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Zmar Eco Experience: a journey towards zero waste

How can Zmar Eco-Experience, an accommodation establishment with a pre-existing commitment to sustainability, further improve its solid waste?



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I. Acknowledgements

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II. Abstract

Tourism is a growing activity, and for that reason, some issues arise, such as its sustainability. Various aspects should be taken into consideration when examining sustainability: economic, socio-cultural and environmental. This research focused in the environmental issues, more specifically the ones that arise due to solid waste generation. Since solid waste is one of the most negative impacts of hotels in the environment and considering this an important sector of the tourism activity, this thesis focused on solid waste in the accommodation sector. In this context, a case-study at Zmar Eco-Experience was carried out in order to study how this accommodation establishment, which has already some commitment to sustainability, can further improve its solid waste.

To study this issue, some concepts and ideas regarding sustainable tourism, solid waste generation, plastic solid waste generation, solid waste management and zero waste were presented. To address the research question, a waste ethnography was carried out and the data was collected through two main methods of data collection: participant observation and a remote interview.

The observations made during the participant observation study were particularly focused on food products. It became clear that the most used packaging material was definitely plastic which aligns with some of the literature found mentioning that plastic is the most used material for food packaging. Throughout the observation, it became also clear that there were two main sources of plastic that could be reduced: the ones protecting the food and the ones used to facilitate the transport of goods. While in some cases the decision of reducing packaging falls in the company, in many other belongs to the suppliers to act more sustainably.

Overall, based on the waste ethnography carried out and the data derived from both data collection methods chosen, some findings allow to argue that the decisions of further improve practices related to solid waste coming from packaging is in some cases influenced by guests' comfort standards, lack of employees, governments and legal requirements, suppliers or other stakeholders with a bigger decision power than the company itself. All mentioned above shows how solid waste issue is much more broad and difficult to analyze than what it seems to be in the first place. Therefore, the ultimate

goal, zero-waste, is also hard to achieve. It can be affirmed that zero-waste is a good aspirational goal, yet very difficult to achieve in a short-term timeframe. Hence, it should be looked at as a long-term goal that would probably not be 100% achievable but a goal where a company can position itself closer and closer each day depending on their actions.

III. Key Terms

For the purpose of this research, the following terms will be defined:

Sustainable Tourism: The United Nations Environment Programme and United Nations World Tourism Organization (2005) define sustainable tourism as "tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities" (p.12).

Municipal Solid Waste (MSW): Municipal Solid Waste is defined as waste or refuse from households, hazardous solid waste from industrial and commercial establishments, refuse from institutions, market waste, yard waste and street sweeping. This includes, among others, commercial wastes consisting of residual food, glasses, metals and other sources of waste generated from hotels, markets, stores, etc.

Solid waste management (SWM): It refers to the different forms of handling waste such as landfilling, recycling, reusing, composting, prevention and minimization. According to the SWM hierarchy, some of these forms of handling waste are preferred than others due to its impact on the environment.

Zero-Waste: This practice prioritizes elimination of waste, in the place of managing waste (Dileep, 2007). It is considered to be "the most economical and integrated form of discard and/or waste management method" *(Dileep, 2007:384).*

In order to remind the reader of these terms and make a clearer connection with the literature presented, these definitions may be also found on the next chapters.

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1. Introduction

"In 2017, international tourist numbers grew a record 7% to reach 1.3 billion" (UNWTO, 2018). In fact, tourism is a growing activity, and for that reason, some issues arise, such as its sustainability. Considering sustainability in its holistic sense, innumerous are the aspects that should be taken into consideration: economic, environmental and social. Moved by a personal concern, I decided to give particular attention to the environmental part of it, specially focusing on solid waste generation and management.

Therefore, this thesis will investigate solid waste management at Zmar Eco-Resort, the first eco-resort in Portugal, located in Zambujeira do Mar, Vicentina Coast. Furthermore, zero-waste is the visionary goal aiming at, and this thesis will explore the necessary journey to follow in order to achieve that goal. By the end of this research, some conclusions will be made relatively to how hard/easy it is to achieve such goal and what are the challenges of this journey. For an overall and contextualized comprehension of this issue, I will start by giving some background of the tourism situation in Portugal as well as the environmental impacts of tourism, specially focusing on the waste issue, the main topic of this research. At the end of this chapter, a structure of the thesis will be presented.

1.1. THE EVOLUTION OF TOURISM IN PORTUGAL

In Portugal, tourism is a strategic activity contributing to the economic and social development of the country (Turismo de Portugal, 2017). Its importance had been recognized due to the increasing revenue over the years, with 11,5 billion euros of revenue in 2015 (UNWTO, 2017). Portugal was ranked as the second country with the biggest variation in revenue from 2005 to 2015: 6,3% (see appendix A).

1.2. THE IMPACTS OF THE TOURISM ACTIVITY – ENVIRONMENTAL FOCUS

"Tourism is increasingly recognized as a significant activity, with a range of economic, social and environmental consequences" (Becken & Hay, 2007:1). Some of these consequences are positive such as the economic growth and the creation of employment. Nevertheless, tourism also generates some negative consequences, being one of the

most discussed nowadays the environmental ones. Thus, for the purpose of this thesis, I will focus on the environmental impacts. Some of the environmental impacts caused by tourism are:

- Energy consumption
- Waste generation
- Air pollution
- Climate change

As Zorpas et al. (2012) mention,

> solid waste generation and disposal is one of the most negative impacts of hotels on the environment. (…) Solid waste is a key concern in the hospitality industry. Typically, a hotel guest can produce 1 kg of waste per day that accumulates to thousands of tonnes of waste annually (p.41).

Given the importance of this issue, in this thesis I will focus on the impact of waste generation, not in tourism in general but in the accommodation sector in specific due to the importance of this sector for the overall activity. More concretely, I will be focusing on a specific accommodation establishment where there is already a pre-existing commitment to sustainability, Zmar Eco-experience.

The generation of waste and its management is a key issue in hospitality nowadays. With the increase of tourists, this is an even more pertinent matter. In Portugal, for instance, the number of tourists has grown year after year (see appendix B). Being Portugal a country where tourism is a very seasonal activity, this impact can be even bigger. As stated in the report *'Tourism and the environment'*, "any increase in the number of tourists undoubtedly has an impact on environmental variables such as waste emissions and energy consumption" (European Comunities, 2002). Therefore, these are issues that should have some attention nowadays, considering the growth of tourism we assist. In fact, Portugal is giving it the deserved attention. An example of this is the fact that in the Portuguese Tourism Strategy[1] for the period 2017-2027 some sustainability goals were established, such as reaching 90% of tourism companies with water and energy-efficient

[1] http://estrategia.turismodeportugal.pt/sites/default/files/Estrategia_Turismo_Portugal_ET27.pdf

measures along with waste management actions (Turismo de Portugal, 2017). Because environmental issues are important and widely spoken nowadays, the tourism industry is forced to give it some attention.

> Growing environmental awareness has made customers change their attitudes and increasingly demand that industries provide products and services that are environmentally friendly and ethically correct. The tourism industry in general, and the hospitality sector in particular, are no exception. Actually, the hospitality industry faces increasing pressure to operate in a more eco-friendly manner given its negative effect on the natural environment (Leaniz et al., 2017:1).

In order to operate in a more eco-friendly manner, it is necessary to understand what are the main environmental impacts caused by the accommodation sector. Among others, one of these negative impacts is the waste generated by the sector (Radwan et al., 2012). Radwan et al. (2010) mentions that, normally, a guest produces 1 kg of waste a day. Being tourism a growing industry, this is a number that gets higher and higher every day and needs immediate action. Landfill, burning, composting, incineration and integrated management are the waste-handling methods practiced the most, nowadays (Dileep, 2007). However, given the environmental impacts of such waste-handling methods, a more sustainable way of handling waste is required. Therefore, 'zero-waste' has emerged as the most effective method for the purpose (Dileep, 2007). This practice prioritizes elimination of waste, in the place of managing waste (Dileep, 2007). It is considered to be "the most economical and integrated form of discard and/or waste management method" (Dileep, 2007:384).

It is important to note that while zero-waste is a good aspirational goal, it is hard to achieve. To deeply understand how the accommodation sector can be more sustainable and move towards zero-waste, I chose to focus on a specific business in Portugal, Zmar Eco-Experience[2], which has already a strong focus on sustainability and includes innumerous green practices on their daily activities. However, there is always space for improvement. Thus, I decided to study and answer the following research question: **How can Zmar Eco-Experience, an accommodation establishment with a pre-existing commitment to sustainability, further improve its solid waste?**

[2] https://www.zmar.eu/en/

The aim of this thesis is to examine Zmar's main sources of waste and identify some measures in order to move Zmar towards zero-waste. Moreover, this research will outline some practices that all accommodations can follow in order to move their operations towards zero waste. Besides being of interest for Zmar, the company where the study will take place, all companies from the accommodation sector with a pre-existing commitment to sustainability can beneficiate by following the practices that will be suggested as more sustainable ones. With this research, I hope to bring a new perspective for the tourism industry with a more sustainable way of thinking and acting.

In this thesis, I will start by presenting the problem formulation which derived from a personal concern and pre-exiting knowledge of tourism impact on the environment. After this, I will gather opinions from different authors in relation to the matter being studied and presented in Chapter 2 Literature Review. In the same chapter, I will present different concepts and theories, specifically sustainable tourism, solid waste generation in Portugal, in general, and in the accommodation sector, in specific, plastic waste, solid waste management and zero waste. For this search, the databases of scientific articles, books and book chapters were used as the main source of searching articles.
To answer the research question: "How can Zmar Eco-Experience, an accommodation establishment with a pre-existing commitment to sustainability, further improve its solid waste?", two main methods of data collection will be presented: participant observation and a remote interview. Before starting the data collection process, the first step was a close look through Zmar's website and blog, used as sources of background information. From this first exploration, I understood this was an establishment with a pre-existing commitment to sustainability. Moreover, some of the sustainable practices carried out by the company are present on the website and blog. However, I needed a more detailed information regarding the way the company treated their waste. Therefore, I decided to ask for an introductory tour with Zmar's Environmental Engineer, Sérgio Francisco, in order to understand the whole environmental commitment and, more concretely, the process of waste management carried out by the company. After having an overall idea of how this process was, I did a participant observation study in Zmar Eco Experience, especially focused on the restaurant, kitchen and bakery areas, with the aim of mapping

out the main sources of solid waste in order to further improve its management and, ultimately, reduce solid waste.

Finally, after all the data collected through a remote interview and participant observation, an analysis will be done, followed by a conclusion and some indications regarding possible future research.

This structure is presented on the diagram below:

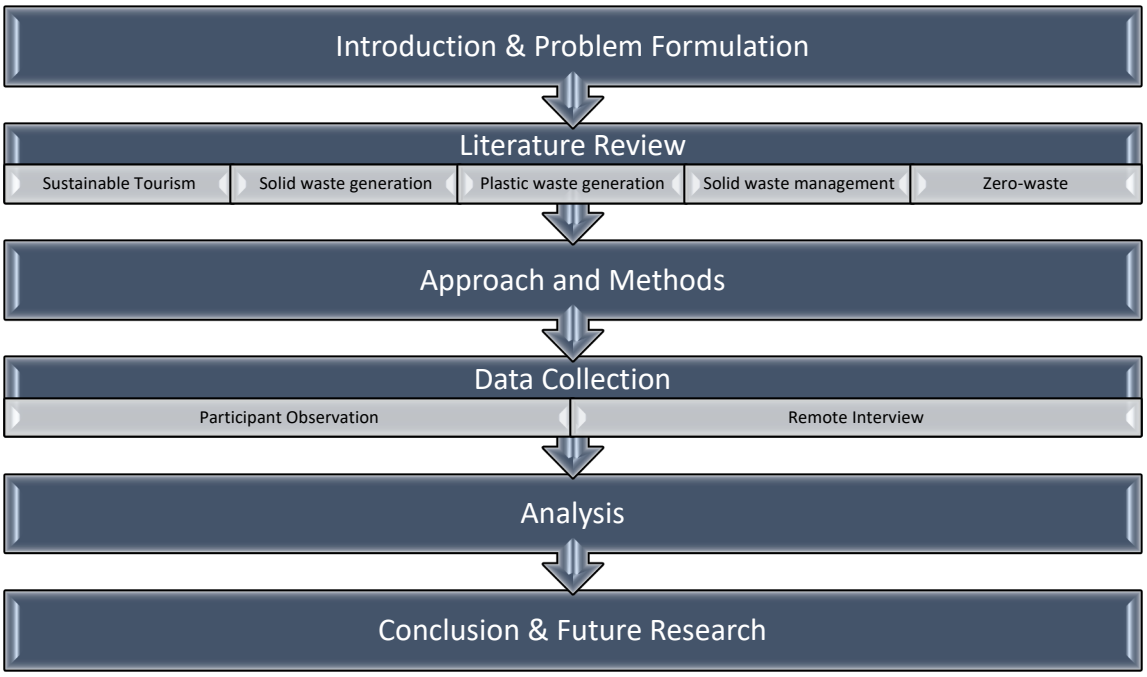

Figure 1: Thesis Structure

2. Literature Review

To study how Zmar EcoExperience can implement more sustainable practices and move towards zero waste, in this literature review I will introduce some topics whose understanding will be the basis of this study. First, I will introduce the concept of sustainable tourism since this can be relevant for an overall comprehension. Afterwards, I will briefly analyze the waste issue in the tourism activity and its challenges, especially focusing on the solid plastic waste generation and it consequences. Next, I will introduce one of the waste management practices, known as an innovation of the 1990s in waste handling, known as zero-waste. As mentioned before, all these topics will help to answer the following research question: **How can Zmar Eco-Experience, an accommodation establishment with a pre-existing commitment to sustainability, further improve its solid waste?**

Tourism is known to be one of the activities with a greater impact at the environmental level. However, it is hard to quantify such impact since this is only one activity among many others with its share on environmental impacts as well. Besides, the lack of detailed data and the difficulties in delimiting the tourism activity also make this quantification harder (European Communities, 2002). Although tourism impact on the environment is hard to quantify, it is significant and has deserved some attention and awareness for this issue has been created.

Due to the environmental issues we face nowadays, along with the increasing knowledge, awareness and interest in sustainability, the intention to become more sustainable is growing in several areas as well as in the tourism activity. As an example of this importance, in the United Nation Environment Programme and United Nations World Tourism Organization publication '*Making tourism more sustainable: A guide for policy makers'*, there are some key challenges mentioned to achieve a more sustainable tourism. One of the challenges mentioned is the climate change. It is argued that "climate change is a major issue for the long-term sustainability of tourism in two senses: climate change will have consequences for tourism, and tourism is a contributor to climate change" (UNEP & UNWTO, 2005:13). Moscardo (2015) also supports this statement when arguing that "tourism has been described as both a contributor to and a victim of

various phenomena linked to sustainability especially climate change" (p.26). It came to a point where we know how tourism is influencing the environment and suffering from its consequences too. Therefore, more sustainable practices are essential. "Some even state that environmentally-friendly practices will soon become essential for all hotels (Enz and Sigauw 1999) and that "the next generation won't tolerate insensitivity to the environment" (Goodman 2000)" (Melissen & Roevens, 2007:8). Since people's requirements started to change when it comes to choose an accommodation or another type of tourism service, the tourism industry started to adapt to this new reality. Innumerous hotels started to put in practice initiatives to show their commitment to environmental preservation. These initiatives include the use of solar panels, updated heating systems in swimming pools, the use of appliances that require less water, systems that reuse wash water and composting organic waste to produce fertilizers (Leaniz et al., 2017).

Nevertheless, it is important to note that, even though adopting those practices and moving towards sustainability and zero-waste is desired, other goals such as profitability are also aimed and, in some cases, even prioritized. In the case of Zmar, sustainability is very much a core value, of course never forgetting the purpose of the business: making profit. However, some steps were done towards a sustainability-based business instead of the traditional profit-based business. As an example, Zmar banned the commercialization of plastic water bottles, substituting them for glass water bottles. "Although more costly for the customers, this option is less costly for the environment" (Zmar, 2018). This is an example of how a business can be more sustainable, when it comes to waste generation. The reason why this action is considered to be more sustainable at some levels will be deeply covered later in the section 2.3.1. Waste generation - Plastic Waste. Nonetheless, some other steps towards sustainability can be harder to take, for example those whose choice does not belong to the company. For instance, the way products are packaged, and the materials used for the purpose are not up to the company but to the supplier as well as to political regulations, and these aspects can be hard to change.

2.1. SOLID WASTE GENERATION IN PORTUGAL

Since this research is focusing on solid waste in Zmar Eco-Experience which is located in Portugal, it is relevant to give some background and to present the solid waste situation in Portugal and the evolution of this issue in terms of numbers. Besides, it is also relevant to define what solid waste (or municipal solid waste) is.

Municipal Solid Waste is defined as waste or refuse from households, hazardous solid waste from industrial and commercial establishments, refuse from institutions, market waste, yard waste and street sweeping. This includes, among others, commercial wastes consisting of residual food, glasses, metals and other sources of waste generated from hotels, markets, stores, etc. I created the diagram below to make it easier for the reader to understand exactly the different types of waste based on the different classifications.

As demonstrated in the diagram, the topic being studied (Municipal Solid Waste) comprises waste from two different sources of origin: domestic and commercial. Because in this thesis the focus is on a specific eco-resort, only one fragment of MSW is being studied, commercial waste which respects to the waste of commercial activities.

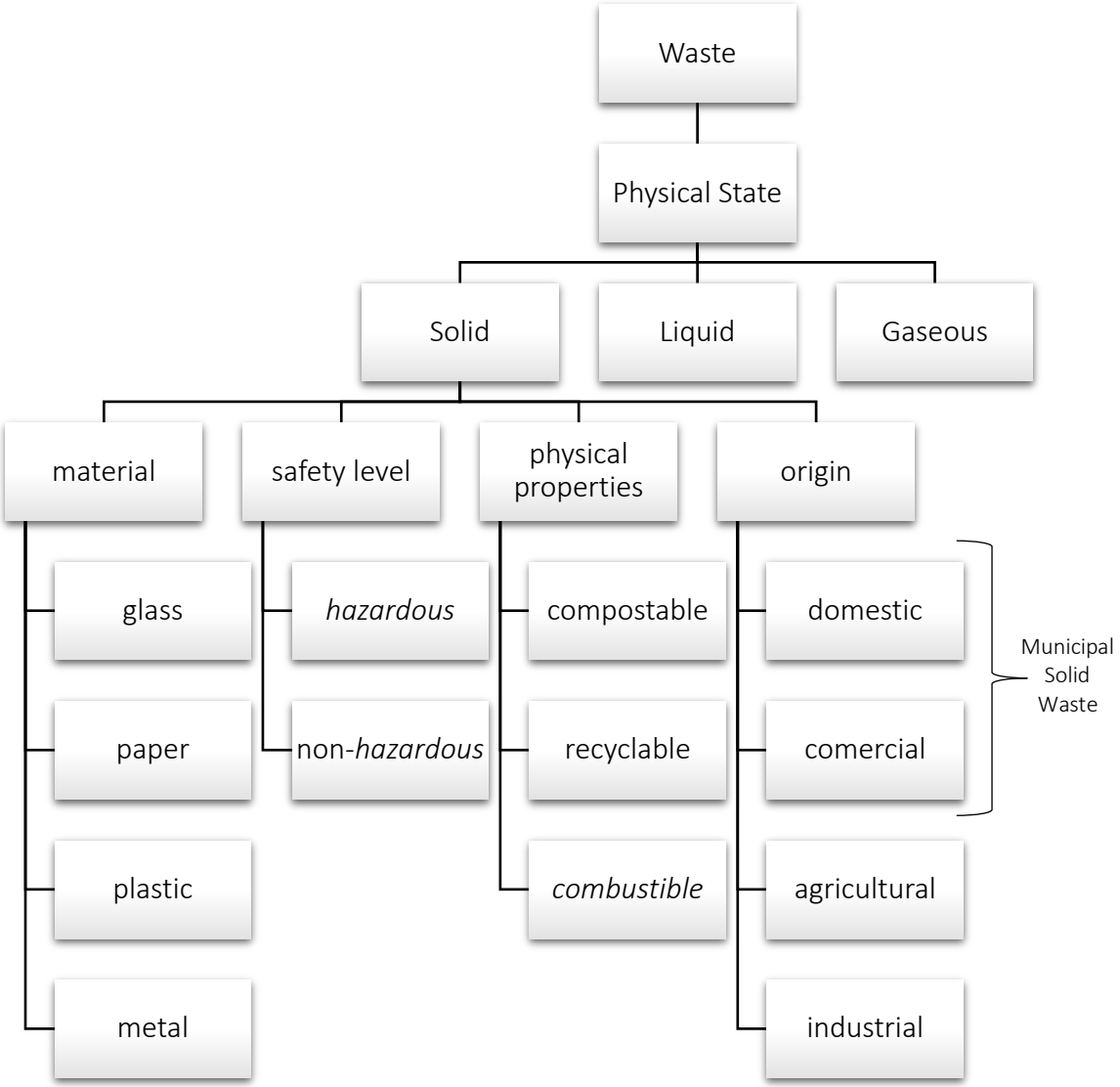

Figure 2: Waste

However, some theories that will be presented in the next chapter regarding Municipal Solid Waste Management still apply. Nonetheless, it is relevant to mention that the fact that commercial waste and domestic waste are referred to as municipal solid waste as a whole, it becomes hard to access their quantitative information individually. As an example, when searching for waste generation data in Eurostat, the values presented refer to MSW and not commercial or domestic waste. That being said, the real values of the exact amount of commercial waste cannot be known. Therefore, the waste generated by the accommodation sector remains unknown as well.

2.2. SUSTAINABLE TOURISM

As a starting point, it is relevant to understand how sustainable tourism is defined. The United Nations Environment Programme and United Nations World Tourism Organization define sustainable tourism as "tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities." (2005, p.12). In other words, sustainable tourism aims to satisfy the present needs of hosts and guests but always considering the impact of such activity on economic, socio-cultural and environmental levels and aiming for the maximization of positive impacts and minimization of negative impacts. For the purpose of this thesis, I will only focus on the environmental impacts of the tourism activity. Nowadays, we face innumerous environmental issues such as pollution, global warming, energy consumption, waste generation, among others (European Communities, 2002). Below, I present some data regarding waste in Portugal, covering total waste, municipal waste and waste going to landfill.

Table 1: Waste in Portugal

Year	Total Waste (tons)	Municipal Waste (tons)	Landfill (tons)
2007		4 967 000	3 170 000
2008	16 882 923	5 472 000	3 530 000
2009		5 496 000	3 342 000
2010	17 312 597	5 457 000	3 381 000
2011		5 178 000	3 048 000
2012	14 184 456	4 766 000	2 593 000
2013		4 598 000	2 320 000
2014	14 586 917	4 710 000	2 307 000

Looking to the most recent year (2014), a little over 30% of the total waste produced was municipal waste (domestic and commercial waste). From this, almost 50% was disposed on landfills. Even though the percentage of municipal waste going to landfill has reduced over the years, there is still a huge amount having this destiny which is not beneficial for the environment since it contributes to the degradation of the environment through pollution of groundwater resources and the emission of explosives gases such as methane (Radwan et al., 2010).

2.3. WASTE GENERATION IN THE ACCOMMODATION SECTOR

Despite all the changes hotels are doing towards sustainability, a major problem of the hospitality industry is generation of waste (Radwan et al., 2010).

> Waste can be classified by a multitude of schemes: by physical state (solid, liquid, gaseous), and then within solid waste by: original use (packaging waste, food waste, etc.), by material (glass, paper, etc.), by physical properties (combustible, compostable, recyclable), by origin (domestic, commercial, agricultural, industrial, etc.) or by safety level (hazardous, nonhazardous). Household and commercial waste [are] often referred to together as Municipal Solid Waste (MSW) (McDougall, et al.: 2001)

Regarding solid waste in general, Radwan et al. (2010) mention that "typically, a hotel guest can produce 1 kg of waste a day that accumulates to thousands of tonnes of waste annually (IHEI, 2002)" (pp. 176), being the aluminum, plastics, glass, steel, cardboard and food waste the main components of hotel waste in some studies (Pirani & Arafat, 2014). In fact, solid waste is considered to be one of most adverse environmental impacts created by small hotels. "More waste usually translates into a greater environmental footprint and therefore more harm to the ecosystem" (Pirani & Arafat, 2014:320). Small hotels' collective waste is massive, and it mostly goes to landfill (Radwan et al., 2010), contributing to the degradation of the environment through pollution of groundwater resources and the emission of explosives gases such as methane. Besides the environmental problems described, waste that goes to landfill can also influence the surrounding populations affected by the odors, flies litter and noise (Radwan et al., 2010). For all reasons above mentioned, solid waste is an issue hotels should start to address.

2.3.1. Waste Generation – Plastic waste

For the purpose of this thesis, I will be focusing on the solid waste generated by hotels, designated as commercial waste. Within this, I will be particularly focusing on solid waste that comes from packaging. Considering their material, the most common used material used for packaging are metal, paper, plastic and glass (Marsh & Bugusu, 2007) but the main focus will be the ones made from plastic. This choice was done due to the increasing use of plastic in recent years (Laville & Taylor, 2017) and the growth in its waste

generation over the years (Geyer, et al., 2017) as well as its impacts on the environment (Toniolo, et al., 2013; Barlow & Morgan, 2013). In addition, plastic is widely used for packaging due to its low cost compared to other materials (World Economic Forum, 2016). For all the reasons mentioned above, plastic solid waste will be the main focus during data collection and analysis, especially focusing on packaging.

As previously mentioned, plastic use has increased over the past years (Laville & Taylor, 2017) as well as the cumulative waste generated since this material has started to be used, as shown in the graph below:

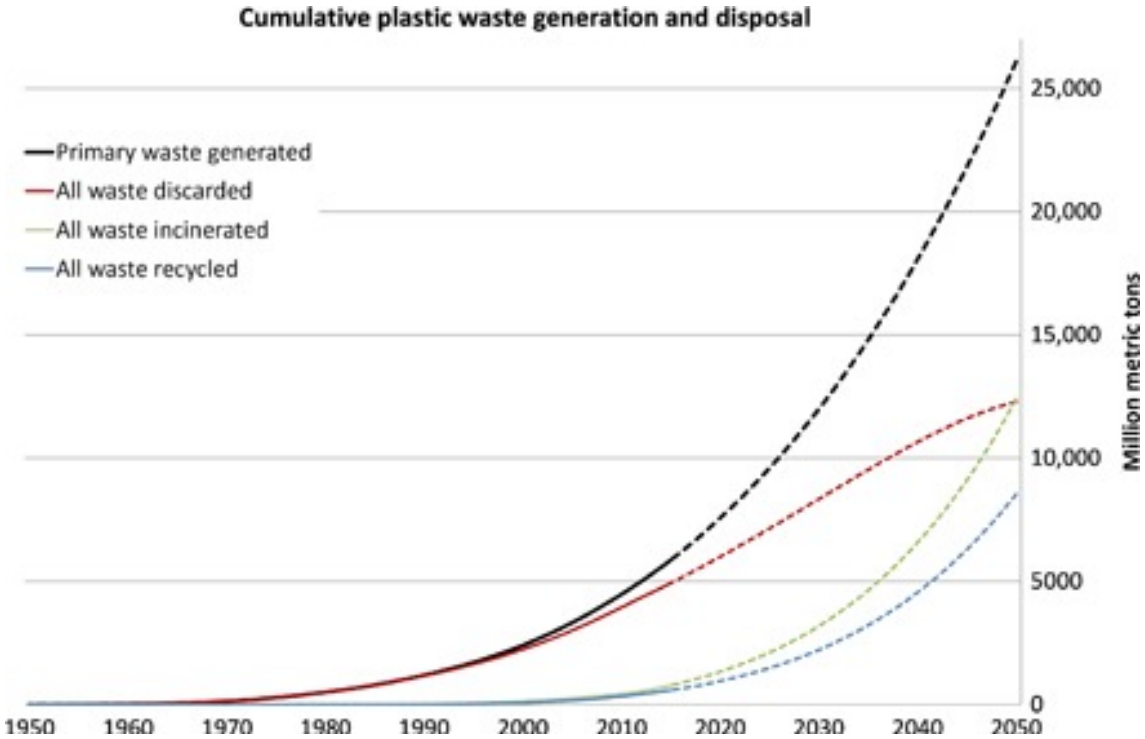

Figure 3: Cumulative plastic waste generation and disposal (Geyer et al., 2017)

The graph shows the cumulative plastic waste generation and disposal, considering the total plastic used, recycled, incinerated and discarded. From this graph, it is visible that since 1950 until 2015 the total plastic waste generation was over 5000 million metric tons (over 5 billion tons) (Geyer, et al., 2017). Furthermore, Al-Salem et al. (2009) also mentioned that, since the first industrial scale production of synthetic polymers (plastics) took place, plastic solid waste has increased considerably. It is also clear in the graph that most of the waste was discarded and only a small part recycled (Geyer, et al., 2017).

Several are the news that mention the plastic crisis we are living nowadays. The newspaper *'The Guardian'* and the magazine *'National Geographic'* have several articles on that matter. Around the world, people throw away roughly four million tons of trash every day and about 12.8 percent of that waste is plastic. (Fox, n.d.). As of 2015, only 9 percent of the plastic waste produced ended up recycled, and another 12 percent was incinerated. The remaining 79 percent has built up in landfills or ended up elsewhere in the environment. (Ferris, 2017)

Plastics are used in a number of applications on a daily basis (Al-Salem, et al., 2009), from water bottles, to food packaging, bags, etc. In fact, "plastic production is a significant issue involving several industrial sectors" (Toniolo, et al., 2013:61), which also contributes to the growing production we are assisting nowadays.

> In 2011, the world plastic production rose to approximately 280 million tonnes, of which 58 million tonnes were produced in Europe (Plastics Europe, 2012). The market share of end-use applications shows that the largest segment is the packaging sector, representing 39.4% of the overall demand (Toniolo, et al., 2013:61).

In fact, "plastics' largest market is packaging" (Geyer, et al., 2017). Packaging of different sorts can be found in the food and drink supply chain (Barlow & Morgan, 2013).

There are several advantages mentioned regarding the use of food packaging: protection/preservation of food, food waste reduction, marketing and information, convenience, among others (Marsh & Bugusu, 2007). While some authors defend that the use of packaging is beneficial in order to prevent food waste, it is important to examine its impacts on the environment. On that matter, Barlow & Morgan (2013) argue that "packaging reduces food waste, but itself adds to environmental burdens by using material, requiring transport and requiring end-of-life disposal" (Barlow & Morgan, 2013:79-80). Some other authors mention that

> plastic packaging can also benefit the environment: its low weight reduces fuel consumption in transportation, and its barrier properties keep food fresh longer, reducing food waste. As a result of these characteristics, plastics are increasingly replacing other packaging materials (World Economic Forum, 2016).

Another aspect to consider in terms of plastic's environmental impact is its lifetime. Packaging is by its nature a temporary product. In fact, most packaging has a short lifetime and is discarded after use, entering the municipal waste stream (Barlow & Morgan, 2013), sometimes even after a single use only which is the case of food packaging (Al-Salem, et al., 2009). Besides its short lifetime, another issue involves the quantity of plastic used for packaging.

> Excessive packaging necessitates more materials, more resources to manufacture, so entailing more costs; over packaged products incur a hefty toll on the environment as product packaging is usually discarded quickly, ending up in landfills. Naturally excessive packaging [is] physically larger and heavier which place greater burden on logistics, thus incurring higher financial and environment costs (Song et al., 2015:203).

It is a fact that public attitudes towards packaging are generally negative (Barlow & Morgan, 2013) and most of these plastics are not recycled. Regarding packaging recycling, O'Connor (2017) mentions that

> the world recycles just 14% of the plastic packaging it uses. Even worse: 8m tons of plastic, much of it packaging, ends up in the oceans each year, where sea life and birds die from eating it or getting entangled in it. Some of the plastics will also bind with industrial chemicals that have polluted oceans for decades, raising concerns that toxins can make their way into our food chain

The impacts above have been mentioned countless times in the news, especially in recent years, and have caught people's attention. However, their attitudes don't seem to be changing as shown in the graph below which presents the plastic waste going to landfill in the year of 2016.

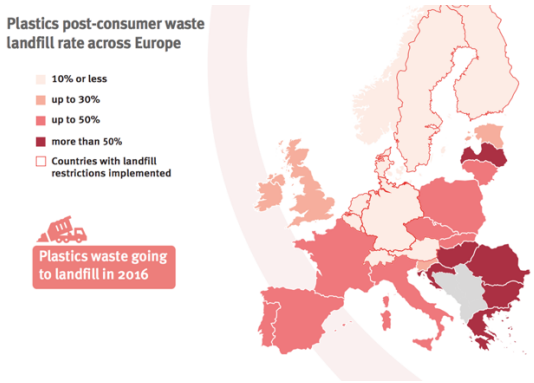

Figure 4: Plastic post-consumer waste landfill rate across Europe (Plastics Europe, 2018)

As shown in the figure above, in Portugal, up to 50% of the plastics are send to landfill (Plastics Europe, 2018) which, as mentioned before, is not the ideal way to manage solid waste due to its environmental impacts. There are more sustainable ways to deal with waste such as recycling, reusing, minimizing or even preventing (Radwan et al., 2012). However, even recycling being better than disposing plastic on landfill, it has some drawbacks. Unlike other materials such as glass, plastic cannot be recycled into the same plastic quality and it loses quality over time (World Economic Forum, 2016). While glass can be 100% recycled endlessly without loss in quality and purity (Glass Packaging Institute, 2018), plastic can only be downcycled, this is, recycled into a lower-quality plastic (World Economic Forum, 2016). Meaning that almost all packaging and plastic bottles are made of raw materials and not recycled plastic (World Economic Forum, 2016). In fact,

> fewer than half of the bottles bought in 2016 were collected for recycling and just 7% of those collected were turned into new bottles. Instead most plastic bottles produced end up in landfill or in the ocean (Laville & Taylor, 2017).

Considering that a million plastic bottles are bought around the world every minute and the number will jump another 20% by 2021 (Laville & Taylor, 2017), some actions should be taken as soon as possible. Otherwise, plastic impacts will be much stronger in the future, as demonstrated in the figure below.

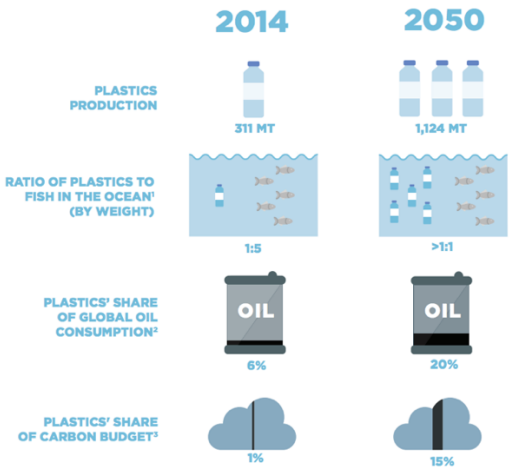

Figure 5: Plastic: 2014 vs. 2050 (World Economic Forum, 2016)

The figure above represents the expectations of plastic production as well as its impact on the ocean, the global oil consumption and the carbon emissions for 2050 if we continue to live based on a linear economy (Word Economic Forum, 2016). This kind of data shows us that the change needs to be fast and drastic. Solid waste management practices should be adopted in order to switch from a linear economy to a circular economy. "Shifting to a real circular economy for plastics is a massive opportunity to close the loop" (Laville & Taylor, 2017). The concepts of linear and circular economy will be further explained in the Section 2.3.3. Zero-waste. Before getting there, I will introduce the solid waste management topic which is relevant for this change to happen in our society.

2.3.2. Solid Waste Management

> In the late 1990s, generally speaking, establishments of the hospitality industry were not very concerned with their environmental impact and a sustainable way of dealing with their waste was not given much priority (Pirani & Arafat, 2014:320).

However, things have changed over the years and there is much more environmental awareness nowadays (Pirani & Arafat, 2014). In regard to small hotels, though they do not generate a lot of waste when compared to larger ones, all these small properties generate very large amounts of solid waste much of it ends up in landfills (Pirani & Arafat, 2014). Therefore, being solid waste such a huge issue in the hospitality industry (Pirani & Arafat, 2014), it is important that small hotels address it in their day to day practices such as in the kitchen/restaurant areas, reception, office, etc. But to address this issue and implement solid waste management programs, hotels should have something that motivates them to do so. They could be motivated by an economic benefit, such as saving money by acting more sustainably, or awareness in the cases where hoteliers educate themselves about the impacts of the industry and become aware of what they can do to prevent, etc. When hotels have something that motivates them to consider solid waste management, behavior takes place. In other words, solid waste management behavior is implemented. This process is represented by the model in the picture below (Radwan et al., 2012*).*

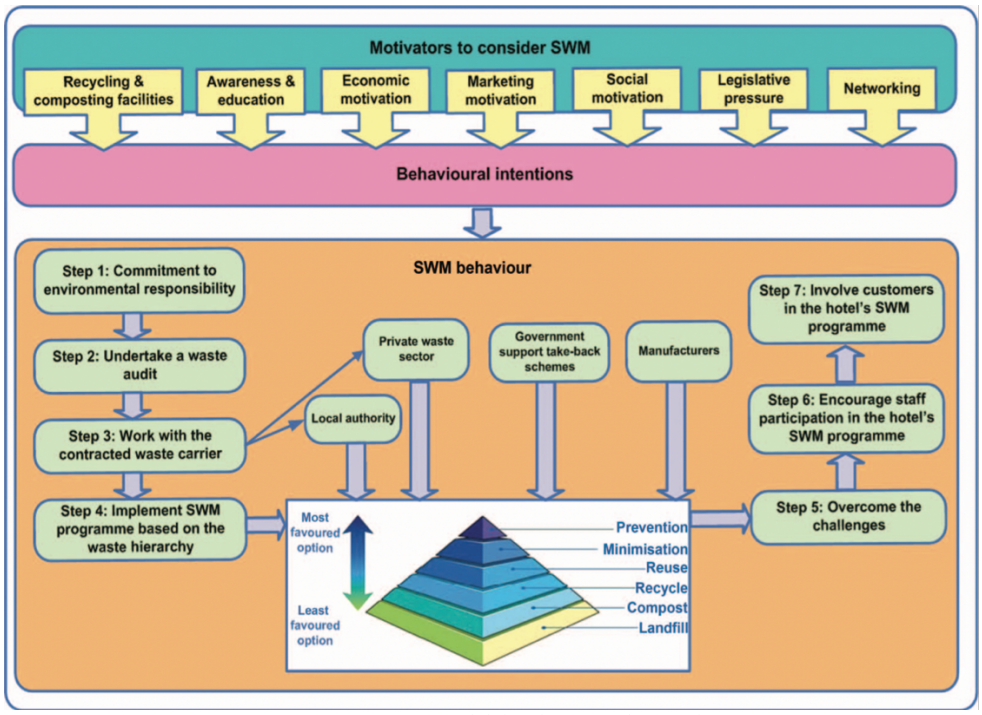

Figure 6: SWM model (Radwan et al., 2012)

The model considers seven main steps for implementing better solid waste management (SWM) practices in small hotels:

1. Hotel commitment to environmental responsibility
2. Undertake a waste audit
3. Work with the contracted waste carrier
4. Implement SWM programme based on the waste hierarchy.
5. Overcome the challenges
6. Encourage staff participation in the hotel's SWM programme
7. Involve customers in the hotel's SWM programme

Firstly, initial motivation is essential to inspire hotels to have more environmentally-friendly attitudes and manage their solid waste accordingly. Then, as mentioned by Radwan et al. (2012), "an auditing process should be carried out to identify types, quantities and sources of waste streams produced and to decide on the best option for handling each waste stream" (p.543). Basically, at this step, the hotel should be aware of their main sources of waste, so the best handling method can be put in practice. Afterwards, the hotel should work with a contracted waste carrier. At this point, a SWM programme should be implemented. An example of a SWM tool that can be used by small hotels is the SWM hierarchy represented by the pyramid below:

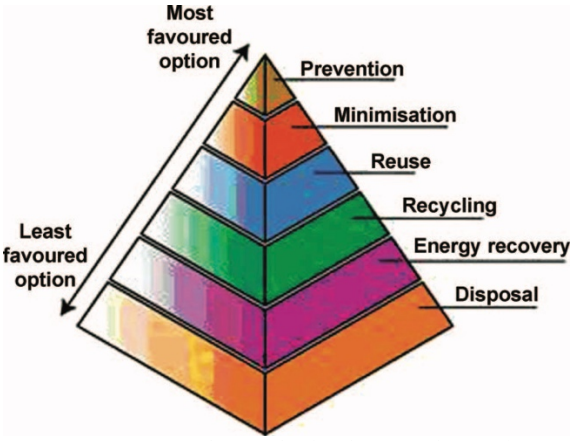

Figure 7: SWM hierarchy (Radwan et al., 2012).

The SWM hierarchy is represented by 6 levels, from the least favored to the most favored option when it comes to handling waste. The least favored option is the disposal of waste and the most favored is its prevention. For example, it would be preferable to use a reusable cup than using a plastic cup and throw it in the common waste bin. On one hand, by using a reusable cup, no impact is being caused in the environment, since the cup can be used innumerous times. On the other hand, by using a plastic cup and throwing it in the common waste bin, the cup is not going to be collect for recycling and, therefore is adding up to the waste present in landfill, contributing to some of the environmental problems we face nowadays.

After giving a practical example of the least and most favored options when it comes to waste handling, I will briefly explain each of the levels present in the hierarchical model. As previously mentioned, the most favored option is the prevention, meaning that waste should be eliminated before it is actually created. This is illustrated by example of the reusable cup. The next level of the pyramid is the minimization, which is the reduction of waste during the life cycle of the product. Then, reusing is the process of putting waste materials back into use instead of being sent to the waste stream. As an example, instead of buying new furniture, a hotel can reuse the furniture they already have by recuperating and changing some of its features, so it can look different but at the same time is being reused instead of going to the waste stream. Recovery is the retrieval of a part of the value of the materials through recycling and energy recovery. Lastly, disposal, at the bottom of the hierarchy, usually involves sending the waste to landfill and incineration. The use of a plastic cup that is not sent to a recycling bin is one example of disposal, already presented before.

As mentioned by Radwan (2010), the SWM hierarchy does not include the method of composting "which [is] an essential SWM option for handling organic waste in a sustainable way" (p.178), for instance food waste. Composting is, in fact, a sustainable alternative when it comes to organic waste because it has economic and environmental benefits. On one hand, the compost produced by the organic waste can be either sold or used as a soil nutrient, representing an economic benefit in that sense. On the other hand, by composting, a hotel can reduce waste by up to 40% (Radwan et al., 2012).
Overall, the model Radwan et al. (2012) present can be a great tool for small hotels to manage their solid waste effectively.
Back to the seven main steps for implementing better SWM practices in small hotels, the fifth step is to overcome the challenges. Subsequently, the hotel should encourage staff's participation in the SWM programme. Staff should be educated on why and how to manage solid waste. Last, but not least, customers should also be a part of the SWM programme. "Educating customers is a significant aspect of a hotels' SWM programme. Hoteliers should develop tools to make all customers aware of the different activities taken to reduce waste (i.e. recycling) and the importance of their participation in the programme" (Radwan et al., 2012:545). As Moscardo (2015) also defends, staff in tourism businesses have an important role when it comes to informing and educating guests. In fact, educating customers is a major aspect of a hotel's SWM programme, since they contribute largely to the environmental impacts caused by such accommodations. Therefore, hoteliers should develop tools to create awareness among guests and let clear the importance of their participation in such programmes (Radwan, 2012). Additionally,

> Cummings (1997) stressed the role of customers in hotel waste recycling programmes arguing that hotels can use several methods for encouraging customers to separate recyclable materials, e.g. supplying bins for recyclable materials in guest rooms, corridors and near elevators and then asking customers politely to put their recyclable materials in the appropriate place (Radwan et al., 2012:536).

In fact, more than ever before, tourism can be used as a way to present messages about sustainability (Moscardo, 2015) and guests are, indeed, one of the best interveners to communicate such messages.

2.3.3. *Zero Waste*

Regarding solid considered to be the most holistic innovation of the twenty-first century for achieving a true sense of sustainable waste management systems (Zaman, 2014). This practice prioritizes elimination of waste, in the place of managing waste (Dileep, 2007). It is considered to be "the most economical and integrated form of discard and/or waste management method" (Dileep, 2007:384). As preciously mention in section 2.3.1. Waste Generation – Plastic Waste,

> since the industrial revolution we have attempted to impose a linear society on a planet that functions in circles. Nature recycles everything; we do not. In four steps we convert virgin materials into waste. It starts with extraction, and then manufacture, then distribution, then consumption and finally waste (Connett, 2007:1).

In this Linear Production-Consumption-Disposal System, products are created, used and thrown away. This is called the throwaway society. The visual representation of such society is illustrated by figure 8.



Figure 8: Linear economy

A society based on a linear economy is a society that highly contributes to the negative impacts on the environment. At each step of the flow illustrated above, there are enormous impacts on the environment (Connett, 2007).

> Extraction from raw materials requires large quantities of energy and in turn produces huge quantities of solid waste, air pollution, water pollution, ecosystem damage, and massive quantities of carbon dioxide which in turn leads to Global Warming. Most of these impacts are repeated again with the manufacture of products. Then transportation between every step entails further energy use and even more carbon dioxide production and more Global Warming (Connett, 2007:1-2).

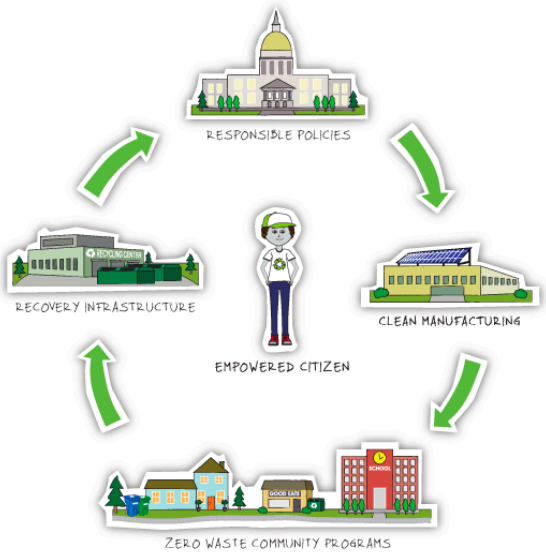

Figure 9: Circular economy

As stated above, the impacts of a linear economy, associated with an over-consumption society, are huge. From air and water pollution to carbon dioxide emission and also solid waste generation, the impact of a linear economy on the environment can have huge consequences if nothing is done. For that reason, it becomes extremely crucial to shift towards a more sustainable society by adopting more environmentally-friendly practices. Regarding one of linear economy's consequences, solid waste generation, Zaman (2014) states that zero waste, a visionary waste management system, has been presented as an alternative solution for waste problems in recent decades and has become an aspirational goal for facing waste problems. A zero-waste system is an example of what could represent a more sustainable society. Instead of linear, this system is based on a circular economy, as represented in figure 9.

Contrasting with a linear economy system, here the focus is on sustainability and all stakeholders and actors that play a role in the economy adopt sustainable practices that contribute for the well-being of the society. This society would be based on clean manufacturing, responsible consumers as well as responsible policies. Zero-waste is a visionary goal that can only be achieved on a society based on a circular economy.

There are different definitions in the literature for what Zero-waste means (Phillips, et al., 2010). Based on what Phillips et al. (2010) and *Silva et al. (2017)* defend, zero-waste means going as far as possible in reducing the environmental impact of waste. It is a pragmatic and visionary goal which seeks to prevent waste occurring, conserves resources and recovers all value from materials. This will be the definition adopted for this thesis and the one which will be in the back of my mind during the data collection process.

In this literature review chapter, I included various topics which I understood as relevant to study the proposed research question **"How can Zmar Eco-Experience, an**

accommodation establishment with a pre-existing commitment to sustainability, further improve its solid waste?". These topics were: sustainable tourism, waste generation issue – in Portugal in general and in the accommodation sector in specific –, the specific case of plastic waste generation, solid waste management and zero-waste. In Chapter 4 Analysis, the ideas and theories here covered, will be deeply analyzed in connection with the case-study. More specifically, the solid waste management model will serve as a foundation to analyze the data collected. By using this model, I will analyze Zmar's main sources of solid waste and understand how solid waste generation can be further improved, by having in my both the waste hierarchy and the circular economy models. Besides, the circular economy model will also be used to discuss the solid waste issue on a broader scale and analyze its implications in the most diverse areas. Regarding the literature presented regarding plastic generation, the facts relative to plastic packaging will be the most used ones because this will be the main focus of the data collection.

Now that I have introduced the topics that will be the basis of this study, I will present the methodological choices for this research in the next chapter.

3. Research approach and Methods

The objective of this chapter is to describe the research approach and methodological considerations chosen for the study in order to answer the research question **"How can Zmar Eco-Experience, an accommodation establishment with a pre-existing commitment to sustainability, further improve its solid waste?"**. Thus, I will begin with a short contextualization by covering Pragmatism as the philosophical basis of this research. Subsequently, I will introduce the concept of qualitative research and explain its suitability for this project. Then, I will present the methods used for data collection. Finally, the method used for the analysis will be presented as well.

3.1. PRAGMATISM

As previously mentioned, pragmatism will be used as the philosophical basis of this research. Pragmatism is a philosophical movement initiated in the United States around 1870 and its major contributors were William James, John Dewey and Charles Peirce ("Pragmatism", 2018).

> Pragmatists contend that most philosophical topics—such as the nature of knowledge, language, concepts, meaning, belief, and science—are all best viewed in terms of their practical uses and successes. The philosophy of pragmatism emphasizes the practical application of ideas by acting on them to actually test them in human experiences ("Pragmatism", 2018)

In other words, pragmatists defend that researchers should not be driven by theory but rather by what they observe and experience. Pragmatists think that the truth is not discovered in a closed room by thinking about it but rather by experiencing it (Cline, 2017). As an example, I do not expect to study the issue of solid waste generation and management by rely solely on theories but by observing the reality and discovering, by experience, what is true or not and then, compare it with what other authors say. As mentioned by James (1975) "theories (…) become instruments, not answers to enigmas in which we can rest" (p.32). This thesis will be carried out based on the pragmatic philosophical ideas stated above.

3.2. RESEARCH DESIGN

3.2.1. Case-Study Research

The research question chosen for this project, focused in the study of a particular problem within a specific company, determines the type of research design adopted (de Vaus, 2001). This project was carried out as a case-study research since I chose to make a detailed investigation within a specific context, the accommodation establishment Zmar Eco Experience, that will be helpful to elucidate some of the theoretical issues studied and covered in Chapter 2 Literature Review (Cassell & Symon, 2004).

3.3. QUALITATIVE RESEARCH

Once the research problem and adequate type of research were chosen, it was then crucial to define whether to follow a qualitative research or a quantitative one. In that matter, King & Horrocks (2010) argue the following:

> Quantitative research is concerned with measurement, precisely and accurately capturing aspects of the social world that are then expressed in numbers – percentages, probability values, variance ratios, etc. Measurement, a term loosely employed here, is approached differently by qualitative researchers. The aim is still to capture aspects of the social world, but this is done in numerous ways that do not rely on numbers as the unit of analysis (p.7).

To make this choice it was important to define the aim of the research. As mentioned in the previous chapter, with this research my aim was to understand how Zmar Eco-Experience could further improve its solid waste management practices and discuss what other things might have an influence on those practices. Considering the aim of this research, it is necessary to observe the way the accommodation establishment treated its solid waste in order to further improve it. Therefore, it is necessary to understand and map out the present situation in relation to waste management practices, rather than quantifying the waste itself. If the aim was to quantify or reduce solid waste, I could have weighted or count solid waste, but my intention is to understand the issue of solid waste management as an environmental phenomenon, and not exactly to quantify or reduce solid waste generation. Thus, a qualitative approach is more suitable for the purpose of

this research since "qualitative research tends to be concerned with words rather than numbers" (Bryman, 2012:380).

3.4. DATA COLLECTION

Once defined the appropriate approach for this project, it is also important to take into consideration the data collection process and the most suitable methods considering the purpose of the project. As stated by Ritchie & Lewis (2003):

> *a good qualitative research study design is one which has a clearly defined purpose, in which there is a coherence between the research questions and the methods or approaches proposed, and which generates data which is valid and reliable (p. 47).*

With this in mind, all the decisions made during this research project were made taking into consideration its impact in the outcome. In other words, the theories and methods used were thought through intentionally to generate valid and reliable data and to address the research question. As an example, the theory presented about solid waste management in the Chapter 2 Literature Review was chosen already thinking about its future application in the data collection process and data analysis. In addition, the questions used in the interview were thought through in order to validate some of my observations.

As mentioned by the authors Cassell & Symon (2004), "case studies are widely used in organizational studies" and such type of research is "particularly suited to research questions which require detailed understanding of (…) organizational processes because of the rich data collected in context" (Cassell & Symon, 2004:323).

Once the type of research was chosen, it was relevant to determine how the data was going to be collected. On that matter Cassell & Symon (2004) argued the following:

> Case studies generally include multiple methods (…). Participant observation, direct observation, ethnography, interviews, focus groups, documentary analysis, and even questionnaires may be used, or in combination (Cassell & Symon, 2004:323).

As defended by the authors, a number of methods could be carried out within a case study. Other authors defended also the existence of different approaches to data

collection. For instance, according to Ritchie & Lewis (2003), there are mainly two different approaches when it comes to collecting qualitative data. One of the approaches focuses on naturally occurring data (for example, observation, documentary analysis, discourse analysis). The other approach focuses on data that is generated through the interventions of the research (for example, narrative accounts, interviews, focus groups) (Ritchie & Lewis, 2003). I chose the most suitable data collection methods considering the purpose of this research and these were: remote interview and participant observation. Therefore, a combination of both generated data and naturally occurring data was chosen. To understand the solid waste management issue, I believe the data collection methods chosen are the most adequate. If the focus was in evaluating the amount of solid waste, I could have used some documents with some data collected by Zmar Eco-experience regarding waste. However, as previously mentioned, the focus of this thesis is not on the quantitative aspect of solid waste.

3.4.1. Methodological triangulation as a research strategy

For the data collection process, I chose to collect data using different data collection methods. The data was then collected through a remote interview and participant observation. As argued by Hall & Rist (1999), "using multiple data sources can deepen our understanding and hence is advantageous in comparison to using a single method" (p. 295). The use of multiple methods to study the same problem is defined by some authors (Duffy, 1987; Patton, 1999; Denzin, 1978) as methodological triangulation or method triangulation (Carter et al., 2014). Triangulation is defined as a strategy in which the researcher brings multiple forms of evidence to bear on a single research question (Stoker, 2011) and "the (…) most common type of generic triangulation is methodological triangulation [in which the researcher uses] two or more methods of data collection procedures within a single study" (Duffy, 1987:131). In fact, combining different data collection methods has a stronger validity associated with the conclusions that can be drawn (Hall & Rist, 1999). Methodological triangulation as referred as between-method triangulation involves the use of multiple methods of data collection (Stoker, 2011) such as interviews and observation.

In some cases, researchers choose to use triangulation as a way of validating or corroborating a theory. However, triangular can also be use with the logic of complementarity (Stoker, 2011). This was the logic followed for this thesis. I chose this form of triangulation because the problem formulation of this thesis does not rely on testing or corroborating theory but rather on understanding a particular phenomenon: solid waste management. There are several reasons to adopt triangulation in this sense, such as the fact that:

- "any one form of empirical evidence will inevitably yield a partial or incomplete understanding of the phenomena under study";
- "different forms of evidence will provide different perspectives on and insights into the phenomena";
- "by combining forms of evidence, a research project will generate a richer and more complete body of knowledge about the phenomena" (Stoker, 2011:2671).

For the reasons mentioned above, I decided to use methodological triangulation as a method strategy for this thesis with the purpose of having a more in-depth understanding of the phenomena being studied. As mentioned above, each form of empirical evidence will not provide a complete understanding of the phenomena being study which has to do with the weaknesses of each data collection method (Hall & Rist, 1999). By combining their use, some of these weaknesses can be, somehow, covered by other method's strengths. As an example, when doing participant observation, the researcher may not understand the actor's motivation for behavior, which can be understood through an interview (Hall & Rist, 1999). "Observations may also sensitize the researcher to the research topic and settings and illuminate aspects of an interaction that are subconscious and less likely to be described in interviews" (Lewis & Nicholls, 2014:58). These could be some examples of how the use of multiple methods can help the study of a particular research problem and why the use of triangulation is particularly relevant (Lewis & Nicholls, 2014).

In this research for example, through participant observation I can only access what I see or what I ask people. Therefore, I might end up getting an incomplete picture of the reality. For that reason, the questions in the interview were created with the purpose of completing the observation and also giving a new perspective. As an example, I know

Zmar includes guests on their sustainable practices. However, I probably would not know all of them. Therefore, I decided to include that question in the interview. Another example is the following: from what I observed I understood Zmar Eco-Experience is concerned with waste. They control the food waste and they weight the food from breakfast that is not eaten. However, only from observation I did not get an understanding of which internal measures they put in practice in order to reduce it. In other words, I did not know what those numbers were used for. For that reason, I also decided to include this question in the interview.

In the next sections, the sources of background information as well as the data collection methods will be presented and some of their strengths and weaknesses will be presented.

3.4.2. Zmar website and blog as sources of background information

Before beginning with the data collection process, it is relevant to mention that Zmar Eco-experience website as well as its blog were used as a source of background information. To have a deeper understanding of the organization, I could have done an interview with the administration on the first place. However, the time-frame to do the study was, unfortunately, not long enough. In addition, the information provided on the website was complete and clear enough to provide me with the knowledge I would get from a first interview. Therefore, I chose to examine the website and blog as a way of getting a deeper understanding of the organization's philosophy as well as their day-to-day practices. I explored Zmar Eco Experience website and searched for relevant information regarding the topic being studied. On the website there is a section where the focus is on the environmental philosophy and policies followed by the accommodation establishment. By having a look at this section, I had a more clear idea of the practices followed at the moment which was helpful for narrowing down the research question as well as to have a more focus on certain aspects while carrying the participant observation study on the field. Here are some of the aspects mentioned on Zmar website which were relevant for my understanding of the organization:

- Philosophy;
- Ecotourism;
- Eco-Hotel Certification;

- Environmental Policies;
- Waste Management.

My focus went to Zmar philosophy, being this an important part to understand why the organization acts in the way they act, mentioning their drive to act more sustainable. In addition, the Environmental Policies as well as the Waste Management sections were of great importance to understand which practices are already followed by the organization. As an example, on the website is mentioned that the organization only uses glass water bottles. Therefore, during the participant observation study I did not focus on the waste of plastic water bottles, for instance because it is a change that was already implemented. Thus, the focus should be on practices that could be improved.

Besides examining at Zmar website, I also looked at Zmar blog which had quite a lot of articles and many of them relevant for my previous understanding of Zmar's practices. At the blog, some interesting articles were:

- Ecotourism and Zmar
- Sustainable stay
- Environmental practices
- Shopping yes, plastic no
- Waste treatment
- Eco data 2017

By reading each one of these small articles I had a better idea of how Zmar acted and, as well as the background information gained from the website, this one helped to narrow the research question, and specifying that Zmar is considered to be an accommodation establishment with a pre-existent commitment to sustainability. After getting a better understanding of the organization through the exploration of its website and blog, I started with the data collection process itself, as previously mentioned, by following participant observation and an interview as the main data collection methods.

3.4.3. Ethnography and Participant Observation

The first data collection method chosen for this study was participant observation. Even though traditional ethnography is widely known for its use in cultural settings (Mack et al., 2005), it is also recognized its use in organizational settings, cases where it can be

defined as organizational ethnography (Ybema et al., 2009), which was the case of this project where the research took place at Zmar Eco Experience.

There is a difficulty in delineating the differences between ethnography and participant observation (Bryman, 2012). However, both "draw attention to the fact that the participant observer/ethnographer immerses him- or herself in a group for an extended period of time, observing behaviour, listening to what is said in conversations both between others and with the fieldworker, and asking questions" (Bryman, 2012:432). Bryman (2012) went further and mentioned that it is possible that the reason why some authors prefer to use the term ethnography has to do with the fact that 'participant observation' seems to imply that researchers only observe when they do actually a more complete research. "Typically, participant observers and ethnographers will gather further data through interviews and the collection of documents" (Bryman, 2012:432). Moreover, "ethnographic fieldwork can be defined as the 'firsthand experience and exploration of a particular social or cultural setting'" (Ybema et al., 2009:23) making use of "field research tools in the interpretative tradition of social science in which participant observation, conversational interviewing and the close reading and analysis of documents are key" (Ybema et al., 2009:23). Based on these points of view, I chose to refer to this research as taking a waste ethnography approach, since the focus was on waste and not on the relationships of the people being observed. Moreover, this waste ethnography approach comprises two data collection methods which will be further explored afterwards: participant observation and a remote interview.

3.4.3.1. Participant Observation

Participant observation has been used for many years as a data collection method in both anthropological and sociological studies (Kawulich, 2005). "Participant observation requires the observer to get close enough to those being observed to achieve a level of comfort with them, thus allowing unimpeded observations and the recording of information" (Hall & Rist, 1999:300). Through participant observation "the researcher observes ongoing behavior of the subject(s), interpreting meaning from what is observed" (Hall & Rist, 1999:300). The degree to which the research involves himself/herself in the research was categorized by Raymond L. Gold into four types

observation stances: complete participant, participant as observer, observer as participant, and complete observer (Kawulich, 2005). Bearing in mind the purpose of this research, I adopted the posture of an observer as participant. According to Kawulich (2005), "the observer as participant stance enables the researcher to participate in the group activities as desired, yet the main role of the researcher in this stance is to collect data, and the group being studied is aware of the researcher's observation activities." (p. NA). Contrasting with the two first stances mentioned, the observer as a participant is not a member of the group and his/her participation happens due to the researcher's interest in observing certain aspects that will provide a more complete understanding of the studied topic (Kawulich, 2005). As defend by Cassell & Symon (2004):

> The first strategy might well be to get a general overview of the structure and functioning of the organization. This might consist of half a dozen 'orientation' interviews in which the researcher learns something of the history and present functioning of the organization. Obtaining an organization chart (if available) is useful in ensuring that you are aware of the work of the principal departments. (…) It can be valuable to be 'walked round' the organization following the workflow and observing the work being undertaken. In this way you can map out where you think the principal sources of data are likely to be. You will probably also gain an idea of when are the best (and worst) times and occasions on which to talk to people and this will help you plan your work (p.328).

The first strategy highlighted by Cassel & Symon (2004) was the strategy I followed at the beginning of this study. First, I met in person some of the people I exchanged emails with prior to being at Zmar. I asked them to have access to the organization chart as a way of understanding the organization of the departments as well as each one's responsibilities and position within the organization. Afterwards, I was walked around in the different areas of Zmar, which was a valuable exercise to get an overall idea of how things worked and to get a first impression of the places that could be more relevant to study.

After the introductory 'guided tour' within the organization, I had to choose only a couple of departments where I wanted to focus the participant observation study and I chose to focus on the kitchen, bakery and storage room areas. The kitchen is an area which involves the preparation of breakfast, lunch and dinner and all those practices were observed. The bakery area involves the preparation of cakes and bread, for breakfast,

lunch and dinner. Finally, the storage room area is where the products are delivered and later sent to the different departments upon request.

Considering the purpose of this study I chose to do a participant observation study because I believed it would generate relevant outcomes in order to answer the research question initially proposed. However, as any other data collection method, participant observation has some advantages and disadvantages inherent that should be mentioned here:

Advantages:

- It is an inexpensive method when compared for instance with surveys (Fine, 2015);
- It allows for richly detailed description of events, behaviors and situations (Kawulich, 2005).

Disadvantages:

- Documenting data can be difficult due to being hard to write notes while in the act of participating and observing (Mack et al., 2005);
- Although participant observation should be objective, it can be a naturally subjective exercise (Mack et al., 2005). This specific disadvantage can be more intensely felt when doing research alone. Alternatively, when doing a team-based research, other group members can help identify objective versus subjective observations (Mack et al., 2005).

As one can understand from what was previously mentioned, conducting fieldwork is an extremely absorbing and time-consuming activity (Cassell & Symon, 2004) and there are a few things to consider such as:

- Gaining access;
- Field notes; and
- Ethical issues.

3.4.3.1.1. Gaining access

"Particular attention has to be paid to this element of the research" (Cassell & Symon, 2004:327). In fact, it can be one of the hardest steps to take and it is quite common to be denied access to organizations (Ybema et al., 2009). Therefore, it is of great importance

to establish a relationship of trust with the organization before the intensive data collection starts (Ybema et al., 2009). Another important aspect to take into consideration is the identification of stakeholders within the organization" (Cassell & Symon, 2004) since they can be our key informants and the ones we should focus on during the first stage of gaining access. To gain access to Zmar and be able to do a participant observation study I started by calling the organization to explain the purpose of this thesis and asked the responsible person with whom I should talk from that point on. An email address was provided, and I sent an email informing the purpose of my thesis and the reason why I was interested in doing the study at Zmar. Some of the benefits the study could bring to Zmar were also presented in the first email. Sometime after, I received approval from the owner to conduct the study at the organization.

3.4.3.1.2. Field notes

When conducting a participant observation study, the researcher notes down behaviors, descriptions and other details. Mack et al. (2005) suggests a creation of map of the observation site where relevant places and activities are identified. I sketched a map on the first day of observation with the areas and completed with the activities that took place in the following days. Now, by the end of the study, we can have an overview of where the observation took place and which places deserve a bigger focus.

Notes taken and drawing representing the research setting are called field notes (Mack et al., 2005). Field notes

> should include descriptions of people, events and conversations as well as the observer's actions, feelings and hunches or working hypotheses. The sequence and duration of events and conversations are noted as precisely as possible. (…) In short, the field notes represent an attempt to record on paper everything that can possibly be recalled about the observation. A good rule to remember is that if it is not written down, it never happened (Cassell & Symon, 2004:156).

Researchers might choose to write field notes discreetly during participant observation or following the activity (Mack et al., 2005). I chose to write the notes right after the events because I believe participants who know I am observing them might feel inhibited of acting normally, which can influence the data being collected.

As previously mentioned, one of the disadvantages of participant observation is the difficulty of taking notes at the same time as participation and observation occur (Mack

et al., 2005). Furthermore, cultivating the ability to listen and observe carefully could help performing this task (Ybema et al., 2009). Thus, it is extremely relevant to have a personal discipline when it comes to writing down the observations as soon and as completely as possible (Mack et al., 2005). Because events can be easily forgotten, I decided to write them down right after they happened and in the end of the day I organized my notes and wrote some thoughts on the observations. This was extremely relevant since "postponing the expansion of notes can lead to loss or inaccurate recording of data. The quality of the data therefore depends on the diligence of the researcher, rather than on technology such as tape recorders" (Mack et al., 2005:14-15). This was a routine I kept day after day while conducting the participant observation study (Kawulich, 2005). As Ybema et al. (2009) mention:

> The growing body of information that emerges in daily notes about events, interviews and other interactions needs to be systematically organized in order to find specific detail easily and to see the emerging patterns in the information (p.32).

In addition to taking notes and expand them every day, I also reviewed constantly the progress of themes and patterns emerging from the data which helped me to keep focus on the goal of the research (Kawulich, 2005).

After writing down the notes on paper, I also introduced them on my computer. It is worth mentioning that both were kept either with me or in a secure location in order to protect the information as well as people being observed (Mack et al., 2005).

Besides observing, I occasionally had short conversations with the participants (staff members) in order to clarify certain behaviors. This procedure is nominated as informal conversation by Mack et al. (2005). Here it was particularly important to record the information in the field notes as soon and with as much detail as possible.

3.4.3.1.3. Ethical issues

"A primary consideration in any research study is to conduct the research in an ethical manner, letting the [organization] know that one's purpose for observing is to document their activities." (Kawulich, 2005). Regarding the ethical issues inherent to a participant observation study, most researchers agree that certain information should not be

included in any published research report (Fine, 2015). Bearing in mind some of these ethical issues, I took some positions in order to protect the participants of the study.

As previously mentioned I decided to adopt a posture of an observer as participant, meaning that I was not a part of the organization, yet I was accepted in the activities with the main focus of collecting data (Kawulich, 2005). Even though all the staff knew I was there to collect data and observe them and their behaviors, I decided to have a discreet attitude to not disrupt the normal activity yet provide enough openness, so they would not feel that my presence could compromise their privacy (Mack et al., 2005). Relationships in fieldwork have important ethical implications (Ybema et al., 2009). Thus, to protect participants privacy, gain their trust and make them feel comfortable and act normally, I decided to send an email declaring the ethical considerations made such as the non-use of real names (Mack et al., 2005), by replacing them with another impersonal terms such as "employee" or "staff" to protect the participant's confidentiality in this thesis (Kawulich, 2005). This email (see appendix C) was sent to Mrs. Sandra Ferreira (Condominium Manager), Mrs. Dina Caiado (Internal Communication) and Engineer Sérgio Francisco (Head of Environment and Quality). It is important to note that there were two different types of participants: the ones being observed and the ones with whom I had interviews and informal conversations with. Regarding the ones being observed, I decided to protect their privacy as mentioned above. Regarding the ones with whom I had informal conversations and interviews I decided to use their real names.

3.4.4. Qualitative interview

The last data collection method chosen to study and answer the proposed research question was the qualitative interview method. Interviews are widely used in qualitative research and a commonly used research method throughout the social sciences (Leech, 2011). There are different types of interviews, from non-structured to semi-structured or structured interviews. "The conventional interview, whether individual or group, involves the researcher sitting down face-to-face with the participants, asking questions and responding to their answers." (King & Horrocks, 2010:79). However, in some situations, for the most diverse reasons, it is not possible to carry the interviews in such traditional

settings (Seidman, 2013). In that case, remote interviewing is used as a method of collection data.

3.4.4.1. Remote Interviewing

There are several remote ways for collecting data, such as through telephone, remote video, e-mail and instant messaging (King & Horrocks, 2010), but the main distinction drawn is between synchronous and asynchronous approaches. Synchronous approach corresponds to data collection methods where the researcher and the participant, such as in traditional setting, communicate at the same time. On the other side, asynchronous approaches have to do with data collection methods that do not require the researcher and the participant to interact and respond at the same time. "The e-mail interview is the most commonly used technique and exemplifies the asynchronous approach" (King & Horrocks, 2010:86).

After carrying a participant observation study, I still had some questions regarding some details that arise from the observations. Since at that time I was not in Portugal anymore – country where Zmar is located –, I decided to make a remote interview via e-mail, also nominated as online interview by some authors (Chen & Hinton, 1999). The reason why I chose the e-mail as the way to do it, was simply because I wanted to provide the interviewee with the freedom of answering at a suitable time and it would have been much more complicated to arrange if it was a synchronous interview (King & Horrocks, 2010). As defended by King & Horrocks (2010), researchers have three reasons for doing remote interviews, being them physical distance from participants, availability of participants and the nature of the interview topic. As already said, in this specific case, the use of a remote interview had to do with the physical distance. However, there are other aspects that should be taken into consideration when it comes to doing an online interview. Chen & Hinton (1999) argue that the researcher should take into consideration the following issues:

- "Are interviewees able to access the technology required?
- Are interviewees amenable to the use of the technology, as opposed to an alternative method?
- Will the interview examine non-controversial material that does not require a private, or secure form of communication?

- Does the interviewer have the skills required to use the technology?
- Is observation of the interviewee not important for the analysis of data collected?"

The interviewee could access the technology required which was the e-mail and was open to do the interview in such terms. The purpose of the interview is not to explore any controversial topic. Therefore, no more secure way of doing the interview was required. Finally, since this interview was more concerning some doubts I have relative to the way Zmar acts, there were no facial expressions or tones of voices or other type of observations that could be relevant enough to choose a personal interview and incur in the costs that choice would have associated over a remote interview.

King & Horrocks (2010) argue that in most cases, e-mail interviewing consists of serious of e-mails rather than only one e-mail with questions from the researcher and an e-mail with answers from the participant. However, in the case of this research, the questions were really precise and associated with specific issues that were not clear through participant observation, meaning that I did not see a reason to not send the questions all at once. In addition, after receiving the answers I felt they elucidated all my doubts and there was no need to exchange extra e-mails. When this does not happen, and researchers feel the necessity of exchanging several e-mails, a schedule should be made together with the participant to define when they should reply to one another. In my opinion and, considering what King & Horrocks (2010) mention as well, this process can result in some of the disadvantages of using e-mail interviewing. It can influence the relationship between the researcher and the participant if the scheduled dates expected are not met. Also, if the participant does not give all answers in due time, the researcher might end up with incomplete information. In addition, it might be time-consuming to compile all the e-mails exchanged when it comes to including such data in the analysis. In fact, similar to any other method of data collection, remote interviews have advantages and disadvantages. Some of the usual disadvantages were already mentioned above. However, those do not apply to this research since I chose not to exchange several e-mails but instead only two: one from my side with the questions and another from the participant side with the answers. Regarding the advantages of using this method,

> perhaps the most obvious [one] is that it can facilitate the inclusion of participants who are geographically distant from the interviewer, without the need for time-consuming and expensive travel or the recruitment of local interviewers (King & Horrocks, 2010:80).

Besides, data management is probably one of e-mail interviewing major appealing factors. When doing an interview via e-mail, the answers are already written. Therefore, all the concerns with recording and transcribing data do not apply here and can be considered as a major advantage for researchers, resulting in less time spent on the process of managing the data collected.

3.4.4.2. Interview Guide

For the purpose of filling some gaps in my knowledge regarding Zmar's practices and beliefs in relation to solid waste management and sustainable practices in general, I decided to interview the CEO, Dr. João Ferreira. As previously mentioned this interview was done remotely, by e-mail. In the list below, I present the questions asked:

1. Zmar Eco-Experience exists since 2009. Was it an initial idea to create a sustainable space with a minimum impact on the environment?
2. What were the main reasons for being interested in sustainability? Was it economic, environmental and/or social reasons?
3. Is the waste issue (not food waste) something that worries Zmar Eco-Experience? In what sense?
4. Was the current waste management programme an initial decision of this project, or was it introduced later?
5. Why did you find it useful to have a waste treatment system organized in the way you have it nowadays?
6. Besides your concern with waste management and treatment, what internal measures have you created to control waste generation (not food waste)?
7. Is staff and guests participation in the waste management process important for Zmar Eco-Experience? Why and how?
8. In what way are staff and guests included in this process?

It is important to note that these questions are the translated version. Since the mother tongue of the CEO as well as mine is Portuguese and because I believe interviewees should be maintained in their comfort zone as much as possible, I decided to ask the questions in Portuguese and the original list of questions and answers can be found in the appendix F as well as the translated version in the appendix G.

3.5. DATA ANALYSIS APPROACH

To analyze the data collected through participant observation and a remote interview, I used the solid waste management model presented below:

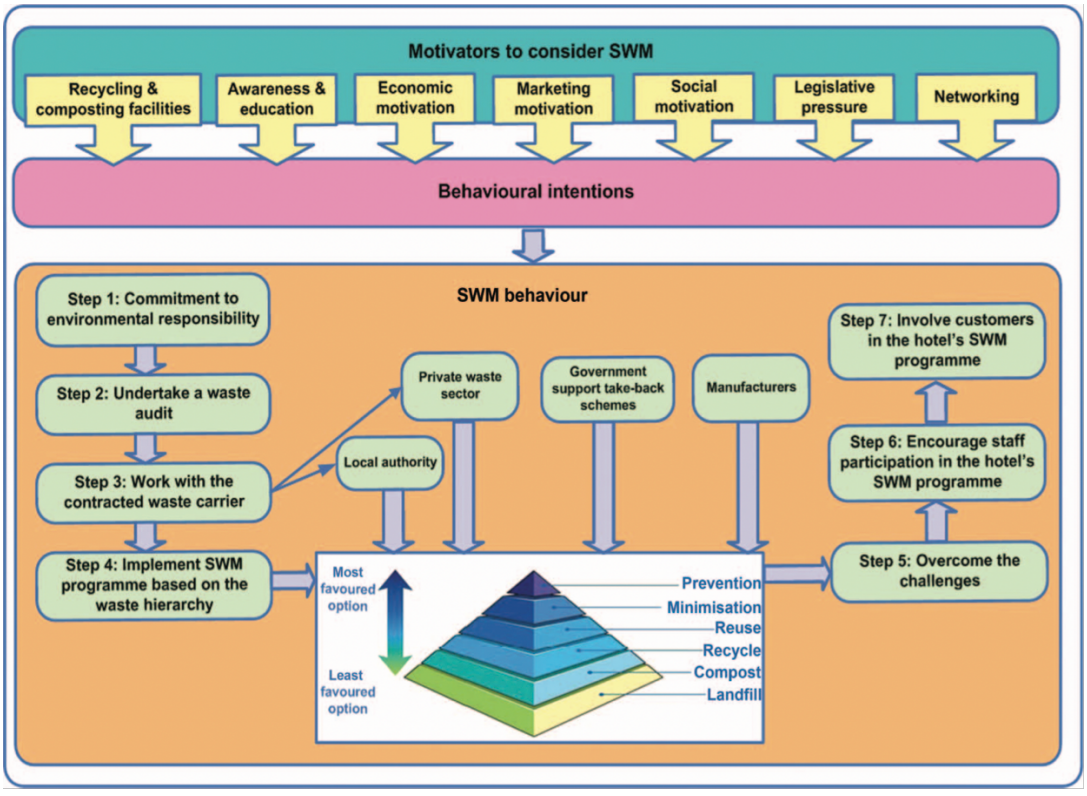

Figure 10: SWM model

This model shows the complexity of undertaking a waste management programme and it highlights the importance of external stakeholders that have an influence in this process. All these aspects will be discussed in the terms of the data collected at Zmar Eco-Experience.

3.6. TRUSTWORTHINESS OF THE RESEARCH

"Historically, qualitative research has been viewed as "soft" science and criticized for lacking scientific rigor compared to quantitative research, which uses experimental, objective methods" (Cope, 2014:89). Some authors argue that qualitative research can be biased by the researcher, produces large amounts of detailed information and cannot be generalized. However, qualitative research is just a different approach. While quantitative research measures, qualitative research explores and discusses (Cope, 2014). In the case of this research, I used a qualitative research approach to examine a specific phenomenon: the generation of solid waste and the journey towards zero-waste. When addressing the credibility and trustworthiness of a research, naturally, different approaches require different criteria. Meaning that, because the nature and purpose of the quantitative and qualitative traditions are different, different criteria of worthiness or merit should be applied (Krefting, 1991). To develop trustworthiness in qualitative research there are four criteria: credibility, dependability, confirmability, and transferability. As stated by Cope (2014), credibility refers to the truth of the data, dependability refers to the constancy of the data over similar conditions, confirmability refers to the researcher's ability to demonstrate that the data represent the participants' responses and not the researcher's biases or viewpoints and transferability refers to generalization of the study findings to other situations and contexts. Triangulation is a commonly used method to address credibility and trustworthiness in qualitative research (Cope, 2014) and the method used in this thesis. Four different types of triangulation were defined: data triangulation, method triangulation, investigator triangulation and theoretical triangulation (Decrop, 1999). As previously mentioned in Section 3.4.1. Methodological Triangulation as a research strategy, I adopted a methodological triangulation strategy since it reflects an attempt to secure an in-depth understanding of the phenomenon in question and addresses the credibility and trustworthiness of this research.

4. Analysis

In this chapter I will analyze the data I have collected from participant observation, represented by the field notes (see appendix D), as well as from some of the informal conversations I had with the staff and from a remote interview I had with the CEO, Dr. João (see appendix G). Before getting to the analysis itself, I will briefly present Zmar's reality not only in general terms but also regarding its sustainability concerns and practices. Afterwards, I will briefly remember the reader of the data collection process. Then, I will present the tool chosen as means of analyzing the data collected: Solid Waste Management (SWM) model. Subsequently, each section of the mentioned tool will be used to analyze some segments of data. In other words, the data collected will be analyzed and discussed by using the SWM model and some pictures will be presented along the way to illustrate my thoughts. Then, I will include a table where some of the information regarding the practical application of the SWM model to Zmar's case study will be presented. In the end of this chapter, I will present some conclusions.



Figure 11: Zmar villas

4.1. Zmar background

In this thesis, I decided to analyze the waste issue in the accommodation sector by focusing on a specific accommodation establishment, Zmar Eco-Experience. Opening doors in 2009, Zmar Eco-Experience was the first eco-resort in Portugal and it is located in Zambujeira do Mar, Vicentina Coast.

Zmar Eco-Experience contains several villas, 80 with one room and 47 with two rooms, making a total of 127 villas. Besides these ones, Zmar also has villas called Zmonte. These ones belong to particulars and during their absence, the eco-resort can rent them out if desired by the owners. Regarding this type of villa, there are 5 villas with one room, 88 with two rooms and 34 with three rooms, making a total of 127 Zmonte. Finally, there are 11 Zmonte which belong exclusively to the owners and cannot be rented. In total, there are 265 villas.

Currently, there are 104 employees maintaining Zmar's activities in the most diverse areas: Administration (Accounting; Human Resources; Marketing and Events; Food & Beverage; Engineering & Sustainability), Reception, Housekeeping, Maintenance, Restaurant, Bar, Kitchen, Bakery, Sports, Convenience Store. The staff secures the stay of an average of about 1000 guests per day during the high season period.

As previously mentioned in this thesis, Zmar Eco-Experience is an accommodation establishment with a pre-existing commitment to sustainability. In fact, this eco-resort has strong values when it comes to its commitment to sustainability. For instance, in their website, Zmar Eco-Experience is described as an ecotourism accommodation where there is a minimal impact on the environment (Zmar, 2018). Zmar's commitment to sustainability is considerable and taken very seriously. On Zmar's website, for instance, there is a page dedicated to present the accommodation's concern regarding the environment. Here, several topics are covered from the certificates the eco-resort holds, their environmental practices, environmental policy as well as waste management practices. Besides all this information available on their website, some interesting posts regarding environmental sustainability are available at Zmar's blog. Here there are presented articles such as: "sustainable stay", "shopping yes, plastic no", "sustainable development", "ecotourism and Zmar", among many others. Besides its online presence when it comes to spread a sustainable message, Zmar also presents some punctual elements, physically, in its infrastructures. An example of this is the awareness poster, shown in the image on the left, where customers are sensitized to consume tap water in order to reduce plastic use from store-bought water bottles. This awareness aligns with Zmar's decision of stopping the selling of plastic water bottles. Despite this single decision, the use of plastic in terms of food packaging, for example, still has a big impact at Zmar's activity.



Figure 12: Plastic awareness poster

4.2. Overview of data collected

To study how Zmar could further improve its solid waste and start its journey towards zero-waste, I carried out a one-week study where I was at the eco-resort to observe their practices and how these have an impact on the waste produced. As mentioned in Chapter 3 Research approach & methods, I carried out a waste ethnography in the form of participant observation. During this study I observed some practices especially focusing on areas that seemed to me as the most relevant considering the purpose of this study, considering the presence of waste and the possibilities of eliminating it. The areas with potential to observed were determined after the first guided tour with Engineer Sérgio Francisco around Zmar facilities. Thus, the observation was taken in the food preparation areas (kitchen, bakery and food preparation rooms) and at the storage room. The storage room is the place where everything that comes from suppliers is received and then distributed to each department upon their request. The field notes from this participant observation study can be found in the Appendix D and the answers from the interview can be found in the Appendix G.

4.3. SWM model: the instrument for data analysis

To analyze the data, I chose to use the solid waste management diagram, presented in Chapter 2 Literature Review, as a tool.

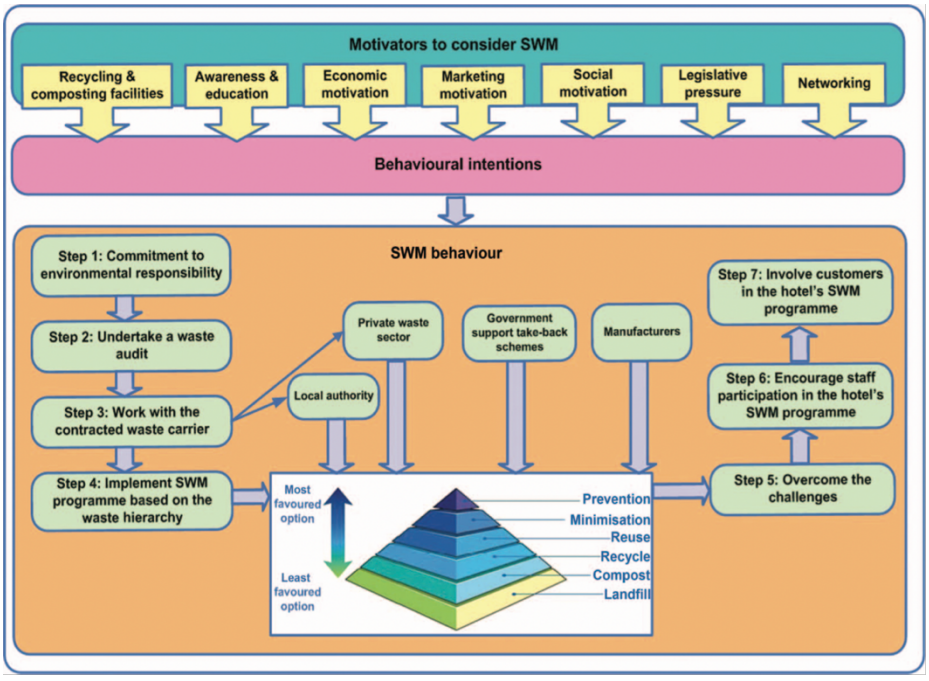

Figure 13: SWM model (Radwan et al., 2012)

In other words, I will use the diagram above together with some of the data I have collected in order to discuss some of the topics I covered during this thesis, being them: sustainability in tourism, solid waste management and other more specific issues such as the generation of plastic as solid waste and zero-waste. More global issues regarding solid waste will also be discussed such as to what extend the responsibility of reducing or eliminating waste belongs only to the accommodation establishment. For this discussion, some ideas about zero-waste and circular economy will be included.

The SWM model gives an overall picture of a hotel's position in regard to SWM practices. Looking at the SWM model, it can be deconstructed into three distinct sections:

- The first section has to do with the hotel's motivations to consider SWM;
- The second section has to do with the behavioral intentions; and
- The third section has to do with the SWM behavior itself.

This last section can be deconstructed into two sub-sections. One where a company takes several steps from having a commitment to environmental responsibility to involve customers in its SWM programme. The other sub-section is a pyramid, known as waste hierarchy, where some actions are described as most favored or least favored when it comes to waste generation. Taking a practical example and observing where in the pyramid the action takes place, a company can improve this action by changing it and moving it to a more favorable position. As an example, an item that goes to landfill would make a better contribution and a lower impact on the environment by being compostable (if possible) or recyclable, rather that disposed in landfill.

Focusing on the first section of the SWM model and applying it to the case-study of Zmar Eco-Experience, almost all the motivators present in the diagram besides "legislative motivation" and "networking" were motivators to consider SWM in the case of Zmar eco-experience. During the interview done with Dr. João, CEO of the company, when asked about the main reasons for their interest in sustainability, economic, environment and social reasons were pointed out. He said:

> We care about the economic aspects, contributing actively to job creation (…) and economic development (…). Environmentally wise, we look for respecting the ecological capacity, through solid waste treatment, reduction of plastic, water and energy consumption. (…) (Appendix G, line 85-89)

At the same time, some of the articles published on Zmar blog show some of this concerns mentioned by Dr. João. Examples of these articles are:

- Shopping yes, Plastic no
- Sustainable stay
- Waste treatment

The first article on the list above mentions the impact of one single plastic bag on the environment by showing the number of years it takes to decompose. Still in this article, some solutions to the use of plastic bags are given. The second article gives the guests an overview of simple yet effective actions they can put in practice during their stay. To complete this information, some strong positive values are given to explain the positive impacts of such actions in the environment. These actions, called by Zmar as Eco-practices are also given to guests on an A-4 paper (see Appendix H) given on their arrival together with a map of Zmar and some other information. The third article briefly explains the waste treatment process at Zmar. Each room has a three-compartment bin to sort the trash produced by guests during their stay. Therefore, by reading this article, guests can have a clear knowledge of how the trash should be or not sorted. Instructions on how to sort the trash are also present on big bins in common areas, as shown below:



Figure 14: Recycling bins

Looking now at the third level of the SWM model corresponding to the SWM behavior itself, there are seven steps portrayed:

1. Commitment to environmental responsibility
2. Undertake a waste audit
3. Work with the contracted waste carrier
4. Implement a SWM programme based on the waste hierarchy
5. Overcome the challenges
6. Encourage staff participation in the hotel's SWM programme
7. Involve customers in the hotel's SWM programme

These seven steps can be seen as an ideal process to pursue when it comes to SWM (Radwan et al., 2012). All of them are very important in order to practice a successful SWM programme. As an example, carrying a waste audit can be of extreme relevance. With a waste audit, a company could have information on how much waste is being generated but also on the type of waste or any other important details (Radwan et al., 2012). In the case of Zmar, in 2017, there were sent to recycle the following quantities of each material:

- 6240 kg of plastic/metal;
- 8500 kg of paper/carton;
- 14660 kg of glass;
- 950 liters of vegetable oil, used to produce biodiesel.

At Zmar these numbers are known because these are the materials sent to the contracted waste carriers to be recycled. However, the total waste produced at the eco-resort remains unknown and those are very important numbers in order to understand how much of the waste goes to recycle, composting or landfill and therefore use such information to take actions and move the eco-resort towards zero-waste. It would be extremely relevant to have the information of how much waste is produced and then being able to categorize it. In the case of Zmar, besides the information regarding waste send to recycle, once in a while the kitchen staff also weights food waste from the staff meals (canteen) and from the guest meals (restaurant). It is important to understand how much food is being wasted but from some informal conversations I had during the

observation study, some of the food wasted is used to feed animals. Therefore, such information would be valuable to quantify in this case because even though the food is not being totally consumed, it is being used for other purpose. Either way, these values should be used in order to take certain actions such as adapt the food available at the buffet for guests or adapt the menus at the canteen based on what food is wasted the less or the most.

Although there might be a long way to go when it comes to waste audit at Zmar Eco-Experience, the steps already in practice can be very important as initial steps for a more in-depth waste audit in the future. Despite not having an in-depth information regarding waste generation, the waste management is taken very seriously at Zmar. On the first day of the observation study, I did a guided tour with Engineer Sérgio Francisco around Zmar and one of the places covered by this tour was a building named "Transfer station" (see figure 15). It is named this way because this is where all waste from the eco-resort is received and sorted one last time to continue its way. In other words, to the transfer station go all waste from the eco-resort: rooms, kitchen, offices, restaurant, convenience store, etc., that was previously separated by guests and staff. During high season the waste assortment is done every day and during low season, it is done only on weekdays.



Figure 15: Transfer station

Here the waste is sorted into seven categories:

- Plastic/metal (Yellow plastic bags)
- Carton/paper (Blue plastic bags)
- Glass (Green plastic bags)
- Used vegetable oil
- Batteries
- Organic waste
- Undifferentiated waste



Figure 16: Recycling containers

After the last assortment, the waste is placed in the respective bins. Plastic/metal, paper/carton and glass are placed in the big containers, respectively (see figure 16). The plastic/metal container (yellow container) capacity is 2000 Kg, the paper/carton container (blue container) is 3000 Kg and the glass container (green container) is 5000 Kg. Once these are full, the contracted waste carrier Ambilital comes to collect the waste produced by Zmar. Regarding the used oils, these are collected three times a year by a company called Biogenoa who uses the oils to produce biodiesel. Lastly, the undifferentiated waste is collected by Odemira municipality on weekdays. The waste assortment is a very important part of a successful SWM programme. But at this stage it would be important to use the waste audit information in order to understand what could be improved, regarding to waste generation, in order to contribute to a more sustainable business and move it towards zero waste. For this purpose, the use of the waste hierarchy, represented in the diagram below, can be very useful. As mentioned by Song et al. (2015), "the waste management hierarchy is a nationally and internationally accepted guide for prioritizing waste management practices with the objective of achieving optimal environmental outcomes and resource utilization" (p.208).

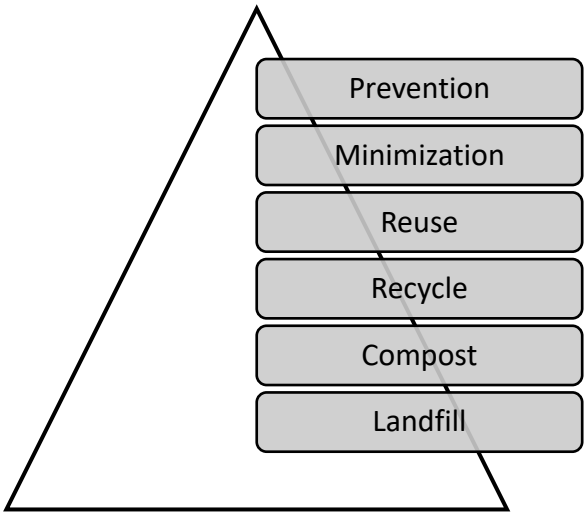

Figure 17: Waste hierarchy

As previously explained in Chapter 2 Literature Review, the waste hierarchy represents various ways of behaving in respect to waste, some more favorable than others. These are: prevention, minimization, reuse, recycle, compost and landfill. As closer to the top as a company is, the closer it will be from zero waste as well. Therefore, in order for Zmar to move towards zero-waste,

their position when it comes to waste should be situated on the top of the pyramid, or at least as closer as possible. Because the actions needed to get there might take some time and effort, and because zero-waste is a good aspirational goal yet hard to put in practice on a business level, small changes can be very important. As an example, if something that is sent to recycle cannot be prevented in the near future, evolving to the next stage and reusing the material represents an important change when it comes to get closer to zero-waste.

The ideal stage is the top of the pyramid where waste is prevented. Thus, it is key to understand what waste can be avoided. As argued by Song et al. (2015), "it can be as simple as switching from disposable to reusable products, or as complex as redesigning a product to use fewer raw materials or to last longer" (p.208). Next on the pyramid is minimization. There are some different ways of doing so, such as source reduction, packaging reduction, rethink design and coordinate reverse distribution with suppliers (Kibert & Languell, 2000). Source reduction, just like the expression indicates, has to do with reducing waste at the source, for example in the production process. Packaging reduction reveals to be one of the most important steps to take (Kibert & Languell, 2000). This topic will be deeply uncovered later on in this chapter. Rethinking the design of a product can be also a way of minimizing waste (Kibert & Languell, 2000). "Moreover, waste can be decreased by using better designed products. This could be facilitated as a result of partnerships between hospitality service providers and product manufacturers" (Pirani & Arafart, 2014:325). Another way of minimizing waste can be by coordinating reverse distribution with suppliers (Kibert & Languell, 2000), meaning that unwanted things could be given back to the suppliers such as boxes or bags that could be reused by them in future deliveries. It is interesting to note here that most of these changes depend somehow on the suppliers and their willingness to participate in such actions and promote sustainability. This issue is going to be further discussed later on. Moving down on the pyramid, the third stage is reusing, meaning that things which could be wasted can be given a second use. For example, at Zmar, some cans from canned foods are reused into flower jars. Because reusing requires less energy than recycling (Song et al., 2015), it is positioned above. The three next stages in the pyramid are recycle, compost and landfill. In the case of Zmar, recycling is a very important and active part of their SWM

practices. As previously mentioned, undifferentiated waste is sent to the municipality and ultimately going to landfill.

Certainly, some of these actions could be further improved and it might be necessary to overcome some challenges along the way. Furthermore, staff and guests' participation in this process are very important and part of a successful SWM programme. As argued by Dr. João in the interview,

> "the participation of staff and guests is relevant to achieve the defined goals, because without them, the dynamic is compromised, and goals become impossible to achieve" (Appendix G, lines 117-119).

Now that I have uncovered my thoughts on the SWM model and its potential to be used as a tool in order to answer the proposed research question of this thesis: **"How can Zmar Eco-Experience, an accommodation establishment with a pre-existing commitment to sustainability, further improve its solid waste?"**, I will deeply analyze some of the issues observed and discuss them using the SWM model, more specifically the waste hierarchy presented in Chapter 2 Literature Review, shown on Figure 17. During the participant observation study, I observed different kinds of situations where:

- decision of avoiding/reducing packaging belongs to Zmar
    - decision belongs entirely to Zmar
    - decision might be influenced by laws or other regulations as well as by market availability
- decision of avoiding/reducing packaging belongs to Zmar's suppliers

4.4. Analysis based on observations

In this analysis, I will present some of the cases I observed which could represent a way of moving the eco-resort towards zero-waste, an ideal situation regarding solid waste management. In order to do so and as previously mentioned, I observed the different food preparation rooms as well as the storage room. At this stage I will present some of these observations and illustrate them with pictures for a better understanding. I will then analyze each situation and place it on the waste hierarchy and discuss some ways of improving. As stated by Pirani & Arafat (2014), "it is the waste management hierarchy which helps hotel (…) administrations make decisions in terms of which waste management strategies should be employed under different situations" (p. 323). Besides the analysis of sources of solid waste through the waste hierarchy, some other aspects that might have an influence in these actions will also be part of this discussion, as well as whether Zmar has the power to change those situations or depends on other stakeholders.



Figure 18: Individual butter packages



Figure 19: Individual honey packages

These first pictures refer to individual butter and honey packages. By having a pre-defined quantity, the use of these packages sometimes invites to food waste. During the participant observation study, I dedicated one morning to observe the dishes that came from breakfast buffet and observing and registering the way people behave when it comes to waste, in this case, food waste. Below, there are some examples of what I just mentioned: trays of finished breakfasts which contain leftovers from butter and honey packages.



Figure 20: Food waste from butter and honey packages

This is a practical example of how solid waste in the form of plastic can also be connected to food waste which is something Zmar puts an effort on. Packaging with food residues cannot be recycled and, therefore, these individual packages are part of the undifferentiated waste that is sent to the municipality and ends up in landfill. The image below shows the bin with a black plastic bag which corresponds to the undifferentiated waste.



Figure 21: Butter packages in undifferentiated waste bin

Looking at the SWM pyramid, any other solution that Zmar might implement is more desirable than the disposal to landfill. Since plastic cannot be compostable and, in this case, cannot be recyclable, by looking at the SWM pyramid, a better solution could be to reuse, minimize or prevent the use of these small packages. Since its reuse might not be of interest to the hotel, minimization or prevention would be the only two solutions. To prevent the use of these individual butter and honey packages, the eco-resort would have to either produce their own butter/honey or replace it with other product. Since none of these solutions is viable, minimizing the use of this packaging seems to be the most reasonable solution. Pirani & Arafat (2014) mention that hotels can use less packaging in the "breakfast buffet by serving yoghurt and jam in dishes and butter in small portions on plates" (p.325). Therefore, the packaging could be minimized by buying bigger packages of butter/honey instead of individual ones and serve in the buffet in plates or small bowls. This is an action that belongs to Zmar Eco-Experience. By making this change, the action would be moved from the bottom of the pyramid (level 6) towards the top (level 2), action which would contribute to move the eco-resort towards a zero-waste stage. However, hygiene standards and regulations when it comes to buffet services would have to be taken into consideration as well.



Figure 22: Vinegar bottles

Vinegar bottles are delivered at Zmar inside a small carton box and then wrapped in a plastic. By using this product, Zmar is wasting three different parts of the product in the end of its use: the carton box, the bottle itself and the plastic used to wrap. All three parts are recycled, meaning that this is positioned on the level 4 of the waste hierarchy. Since Zmar does not

produce vinegar, the ideal stage of prevention cannot be achieved. However, the stage of minimization can. As previously mentioned one of the ways of minimizing waste had to do with packaging reduction which is the way to act in this case, as well. As previously mentioned in Chapter 2 Literature Review, plastic is not considered to be the most sustainable way of packaging. Therefore, paper or glass are preferred. (Laville & Taylor,2017; World Economic Forum, 2016).

In that sense, the vinegar bottle could be produced using glass instead of plastic and the packaging could be only a carton box for transportation. This change would mean moving from level 4 (recycle) to level 2 (minimization) and therefore, being closer to zero-waste. It can be of Zmar's responsibility to have access to a glass vinegar bottle. However, it should be mentioned that this choice might represent higher costs for the company since glass is more expensive than plastic. On the other side, when it comes to the packaging, it is up to suppliers to take action and be more sustainable by using less plastic and more reusable items such as boxes that can be used to transport products more than once.



Figure 23: Individual sugar packages

Individual sugar packages are very common in Portugal. Every time a coffee is served, one package of sugar comes along. At Zmar, this is no exception. Besides being served with coffee, individual sugar packages are also present in the breakfast buffet. Another interesting thing to point out is the fact that some customers do not use the full package, contributing to food waste in this case. Even though paper can be 100% recycled and it does not represent such a big problem as plastic does, this specific case represents an unjustifiable waste of paper. And based on the waste hierarchy, there are better solutions than recycling. Therefore, the eco-resort could adopt other ways to present this product. Sugar cubes or granulated sugar can be placed in a small glass or porcelain container and put in each table. By doing so, a vast amount of paper can be minimized. In addition, each customer only uses the amount of sugar needed and no food waste is generated in the process. As well as butter and honey packages, also sugar packages were

found in the customers' breakfast trays, fortunately, unopened. In these cases, since the package is not open, and according to the hygiene rules for hotels and restaurants, the product can be used again, avoiding food waste. Below are some of the pictures that show the unopened sugar packages customers put on their breakfast trays.



Figure 24: Individual sugar packages in guests' breakfast trays

In the case above, there were no opened sugar packages, but one employee mentioned that it happens to find them open sometimes. In case Zmar wanted to study this issue deeply, they could weight all sugar left on individual sugar packages after customers' use and see how much sugar is wasted by using such way of packaging. This waste audit could be done over a certain period of time such as two weeks or one month. Then, it would be interesting to see how many sugar packages are consumed in that period, so the ratio of total product and wasted product could be known. Another interesting thing to note here is that most of this individual sugar packages come from the breakfast buffet. During my observation, I saw that the process of cleaning up the dishes coming from the restaurant has to be fast enough in order to do other things. Therefore, it happens that some of the sugar packaging is actually going to bins together with food waste, waste going to landfill in the last place. The solution previously mentioned could also help in this sense. By adopting such solution, Zmar would be moving this product from level 4 (recycle) to level 2 (minimization). In this case, the decision of minimizing waste belongs exclusively to Zmar. However, it is relevant to mention that customers should also act more responsibly by not taking to their tray something that they are not going to use or eat. This would be an example of a responsible customer, previously mentioned in Section 2.3.3. Zero-Waste.



Figure 25: oil bottles

In the picture on the left, there are represented the oil bottles bought by Zmar designated for kitchen use. Considering that each bottle contains 10 liters and that in 2017 Zmar recycled 950 liter of oil ("Dados Eco | 2017", 2018), it can be stated that in the same year Zmar used at least 95 bottles of oil. During the participant observation study, one employee mentioned that these bottles cannot be washed due to the lack of time and employees to do so. Since these bottles contain oil, when used and not washed, the oil remains on the interior of the bottle and therefore the package cannot be recycled. By weighting one of these bottles and multiplying for 95, the amount of plastic going to landfill instead of being recycled can be identified. In a situation where the plastic is not being recycled for the reason mentioned above, an action should be taken. The reason pointed out by the employee for this situation was the lack of employees. Just like in this situation, in some other situations this reality was mentioned. Therefore, it should be something for the administration to think about and take action. With more employees, it would be easier to include certain procedures in the daily activities, such as washing the oil packages in this case. However, it is relevant to consider some other aspects such as the quantity of water needed to wash the packages. Nonetheless, this will always be a concern because, whether the oil is packaged in plastic or glass, the packages have always to be washed in order to be recycled. However, regarding plastic packaging, it should be analyzed whether the plastic is recyclable or not. In case it is not recyclable, there is no reason to wash because it will end up in landfill either way. In case the plastic can be recyclable, it could then be washed as previously mentioned. Even though this will have a cost associated to the use of water, if Zmar wants to further improve its solid waste and assume itself as a sustainable accommodation establishment, details such as this one have to be considered too. This situation could be overtaken by, as an example, buy olive oil from a local producer. In this case, Zmar could buy 10 packages for example and the next time the supplier would deliver, the first packages could be given back to the supplier in order to be reused.

Analyzing now this situation in terms of the waste hierarchy, since the packages cannot be recycled, it means they are disposed in landfills. Therefore, this situation can be categorized as being on the bottom of the pyramid (level 6), which represents the less favored option in the pyramid. By changing this situation and buying from a local producer, the same could be categorized as both a minimization (level 2) and a reuse (level 3). Thus, this situation cannot be clearly positioned in the pyramid. In case Zmar would choose to continue buying the same packaged oil but wash the packages, this situation would move from level 6 (landfill) to level 4 (recycle). In this case, the decision of minimizing the use of packaging is up to Zmar, by choosing a new supplier.



Figure 26: Granola packages

Another example where some changes could be done is in the granola packages. First of all, the packages are too small considering that its use is for commercial purposes. In other words, just by buying bigger packages, Zmar would be producing less plastic. However, just like represented in the waste hierarchy, better that minimizing is preventing. Thus, it would be better to not produce plastic at all than producing less. This is a case where prevention could be achieved. In order to do so, the kitchen staff could start making their own granola. This action would save a lot of plastic and would probably result in a much healthier final product and less costly for the company as well. It is important to mention that for preparing its own granola, Zmar would have to buy other primary ingredients which would come in packages as well. Ideally, the ingredients should come in paper packages in order to produce less plastic. In the case paper packages are not available, the second option should always be industrial packages in order to reduce the packaging. Another aspect already mentioned before which would also be crucial in this case is the existence of kitchen staff to do this kind of tasks. In this case, considering the waste hierarchy this action would be moved from recycle (level 4) to prevention (level 1) and the decision of prevention belongs to Zmar, even though there is some dependency on the availability of industrial package or paper packaging.



Figure 27: Cleaning products

During my observation at the storage room, another item found there were scrub sponges used for cleaning purposes. These items "are typically plastic-based and crafted from polyurethane (a petroleum-based ingredient)" which can be very harmful for the environment (Adler, 2014). As mentioned in the same article, the permeable quality of these sponges is inviting to bacteria, which provides a good reason for throwing it away and buy a new one (Adler, 2014). However, this constant change of scrub sponges will add on to non-compostable plastic landfill waste which is not a sustainable aspect in itself. The same author mentions that "a year's worth of discarded sponges from one household could take up landfill space for upwards of 52,000 years" (Adler, 2014). Considering that the use of scrub sponges at Zmar is considerably higher than one household, the impact on the environment is huge.

In this case, an alternative could be to use biodegradable cleaning items. Nevertheless, Zmar is a company that besides caring about sustainability, also looks for supporting the local economy by buying their products locally. Regarding sustainable options for cleaning products, I have done some research and I could not find any Portuguese options of such products. Thus, in this case Zmar has to prioritize what they think is more important, if to support the local economy by buying plastic sponges or if buying more sustainable options, even if outside the country considering the impact that transportation will entail. Here, there is an interesting aspect to point out. As mentioned previously in Chapter 2 Literature Review, a cleaner production would be necessary in order to have a zero-waste system in practice. In this case, where Zmar has two requirements: to be sustainable and to support the local economy; the company is dependent on the industry in order to achieve both. By not having a clean production, Zmar has to prioritize one requirement over the other. In other words, the company has to sacrifice one of their values in detriment of the other. This specific case shows us how broad this issue actually is. When it comes to solid waste reduction, the use of

environmentally-friendly sponges would signify moving from level 6 (landfill) to 5 (compost). Even though this might seem a small change, it is one that makes a huge impact considering the amount of plastic that does not go to landfill anymore. As previously mentioned, since there is a product available on the market that is environmentally better than the one in use at the moment, the decision to make this change and move towards zero-waste belongs to Zmar.



Figure 28: Oat flakes packages

Oat flakes packages were another item found in the shelves of the storage room. Again, for commercial purposes, 400g packages might be too small and, therefore, represent a big contribution when it comes to solid waste in the form of plastic. The step to take could be to buy bigger packages and, if possible, paper ones instead of plastic. Analyzing this situation in terms of the waste hierarchy, it is situated at level 4, considering that the package is recycled. By opting for bigger packages, this action could be moved towards the top, to level 2 (minimization), bringing Zmar closer to a zero-waste situation. Having such product on the market, the decision of minimizing the waste coming from this package falls exclusively on Zmar.


Figure 29: brown sugar packages

The picture on the left shows 500g brown sugar packages. One more time, the small quantity of each package does not seem suitable considering the commercial purpose of such product. The step to take could be to buy bigger packages and, if possible, paper ones instead of plastic. Analyzing this situation in terms of the waste hierarchy and considering that this package is recyclable, this action could be moved from level 4

(recycle) to level 2 (minimize). Having such product on the market, the decision of minimizing the waste coming from this package falls exclusively on Zmar.



Figure 30: milk packages

The picture on the left shows milk packaged in paper containers. They are delivered at Zmar wrapped in a plastic. By using this product, Zmar is wasting two different parts of the product in the end of its use: the packaging itself and the plastic used to wrap. All two parts should be able to be recycled. However, it is known that thin plastics such as the ones used to wrap these products are usually not accepted by some waste carriers. That being said, the use of the plastic in case it cannot be recycled is positioned on the level 6 of the waste hierarchy (landfill) and the rest of the packaging: paper packaging is positioned on the level 4 of the waste hierarchy (recycle). Some brands transport milk packages in carton boxes instead of wrapped in plastic. By buying a product with a different packaging, this specific situation could be moved from level 6 (landfill), in the case of using plastic as a way of wrapping the product, to level 4 (recycle) by the use of single-use carton boxes, as an example. In this case, considering that this product exists in the market, it belongs to Zmar the choice of being more environmentally friendly and avoid the use of plastic, even if indirectly.


Figure 31: canned goods

Canned products are delivered at Zmar on top of a small carton and then wrapped in a plastic. By using this product, Zmar is wasting three different parts of the product in the end of its use: the carton base, the can itself and the plastic used to wrap. All three parts should be able to be recycled. However, it is known that thin plastics such as the ones used to wrap these products are usually not accepted by some waste carriers. That being said, the use of the plastic in case it cannot be recycled is positioned on the level 6 of the waste hierarchy (landfill) and the rest of the packaging: carton base and metal can are positioned on the level 4 of the waste hierarchy (recycle). Ideally, some products such as beans could be bought dry and the packaging could be reduced that way. Nevertheless, this would require a huge change in the routines of Zmar as well as better planned day-to-day practices. In addition, more employees would be probably necessary to carry on the necessary tasks. For all reasons mentioned above, although being an ideal solution environmentally speaking, this solution might not be ideal considering Zmar's reality and capability of handling certain things. This all means that in this case, the ideal solution would be to pack the product in a carton box instead of wrapping it in thin plastic that would most probably not be recycled and end up in landfill. By taking this action, this specific situation could be moved from level 6 (landfill), in the case of using plastic as a way of wrapping the product, to level 4 (recycle) by the use of single-use carton boxes, as an example. This is another case where, when it comes to the packaging, it is up to suppliers to take action and be more sustainable by using less plastic and more sustainable items such as carton boxes that can be fully recycled.



Figure 32: Knorr broths and ready-to-use sauces

Another product found on the shelves of the storage room were Knorr broths and ready-to-use sauces. Despite not being a healthy option (worth mentioning even though that is not the focus of this research), this product uses a lot of plastic. The box is made of plastic and then each Knorr cube inside is wrapped in a sort of paper that due to the contact with the cube itself

cannot be recycled. In this case, it would be a better option for Zmar to make their own broths by using food scraps. Besides being much healthier, it is much more sustainable. Parts of foods that would be thrown away can be used to make different broths that will be used in the preparation of certain dishes afterwards. By doing so, besides using food at its maximum potential, Zmar would be contributing for less plastic consumption as well. In this case, looking at the waste hierarchy, a situation that was placed on level 4 (recycle) in case this packaging is recyclable, could be moved to the ideal level, which is prevention. This action is an entire responsibility of Zmar, although it might need some adaptations to their actual reality, meaning that some new procedures would have to be included in the day-to-day practices. This is another case where the existence of more employees would be extremely beneficial.



Figure 33: Sugar packages

Figure 33 is an example of a product which could be eco-friendly but to make transportation easier and cheaper, the packages are wrapped in plastic. Again, just like in some of the previous examples, these thin plastics used to wrap are not always recyclable and, in that case, will end up in landfill. Therefore, this situation is situated on level 6 (landfill) of the waste hierarchy. To change this and move towards the top of the pyramid, one solution could be the use of carton boxes for the transport. In that case, this situation would be positioned at level 4 (recycle), which would represent a better situation. In this case as some others already discussed, the decision of changing and move towards more sustainable options belongs to the suppliers.



Figure 34: Brown Rice packages

The picture on the left shows 1Kg brown rice packages. One more time, the small quantity of each package does not seem suitable considering the commercial purpose of such product. The step to take could be to buy bigger packages and, if possible, paper ones instead of plastic. Analyzing this situation in terms of the waste hierarchy and considering that this package

is recyclable, this action could be moved from level 4 (recycle) to level 2 (minimize). Having such product on the market, the decision of minimizing the waste coming from this package falls exclusively on Zmar.



Figure 35: Rissóis packages

The picture on the left represents rissóis, a ready-to-eat Portuguese food that only needs to be fried. Each of these packages contains only four units. As previously mentioned in other cases, the small quantity of each package does not seem reasonable for a commercial purpose. Therefore, a package with a bigger quantity, besides being more reasonable and probably less expensive, would also be more sustainable in terms of packaging. In this case, considering the waste hierarchy, this action is positioned at level 4 (recycle) in the case the packaging is recyclable. Moreover, by changing to bigger packages, the action would be moved to level 2 (minimize) since Zmar would be minimizing the packaging used for the purpose. Given that such product exists on the market, the decision of minimizing the waste coming from this package falls exclusively on Zmar.



Figure 36: Frozen vegetables

In the pictures above, there are some frozen vegetables and potatoes which are delivered in big packages. Opposing to most of the other cases where the packages where too small and, in my opinion, not appropriate for the purpose of commercializing, these packages are actually more adequate. However, there is always a way of acting more sustainably, even if that requires a bigger effort from the company. During some of the informal conversations I had, several employees from Zmar manifested a desire of having a small garden where they could plant some herbs, fruits and vegetables, even acknowledging the difficulty of having such thing due to the lack of employees. In fact, the existence of such facility would make for a more sustainable and plastic-free way of having vegetables. If the lack of employees is a problem, Zmar could invest on having more interns doing certain tasks such as this one. By using frozen vegetables that come in plastic packages, this action is placed at level 4 (recycle) in case the plastic can be recycled. By changing this action and produce its own vegetables, Zmar could have this action placed at the very top level (prevent), the ideal one when it comes to moving towards a more sustainable and zero-waste practice. This is, again, a case where the decision or minimizing or, in this specific case, preventing the use of plastic and move towards zero-waste depends exclusively on Zmar.



Figure 37: juice glass bottles

These juices bottled in glass, shown on the picture on the left, are delivered at Zmar on top of a small carton and then wrapped in a plastic. Once again, a situation where there is excessive packaging. The only extremely necessary packaging is the glass bottle to carry the juice. The remaining is only helpful for transportation but has no utility in terms of preserving the food as an example. In fact, "excessive packaging are physically larger and heavier which place greater burden on logistics, thus incurring higher financial and environment costs." (Song et al., 2015: 203).

By using this product, Zmar is wasting three different parts of the product in the end of its use: the carton base, the glass itself and the plastic used to wrap. All three parts should be able to be recycled. However, it is known that thin plastics such as the ones used to wrap these products are usually not accepted by some waste carriers. That being said, the use of the plastic in case it cannot be recycled is positioned on the level 6 of the waste hierarchy (landfill) and the rest of the packaging: carton base and glass bottles are positioned on the level 4 of the waste hierarchy (recycle). The brand which commercializes these juices, also has some of them packaged in carton which would be more beneficial at various levels. First of all, in terms of packaging, the way paper juice containers are transported is different from the way glass bottles are. In the first case they are packed inside a carton box. In the second case, as shown in the picture above, they are wrapped in a thin plastic. One other reason why this option would be more beneficial is the fact that the use of glass is not allowed in the swimming pool. Being this such a big attraction for children at Zmar and being these juices also targeted for the small ones, the use of paper containers instead of glass ones would be also very much appreciated by guests at the eco-resort. By buying a product with a different packaging, this specific situation could be moved from level 6 (landfill), in the case of using plastic as a way of wrapping the product, to level 4 (recycle) by the use of single-use carton boxes, as an example. In this case, considering that this product exists in the market, it belongs to Zmar the choice of being more environmentally friendly and avoid the use of plastic, even if indirectly.

The table below resumes all the cases previously analyzed:

Figure	Actual Packaging	Ideal Packaging	SWM hierarchy (actual level)	SWM hierarchy (ideal level)	Responsibility for change
18	Individual packages (plastic)	Bigger packages (plastic)	6	2	Zmar
19	Individual packages (plastic)	Bigger packages (glass)	6	2	Zmar
22	Carton + plastic + plastic	Carton + glass	4	2	Zmar's suppliers

23	Individual packages (paper)	Bigger packages (paper)	4	2	Zmar
25	Plastic bottles	Plastic/glass bottles	6	3/2	Zmar
26	Plastic packages	Own product (no package)	4	1	Zmar
27	Plastic-based	Plant-based materials	6	5	Zmar
28	Plastic packages	Bigger packages (paper)	4	2	Zmar
29	Plastic packages	Bigger packages (paper)	4	2	Zmar
30	Carton + Plastic	Carton + Carton	6	4	Zmar
31	Carton + metal + plastic	Carton + metal	6	4	Zmar's suppliers
32	Plastic packages	Own product (no package)	4	1	Zmar
33	Paper + plastic	Paper + carton	6	4	Zmar's suppliers
34	Plastic packages	Bigger packages (paper)	4	2	Zmar
35	Plastic packages	Bigger packages (plastic)	4	2	Zmar
36	Plastic packages	Own product (no package)	4	1	Zmar
37	Carton + Glass + Plastic	Carton + Carton	6	4	Zmar

I have just analyzed some of the main sources of solid waste observed during the participant observation study at Zmar. "Aluminum, plastics, glass, steel, cardboard and food waste were cited as being the main components of hotel waste in some studies" (Pirani & Arafart, 2014:322). At Zmar the main sources of waste are practically the same as the ones mentioned by Pirani & Arafart (2014), except for the steel. A clear classification of map of waste based on its material and location can be found in Appendix E. During this analysis, the SWM model was used as a way of practically analyzing Zmar's actions and discuss the implications and challenges of taking actions that can help Zmar

to further improve its solid waste and move the eco-resort towards zero-waste. Some information originated from informal conversations and an interview, as well as some observations registered through pictures were used to support some of the arguments.

The overall study contributed to develop an understanding of the solid waste issue. From the situations I have observed, I can argue that solid waste can be much more broad and difficult to analyze than what it seems to be in the first place. Phillips, et al. (2010) argue the following:

> "In the move towards zero waste a large number of issues have started to emerge. It is a complex field as zero waste covers much more than simply solid waste and it tackles many aspects of wider environmental concern. There are a wide range of publications considering topics such as the challenges presented to policy makers (Zotos et al., 2009), energy issues (Bagci, 2009), MSW composition (Chang et al., 2008) and the processes involved in working towards a zero waste environment (Young et al., 2010)" (p.337).

In fact, achieving zero-waste becomes hard due to all the peculiar details and stakeholders involved and influencing the decision-making process. As an example, a simple action that could be changed might depend on certain regulations such as hygiene and security standards. Customers' expectations also play a very important role in the process of changing. Some of the observations also indicated the responsibility and power the industry has in taking action and producing cleaner products as well as providing companies the chance to have more sustainable businesses too. To address solid waste and further improve it with the zero-waste goal, we would need a circular economy where every single individual contributes for that purpose. Cleaner production, more informed and educated customers, green regulations are all important aspects which would make for an easier journey towards zero-waste for companies such as Zmar which already work hard to maintain a sustainable business but want to give the extra mile and take a step further in the sustainability journey.

5. Conclusion & Future research

During this thesis I proposed to study solid waste management and answer the following research question: **"How can Zmar Eco-Experience, an accommodation establishment with a pre-existing commitment to sustainability, further improve its solid waste?"**. To do so, I decided to approach different concepts such as sustainability, solid waste management and zero-waste. Considering the literature studied, Zmar could further improve its solid waste by **following a very rigorous SWM programme** and by **practically implementing the waste hierarchy** to its day-to-day practices which would require **reducing food packaging** and **producing whatever possible inside the eco-resort**.

5.1. Key points/insights

Through this research I had to make some choices regarding which literature to use and which methods in order to address and answer the research question. Naturally the choices made influenced the outcome of this thesis.

5.1.1. Literature

Concerning the literature, as previously mentioned, theories regarding sustainability, solid waste management, solid plastic waste generation and zero-waste were included for a better understanding of the phenomenon being studied: solid waste. Regarding the literature available at the moment to study this issue, I would argue that there are innumerous articles about waste, waste management, zero-waste, plastics, etc. However, there is a lack of research when it comes to understand the interface between human decision making and waste generated. As an example, power relations relatively to waste generation should be deeply studied. It is necessary to understand the relationship between the waste generated and the stakeholders who have power in influencing it. It would also be beneficial to understand how companies and suppliers can cooperate in order to further improve solid waste, without compromising their present economic situation. Finally, the role of guests and staff in waste generation and how it can be further improved is also an understudied subject.

5.1.2. Methods

Regarding the methods of collecting data, an interview and participant observation were carried out. Then, I chose to apply the SWM model to the analysis of the data collected since this was a good way of addressing solid waste and a hotels' journey towards zero-waste. Even though this is, in my opinion and according to some researchers, an adequate way of analyzing solid waste, I believe using other methods would have helped in getting an ever more in-depth knowledge. Unfortunately, the time frame for this thesis was not big enough to collect and analyze big amounts of data. In case the time frame was enough to do a more detailed research, a quantitative study could have been carried out along with the qualitative one. A similar study to the one carried out by Papargyropoulou et al. (2016) – *Conceptual framework for the study of food waste generation and prevention in the hospitality sector* – could be done, where quantitative and qualitative approaches are simultaneously used to study the waste issue.

5.1.3. Findings

The observations made during the participant observation study were particularly focused on food products. Most of these products, if not all, were packaged and the materials used for the purpose were plastic, carton, paper, metal and glass. The most used packaging material was definitely plastic which aligns with some of the literature found mentioning that plastic is the most used material for food packaging. Faced with such a reality it was important to understand why it was this way. Why was food bought with so much plastic? What were the important factors when choosing what product to buy? During my informal conversation with Marta Benedito (see appendix D), the costs of the products, the guests comfort and the lack of power with the suppliers were mentioned as the main reasons why some products are bought rather than others that might represent a more sustainable option. When asked about the size of the packaging which is a specification that is usually associated with economic benefits and packaging reduction, Marta mentioned that it was something Zmar never thought before but could be the next step towards an even more sustainable eco-resort. As mentioned throughout Chapter 4 Analysis, there were two main sources of plastic that could be reduced, the one protecting the food and the ones that facilitate the transport of goods. While in the

first case the responsibility for reducing the plastic belongs to Zmar, in the second case this decision belongs to the suppliers. To further improve its solid waste coming from food packaging made by plastic, Zmar could buy food in bigger packages, since some of the suppliers offer an industrial version of the products. In fact, some observations indicate that taking action to improve solid waste coming from packaging might influence and decrease food waste. However, this topic should be further researched. Regarding the plastics used for an easier transportation, the decision does not belong to Zmar and, based on what Marta said, Zmar does not have the power to influence the suppliers to reduce the plastic used for transportation purposes due to its remote location and reduced number of orders placed to suppliers. In this case, Zmar cannot do much to further improve its solid waste.

Overall, based on what I observed and from the informal conversations I had, the decisions of further improve practices related to solid waste coming from packaging is in some cases influenced by guests' comfort standards, lack of employees, governments and legal requirements, suppliers or other stakeholders with a bigger decision power than the company itself. All mentioned above shows how solid waste issue is much more broad and difficult to analyze than what it seems to be in the first place. Therefore, the ultimate goal, zero-waste, is also hard to achieve. It can be affirmed that zero-waste is a good aspirational goal, yet very difficult to achieve in a short-term timeframe. It should be looked at as a long-term goal that would probably not be 100% achievable but a goal where a company can position itself closer and closer each day depending on their actions.

5.2. Theoretical Contributions

While waste management articles are vast, specific studies within tourism are not as many. Therefore, this research adds another case-study to the growing body of case-studies within waste management in tourism and enriches the existent literature regarding waste management in tourism, more specifically in the accommodation sector. Regarding the specific findings, this research aligns with most of the existent literature. The only finding resultant from this study but would need to be deeply explored is regarding the relationship between solid waste reduction and food waste reduction.

5.3. Empirical Contributions

This research will be particularly useful for accommodation establishments which, as Zmar, already have a pre-existing commitment to sustainability, yet want to further improve their solid waste by reducing plastic packaging and move the accommodation establishment towards zero-waste. That being said, the study undertaken at Zmar can be certainly applied in other organizations. Furthermore, the practical application of the waste hierarchy as used in this thesis might be an innovation that can be useful for future researches as well as for accommodation establishments that want to further improve their solid waste management practices.

5.4. Practical Contributions

As previously mentioned, this issue is broad and complex to address. Nonetheless, to further improve its solid waste, Zmar will need first to undertake a serious and detailed waste audit where all waste should be quantified and weighted, and the type of waste and its source identified. Then, as I did in the analysis, Zmar can also apply the waste hierarchy model for the main sources of waste found and practically change the present actions by more sustainable actions, by moving them towards the top of the pyramid. After this, some main sources of waste would have been identified and then the practical changes should take place. Considering that some of the things I have observed would also be observed by Zmar when doing this study, I will use my findings to explain how Zmar could use theirs to further improve its solid waste.

One of the actions might be to make a better search of what products exist on the market and try to buy bigger packages. This would require a detailed list of what the current products in use, its quantity and cost price are, compared with the new products. This would require the financial department and storage room staff to cooperate in order to make this comparison list. After this, ideally, some changes could arise. Then the responsible for purchasing should contact the new supplier or the same supplier in case they also offer an industrial size of a product.

Another action might have to be hiring new employees or trainees to assist with some tasks that could be beneficial to further improve solid waste. Here there are economic and bureaucratic aspects to consider and financial and human resources departments

would be involved in such action. From my informal conversation with Marta, these are some action that would make sense for Zmar.

5.5. Limitations

As mentioned several times, to analyze my observations I used the SWM model, more concretely, the waste hierarchy by practically allocating the current actions to a specific stage of the pyramid and then evaluate how different actions could change the stage Zmar is at. The use of the pyramid in this sense is only considering the most sustainable practices in terms of waste generation. However, other issues such as energy and water consumption, as well as carbon footprint are not taken into consideration. Even though I examined those issues during my analysis, I would argue this is a limitation of the waste hierarchy application if considering only the tool itself. As an example, a life-cycle assessment, also known as life-cycle analysis "is a technique to assess environmental impacts associated with all the stages of a product's life from raw material extraction through materials processing, manufacture, distribution, use, repair and maintenance, and disposal or recycling" ("Life-cycle assessment", 2018). A life-cycle analysis together with a practical application of the waste hierarchy would for sure give a better understanding of which practices are more or less desirable.

5.6. Future Research

During the one-week observation study at Zmar some interesting things other than the ones directly related to solid waste coming from packaging were observed. Although they were not relevant to deeply uncover in this thesis considering its purpose, some of these topics could make for a good starting point for other studies. Based on that, here are some interesting issues that could be further researched within the tourism activity:

- Impact of food-related practices on the environment
- Understand the food waste issue and hotel guests and employees role in it
- Understand the power relations and political aspects behind waste management

While observing some of the packaged goods in the storage room at Zmar as well as the food preparation and the overall practices, I faced myself with some interesting details

that could be better uncovered on a future research. As an example, while observing the preparation of food in the bakery section, I looked at the eggs used. Each egg has a code on the shell which represent its origin: the country, the producer identification, followed by the conditions in which the kitchens are kept. This allows consumers to distinguish free range eggs (code: 1) and organic farming eggs (code: 2) from the industrial caged hen production (code: 3). Another aspect that caught my attention was the presence of palm oil in the granola Zmar uses in the breakfast buffet. Palm oil, when not organically produced, is directly associated with deforestation, species risk of extinction and carbon emissions (Helmer, 2017). Finally, a restaurant menu fully animal-based has a strong impact on the environment in various aspects: waste production, water consumption, land use, greenhouse gases emission, rainforest destruction, ocean damage, among others. Given that Zmar wants to practice a responsible and sustainable business where the impact on the environment is reduced, this is also one aspect to consider. Below there is an infographic with effective information regarding the impact of the animal agriculture industry on the environment.

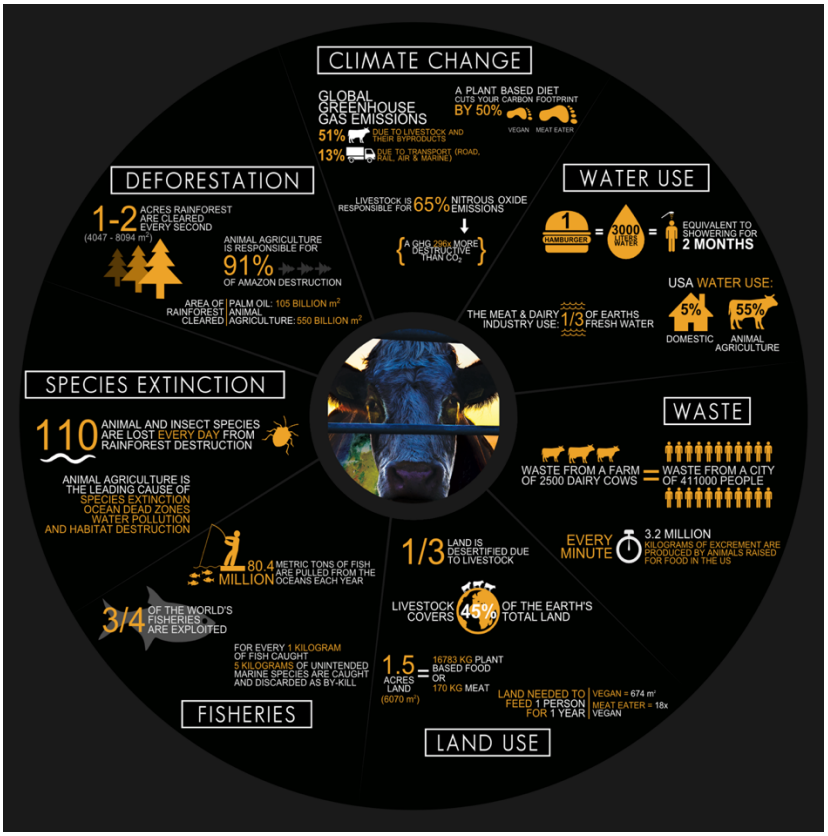

Figure 38: Facts about animal agriculture industry

All of the issues mentioned before could be further address in terms of the impact food-related practices within tourism have on the environment.

Another reality I faced was the food waste issue, in a morning where I decided to observe the breakfast trays coming from the buffet. Some of the figures included in Chapter 4 Analysis already revealed this reality. However, this could be deeply examined in the future. This is an issue that concerns Zmar to a point that they have even created a campaign against food waste and have created a slideshow with strong messages shown on a big screen at the restaurant, as shown in the figure below.

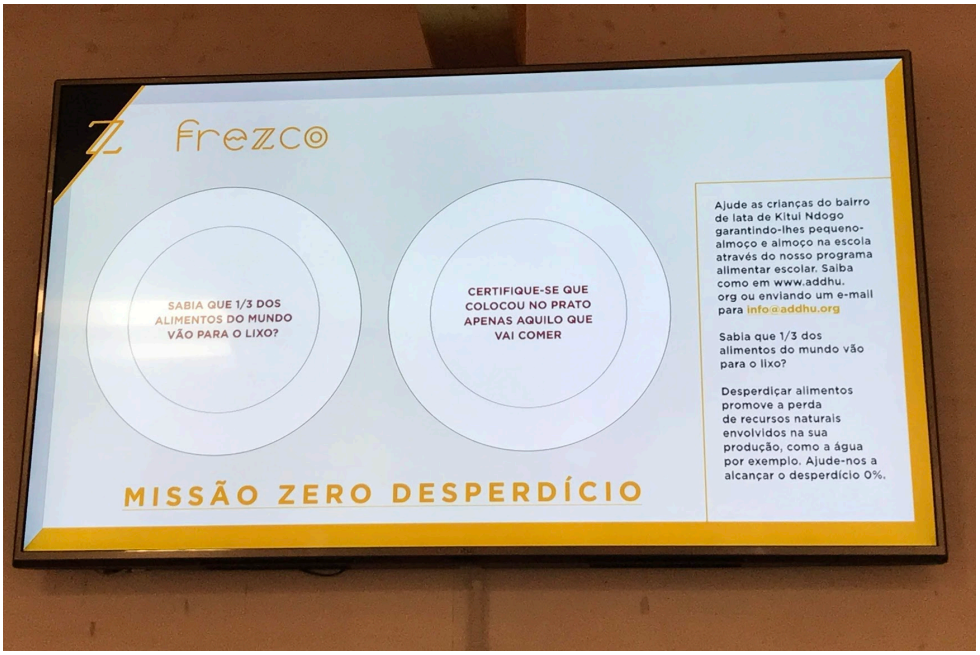

Figure 38: Food waste campaign

For a future research, the issue could be deeply scrutinized. In fact, I think this would be an important step for Zmar. Even though some control over food waste is already in practice, some more concrete details should be taken into consideration when analyzing the food waste produced. This was previously mentioned during Chapter 4 Analysis.

Lastly, as mentioned several times during the analysis, some of the solutions to get closer to zero-waste depend on several aspects such as regulations, suppliers power over the company, as well as other factors. Therefore, it might be interesting to scrutinize the power relations that might influence waste management actions.

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7. Appendix

7.1. *APPENDIX A: Tourism Revenue (Comparative analysis)*

CRESCIMENTO NAS RECEITAS TURÍSTICAS – ANÁLISE COMPARATIVA COM PAÍSES CONCORRENTES

Entre 2005 e 2015, Portugal registou um crescimento médio anual superior ao dos concorrentes, sendo o segundo país com melhor desempenho na evolução das receitas turísticas.

RECEITAS TURÍSTICAS INTERNACIONAIS (mil milhões €)	2005	2010	2015	TVMA 2005-2015
Malta	0,6	0,8	1,2	+7,4%
Portugal	**6,2**	**7,6**	**11,5**	**6.3%**
Turquia	15,4	17,0	24,0	+4,5%
Marrocos	3,7	5,1	5,3	+3,7%
Croácia	5,9	6,1	8,0	+3,1%
Grécia	10,7	9,6	14,1	+2,8%
Espanha	40,00	41,2	50,9	+2,4%
Itália	28,5	29,3	35,6	+2,2%
França	35,4	35,5	41,4	+1,6%
Egito	5,5	9,4	5,5	+0,0%
Tunísia	1,7	2,0	1,2	-3,2%

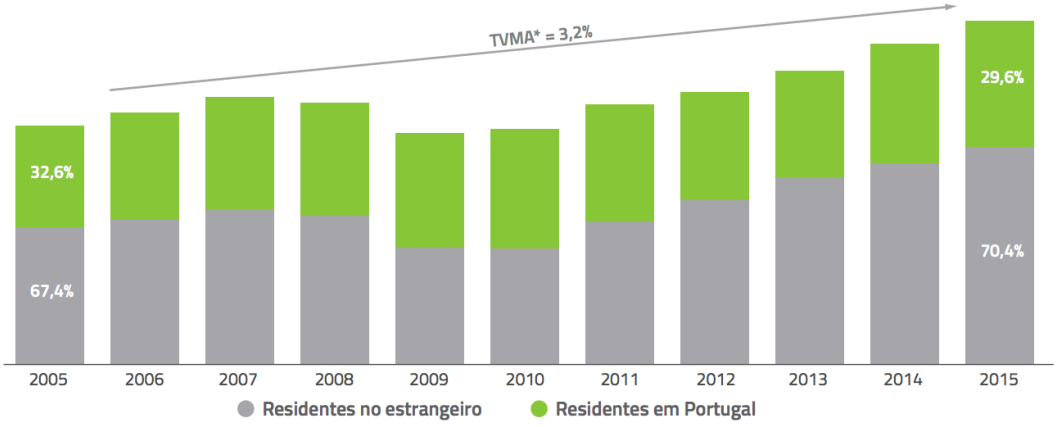
Fonte: World Tourism Organization (UNWTO), janeiro 2017

7.2. *APPENDIX B: Nights spend by tourists*

CRESCIMENTO NAS DORMIDAS

Entre 2005 e 2015 as dormidas cresceram a uma taxa média anual de 3,2%.

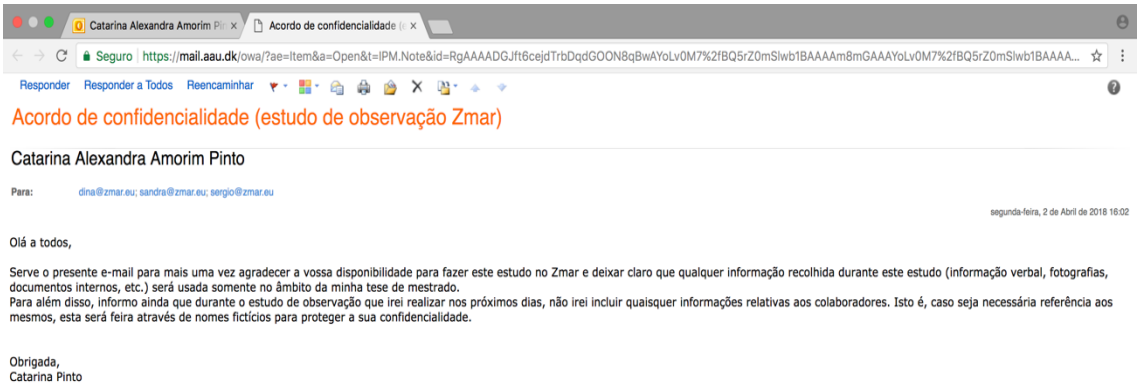
Gráfico 5 - Dormidas em estabelecimentos hoteleiros, aldeamentos, apartamentos turísticos e outro alojamento (%)



Fonte: INE

* Taxa de variação média anual.

7.3. APPENDIX C: Confidentiality Agreement



Catarina Alexandra Amorim Pi... | Acordo de confidencialidade (...

Seguro https://mail.aau.dk/owa/?ae=Item&a=Open&t=IPM.Note&id=RgAAAADGJft6cejdTrbDqdGOON8qBwAYoLv0M7%2fBQ5rZ0mSlwb1BAAAAm8mGAAAYoLv0M7%2fBQ5rZ0mSlwb1BAAAA...

Responder Responder a Todos Reencaminhar

Acordo de confidencialidade (estudo de observação Zmar)

Catarina Alexandra Amorim Pinto

Para: dina@zmar.eu; sandra@zmar.eu; sergio@zmar.eu

segunda-feira, 2 de Abril de 2018 16:02

Olá a todos,

Serve o presente e-mail para mais uma vez agradecer a vossa disponibilidade para fazer este estudo no Zmar e deixar claro que qualquer informação recolhida durante este estudo (informação verbal, fotografias, documentos internos, etc.) será usada somente no âmbito da minha tese de mestrado.
Para além disso, informo ainda que durante o estudo de observação que irei realizar nos próximos dias, não irei incluir quaisquer informações relativas aos colaboradores. Isto é, caso seja necessária referência aos mesmos, esta será feira através de nomes fictícios para proteger a sua confidencialidade.

Obrigada,
Catarina Pinto

7.4. APPENDIX D: Field Notes

1/April

Today I traveled to Zmar and met on the bus one old employee from Zmar. Even not being this part of field work, it gave me some previous knowledge about Zmar. From this conversation I understood that Zmar was distant from everything else which made me think even more that this study is very beneficial because it is a nature place and as closer as possible we can get to nature, meaning no waste, the better. This woman also told me that Zmar had a fire incident a year ago and it had closed at that time.

2/April (11:30 – 13:00)

Today I did a guided tour with Engineer Sérgio Francisco around Zmar. The tour covered the following areas:

- Administration
- Canteen
- Storage Room
- Food preparing rooms (fish, meat, vegetables, breakfast)
- Bakery
- Kitchen
- Restaurant
- Pool water treatment
- Solar Panels (for electricity)
- Transfer Station
- ETA & ETAR

KITCHEN & PREP ROOMS:



BAKERY:



POOL WATER TREATMENT:



One of Zmar's biggest attraction is the inside pool with waves. Besides this one, they also have a 100m swimming pool and a child's pool. In this part of the visit I was shown the big technical room under the swimming pool. Here is where the water treatment happens as well as the mechanism of creating waves.

TRANSFER STATION:



This is the place where the trash is sorted. It is the last step before sending it to the operator who takes care of the produced waste.

Here the trash is sorted into seven categories:

- Plastic/metal (Yellow plastic bags)
- Carton/paper (Blue plastic bags)
- Glass (Green plastic bags)
- Used vegetable oil
- Batteries
- Organic waste
- Undifferentiated waste

Note: after being used, the big plastic bags are washed and dried, so they can be used again and again when possible. This reduces the waste production in this section. Once sorted, the waste is put into the big containers outside:



Their capacity is as follows:

Yellow container – 2000 Kg
Blue container – 3000 Kg
Green container – 5000 Kg

ETA (ESTAÇÃO DE TRATAMENTO DE ÁGUAS):

ETA is the water treatment station. The system of water treatment is enough to provide water for 4500 people.

Here is the process of water treatment:

Water comes from: Water dam Sta. Clara (Odemira)

The water comes through open and closed pipes along 70km

The water is received on a big tank called “gross water tank”

The water goes through different processes: coagulação floculação + decantação + filtração + desinfeção + desinfeção com Cloro.

After these processes, the water is treated and ready to be used by staff and guests for various purposes such as to drink, to use in the kitchen or other departments, to shower, to cook, etc.



ETAR (ESTAÇÃO DE TRATAMENTO DE ÁGUAS RESIDUAIS):



ETAR is the residual water treatment station. Here the water staff and guests use, is treated in order to be reused to water the plants.

Here is the process of residual water treatment: Some sediments and oils are removed from the residual water

Then, the water goes through a biological treatment. At a final stage the water is filtered and disinfected and it is ready to be used for its purpose.

3/April

13:15-14:00 – Observation in the bakery section
14:00-15:15 – Observation of breakfast prep. section
15:15-16:00 – Observation of kitchen section

Observation in the bakery section



When I started the observation, the employee working in the bakery section was making baked apples. The apples were cut in halves because if they bake the entire apple the customer would take one apple but, because they want to try other deserts as well, there is a bigger chance of wasting some of the apple. For that reason, they decided to bake the apples in halves, so the customers can take only one half or more, depending on how much they want. The sugar used to coat the apples comes on a 1Kg package which is a regular package people buy for their homes. In an organizational context, these packages could be bigger. A dessert (Leite Creme) is being prepared and the following ingradients will be used: Eggs (the eggs used have the code 3 which represent eggs from chickens in cages); Milk (packaged in 1L and wrapped with plastic along with 5 other packages); Sugar (1Kg package)







Some other notes:

- Due to the lack of time, the containers with oil are not washed and, therefore, not recycled
- The oven is used for one kind of desert at a time due to the different temperature/humidity required
- On a regular day, the bakery section is responsible for preparing 4 different deserts



Observation of breakfast prep. section



- There is a document where employees register the values for the amount produced of a product and the respectively amount consumed; However, this document lacks the information of number of breakfasts served. With this number, calculations could be made in order to find out the average consume per person
- Butter and Jam individual packages (this produces a lot of plastic waste)
- Sugar in individual packages





- Fresh cheese and ham come in rather small packages considering the amount used for breakfast
- Cereals come in packages as well. Muesli could be made at Zmar and possibly used as a workshop for families
- For breakfast, there are prepared a few trays of ham (around 1,5Kg) which requires the use of 3 packages – Ham could come as an entire piece to be cut by Zmar's employees; in that case, they need to invest on a ham cutting machine
- Ham leftovers are used for next day's breakfast. In case it doesn't look good visually, it is cut and sent to the kitchen for pizzas





Observation of kitchen section – dinner prep

Vegetables came to the kitchen already without packaging on a little “kitchen car” used to transport food. For that reason, I decided to observe the prep of meat/fish/vegetables the next day on their respective rooms.

Rotten eggplant: it was used at its maximum but maybe rotting could have been avoided. This is an issue that has to do with another section

Felt some retention from the person being observed. Therefore, I decided to step back and finish this observation also because there was nothing really to note in terms of waste in the kitchen area.

4/April

Vegetables Prep







Fish Prep











Notes: Fish is bought frozen and, therefore, packaged in plastic.

Meat Prep

Alike fish, also meat is packaged in plastic and frozen.



5/April

Today I talked with the Financial Director, Sónia Benedito. Before going to this conversation, I went to Zmar's stoarage room. Here is where the deliveries are received and confirmed and later organized or sent to the different departments when requested. At the warehouse I took pictures of the different products I found and later I made a list of things that could be improved and during the informal conversation with Marta, I presented those things as well as some possible ways of substituting them.

Here is the table with the swaps I came up with, based on the findings:

PRODUCT	HOW IS IT PACKAGED?	HOW CAN WE CHANGE?
Individual juice packages	15 glass bottles wrapped in plastic	Package in carton
Milk (Nova Açores)	6 packages wrapped in plastic	Package in carton
Canned goods	Wrapped in plastic	Package in carton
Individual butter packages	100 packages (10g each)	Substitute for a bigger butter package and serve on a ceramic container at the buffet

Small candles	30 candles per plastic bag	Make own candles with used oil
Knorr broth	Plastic containers	Make own broths
White sugar (Sidul)	Wrapped in plastic	Package in bigger bags and avoid the plastic. Use carton instead to transport
Brown rice	Plastic bags 1Kg	Paper package; Bigger package
Toilet paper	Wrapped in a 9-pack and again wrapped in plastic	Bigger packages
Colgate toothbrush	It is a plastic toothbrush packaged with carton and plastic	Buy bamboo toothbrushes
Take away boxes	The lid is made of plastic and the delivery is wrapped in plastic	Choose eco-friendly and compostable take away boxes
Honey (Casa de Mateus)	Packaged in individual plastic containers and the whole box is wrapped in plastic	Buy bigger packages
Granola	Packaged in plastic + contains Palm Oil	Make own granola
Oat flakes	Packaged in plastic (400g)	Choose paper packages + bigger package
Individual Sugar packages	Approx. 5g in each package (paper package)	Substitute these packages on the buffet. Instead put a container in each table with sugar and a spoon

From this conversation, I understood that some of these measures could not be put in practice due to their relationship with the suppliers. Because Zmar is located at a distant place, there is not much choice when it comes to choose a supplier. Therefore, when establishing a relationship with a certain supplier, suppliers know this situation and have a bigger power for instance to choose when to deliver, etc. For this reason, asking for certain requirements such as the non-use of plastic is not possible. Apart from that, Zmar does not represent a significant part of their income, meaning that it becomes hard to ask for such changes. The only choice here is to find a new supplier. However, we cannot forget that Zmar privileges the local economy.

Even though some of these swaps might reveal as hard to make, some other are rather simple and depend on the organization. Nevertheless, some of the swaps might require an investment on human resources.

6/April

Observation of other departments of the hotel – to suggest further research

Accommodations:

- Shampoo containers in rooms
- Plastic bags (3 for recycling trash + 1 in toilet): maybe they could be replaced with biodegradable bags

Supermarket:

- When selling something, they give a paper bag to the customer. Even though paper is 100% recycled, it is better to support a circular economy instead of a linear economy. In other words, it would be better to use a bag that will be reused later on than using a bag a recycle. To solve this, they could either sell the bag and less people will buy and would prefer using their own. They could also suggest people to bring their own bag (for example when the reservation is made online and then at the check-in). Other option could be to pay a small fee for a tote bag (ex: 4€ which can be the price of selling a tote bag) and in the end of their stay, guests could choose to have the bag or to have their money back and the bag would be used by future guests.

Restaurant:

- Study how an investment on a sensitization campaign could pay off in terms of guests' waste on the meals eaten at the restaurant. The sensitization campaign could consist of investing in tablets to put inside the restaurant tables. These tablets would communicate the messages being communicated on the big TV screen. Most people to not look at these screens long enough to read all the messages. On the other side, if this communication was done through a tablet that is on the table people eat, they would perhaps be more likely to pay some attention to this information. Another way of doing this campaign (and maybe a less expensive one) could be printing the information they show on the screen in the plates.



On the picture above, we see one of the pictures shown on the TV screen at the restaurant. The idea would then be to print this information on the actual plates, since that is what they are trying to recreate in the picture

Other notes:

The table below represents the number of guests Zmar received in 2017 and 2018:

		Valores Média/Dia			
		Hóspedes	**Visitantes**	**Total média/ dia**	
2017	Junho	536	69	**605**	
	Julho	934	87	**1021**	
	Agosto	1377	85	**1462**	
	Setembro	642	35	**677**	Set/2017 – Grupo retiro espiritual de dia 19 a 27.
	Outubro	225	21	**246**	
	Novembro	89	18	**107**	
	Dezembro	126	45	**171**	
2018	Janeiro	36	11	**47**	
	Fevereiro	114	22	**136**	
	Março	136	32	**168**	
	Abril	451	36	**487**	Abr/2018: Grupo retiro espiritual de dia 11 a 18 e Grupo viagem finalistas de 27 Abril a 01 Maio.
	Maio	135	31	**166**	Mai/2018 - Dados até dia 18.

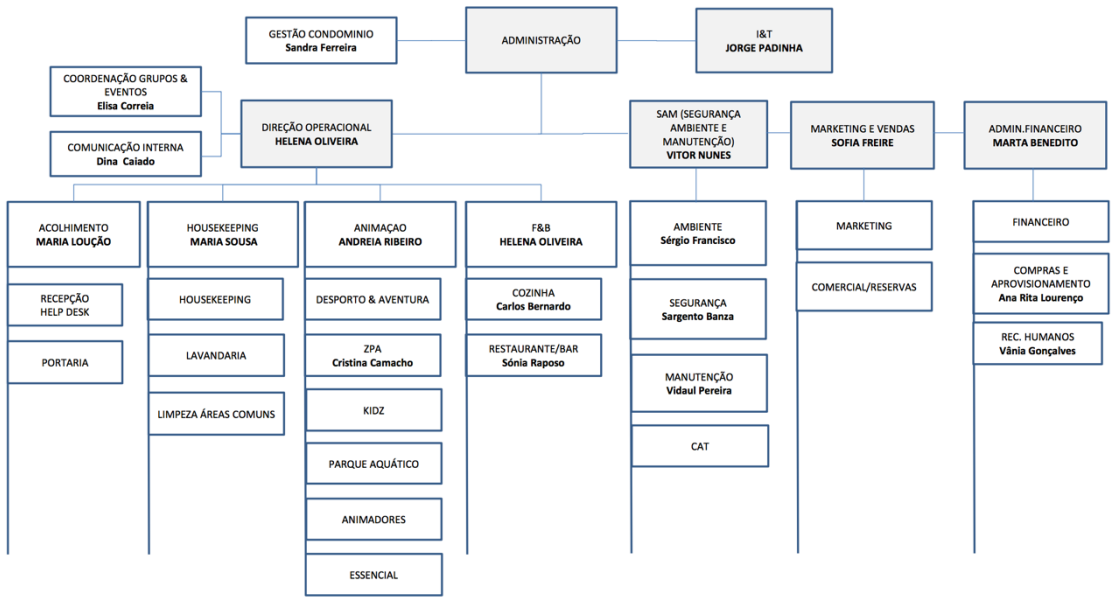
Zmar Villas:
T1 - 80
T2 - 47
Total 127

Zmontes:
T1 - 5
T2 - 88
T3 - 34

Total 127 + 11 (private use)
Total number of accommodations: **265**

Number of employees: 104

Company hierarchy:



7.5. *Appendix E: Waste map*

Based on my observations, here is a map that shows the type of waste I saw in the different sections I observed: Storage Room, Kitchen, Bakery, Food Preparation Rooms and Restaurant. In the food preparation rooms (meat, fish, vegetables and breakfast), the products are taken out of the packages which are mainly plastic packaging. Besides, as an example, to the breakfast preparation room is where plates with leftover go after breakfast so, food waste is another source of waste in this section. In the other preparation rooms, the food waste comes from the inedible parts of the aliments being prepared. At the storage room arrive all products that will be used by the eco-resort in the different departments. Here the main sources of waste have to do with the packaging used for transportation which is mainly paper (carton boxes) and plastic. In the kitchen and bakery different sources of waste are observed such as plastic, paper, metal and food waste. Finally, at the restaurant, the main sources of waste are plastics (from individual butter packages for example), paper (from individual sugar packages for example), food waste coming from food guests leave on their plates and glass (water bottles). This can be observed in the map below:

<table>
<tr><td colspan="2">Food Preparation Rooms

Plastic
Food Waste</td><td>Storage Room

Plastic
Paper</td></tr>
<tr><td colspan="2">Corridor</td><td>Kitchen

Plastic
Paper
Metal
Food Waste</td></tr>
<tr><td>F&B Office</td><td>Bakery

Plastic
Paper
Metal
Food Waste</td><td>Restaurant

Plastic
Paper
Food Waste
Glass</td></tr>
</table>

7.6. Appendix F: interview (Original version in Portuguese)

Entrevista Dr. João (Perguntas e Respostas)

1. O Zmar já existe desde 2009. Foi uma ideia inicial a de criar um espaço sustentável e com o mínimo de impacto ambiental possível?

   O Zmar foi criado como um resort para todos, para dar o exemplo de como é possível desenvolver um projeto sustentável, e criar um life style activo amigo do ambiente, em comunhão com a natureza, da qual fazemos parte.

2. Quais foram os principais motivos para o interesse do Zmar em sustentabilidade: económicos, ambientais, sociais?

   Os três. De facto preocupamo-nos com a carga económica, contribuindo activamente para a criação de emprego, o desenvolvimento profissional e o desenvolvimento económico, através das relações económicas conexas. Em termos ambientais, procuramos contribuir para o respeito da carga ecológica, quer através do tratamento integral dos lixos de produzimos, da redução do consumo de plástico, do consumo de água e do consumo energético, pela produção de energia térmica e foto voltaica. Por outro lado, estabelecemos zonas ecologicamente equilibradas, evitando o contacto humano com zonas selvagens, como seja o lago e outros espaços no Zmar. A relação é tão boa, que temos sinais claros dessa afirmação, quer pela presença de morcegos no zmar, quer pela presença de lontras no lago. No que diz respeito à carga social, apoiamos projectos de solideriadade social no concelho de Odemoria.

3. A geração de resíduos (não alimentares) é um assunto que preocupa o Zmar? Em que sentido?

   Sim. Temos várias políticas activas, com vista à redução do consumo de plástico, como seja a eliminação de qualquer plástico pet no Zmar. Por outor lado, efectuamos a separação de todo o lixo não alimentar, e parte dele reciclamos

diretamente, por outro lado, enviamos periodicamente contentores de lixo reciclável para a Ambilital.

4. O programa de gestão de resíduos hoje em prática foi uma decisão inicial do projeto ou foi uma necessidade introduzida mais tarde?

   Foi uma decisão inicial do projecto, mas que tem vindo a ser desenvolvida e diversificada.

5. Porque acharam relevante ter um sistema de tratamento de resíduos organizado da forma que têm?

   Pelo carácter ecológico que envolve toda a actividade do Zmar.

6. Para além das preocupações em termos de gestão de resíduos, que medidas internas criaram para controlar a criação de resíduos (não alimentares)?

   Como já foi referido, a substituição de garrafas de plástico por garrafas de vidro, a substituição de copos de plástico por copos reutilizáveis, entre outros.

7. O envolvimento do staff e dos guests no processo de gestão de resíduos é algo que se revela importante? Porquê?

   Sim, é importante. Em relação aos colaboradores, anualmente estabelecemos objetivos ecológicos, quantificáveis, quer ao nível da pegada de carbono e água, quer ao nível da produção de lixo indiferenciado não reciclável e reciclável. A importância em atingir estes objetivos é vital para o Zmar, pois casa com a sua imagem e notoriedade, e tentamos todos os anos atingi-los, o que temos conseguido. Assim, o envolvimento de colaboradores e clientes, é vital para a prossecução dos referidos objetivos, pois sem eles, cuja acção determina essa dinâmica, e sem eles é impossível consegui-lo. Por outro lado, torna-se uma acção de marketing, que reforça a imagem ecológica do Zmar, e os clientes e colaboradores orgulham-se do seu papel, e isso é muito positivo.

8. De que forma o(s) staff/guests é(são) incluídos neste processo? Qual a sua contribuição?

Os nossos clientes são sensibilizados para a produção de lixo e consumo de água e energia, sendo depois informados da pegada de água e carbono que atingimos no mês da sua estadia, bem como da quantidade de lixo reciclável e não reciclável per cliente que foiu produzido no mês. Esses dados são comparados com os nossos objectivos, e informados os clientes sobre a sua performance. Este facto deixa os clientes muito satisfeitos sempre que conseguimos atingir os objetivos, pois sentem que contribuíram para o processo. Os colaboradores têm objetivos mensais a atingir, e quando isso acontece sentem-se sempre realizados e satisfeitos.

7.7. *Appendix G: interview (Translated version in English)*

1. Zmar Eco-Experience exists since 2009. Was it an initial idea to create a sustainable space with a minimum impact on the environment?

   Zmar was created as a resort for all, to give an example of how is possible to develop a sustainable project and create an environmentally-friendly lifestyle.

2. What were the main reasons for being interested in sustainability? Was it economic, environmental and/or social reasons?

   The three of them. In fact, we care about the economic aspects, contributing actively to job creation, professional development and economic development through the economic relations. Environmentally wise, we look for respecting the ecological capacity, through solid waste treatment, reduction of plastic, water and energy consumption, through production of thermal energy and solar energy. On the other side, we create ecologically balanced zones, avoiding the human contact with wild zones, such as the lake and other spaces at Zmar. The relationship is so good that there are bats at Zmar as well as otter in the lake. Regarding the social aspect, we support charity projects in the municipality of Odemira.

3. Is the waste issue (not food waste) something that worries Zmar Eco-Experience? In what sense?

   Yes. We have several active policies aiming the reduction of plastic, such as elimination of any PET plastic at Zmar. On the other side, we sort all waste and some of it we recycle directly. The remaining is sent periodically to Ambilital in containers.

4. Was the current waste management programme an initial decision of this project, or was it introduced later?

   It was an initial idea of the project, but it has been developed and diversified.

5. Why did you find it useful to have a waste treatment system organized in the way you have it nowadays?

For the ecological character that all Zmar activity entails.

6. Besides your concern with waste management and treatment, what internal measures have you created to control waste generation (not food waste)?

As already mentioned, the swap from plastic to glass water bottles, the swap from disposal plastic cups to reusable plastic cups, among others.

7. Is staff and guests' participation in the waste management process important for Zmar Eco-Experience? Why and how?

Yes, it is important. Regarding the staff, annually we establish some ecological goals, quantifiable, either relatively to the carbon and water footprint or to the generation of waste. It is very important for Zmar to achieve such goals and we have been able so far. Thus, the participation of staff and guests is relevant to achieve the defined goals, because without them, the dynamic is compromised, and goals become impossible to achieve. On the other side, it become a marketing strategy, enhancing Zmar's ecological image, and guests and staff are proud of their role and that is extremely positive.

8. In what way are staff and guests included in this process?

Our customers are aware of the waste production as well as the water and energy consumption, being informed of the water and carbon footprint during the month of their stay as well as the quantity of recyclable and non-recyclable waste that each guest produced, on average. This information is compared with our goals and we inform the guests about their performance. This gives guests very satisfied when we achieve our goals because they feel part of the process. Staff have montly goals to achieve e when that happens they feel satisfied and accomplished.

7.8. *Appendix H: Zmar map and Eco-practices*



Eco Práticas Zmar
Zmar Eco Practices

O ZMAR FOI CONCEBIDO PARA SE INTEGRAR NO CENÁRIO NATURAL E CONSERVAR OS RECURSOS NATURAIS.
ZMAR WAS BUILT IN ORDER TO MINGLE IN THE NATURAL SCENARIO USING RENEWABLE RESOURCES SUCH AS WOOD AND STONE.

OS EDIFÍCIOS ESTÃO ASSENTES EM ESTACAS DE MADEIRA, ANULANDO ASSIM OS EFEITOS NEGATIVOS DA IMPERMEABILIZAÇÃO DOS SOLOS.
ALL BUILDINGS WERE BUILT SUSPENDED ABOVE THE GROUND, WITH NO IMPERMEBIALIZATION OF THE SOIL.

TODA A MADEIRA USADA NO ZMAR VEIO DE FLORESTAS CERTIFICADAS: FLORESTAS EM QUE A TAXA DE CRESCIMENTO SUPERA A DOS CORTES EFECTUADOS.
ALL THE WOOD IN ZMAR CAME FROM CERTIFIED FORESTS, WHICH MEANS THAT THEY ARE WELL-MANAGED AND LEGALLY HARVESTED.

OS EDIFÍCIOS E JANELAS ESTÃO ORIENTADOS DE MANEIRA A QUE TENHAM SOMBRA, MINIMIZANDO O USO DE AR CONDICIONADO.
ALL BUILDINGS AND WINDOWS WERE BUILT AND INSTALLED IN ORDER TO TAKE THE MOST ADVANTAGE FROM NATURAL SHADE.

USAMOS ENERGIA SOLAR RECORRENDO AO USO DE PAINÉIS FOTOVOLTÁICOS, QUE ALIMENTAM OS POSTES DE ILUMINAÇÃO E LUZES DE PRESENÇA DAS ZONAS COMUNS.
SOLAR ENERGY IS USED, THROUGH PHOTOVOLTAIC PANELS ON EVERY LAMP POST AND GUIDING LIGHTS.

A ENERGIA TÉRMICA É UTILIZADA NO AQUECIMENTO DA ÁGUA DE TODOS OS EDIFÍCIOS.
THERMAL ENERGY IS USED TO HEAT THE WATERS IN ALL BUILDINGS.

O ZMAR TEM A SUA PRÓPRIA ETA E ETAR NAS QUAIS TRATA AS ÁGUAS RESIDUAIS COM O OBJECTIVO DE AS REUTILIZAR PARA A REGA DOS ESPAÇOS COMUNS.
ZMAR HAS A SEWAGE TREATMENT UNIT TO TREAT AND REUSE WATER.

A CIRCULAÇÃO DE VEÍCULOS É LIMITADA DENTRO DO ZMAR: UTILIZAMOS CARRINHOS ELÉCTRICOS COM PAINÉIS SOLARES INCORPORADOS PARA REDUZIR AS EMISSÕES DE CO_2.
TRAFFIC IS LIMITED INSIDE ZMAR: WE USE ELECTRIC CARS EQUIPPED WITH SOLAR PANELS IN ORDER TO REDUCE CO_2 EMISSIONS.

O ÓLEO UTILIZADO NAS COZINHAS É RECOLHIDO PARA A PRODUÇÃO DE BIODIESEL.
USED KITCHEN OIL IS COLLECTED AND RECYCLED FOR THE PRODUCTION OF BIODIESEL.

NO ZMAR SUGERIMOS-LHE A COMIDA MAIS SAUDÁVEL E QUE TENHA O MENOR CUSTO ECOLÓGICO, DANDO PRIORIDADE AOS PRODUTORES LOCAIS.
ZMAR SUGGESTS A WIDE RANGE OF HEALTHY FOOD WITH THE LEAST ECOLOGICAL COST, SINCE WE TRY TO BUY EVERYTHING LOCALLY.

NO ZMAR TENTAMOS COMPRAR PRODUTOS LOCAIS E NACIONAIS, DE FORMA A REDUZIR AS EMISSÕES DE CO_2 CAUSADAS PELO TRANSPORTE.
AT ZMAR WE TRY TO BUY EVERYTHING LOCALLY AND NATIONALLY IN ORDER TO AVOID CO_2 EMISSIONS CAUSED BY TRANSPORTATION.

EXISTEM PILHÕES NO EDIFICIO COMUM PARA RECICLAGEM DAS PILHAS E BATERIAS.
THERE ARE BATTERIES DISPOSALS IN THE COMMON BUILDING.

TODOS DIAS, TODOS NÓS CONTINUAMOS A APRENDER A VIVER DE UMA FORMA QUE REDUZA O NOSSO IMPACTO NO AMBIENTE. JUNTE-SE À EQUIPA!
JUST LIKE YOU, WE ARE LEARNING EVERY DAY HOW TO LIVE IN A MANNER THAT REDUCES OUR IMPACT ON THE ENVIRONMENT. PLEASE JOIN US!

Eco Dicas para uma Estadia Sustentável
Eco Tips for a Sustainable Stay

DESLIGUE AS LUZES
TURN OFF THE LIGHTS

TOME DUCHES RÁPIDOS
TAKE QUICK SHOWERS

TIRE AS FICHAS DAS TOMADAS
UNPLUG YOUR ELECTRIC EQUIPMENTS

REDUZA, REUTILIZE E RECICLE
REDUCE, REUSE AND RECYCLE

A MUDANÇA DE ROUPA DE CAMA E DE TOALHAS É EFECTUADA DE 4 EM 4 NOITES:
SE UM MILHÃO DE PESSOAS USASSEM APENAS UM JOGO DE TOALHAS NOS HOTÉIS POR SEMANA, POUPARÍAMOS 5.7 MILHÕES DE LITROS DE ÁGUA
LINENS AND TOWELS ARE CHANGED EVERY 4 NIGHTS: IF ONE MILLION PEOPLE USED ONE SET OF HOTEL LINENS AND TOWELS PER WEEK, WE'D SAVE 5.7 MILLION LITERS OF WATER