requirements must be fulfilled. Usually, one of those requirements is compliance with the law (International Organization for Standardization, 2015d).

Next, to contextualize some aspects present in the Chapter 5 of the present work, the Standards and Certifications of the companies studied will be further explored.

4.1.1 - ISO 9001 – Quality Management System

Part of the ISO 9000 family for Quality management, it sets the criteria meant for companies to fulfil in order to be certified on this purpose. This allows customers to get consistent, good-quality products and services (International Organization for Standardization, 2015c).

Follows seven quality management principles (QMPs), which are:

1. Customer focus;
2. Leadership;
3. Engagement of people;
4. Process approach;
5. Improvement;
6. Evidence-based decision making;
7. Relationship management

Each of the previous principles represents various benefits for the companies and their clients such as increased customer value and satisfaction or increased revenue, market share (Principle 1), better coordination and efficiency (Principle 2), enhanced involvement of people, trust and collaboration (Principle 3), consistent and predictable processes, optimized performance (Principle 4), greater drive for innovation (Principle 5), better decision-making processes (Principle 6), and shared goals and values across all the interested parts (Principle 7) (International Organization for Standardization, 2015e).

According to this Standard's Requirements, an organization "needs to demonstrate its ability to consistently provide products and services that meet customer

and applicable statutory and regulatory requirements” and “aims to enhance customer satisfaction through the effective application of the system, including processes for improvement of the system and the assurance of conformity to customer and applicable statutory and regulatory requirements, being that only then it is eligible to be ISO 9001:2015 certified (International Organization for Standardization, 2015d).

4.1.2 - ISO 14001 – Environmental Management Systems

It is part of the ISO 14000 family for Environmental Management Systems and sets the requirements with the purpose of guiding organizations that wish to “manage its environmental responsibilities”(International Organization for Standardization, 2015b), helping them improve their environmental performance regarding the more efficient use of resources and reduction of waste. This approach is beneficial in several aspects, both to the organization and to the clients since it helps demonstrate compliance with the legislation, increases the engagement of employees and leadership, improves the company’s reputation and gives a competitive advantage (increased efficiency and lower costs), among others (International Organization for Standardization, 2015a).

It follows the organizations’ environmental policies, and does not set targets nor criteria for environmental performance (International Organization for Standardization, 2015b).

4.1.3 – Eco-Management and Audit Scheme - EMAS

It consists of a voluntary mechanism, introduced by the European Commission and transposed to Portuguese law under the Agência Portuguesa do Ambiente, that aims to promote continuous improvement regarding organizations’ environmental performance through the establishment and implementation of environmental management systems (EMAS, 2020a).

Among its benefits are the increase in environmental and financial performances, enhanced management of risks and opportunities, higher credibility and reputation, and more engagement from employees (EMAS, 2020b).

4.1.4 - ISO 50001 - Energy Management

Used within the context of other Standards (ISO 9001 or ISO 14001), the ISO 50001 norm’s purpose is to help companies to more easily integrate energy management into their efforts for a more sustainable management. The requirements are:

1. “Develop a policy for more efficient use of energy;
2. Fix targets and objectives to meet the policy;
3. Use data to better understand and make decisions about energy use;

4. Measure the results;
5. Review how well the policy works;
6. Continually improve energy management”(International Organization for Standardization, 2018g).

Its implementation includes various parameters, for instance an energy policy, objectives, energy targets and action plans related to energy efficiency, energy use, and energy consumption, always having into consideration the legal requirements (International Organization for Standardization, 2018f)

4.1.5 - ISO 22000 – Food Safety Management System

This Standard is also used within the context of other Standards (i.e. ISO 9001) and sets the requirements for a food safety management system. It helps the organization to understand what it needs to achieve to demonstrate its capacity to control safety hazardous and guarantee that its products are safe (International Organization for Standardization, 2018a) and meet regulatory requirements (International Organization for Standardization, 2018b), which is one of the biggest benefits of its implementation (International Organization for Standardization, 2018c).

4.1.6 - FSSC (Food Safety System Certification) 22000

ISO-based independent Certification scheme that describes the requirements for audit and certification of quality and food safety management systems in the supply chains. Is based on ISO’s 22000 and 9001 requirements and adds specific requirements to ensure consistency, integrity, and to provide management of the norm, and increases transparency all over the supply chain (Foundation FSSC 22000, 2019)

4.1.7 – HACCP System (Hazard Analysis and Critical Control Point)

This system’s objective is to identify and eliminate, in a preventive manner, potential hazards in the food supply chain, reduce food contamination risks, at any area or point in the food system. It involves a systematic study of various parameters of the system (i.e. ingredients, conditions of processing, storage, consumer use, etc), that allows the identification of sensitive areas that might contribute to a hazard - Critical Control Points (CCP). To help determine CCPs some criteria, such as time, temperature, humidity, salt concentration, pH and viscosity is used.

In order to be implemented, seven principles must be taken into consideration:

1. Conduct a Hazard analysis;

2. Identify the Critical Control Points (CCP);
3. Establish Critical Limits;
4. Monitor CCP;
5. Establish Corrective Action;
6. Verification;
7. Recordkeeping.

Products that have the HACCP mark can be advertised as safe, trustworthy and of enhanced quality. Moreover, the identification of potential hazards and risks allows a more rigorous and efficient use of resources, and a well-timed response to problems. Just like the previous systems, HACCP also requires legal compliance (Pierson & Corlett, 1992).

4.1.8 - IFS (International Featured Standards) Standard/ PACsecure

The aim of this Standard is to measure packaging materials' quality and safety and respective compliance with customer requirements. It applies to various packing materials such as rigid plastic and paper, and intends to provide food safety, establish a uniform evaluation system, work with accredited certification bodies and approved auditors, ensure comparability and transparency and reduce costs and time. It offers numerous benefits to companies such as quality certified products, safety and customer satisfaction, and helps controlling compliance with the regulations (IFS, 2017).

4.1.9 - IFS Broker

It was created with the purpose to fill the gap between production and distribution when it comes to ensure quality and safety. Tries to ensure that all parties have implemented the appropriate measures that allow suppliers to operate in accordance with product safety and quality requirements. It applies to trade agencies and importers. The benefits of the adoption include, among others, improved confidence in suppliers and products, monitoring of compliance with food regulations, efficiency in resource use and improved business reputation (IFS, 2013).

4.1.10 - Forest Certification

With a coverage of 2,1 million ha, *Montados* can be found in numerous countries of the Mediterranean Area such as Portugal, Spain, Argelia, Morocco, Italy, Tunisia and France. Portugal represents more than 30% of the total (736 thousand ha), with 84% being in *Alentejo* (Cork Information Bureau, 2019).

These forests are home to various species of animals (mammals, reptiles, birds and amphibians) and plants (i.e. Lavender) therefore it is crucial that their economic exploitation respects and protects the fauna and flora, but also defines limits and

boundaries, not only economic, but also social and environmental. Currently, there is a term which is used to include these concerns - Sustainable Forest Management (SFM) – defined by Ministerial Conference on the Protection of Forests in Europe (MCPFE) as “the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions at local, national, and global levels, and that does not cause damage to other ecosystems”.

Because awareness around the sustainability issues has been increasing, leading to more demanding clients/consumers, so does the need for certification of raw materials. There are a few ways to do this:

- **Chain of Custody (CoC)/ Third Party Certification** – this concerns the operations which use, sell or purchase certified raw materials, and therefore earn a CoC Certification. It assures companies and costumers that the product they’re acquiring is from a certified, environmentally and socially responsible forests, and possible to track up to the sale point and backwards (Forest Stewardship Council®, 2015)
- **Certification Systems** – is applied to forests and cork in the same way it is for other goods: an independent organization develops standards/norms on forest management, then an independent auditor issues certificates to producers that comply with those norms. The two most common Cork Certification Standards (table 10) are the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification schemes (PEFC), these reunite various principles and criteria that companies should comply to in order to be certified; in the case of FSC, the 70 criteria are divided among the 10 principles (table 11).

Table 10 – Certification Organizations (Worldwide)

Forest Stewardship Council (FSC)	Programme for the Endorsement of Forest Certification schemes (PEFC)
	
Created in 1994	Created in 1999
Based in Bonn, Germany	Based in Geneva, Switzerland
Active in 123 countries	-

Forest Stewardship Council (FSC)	Programme for the Endorsement of Forest Certification schemes (PEFC)
210 million ha of forest certified worldwide- April (2 nd , 2020)	325 million ha of certified area (worldwide – 2 nd semester 2019)
41 thousand certified companies (worldwide – April 2 nd , 2020)	+20 thousand industrial plants certified (worldwide – 2 nd semester 2019)
Independent	Independent
Non-Profit	Non-Profit
Non-Governmental Organization	Non-Governmental Organization

Table 11 – List of the FSC Principles and (first) criteria as stated in the FSC International Standard

Principle	Aim
1 – compliance with laws (8 criteria)	The Organization shall comply with all applicable laws, regulations and nationally ratified international treaties, conventions and agreements.
2 – Workers’ rights and employment conditions (6 criteria)	The Organization shall maintain or enhance the social and economic well-being of workers.
3 – Indigenous peoples’ rights (6 criteria)	The Organization shall identify and uphold indigenous peoples’ legal and customary rights of ownership, use and management of land, territories and resources affected by management activities.
4 – Community relations (8 criteria)	The Organization shall contribute to maintaining or enhancing the social and economic well-being of local communities.
5 – Benefits from the forest (5 criteria)	The Organization shall efficiently manage the range of multiple products and services of the Management Unit to maintain or enhance long term economic viability and the range of environmental and social benefits.
6 – Environmental values and impact (10 criteria)	The Organization shall maintain, conserve and/or restore ecosystem services and environmental values of the Management Unit, and shall avoid, repair or mitigate negative environmental impacts.
7 – Management planning (6 criteria)	<p>The Organization shall have a management plan consistent with its policies and objectives and proportionate to scale, intensity and risks of its management activities.</p> <p>The management plan shall be implemented and kept up to date based on monitoring information in order to promote adaptive management. The associated planning and procedural documentation shall be sufficient to guide staff, inform affected stakeholders and interested stakeholders and to justify management decisions.</p>
8 – Monitoring and assessment (5 criteria)	The Organization shall demonstrate that progress towards achieving the management objectives, the impacts of management activities and the condition of the Management Unit, are monitored and evaluated proportionate to the scale, intensity and risk of management activities, in order to implement adaptive management.
9 – High conservation values (9 criteria)	The Organization shall maintain and/or enhance the high conservation values in the Management Unit through applying the precautionary approach.
10 – Implementation of management activities (12 criteria)	Management activities conducted by or for the Organization for the Management Unit shall be selected and implemented consistent with the Organization’s economic, environmental and social policies and objectives, and in compliance with the Principles and Criteria collectively.

Source: (Forest Stewardship Council®, 2015)

In Portugal, as of April 2nd, 2020, there were 480 149 ha of forest (all kinds) certified and 365 CoC certificates issued by FSC and 278 449 ha certified by PEFC (table 12) (FSC Portugal, 2020).

Table 12 – Certified area and plants/companies in Portugal

Forest Stewardship Council (FSC)	Programme for the Endorsement of Forest Certification schemes (PEFC)
480 149 ha of forest certified	278 449 ha of forest certified
365 CoC Certificates	170 CoC certificates

4.1.11 - OHSAS (Occupational Health and Safety Assessment Series) 18001 – Occupational Health and Safety

BS OHSAS 18001 has been replaced by ISO 45001.

4.1.12 - ISO 45001 – Occupational Health and Safety (OH&S) Management System

ISO 45001 is the OHSAS 18001 successor on Occupational Health and Safety Management System and “sets the minimum standard of practice to protect employees”. Guides companies, enabling them “to provide safe and healthy workplaces by preventing work-related injury and ill health, as well as by proactively improving its OH&S performance”. The intended outcomes are the continual performance improvement of OH&S, the compliance with legal requirements, and achievement of OH&S objectives. This Standard does not specify criteria for OH&S performance (International Organization for Standardization, 2018d). Among other benefits, the implementation of this standard results in a reduction of workplace incidents and absenteeism and turnover which leads to an increase in productivity, a reduction in insurance costs and ability to comply with legal and regulatory requirements (International Organization for Standardization, 2018e) .

4.1.13 – Product Certifications

A few of the certifications specified next (Colombian Coffee, Fairtrade and UTZ) are a mean of empowerment for the people who face the most unfavourable conditions, not only on their works, but also on their lives, usually on the developing countries. They try to ensure that these people have their rights (human and labour) respected, through an equal and fair distribution of wealth.

These have become increasingly more important, not only because of social aspects, but also due to the higher demanding nature of clients regarding origin and justice of the products they acquire.

4.1.13.1 – Colombian Coffee

Associated with the *Federación Nacional de Cafeteros de Colombia* (National Federation of Colombian Coffee growers), one of the biggest rural, non-profit Non-Governmental Organizations (NGOs) around the world. It aims to ensure the well-being of Colombian coffee growers through an effective democratic and representative organization. This certification ensures the costumers that what they're acquiring is of quality and produced in a humane manner (Fedaración Nacional de Cafeteros de Colombia, 2020).

4.1.13.2 – Fairtrade

A fair trade is one in which prices, working conditions and deals are as fair and equal as they should be, without the marginalization of farmers and workers, especially in the poorest regions of the planet. Fairtrade sets a minimum selling price for the products that is determined by Fairtrade International. This tries to defend the people who barely have any voice or power on an international trading level. Products with a Fairtrade seal ensure the costumers that their production and sale help fight poverty and improve working conditions (FairTrade, 2020).

4.1.13.3 – UTZ Certification

UTZ Standard certifies coffee, tea, cocoa and hazelnuts, and is guided by the principles of fairness and transparency. It is divided into two sets of guide lines, first the Code of Conduct that encompasses the growing and harvesting processes, and determines the guidelines which ensure human rights are not being violated (i.e. forced and/or child labour) ; second, Chain of Custody (CoC), which as previously seen, traces the products from the producing place to the shelf (UTZ, 2020).

4.1.13.4 – Halal Certification

Halal is the Arabic word for lawful or permitted. When a dietary product is Halal certified, it means that its consumption is allowed by Islamic law (inscribed in the *Qur'an*), which is followed by more than 50 million people in Europe only (1,6 billion worldwide). This helps expand the products' market to other consumers and assure its consumption does not harm beliefs (Instituto Halal de Portugal, 2015).

4.1.12.5 – FDA (Food and Drug Administration) Certification

Table 13 – Management Systems and Certifications referred (Summary)

Management System Standards and Certifications							
Quality	Environment	Energy	Food Safety	Forest	Occupational Health and Safety (OHS)	Product Certification	Social
NP EN ISO 9001	NP EN ISO 14001	NP EN ISO 50001	-NP EN ISO 22000 -FSSC 22000 -HACCP -IFS Standard/PAC -IFS Broker	-FCS -PEFC	-OHSAS ISO 18001 -ISO 45000	- Colombia Coffee - Coffee from biological agriculture - Fairtrade - UTZ - Halal -FDA	SA 8000

4.2 – Legislation

In the previous section (4.1 – Certification and Accreditation) it is stated that in order to be certified a company must comply with the prevailing law because that is one of the requirements, and all requirements must be fulfilled.

Next, the legislation mentioned on both companies' reports will be further explained.

4.2.1 - *Decreto-Lei n°147/2008*

Establish the legal regime of liability for environmental damage and transpose to an internal legal request the EU Directive No. 2004/35 , of the European Parliament and of the Council, of 21 October, which it approves, based on the “polluter-pays” principle, the regime on environmental liability applicable to the prevention and remedying environmental damage, with an amendment that was introduced by Directive No. 2006/21, of the European Parliament and of the Council, on the management of waste from the extractive industry.

This decree, aiming at solving doubts and difficulties around environmental responsibility in the Portuguese juridical system, states that an environmental liability regime that does not want to result in a deficit in legal protection has to overcome at least five types of problems:

- i) “the dispersion of environmental damage, in which the injured party, in a cost benefit analysis, is discouraged from demanding the polluter;

- ii) the con causality in the production of damages, which in environmental matters is particularly acute due to the technical and scientific nature and is likely to prevent the liability from being carried out;
- iii) the latency period for the causes of environmental damage, which means that damage only appears long after the fact(s) that are at its origin are produced;
- iv) the technical difficulty of proving that a cause is capable of producing the damage (and, consequently, of attributing it to the respective author);
- v) the question of ensuring that the polluter has sufficient financial capacity to support repair costs and internalization of the social cost generated.”

Additionally, in Articles no 7 and 8, objective and subjective responsibilities are defined, respectively: is objectively responsible “who, due to the exercise of an economic activity (...), which is an integral part of it, offend the rights or interests of others through the injury of any environmental component, is obliged to repair the damages resulting from that offense, regardless of guilt or deception; is subjectively responsible “whoever, with intent or mere guilt, offends the rights or interests of others through the injury of an environmental component, is obliged to repair the damages resulting from that offense”.

4.2.2 - Decreto-Lei nº58/2005

Approves the *Lei da Água*, transposing Directive 2000/60, of the European Parliament and of the Council, of 23 October, into the national legal order, and establishing the bases and institutional framework for sustainable water management.

4.2.3 - Decreto-Lei nº226-A/2007

Establishes the regime for the use of water resources

4.2.4 - Decreto-Lei nº152/2017

Changes the water quality regime for human consumption, transposing Directives 2013/51/Euratom which lays “down requirements for the protection of the health of the general public with regard to radioactive substances in water intended for human consumption” and 2015/1787 (EU) which is “on the quality of water intended for human consumption”

4.2.5 - **Decreto-Lei nº306/2007**

It also refers to the water quality regime for human consumption, and transposes EU directive CE/98/83. This is the predecessor of the previous decree (*Decreto-Lei nº152/2017*), which came to consolidate this version.

4.2.6 - **Decreto-Lei nº71/2008***

Establishes the energy consumption management system for companies and facilities with intensive consumption.

Its purpose is to promote energy efficiency and to monitor energy consumption in facilities with intensive use of energy; it applies to companies with an energy use superior to 500toe/year, and, among other things, it forces them to elaborate energy audits and Planos de Racionalização do Consumo de Energia (PREn), an Energy Rationalization Plan which establishes various goals (i.e.. related to carbon and energy intensities).

– Despacho 17313/2008, 26 de junho* - this dispatch is associated with the decree above, was emitted by *Direção Geral de Energia e Geologia* (Ministry of Economy). Publishes the conversion factors to tonnes of oil equivalent (toe) of energy contents of selected fuels. It also determines the factors to calculate carbon intensity from GHG emissions in kGCO₂eq.

4.2.7 - **Decreto-Lei nº68-A/2015***

Establishes dispositions in matters of energy efficiency and production in co-generation; transposes EU's directive (Directive 2012/27/EU of the European Parliament and of the Council), on energy efficiency.

4.2.8 - **Decreto-Lei nº39/2018***

Establishes the regime for the prevention and control of pollutant emissions into the air, and transposes EU directive 2015/2193 on “the limitation of emissions of certain pollutants into the air from medium combustion plants”. Among other things, it determines the competent monitoring authorities, the procedure to issue air emissions permits, the obligations of operators and laboratories, requirements for installations, how to monitor emissions and their limit values, and sanctions for non-compliance.

4.2.9 - *Decreto-Lei nº85/2014*

Ensures the implementation, in the domestic legal order, of the obligations arising from Regulation (EC) No. 1005/2009, of the European Parliament and of the Council, of 16 September 2009, on substances that deplete the ozone layer”

4.2.10 - *Decreto-Lei nº145/2017*

Ensures the implementation, in the national legal system of the EU 517/2014 Regulation on fluorinated greenhouse gases. It intends, for example, to increase the reliability of data, promote the use of less harmful substances and to reduce emissions of fluorinated gases and other substances which deplete the ozone layer.

4.2.11 - *Decreto-Lei nº236/98*

“Establishes quality standards, criteria and objectives in order to protect the aquatic environment and improve water quality according to its main uses.”

4.2.12 - *Decreto-Lei nº 152-D/2017**

Unifies the regime for the management of specific waste streams subjected to the principle of producer’s extended responsibility. Transposes EU directives, namely, EU 2015/720, EU 2016/774 and EU 2017/2096.

Among other things, it defines new rules for the treatment to be used in several types of waste, makes the producer or packager accountable for the residues that their product or packaging produces, clarifies the role of the entities that manage specific waste streams.

4.2.13 - *Decreto-Lei nº9/2007*

It approves the General Regulation on noise and repeals an older *Decreto-Lei nº292/2000* on the noise pollution legal regime.

4.2.14 - *Decreto-Lei nº89/2017*

Discloser of non-financial information by large companies and groups; transposes EU Directive 2014/95. This non-financial information required to be disclosed includes environmental, social, workforce parameters, among others, and contribute to evaluate companies’ performance and impact on society, identify sustainability risks and reinforce investors and consumers trust on companies.

4.3 – Scope of GHG emissions

GHG emissions are divided into three groups (scopes) – 1,2 and 3- each one refers to the source of those emissions. Scope 1 concerns all direct emissions, scope 2 regards indirect electricity GHG emissions (electricity purchased), and scope 3 indicates all other indirect emissions such as business travels (Table 14). These scopes are defined on the Greenhouse Gas Protocol (Schmitz et al., 2000).

Table 14 – Scopes of emissions: adapted from the Greenhouse Gas protocol

	Scope 1	Scope 2	Scope 3
Scope	Direct GHG Emissions	Electricity indirect GHG emissions	Other indirect GHG emissions
Definition	Emissions from sources that are owned or controlled by the company.	GHG emissions from the generation of purchased electricity consumed by the company.	emissions are a consequence of the activities of the company but occur from sources not owned or controlled by the company.
Additional Information	- emissions from combustion in owned or controlled boilers, furnaces, vehicles, etc; - emissions from chemical production in owned or controlled process equipment.	Purchased electricity is defined as electricity that is purchased or otherwise brought into the organizational boundary of the company.	Some examples are extraction and production of purchased materials; transportation of purchased fuels; and use of sold products and services

5 – Case studies

5.1 - Corticeira Amorim, SGPS, S.A

Founded by António Alves Amorim as a manual cork stopper factory in 1870, the *Corticeira Amorim* has since been growing to become the world leader in the Cork Industry. It has companies in five continents, operating in various economic fields such as the cork industry, viticulture and wine tourism. It is present in more than one-hundred countries, employs around 4450 people and its business volume in 2019 was of €702 million.

Includes 52 distribution companies, 35 industrial plants (12 raw material and 23 Cork Solutions – Insulation cork, composite cork, Floor and wall coverings and cork stoppers), 10 joint ventures and 254 agents (table 15).

Table 15 – Main Figures of Amorim Group

Country	Algeria	Argentina	Australia	Austria	Bulgaria	Chile	China	Denmark	France	Germany	Hungary	Italy	Moldavia	Morocco	Netherlands	Poland	Portugal	Russia	South Africa	Spain	Sweden	Switzerland	Tunisia	United	USA
Raw Material	1													1			4			4			2		
Cork Solutions									1								17			3	1				1
Distribution		1	1	1	1	5	1	1	10	4	1	3	1		1	1	4	2	1	4	1	1		2	5
Joint Ventures		1				1	1		1							1	1			1	1				

Source: Adapted from Business Report 2018 (Corticeira Amorim, 2019)

It is then divided into 5 Business Units (fig.1) (UN – Unidades de Negócio) (% of sales/business unit) *:

1. Raw material (1.8%)*;
2. Cork stoppers (70.3%)*;
3. Floor and Wall Coverings (13.6%)*;
4. Composite Cork (12.7%)*;
5. Insulation Cork (1.5%)*;

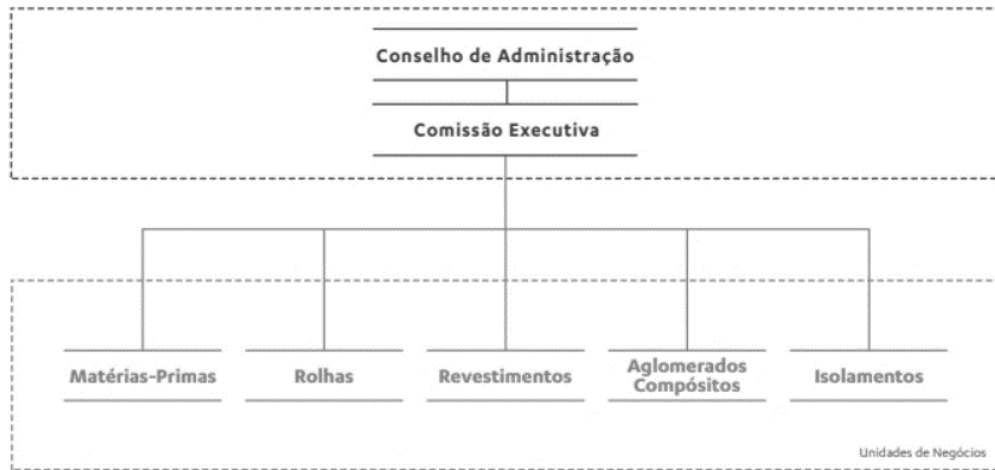


Figure 1 – Business Management Structure (Source: Sustainability Report (Corticeira Amorim, 2019))

Its biggest market is the EU (including Switzerland, excluding Portugal), to which 58,6% of sales were made in 2019. Followed by the United States with 17,4% of sales. Portugal represents 7%, being the third market.

The main raw material is cork, and the primarily transformed product is cork stoppers.

5.1.1 - Sustainability Indicators

To gather the information regarding the environmental performance of the company, the company's 2018 sustainability report was analysed.

As a big, leader and renowned company, Corticeira Amorim, should lead the sector in terms of responsibility, being it social or environmental, this work will focus on the second. However, it is important to notice that they are both fundamental to plough an equal society.

The parameters analysed are certification, annual emissions, water and energy consumption, renewable energy consumed and production, waste treatment, and recycling within a circular scheme.

5.1.1.1 – Certification

Depending on the activity on which industrial plant the certification will be different and adequate to that activity. In general, the various plants have Quality (ISO 9001), Environmental (ISO 14001), Energy (ISO 50001), Food Safety (ISO 22000), Forest and CoC, and Occupational Health and Safety Certifications (ISO 45001).

5.1.1.2 – Annual emissions

As seen above (Point 4.3 – Scopes of Emissions), emissions are divided into three groups, therefore, in its Sustainability Report, the company presented the results on those terms.

Within scopes 1 and 2, are the emissions which source is the use of energy, it encompasses emissions from petrol, propane gas, diesel, natural gas and electricity, and totals 69408 tonnes of CO₂ emitted (Fig.2). Scope 2, which regards only electricity emissions totals 63355 tonnes of CO₂ emitted.

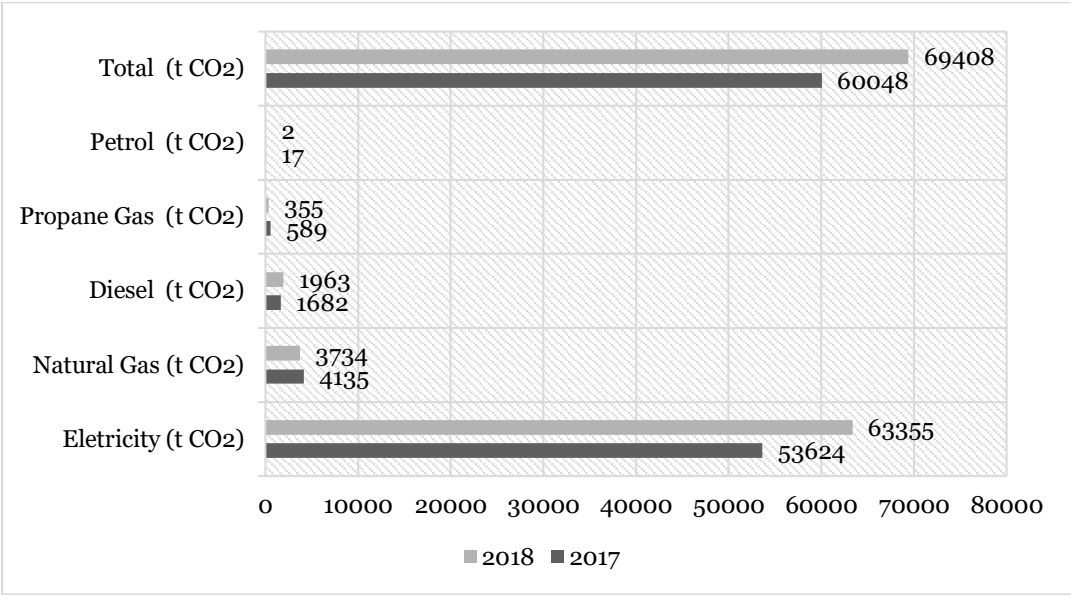


Figure 2 – Emissions by source of energy

From 2017 to 2018, emissions from scopes 2 and 3 increased, 15 and 10%, respectively. Scope 1 emissions decreased by 6% (table 16). Electricity consumption is the biggest emitter and factor on the increase of emitted CO₂. The company does not specify from which source (renewable or non-renewable) it buys its electricity.

Table 16 – Emissions on each scope and respective variation

	Emissions (t CO ₂)		Variation (%)
	2017	2018	
Scope 1	6 424	6 053	-6,1
Scope 2	53 624	63 355	15,4
Scope 3	97 911	108 813	10,1
Total	157 959	178 221	11,4

Regarding scope 3 emissions (table 17), they were distributed into 5 categories - upstream transportation and distribution, generated waste, business travels, staff transportation and downstream transportation and distribution. Most of the emissions (96%) occurred during the transport of raw material – upstream - and products -

downstream -, mainly provided by external logistic services. The biggest percentual increase came from the waste generated, with 16%, followed by the staff transportation with a 10% increase. On their turn, business travels emissions decreased more than 13%.

Table 17 – Scope 3 emissions and variation

	2017	2018	
	Emissions (t CO ₂)	Emissions (t CO ₂)	Variation (%)
Upstream Transportation and distribution	27 022	32 916	18
Waste generated in the activity	237	283	16,3
Business Travel	1 175	1020	-13,2
Staff Transportation	2 405	2 677	10,2
Downstream transportation and distribution	67 072	71 917	6,7
Total	97 911	108 813	10

In this context, another parameter measured was the Carbon Intensity, which is defined by the quantity of CO₂ (in tonnes) is emitted, on scopes 1 and 2, to the atmosphere per million euros in sales (t CO₂/M€ sales). The data shows that from 2017 to 2018, carbon intensity increased very slightly by 3,5% (table 18), however, the 2018 report includes a bigger perimeter of data than the previous report, meaning that if the perimeter of measurement had been kept, this parameter would be of 87 t CO₂/M€ sales, corresponding to a 1,6% decrease.

Table 18 – Carbon Intensity and variation

	2017	2018	Variation (%)
Emissions (t CO₂ – scopes 1 and 2)	60 048	69 408	13,5
Consolidated economic result (millions €)	675	753	10,4
Carbon Intensity (emissions/million € sales)	89,0	92,2	3,5

5.1.1.3 – Water Consumption

Most of the water consumed in the operations is collected from the ground (92%), the other part comes from the Public Water Supply Network (8%). The consume of water

has been increasing every year, groundwater usage increased 2,54% between 2017 and 2018, and water from the public network increased 27,42% in the same period (table 19) This increase was attributed to an expansion in operations.

Table 19 – Water Consumption by source (m³)

	2017	2018	Variation (%)
Public Water Supply	30 259	41 692	27,42
Groundwater	453 863	465 673	2,54
Total	484 122	507 365	4,58

5.1.1.4 – Energy Consumption

Various sources of energy are used – petrol (least used), propane gas, gasoil, natural gas, electricity and biomass – the last is the most used (Fig.3).

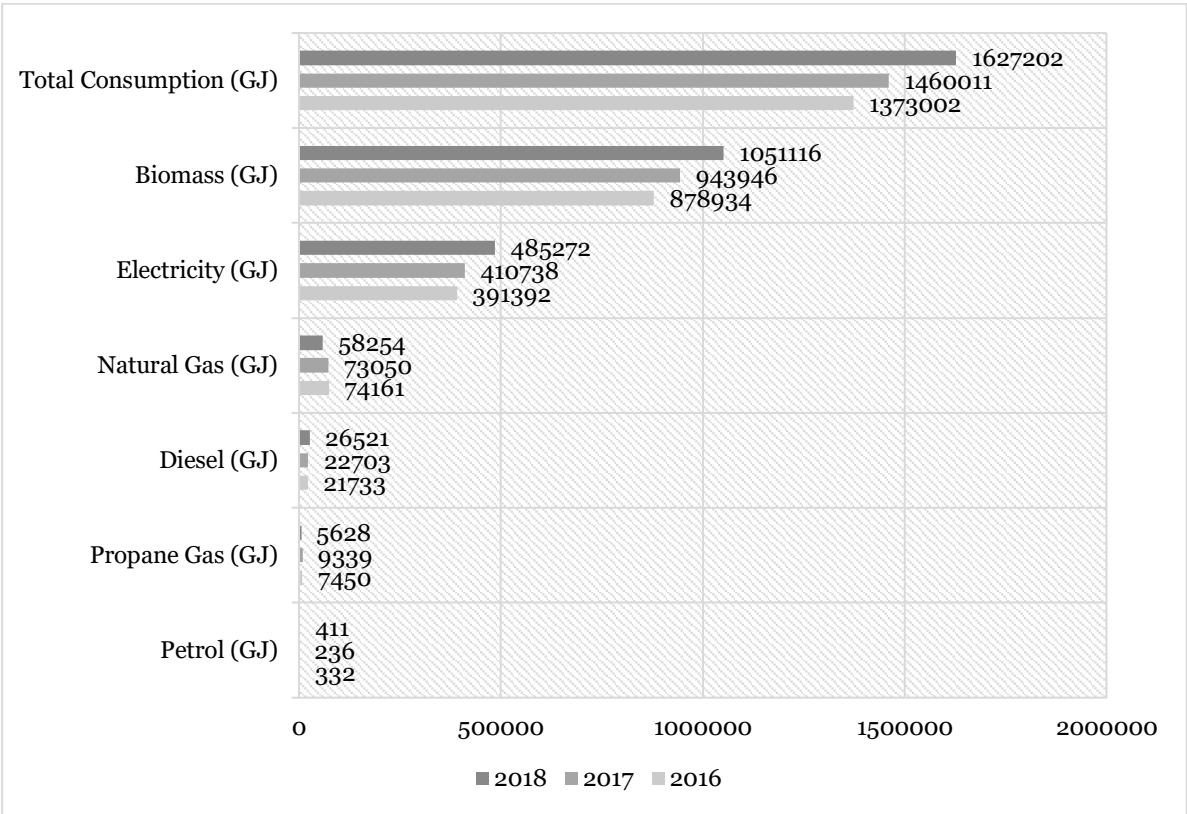


Figure 3 – Absolute energy consumption (total and by source)

Overall, energy consumption increased from 2017 to 2018 by about 10%. Propane and natural gas consumption decreased, 39% and 20%, respectively, all the others increased. Petrol and diesel consumption increased by 42% and 13%, respectively, being the first the biggest increase of all sources, followed by electricity with a 15% increase; to

notice that biomass also increased by 10%, but the energetic mix was maintained, meaning that the percentages of use were kept around the same values (Table 20).

This increase is attributed to expansion of activity and integration in the sustainability perimeter of three new industrial units within the information reported.

Table 20 – Energy usage in 2018 and 2017 by source and consumption variation between 2017 and 2018 (in percentage)

Consumption	Petrol	Propane Gas	Diesel	Natural Gas	Electricity	Biomass	Total
Consumption in 2017 (%)	0,02	0,64	1,55	5,00	28,13	64,66	100
Consumption in 2018 (%)	0,03	0,35	1,63	3,58	29,82	64,59	100
Variation in the absolute values (2017-2018 (%))	42,6	-39,7	13,5	-20,3	15,4	10,2	10,3

Energy intensity (GJ/million€ sales) decreased very slightly between the same period (2017-2018), meaning that each million of euros in sales required less energy, given that consumption in energy increased, this means that the sales (in €) increased at a bigger rate (Table 21). This is the result, according the company, of the implementation of 84 operational/energetic efficiency measures, divided among numerous ambits – thermic energy (20 measures), compressed air (37 measures) and drives/motors (10 measures). Moreover, 3,5 million euros were invested, which will result in an annual saving of more than 212 thousand GJ.

Table 21 – Variation in Energy Intensity

	2017	2018	Variation (%)
Energy Consumption (GJ - total)	1 460 011	1 627 202	10,3% (increase)
Consolidated economic result (millions €)	675	753	10,4% (increase)
Energy Intensity (total/million sales)	2161	2160	0,046% (decrease)

5.1.1.5 – Renewable Energy Consumption and Energy Production

As seen in the previous point (5.1.1.4 - Energy Consumption), the biggest source of energy in 2018 was biomass which accounted for around 65% (table 20) of the total consumption. This neutral - in terms of emissions - energy is produced by the company with cork powder, a by-product of the industrial process, allowing it to maximize the

potential of its activity's, avoid the emission of 72 thousand tonnes of CO₂ into the atmosphere (2018) and save money. Because cork powder can be valued as an energy source, the company does not consider it as waste.

5.1.1.6 – Waste Treatment

The company divides its waste into two groups – hazardous and non-hazardous. Part of it within each group is either valorized or eliminated by competent entities designated by Corticeira Amorim. As in to 2017, in 2018, (cork powder not included – see point 5.1.1.5) 90% of all waste, hazardous and non-hazardous was valorized and 10% was eliminated (table 23). Hazardous waste increased by 24% between 2017 and 2018, its valorisation and elimination increased by 28% and 17%, respectively, in the same period. Regarding the production of non-hazardous waste, it increased 15%, valorisation and elimination increased by 14% and 22%, respectively (table 22).

Since the overall percentage of both kinds of waste maintained roughly the same in 2018 compared to 2017, it means that its valorisation and elimination in 2018 increase at the same rate as the year before.

The Sustainability Report does not refer how the waste is eliminated or in which way is valued.

Table 22 – Valorisation and Elimination of Waste (variations)

	2018		2017		Variation (2017 - 2018 in %)
	Absolute Value (ton)	%	Absolute Value (ton)	%	
Hazardous Industrial Waste	373	100	282	100	24,4
Valorisation	237	63,5	170	60,3	28,3
Elimination	136	36,5	112	39,7	17,0
Non-Hazardous Industrial waste	10 059	100	8 544	100	15,1
Valorisation	9 114	90,6	7 811	91,4	14,3
Elimination	945	9,4	733	8,6	22,4
Total	10 432		8 826		

Table 23 – Valorisation and Elimination of total waste

	2018		2017	
	Absolute Value (ton)	%	Absolute Value (ton)	%
Total Valorization	9351	90	7981	90
Total Elimination	1081	10	845	10

5.1.1.7 –Circular Economy and Recycling

In 2018, no cork was wasted, and 478 tonnes were recycled, 87% being cork stoppers and 13% other products (i.e. In Corticeira Amorim all the by-products generated during the production of cork stoppers (main product) are incorporated in other high value applications – insulation and composite. The part that cannot be used to produce these products is valued as a source of energy- biomass- which in this case results in 65% of the energy used by the company.

Cork stoppers cannot be used a second time with the same function, meaning that they cannot be reused as cork stoppers, therefore the company collects the used ones through a number of projects both in Portugal and abroad (France, USA, Spain, Canada, UK, South Africa, and Australia), shreds them, transforming them into a cork granulated which is then used for the already stated applications (Fig. 4).

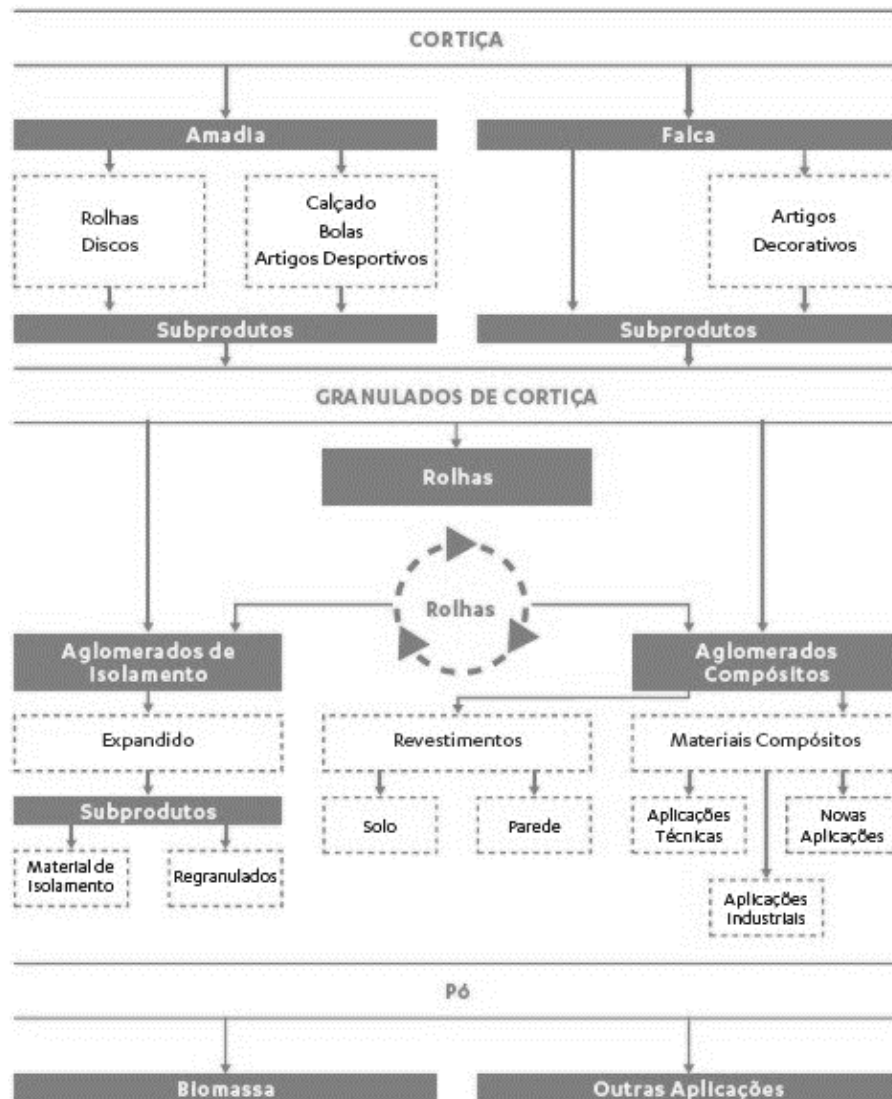


Figure 4 – Circular Economy within the company (copied from the 2018 Sustainability Report)²

² Taken from Sustainability Report 2018

5.2.1.9 – UN’s Sustainable Development Goals

Corticeira Amorim, developed its own goals aligned with UN’s SDGs; in total, they include 12 of the 17 UN’s pillars for sustainable development: Good health and well-being (3), quality education (4), gender equality (5), clean water and sanitation (6), affordable and clean energy (7), decent work and economic growth (8), industry, innovation and infrastructure (9), sustainable cities and communities (11), responsible consumption and production (12), climate action (13), life on land (15), partnerships for the goals (17) (table 24). Moreover, integrated within the 12 company’s priorities are 44 individual aims, an example for each one of them is shown on table 25.

Table 24 – Company’s Goals aligned with UN’s SDGs (17 not included).

Field	Economic		Social		Environmental			
Sub-Categories	Research, development and Innovation	Economic Performance	Training and Development	Occupational health and safety	Circular Economy	Product’s Environmental impact	Energy efficiency and climate change	Promotion of the <i>Montado</i> , biodiversity
SDGs	8 9	8	4 5 8	3 8	8 12	6 7 13	7 11 13	11 12 15

Table 25 – Individual aims from each SG goals adopted by the company (one of each)

SD Goal	Aims
3	Reduce, at a global level, o number of kills and wounded in car traffic accidents’
4	Ensure equal access to all men and women to quality technical, professional and superior education, at accessible prices.
5	Eliminate all forms of violence against all women and girls within public and private spheres, including trafficking and sexual exploitation
6	Substantially increase water efficiency in all sectors and ensure sustainable extractions (...).
7	Double, until 2030, the energy efficiency rate
8	Protect worker’s labour rights and promote safe and protected environments for all workers, including migrants - particularly, migrant women - and people with precarious jobs
9	

SD Goal	Aims
	Modernization of infrastructures and industrial rehabilitation to become more sustainable, with higher efficiency on resource use, and higher adoption of technologies and clean environmentally righteous processes
11	Strengthen the efforts to protect and salvage world's cultural and natural heritage
12	Reach a sustainable management and an efficient use of natural resources until 2030
13	Integrate, within policies, strategies and national planning, measures related to climate change
15	Take significant urgent measures to reduce natural habitats degradation, stop biodiversity loss, and until 2020, protect and avoid the extinction of endangered species.
17	Reinforce global partnership for sustainable development, sharing of knowledge, expertise, technology and financial resources, to support all goals accomplishment in all countries, particularly in developing ones

5.2 – Delta Cafés

Delta Cafés is company in the field of coffee, it was created in 1961 by Rui Nabeiro in Campo Maior, Portugal, as a roasting coffee company, has been the sector leader in Portugal for last 26 years (since 1994). It operates in 48 countries, buys 27 000 tonnes of raw coffee each year, sells 22 600 tonnes, of it 30% is sold to international markets. The company works in 8 direct international operations within three business segments – coffee, food and beverages. Employs more than 3000 people and its business volume in 2019 was of €340 million.

The mission is to “correspond to clients/markets real demands to obtain consumers total satisfaction and loyalty”. And the values are Integrity and Transparency, Total Quality, Loyalty, Responsible Innovation, Truth, Sustainability, and Solidarity.

The productive process begins with the cleaning of the raw coffee, which is then roasted, divided into blends, grinded, packed, palletized and stored (fig.5).

Unlike Corticeira Amorim, NovaDelta buys all of its energy necessities in the exterior market, and doesn’t produce any, being it renewable or not.

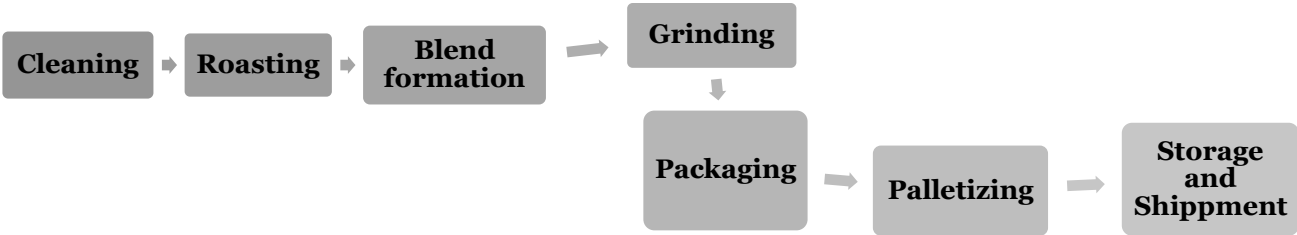


Figure 5 – Production Process

5.2.1 - Sustainability Indicators

These indicators correspond to one Industrial Plant only, in Campo Maior, which is responsible for the roasting, packing and marketing of the coffee.

Contrasting with Corticeira Amorim, that uses the volume of sales to measure the intensity of their activity in different aspects (consumption/ million € sales), Delta Cafés uses as reference the quantities produced, measured in tonnes (consumption/t produced), these values are described on table 26.

Table 26 – Yearly Production and variation (in %)

Production (in tonnes) by year		
2017	2018	Variation (%)
24 648	24 969	1,3%

5.2.1.1 – Certification

In chapter 4, section 4.1, the benefits of Standardization were presented, Delta, being a big, well-known company, is also aware of this, therefore various management systems were implemented:

- ISO 9001, transposed as NP EN ISO 9001;
- ISO 14001, which is transposed into Portuguese law as NP EN ISO 14001:2004;
- OHSAS 18001;
- ISO 22000, transposed as NP EN ISO 22000;
- BRC and IFS;
- FSSC 22000;
- SA 8000

It also involved in an Eco Management Community System which is audited by EMAS.

5.2.1.2 – Annual emissions

Regarding emissions, the company does not report them within the three different scopes, instead, the information is given as a single figure of the total emissions (electricity and natural gas). However, using the conversion factor determined in the legislation (Despacho 17313/2008, de 26 de Junho) it is possible to determine which amount of CO₂ emitted is the result of electric consumption (table 34). According to this legislation, in order to correspond a unit of energy in Kw/h to its kgCO₂ equivalent emitted, that figure (in kWh) should be multiplied by 0,47 (kgCO₂e/kWh). Therefore, by multiplying the 5 547 298 kWh (company's electric consumption) by the conversion factor – 0,47 – the value of CO₂ emitted, in kilograms, is obtained, in this case it was of 2 607 230 kgCO₂. To convert that number to tCO₂ (as shown in the report), the previous number is divided by 1000, resulting in 2607 tCO₂ emitted as a result of electric consumption by the company in 2018. Because the total emitted (gas and electricity) is given (5393 tCO₂), the part of the emissions which correspond to natural gas can be calculated by subtracting the part concerned with electricity from the total, equalling to 2786 of tCO₂ that result from the consumption of natural gas (table 27).

Table 27 - Source of emissions by source and its variation

	Emissions (tCO₂)		
	2017	2018	Variation (%)
Electricity (tCO₂)	-	2 607	-
Gas (tCO₂)	-	2786	-
Total (tCO₂)	5 478	5 393	-1,6

From 2017 to 2018, emissions decreased from 5 478 tCO₂ to 5 393 tCO₂, this translates to a 1,6% reduction, as shown in table 27.

It is now possible to attribute values to two of the scopes, Scope one is the sum of both sources, and accounts for 5393 tCO₂, scope two is related only to electricity and accounts for 2 607 tCO₂; there isn't any data related to scope three emissions available (table 28).

Table 28 – Scope of the emissions

	Emissions (t CO₂)		
	2017	2018	Variation (%)
Scope 1	N/A	5393	N/A
Scope 2	N/A	2 607	N/A
Scope 3	N/A	N/A	N/A
Total	5 478	5393	-1,6

Carbon Intensity decreased around 2,7% in 2018 when compared to 2017, from 222 kgCO₂/ton to 216 kgCO₂/ton (table 29).

Table 29 – Carbon Intensity

	2017	2018	Variation (%)
Emissions (tCO₂)	5 478	5 393	-1,6
Total Production (tonnes)	24 648	24 969	1,3
Carbon Intensity/ Specific Consumption (kgCO₂/t)	222	216	-2,7

As seen above, natural gas is the bigger source of emissions, that happens because the main production process of the company is the roasting one, and the fuel used by the ten combustion chambers of the roasting machines is natural gas. Moreover, 38 of the 56 points of emission identified are directly related to this process (table 30). These points are specified according to the **Decreto-Lei n°39/2018**.

Table 30 – Sources and points of emissions

Source	Points of emission
Respirators from the coffee and substitutes of the roasters feeding systems	10
Exhaustions from the 10 natural gas fuelled roasting chambers	10
Exhaustions associated with the roasters' coolers	10
Exhaustions from the roasters destoners	8
Exhaustions from the coffee aspiration systems which lead to the destoners	6
Other sources	13

The roasting process not only causes the emission of Carbon Dioxide but also various other particles such as NO_x (nitrogen oxides), CO (carbon monoxide), VOC (volatile organic compounds), H₂O (water), O₂ (oxygen), and SO₂ (sulphur dioxide). Therefore, and according with the legislation (**Decreto-Lei n° 39/2018**), the company states that it monitors these particles, however it did not make the data public on their report, stating that the reports were sent to the responsible entities and that the values were approved.

5.2.1.3 – Water Consumption and liquid effluent treatment

The data regarding this parameter responds to various pieces of legislation: **Decreto-Lei n°58/2005**, **Decreto-Lei n°226-A/2007**, **Decreto-Lei n°152/2017**, **Decreto-Lei n°306/2007**, and **Decreto-Lei n°236/98**

All of the water consumed by the company comes from four boreholes located within its perimeter. Between 2017 and 2018, the consumption decreased 30,6% from 38 204 m³ to 26 505 m³ (table 31).

Table 31 – Water consumption (m³) and variation

	2017	2018	Variation (%)
Water Consumption (m³)	38 205	26 505	30,6

Water consumption decreased, however, production increased (1,3%), this means that the productive process used less water to produce more product, namely, 1% more production with 30% less water, as shown in table 31. This result was attributed to the end of a period of tests regarding the use of water in emergency situations, the installation of flow reducers on taps, update of the cleaning of vehicles plans, and staff education.

Looking into water intensity, and because water consumption significantly decreased (30%), and the production had a slight increase (1,3%), this parameter suffered a more than 31% decrease, as shown in table 32.

Table 32 – Water intensity

	2017	2018	Variation (%)
Water Consumption (m³)	38 205	26 505	-30,6
Total Production (tonnes)	24 648	24 969	1,3
Water Intensity/ Specific Consumption (consumption/production)	1,55	1,06	-31,6

Residual water treatment takes place in a wastewater treatment plant (WWTP) owned by company. The effluents which come from the factory, roasting chambers or the cleaning of vehicles have their solids removed before going into the treatment plant, following the treatment are submitted to a final filtration and disinfection and then stored. The treated water is then either used for irrigation in agriculture or discharge in a waterline (fig.6).

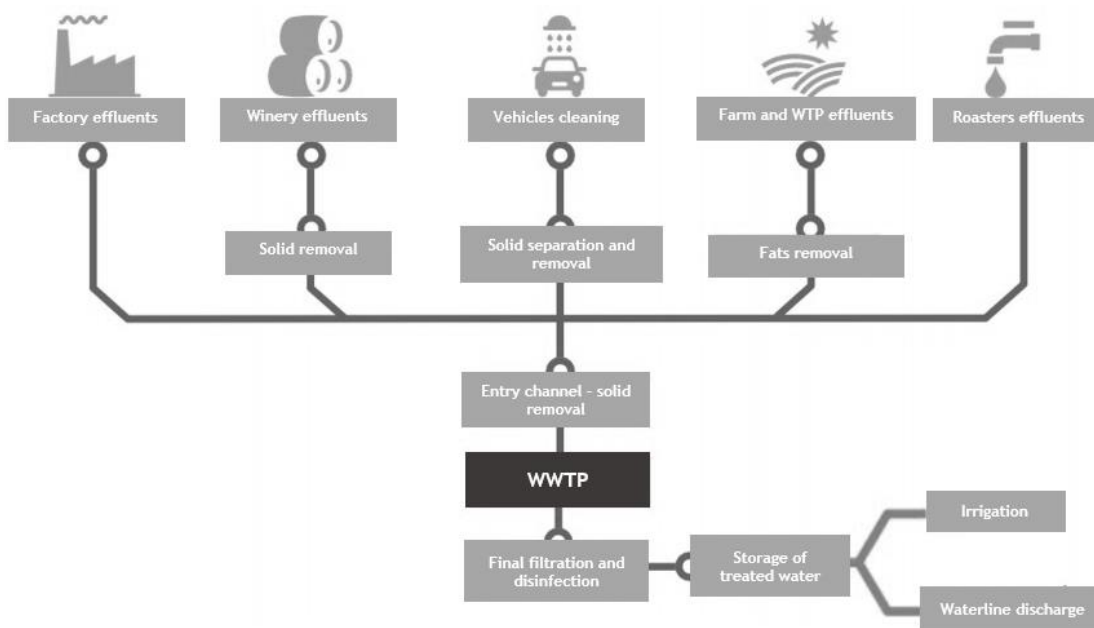


Figure 6 – Scheme of water treatment phases³

The total residual water rejected which totalled 18 953m³ in 2017, decreased to 13 571m³ in 2018, a 28% increase. The part correspondent to the water reused in irrigation also decreased, from 2017 to 2018, by 38%. Finally, the discharged water had a reduction of 22%, in the same period (table 33).

³ Scheme adapted and translated from the 2018 Environmental Declaration.

Table 33 – Rejection of residual water and variation (%)

	2017	2018	Variation (%)
Irrigation (m³)	7 206	4 453	-38,2
Discharged (m³)	11 747	9118	-22,4
Total (m³)	18 953	13 571	-28,4

5.2.1.4 – Energy Consumption

The company tries to optimize energy consumption according to the legislation, namely, **Decreto-Lei n°71/2008** and **Decreto-Lei n°68-A/2015**, which regulate energy efficiency.

Only two sources of energy were used – electricity, measured in kW/h, and natural gas, measured in Nm³ (Normal cubic meter of natural gas), the total of energy used is given in ktoe (kilogram of oil equivalent).

Table 34 – Energy Consumption and variation

	2017	2018	Variation (%)
Electricity (kW/h)	-	5 547 298	-
Gas (NM³)	-	1 147 049	-
Total (kgoe)	2 256 436	2 230 876	-1,1

Regarding Energy Intensity, it decreased 2,4%, from 91,5 kgoe/t in 2017 to 89,3 kgoe/t in 2018. Similarly to water consumption (point 5.2.1.3), the decrease in energy consumption was accompanied by an increase in production (table 35). The goal set to 2022 is to decrease this parameter to 80,5 kgoe/t.

This decrease is attributed to the upgrade of the control and automation system, the thermic optimization in the roasting process and the substitution of the illumination by LED.

Table 35 – Energy Intensity and variation

	2017	2018	Variation (%)
Energy consumption (kgoe)	2 256 436	2 230 876	-1,1
Total Production (tonnes)	24 648	24 969	1,3
Energy Intensity	91,5	89,3	-2,4

5.2.1.5 – Waste Treatment and Recycling

Waste management in the company follows a hierarchy, which consists of five (5) actions. The first one is **prevention (1st)**, the company tries to prevent waste creation; second is **minimization/reuse(2nd)**, where the company tries to minimize waste creation and to give another use to products before going to waste; third is **recycling**

(3rd); fourth consist of **energy recovery (4th)**; finally, the fifth action is **landfill deposition (5th)**, this is last resort used by the company to manage its waste.

The activities of collection, transportation, valorisation and elimination are maintained by licensed external entities. Regarding cardboard and wood packages, these are managed by Sociedade Ponto Verde (SPV), which ensures management of these waste complies with the law, namely with **Decreto-Lei n^o 152-D/2017**.

Overall, the quantity generated of all kinds of waste increased (8,7%), but particularly plastic packages which increased more than 200%, both in quantity (table 36) and in intensity (table 37). The company associates this with the production increase of individual doses of coffee – capsules – and with equipments’ packages, stating that these are punctual situations. The amount of generated hazardous waste comes next with a more than a 160% increase, in both parameters as well (tables 36 and 37), this is due to the cleaning of the hydrocarbons’ separator in the WWTP. Waste from composite packages also increased, in this case a bit less than the previous materials, around 40% in both parameters (tables 36 and 37), this is linked with an increase in production and destruction actions.

Table 36 – Waste quantity (kg) and variation (%) by source

		Quantity (kg)		Variation (%)
		2017	2018	
Non-hazardous waste	Cardboard and paper	337 405	389 360	15,4
	Plastic Packages	16 997	53 980	217,6
	Litter sacks	224 060	228 140	1,8
	Composite packages	118 940	167 620	40,9
	Coffee grains’ peels	180 060	188 680	4,8
	Hazardous waste	5113	13 491	163,9
	Total Waste production (hazardous and non-hazardous)	1 056 386	1 147 841	8,7

Table 37 – Waste intensity (kG/t) and variation (%) by source

		Intensity (kG/production)		Variation (%)
		2017	2018	
Non-hazardous	Cardboard and paper	13,7	15,6	13,9
	Plastic Packages	0,7	2,2	213,5
	Litter sacks	9,1	9,1	0,5
	Composite packages	4,8	6,7	39,1
	Coffee grains’ peels	7,3	7,6	3,4

Hazardous waste	0,2	0,5	160,5
Total Waste production (hazardous and non-hazardous)	42,9	46,0	7,3

5.2.1.6 – Circular Economy

The company still has very linear system; however, it's been taking some actions regarding the recycling of capsules. The process consists on the separation of the coffee grounds from de packaging material, where the first one is then transformed into composting material and the second one (mixed plastic) is transformed into another industrial process raw material. To allow this process to happen, the company created the “**reciQla**”, a recycling bin destined to the deposit of used capsules by the clients.

Moreover, Delta is in the process of substituting some of its plastic materials by FSC certified wood and paper (Delta Cafés, 2018).

5.2.1.7 – UN’s Sustainable Development Goals

Similarly, to *Corticeira Amorim*, *Delta* also bases their environmental goals in the UN’s Sustainable Development Goals. It Divides them into 9 areas of interest which are valued by the company: no poverty (1), zero hunger (2), good health and well-being (3), quality education (4), gender equality (5), decent work and economic growth (8), industry, innovation and infrastructure (9), responsible consumption and production (12), climate action (13), life on land (15), and partnerships for the goals (17) (table 38). In this case, 11 SDGs were transposed into the company’s aims as shown on table (39).

Table 38 – Company’s areas of interest integrated within UN’s SDGs.

Categories	Responsible Entrepreneurship	Responsible Citizenship	Health, Safety and well-being	Circular Economy	Operations efficiency	Biodiversity	Jobs generation	Coffee growers’ communities	Business sustainability
SDG	12 3	3 1 4 17	4 8 17	12	13 12	15 12	4 5 3 8	1 2 8 5	12 9 4 8

Table 39 - Individual aims from each SG goals adopted by the company (one of each)

SD Goal	Aims
1	Contribute to eradicate poverty in countries that produce coffee
2	Eradicate hunger in countries that produce coffee
3	Foster quality of life of small coffee growers
4	Increase literacy of coffee growers
5	Investment on a qualified human capital, equal in terms of gender
8	Implementation of good practices which promote the equilibrium between professional and personal lives
9	Continual investment on the discovery of new products and services
12	Sensitize clients regarding coffee's origin diversity
13	
15	Promote certified coffees which contribute to the preservation of biodiversity
17	Partnerships with public and private entities such as schools, universities, and laboratories for scientific research

Table 40 – Chapter Summary

	Corticeira Amorim, SGPS, S.A.	Delta Cafés
Logo		
CAE⁽⁴⁾ of main activity	16294 (Cork Stopper Production)	46370 (Main – “Wholesale of coffee, tea, cocoa and spices”)
Year and country of Foundation	1870 Portugal	1961 Portugal
Primary Raw Material	Cork	Coffee beans
Main Product(s)	Cork Stoppers	- Roasted Coffee - Coffee Packaging
Number of Employees	4450	+3000
Business Volume in 2019	€702 million	€340 million
Year of Sustainability Report/Declaration	2018	2018
Environmentally Certified	Yes	Yes
Annual GHG Emissions	178 221 ton CO ₂	5 393 ton CO ₂
Water Consumption (m³)	507 365 (increase from 2017)	26 505 (decrease from 2017)
Energy Consumption (Total)	1 627 202 GJ	2 230 876 Kgoe (2,4% decrease from 2017)
Renewable Energy Consumption	1 057 681,3 GJ (65% of the total)	-
Energy Production	1 057 681,3 GJ (65% of the total)	-
Waste Treatment/ Management	0 waste	Sociedade Ponto Verde responsible for Waste management
Recycling	478 ton of cork	-

⁴ Classificação Portuguesa de Atividades Económicas

6 – Discussion

After an analysis of the companies' reports and declaration, the results indicate that both are aware of their activities' impact on the environment, and that they are trying to reverse it. Both have set long- and short-term goals in line with the UN's Sustainable Development Goals (SDG) and with their specific role in the respective sector of activity.

Regarding *Corticeira Amorim*, the parameters analysed show that emissions, water and energy consumptions, hazardous and non-hazardous waste, and carbon intensity have increased from 2017 to 2018, however, a bigger perimeter (data from more plants) was included. In contrast, energy and water intensities have decreased during the same period.

The company has a circular economy scheme well implemented (fig.) which allows it to produce 65% of its energy needs - through biomass - and to reintroduce the by-products of its main activity (cork stoppers) into the production process to produce different products, which total more than one third of all sales. This means that it was possible to value what would be otherwise wasted.

Several industrial plants are certified, from quality with ISO 9001 to energy (ISO 50001), to OHS (ISO 45000), indicating that there is, obviously, a concern with how their products are perceived by clients and other stakeholders, and with managing resources in the most efficient manner.

In regard to *NovaDelta*, some data from 2017 was not available on the declaration, such as the emissions generated respectively by electricity and gas, however the total figure of that year is given, allowing the possibility to estimate the yearly variation, which was of -1,6%. In this context, the other parameters which suffered a decrease were water and energy consumptions and carbon and water intensities. In contrast, hazardous and non-hazardous waste creation increased an overall 8,7% and its intensity 7,3%.

The company has a very linear economic model, doesn't produce any of its energy and uses a great amount of electricity, which is the biggest polluter in terms of energy sources.

NovaDelta's management systems are also certified in various spectres, quality (ISO 9001), energy (ISO 14001), OHS, a social certification (SA 8000), and given the company's activity, it is certified by numerous Food Safety standards, such as ISO 22000 and FSSC 22000. This fact unveils the same concerns about company image to the stakeholders and about its impact on the environment.

On the beginning of its report, *Corticeira Amorim*, states that it serves the legal requirements introduced by a Decree - *Decreto-Lei n.º 89/2017* – in article 8, which, as

seen above (Chapter 5), forces companies to give a Non- Financial Consolidation Demonstration, which includes an environmental one. No other piece of legislation is mentioned in the report; however, it becomes clear that the document serves as a legal requirement fulfilment.

Delta, also does the same, stating that the declaration fulfils a legal requirement. However, it quotes a different decree (*Decreto-Lei n^o147/2008*), which determines the legal regime of liability for environmental damage. Moreover, throughout the document, the company always justifies the existence of each parameter's measurements using legislation. This indicates that all the data available is mandatory within the frame and scope of the law.

In this context, the results are in line with the research and, as expected, legislation plays a significant role, not only to bring companies' environmental performance to light, but also in the adoption of sustainable measures, with investment in innovation and new products to more specifically and economically sustain the transition within the companies' activity. To serve as an illustration, there is the previously discussed use, by *Corticeira Amorim*, of cork that otherwise would be considered wasted, to produce new, different products.

The legislation quoted is Portuguese, yet, most of it, is translated from EU's directives, and since EU law has a precedence over national laws (EUR-Lex, 2020), it demonstrates the central role that is played by EU and its institutions (i.e. European Commission) to make more demanding legislation, regarding these aspects, to substitute the softer ones within its borders. Additionally, makes it possible to harmonize rules across the member states and to ensure that one country does not try to take an unfair advantage over other countries.

Another important factor, and this includes only *Corticeira*, is that all of the energy that is produced by the company is not bought on the external market. Investments were made to allow the company to rely/depend less on this market, however, on the long term these investments will be payed-off, not only economically, with the energy savings, but also environmentally if renewable energy is the companies' choice; in this case the source of energy is biomass, which is considered neutral in terms of emissions; here, two principles are applied, recycling and remanufacture (as shown in table 4, chapter 3).

Both companies also pronounce themselves about their long and short-term goals in the matters of sustainability which are in line with UN's SDG. These are not mandatory, these are not of forced implementation, but "mere" guidelines towards a more sustainable planet; being so it indicates that widely respected international

institutions and organizations, like United Nations or EU, have great influence, soft power, and the capacity to mobilize society, companies included.

In line with the previous paragraphs, society, especially in the developed countries is more demanding, as clients tend to trust more on certified products and services. Certification requires compliance with the law, therefore, not complying may punish the company in terms of market scope. Moreover, not following the legislation is sanctionable by the entities which regulate these matters. Hence, companies should base their actions, measures, values and obligations on the law, not only to avoid governmental and international sanctions but also client's distrust.

The implications of these results are various, and perhaps the most important one is that civil society has a fundamental role, especially in democratic countries - where the policy makers are elected to protect everyone's interests, there is a higher level of education and purchasing power - in demanding more from them (lobbying). More adequate regulation, bigger economic incentives to the transition, higher sanctions, and selectiveness towards sustainability when buying products/services are essential and make these countries a guiding role and an aid to the rest of the world.

While nearly a third (28%) of all emissions in Portugal are caused by only 10 big companies (0,0008% of the Portuguese industrial sector) (ZERO, 2019), this work has some limitations since it focus on two big ones which, although have a large business volume (in Portugal they represent a weight 43,8% of the country's total industrial business volume (PORDATA, 2018b)), do not represent the industrial sector, where big companies represented, in 2018, less than 0,1% of the total (PORDATA, 2018a). Moreover, it does not explore the consequences, being them positive or negative, on employment regarding the adoption of some measures.

It is then important to further explore how concrete measures should be taken in the context of SMEs to influence social parameters such as employment, people's economic health and quality of life. Additionally, the role of big companies in the sustainable transition of SMEs should also be taken into consideration.

7 – Conclusion

This work aimed to identify which factors may drive a company into taking environmentally sustainable measures. In order to achieve that purpose, Sustainability reports and declarations of two big, well-known Portuguese companies, were analysed. Crossing the information gathered in the research with the data analysis, it was possible to reinforce the importance of some of the main drivers or instruments and to introduce new ones.

In these regards, the main instrument, already described and well accepted is Legislation compliance. Other factors are the influence and lobbying of powerful and influential world organizations (i.e. EU and UN), avoid stakeholder disinterest on the products, avoid sanctions for non-compliance, diminish costs, fewer dependency on the external energy market, respond to clients and other stakeholders demands, marketing reasons, creation of new products and market segments, and increase stakeholders loyalty and confidence.

The analysed data is specifically and legally required from big companies, because their activity has a greater influence on the environment, however they do not represent the industrial panorama, and employ far less people than SMEs, this represents a limitation of this work. Following the previous point, and to increase and further validate the importance of these drivers, future studies could address its applicability and implications on SMEs' activity.

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