

A Work Project, presented as part of the requirements for the Award of a Master's degree in  
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**IMPLEMENTING SUSTAINABILITY INITIATIVES IN THE SUPPLY CHAIN: THE  
CASE OF LISBON URBAN HOTELS**

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## **Abstract**

### Implementing sustainability initiatives in the supply chain: The case of Lisbon urban hotels

The issue of sustainability is increasingly more relevant for businesses, including in the Hospitality—Lodging industry, owing to its negative environmental impact. This industry is also economically important for Portugal, particularly in Lisbon. The present study investigates the degree of implementation of sustainability initiatives throughout the supply chain of 4-and 5-star urban hotels in Lisbon. A survey was sent to 54 hotels, yielding 25 responses. The results show most surveyed hotels are at a low level of implementation, though with interest to move towards a medium level. Future research could explore other regions and lodging categories.

## **Keywords**

Supply Chain Management; Sustainability; Hospitality; Lodging; Urban Hotels

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## **1 Introduction**

Sustainability is one of the core issues of the 21<sup>st</sup> century. As explained by the WWF in 2017, “in our relatively short time on the planet we have tended to use these resources with very little thought for the future” (WWF, 2017). To reduce the impact of this behaviour on the health of the environment, those resources should be used in a sustainable way—this means managing the current resources to meet basic human needs while assuring the ability of future generations to meet theirs, that is, without compromising those resources.

Similarly, in a business, as defined by the Harvard Business School, “sustainability refers to the effect that companies have on the environment or society” (Chladek, 2019), and it has been gaining more and more importance, since it can be a strategic path for generating long-term value when operating with concerns for the impact on the social, ecological, and economic environment. Because these entities possess a considerable amount of resources, as well as being the decision-makers behind the production and distribution processes, they are the ones in the best position to push for the needed sustainable change and at a significant scale. Hence, businesses should take sustainability as a core issue within their activity, and it is of utmost relevance for all of them to develop sustainability strategies that not only aim at reducing the negative impact of the operating activity, but also consider the development of competitive advantage. In order to have a strong commitment with this matter it is important to have a transparent messaging, which goes beyond good intentions and the use of “buzzwords” just for the sake of good PR, avoiding actions of smokescreen.

When moving towards a sustainable approach, many companies identify the supply chain as a difficult area of a business to make sustainable (Park, 2019), despite it being one of the most important. According to Peter Senge, making progress on environmental issues requires

organizations realize that they are part of a larger system (Prokesch, 2010), and therefore, to enhance the scale of effects of the integrated sustainable initiatives and practices in each business, it is becoming increasingly pertinent to consider its application on several if not all parts of a business's supply chain, also known as supply network.

With all these considerations in mind, there are some industries where the concern with sustainability might be harder to deal with due to the nature of the business itself, that being the case of the Tourism/Hospitality industry. This industry is said to be responsible for an estimated 5% of today's greenhouse gas emissions, which is expected to increase 130% by 2035 as the number of travellers and hotel rooms is also increasing (Nicholls, 2014). Consequently, this industry is not only responsible for a significant impact on a global scale, but it is also extremely exposed to changes in the environment, therefore highlighting how necessary it is to shift towards more sustainable practices. Nonetheless, as it happens for other businesses, sustainability is also a strategic path for this industry, and some hotels are already taking advantage from it. Regarding the future, by 2050 hotels are expected to have reduced emissions by 90% to meet the requirements of the Paris Climate Agreement, which shows the need for all hotels to be on board with sustainability, as well as to integrate it throughout every part of their supply chains to be more effective (Wich, 2019).

In Portugal, the hospitality industry is of significant economic importance for the country, being responsible for a considerable part of its exports and revenue (Turismo de Portugal, 2020). Also, according to the 2019 Atlas da Hotelaria study from Deloitte, in 2018, besides an increase in the supply and demand of hotels in Portugal, Lisbon was in the top 5 European cities by occupancy rate, being classified by several international entities as the best destination in Europe and in the world. Lisbon had, as of 2018, 16% of the total lodging units in Portugal, ranking fourth place after the Norte, Algarve and Centro regions, but registered 21% of the total rooms and apartments in the country, ranking second place after the Algarve region.

Considering the popularity of Lisbon as a tourist destination and the relevance of the industry for the Portuguese economy, one might wonder if this sector is evolving accordingly to new trends and concerns to maintain or even improve its position as an attractive country to tourists and as a relevant source of revenue, and in particular how it addresses the problem of sustainability. Regarding this issue, within the Portuguese hospitality industry, the lodging sector is one which has been taking some action, seen in the increased number of hotels certified for their commitments with sustainability throughout the years—for instance, in 2018, 10 hotels in Lisbon & Vale do Tejo were awarded the Green Key award, which is an environmental educational program that recognizes touristic establishments that implement good environmental and social practices. In light of this, the present study aims to evaluate the degree of sustainability efforts in the hotel supply chain, given the relevance of this sector maintaining its contribution to the country's economy while upholding social responsibilities to the community.

## **2 Literature Review**

The following section is mainly based on three review papers: Aragon-Correa, J. et al (2015), Boley, B. & Uysal, M. (2013) and Hall, C. et al (2016).

### **2.1 Hospitality Industry & Sustainability**

The existing literature about Sustainability within the Hospitality industry addresses several distinct aspects. A common one is the motivation behind the decision to integrate sustainability concerns in the management of the hotels. While Alvarez *et al.* (2001) & Vidal-Salazar *et al.* (2012) point to the pressure from stakeholders as drivers of environmental management development in hotels, with the organizational culture also being relevant for the adoption of new environmental initiatives, Aragon-Correa *et al.* (2014) indicate the public recognition of environmental responsibility as a reason to implement an environmental management system (EMS).

Within the implementation of certified environmental management standards on hotels, most research focuses on the ISO 14001 standard. Considering this standard, Chan & Wong (2004) found that the most relevant factors determining a hotel's intention to obtain this certificate are corporate governance and legislation. Thus, the motivations to implement this specific standard differ from the ones previously stated by Aragon-Correa *et al.* (2014) regarding the implementation of general EMS, and by Alvarez *et al.* (2001) & Vidal-Salazar.

However, some authors point out that the adoption of these standards as well as general environmental initiatives place managers several challenges. Some managers complain about the costs and hard work related with the implementation of these standards, among which the elaboration of annual reports and the insufficient recognition of these labels by the public at large (Ayuso, 2007). For instance, in an interview to Spanish hotel managers in 2011, Bonilla-Priego *et al.* showed that out of 10 hotels eight had left EMS due to the high maintenance costs. Furthermore, some studies report that to proactively implement such environmental practices, hotels need more knowledge and motivation, and to develop an organizational climate that motivates green behaviour in employees (Chou, 2014), while providing them with information (Sharma, 2009) and skills, achieved through training (Vidal-Salazar *et al.*, 2012). Another obstacle is the required collaboration with outside partners on matters such as waste management and green purchasing (Ayuso, 2007), as well as the fact that managers lack professional advice.

Implementing sustainability initiatives, environmental management systems or certified standards also bring several benefits for hotels, such as achievement of a competitive advantage, which has been one of the focal aspects of studies about the Triple Bottom Line (TBL) sustainability concept. This concept was developed "to broaden businesses focus to include their social and environmental impacts in addition to their economic profits" (Faux, 2005; Tyrrell & Johnston, 2012). It seems that when hotels embrace a TBL sustainability philosophy

they become more competitive, since this approach is about “maximizing the positive (...) impacts of tourism while minimizing the negatives” (Faux, 2005; Stoddard *et al.*, 2012; Tyrrell *et al.*, 2013), resulting, therefore, in better market positioning, enhanced stakeholder relationships, efficiency and cost savings, superior tactical decision making and increased competitiveness (Tyrrell *et al.*, 2013).

Other studies also approach the benefits of adopting sustainability initiatives, mentioning the improvement and optimization of operational efficiency, via savings in water and energy (Chan & Lam, 2003; Deng & Burnett, 2002) or waste management and recycling (Radwan *et al.*, 2012). The relationship between the hotel’s star rating and the degree of implementation of sustainability initiatives is also often addressed in research studies. Álvarez *et al.*, (2001), Claver *et al.*, (2007) & Tarí *et al.*, (2010), Ali *et al.* (2014) and Al-Aomar & Hussain (2017) agreed that hotels with higher star ratings (4 and 5 stars) show a higher level of concern towards the environment, with more advanced environmental strategies. Another often addressed aspect is the level of adoption of sustainable practices, which has been evaluated as modest by Hobson & Essex (2001) having determined the reduction of energy consumption as the most broadly integrated activity. Lastly, in several studies it is perceptible that the inclusion of sustainability within the hospitality industry is moved by an interest of attracting consumers, potential employees and in cost savings, rather than a sense of responsibility and concern with the health of the planet.

## **2.2 Hotel Supply Chain**

### **2.2.1 Green Supply Chain Management in the Hospitality Industry**

Green supply chain management (GSCM) is the integration of environmental concerns into the inter-organizational practices of supply chain management, including green procurement, green manufacturing, green distribution, and reverse logistics (Amemba, 2013; Sarkis, Zhu & Lai, 2011). In the case of the lodging sector, GSCM comes to ease the typical negative aspects



associated with a hotel's operation, striving at conserving scarce resources, by reducing waste and costs, minimizing pollution, saving energy, and reducing carbon emissions. Thus, its adoption promotes a performance improvement at the level of the processes and products, leading to fewer operational costs, better cooperation with suppliers, and lower environmental impacts along hotels' supply chain. Consequently, GSCM contributes towards the TBL sustainability model, by joining together social, environmental, and economic concerns. GSCM is in fact a business value driver (Wilkerson, 2005), being a source of competitive advantage. For that reason, it has emerged as an important organizational strategy for hotels.

To structure the hotel supply chain and study how the green practices were allocated throughout the different stages, Al-Aomar & Hussain (2017) used a Supplier-Input-Process-Output-Customer chart (SIPOC), stating that this chart simplifies "collaboration linkage of different supply chain partners". Overall, this approach provides hotels with know-how regarding the root causes of wastes and the effective implementation of appropriate green practices to each stage of the supply chain.

Current literature on GSCM is mostly researched from the point of view of a specific country or market. For instance, Al-Aomar & Hussain's research focused on hotels in the United Arab Emirates, and showed that hotels confirmed the need to adopt green practices, despite producing a lot of waste. Most hotels presented medium to high experience in adopting such practices, spreading them across the supply chain, mainly in the key stages of input, process and output. The authors found the most common practices were recycling and reuse, as well as the application of green technology to conserve energy and water, such as solar panels and LED lights. Waste prevention was also considered by some hotels as a key green practice, while others focused on the management of generated waste through a pulper system. Additionally, several hotels implemented environmental standards, such as the ISO 14001, which the authors suggest should be applied. Similarly, Amemba (2013) focuses on Kenyan hotels, and offers

recommendations for green practices. These include: guaranteeing suppliers are environmentally friendly, (green procurement); imposing the use of biodegradable raw materials and inputs (green design); recycling, reusing and applying reverse logistics to attain environmental efficiency (green operations); favouring fresh produce from local farms and solar energy (green manufacturing); and finally, using water efficiently to control waste (waste management).

However, hotels still face challenges in adopting green practices throughout the supply chain. In Al-Aomar & Hussain's work, hotels pointed to the lack of know-how and insufficient management support as key roadblocks for the integration of green practices. In some specific cases the fact that management "still do not view the costs associated with green practices as investment towards waste reduction, more effectiveness, better social impact and higher guest satisfaction" (Al-Aomar & Hussain, 2017), was also a challenge. Furthermore, the authors claim that "hotels still view sustainability as adhering to environmental standards and audits rather than the effective implementation of green practices" (Al-Aomar & Hussain, 2017). Nevertheless, across the literature, different authors agree on the positive effect that GSCM has on all competitive priorities, with the conclusion that the "more competent the company is in terms of GSCM, the higher its performance" (Astawa *et al.*, 2020).

### **2.2.2 Green Supply Chain Management in the Portuguese Hospitality Industry**

One of the few studies on the topic of GSCM that addresses the case of the Portuguese hospitality industry is Alemão (2019). Using an empirical model to evaluate the level of presence of environmental sustainability practices on the supply chain of 1-, 2-, 3-, 4-, and 5-star hotels in Porto, Lisbon and Algarve, the author classified the results in low, medium, and high. Out of 28 surveyed hotels, 18 had a low level of implementation, 10 a medium level and no hotel had a high level. Additionally, the author found that only 3-, 4- and 5-star hotels have

a medium level of implementation, with Algarve being the region where most hotels have a medium rather than low level.

All hotels surveyed had implemented at least one environmental sustainability practice, showing, therefore, some development. Most of these practices were in the areas of waste treatment, water conservation and treatment, general internal tools of environmental sustainability and energy. Within these areas the most adopted practices were LED lighting, solar effect (double glazing on doors and windows) and tools in energy and water consumption. In terms of other environmental practices, hotels also approached the theme of dealing with staff, suppliers, and customers in a green-directed way.

Finally, and similarly to the conclusions of aforementioned studies, Alemão concluded that in Portugal “4- and 5-star hotels have a higher level of environmental sustainability practices” and that around 60% of the hotels confirmed to feel barriers regarding the implementation of new practices, such as financial barriers, difficulties on the implementation process, and low acceptance from staff.

### **3 Research Question & Methodology**

#### **3.1 Objectives and Research Question**

The main goal of the present study is to evaluate the degree of integration of supply chain sustainability initiatives in Lisbon urban hotels. A second goal is a preliminary assessment of employee knowledge and awareness about sustainability in the supply chain.

The few papers on the topic of sustainability in the supply chain of Portuguese hotels cover all types of hotels throughout the country, while the present study focuses on 4- and 5-star urban hotels in Lisbon. The motivation behind this is that these hotels are located within urban centres, having a smaller direct impact in the surrounding natural environment and, therefore, lower incentives to integrate sustainability initiatives in their supply chains. This stands in contrast

with other venues such as rural hotels, eco-resorts/resorts, and beach hotels, which are often surrounded by nature, thus incentivizing the inclusion of at least some sustainability practices (Kularatnea *et al.* 2019). The focus on Lisbon derives from the fact that it is the largest and one of the most attractive cities in the country, contributing significantly towards the health of its economy.

With these objectives in mind, the following research question was defined: What is the degree of implementation of sustainability initiatives throughout the supply chain of Lisbon's 4- and 5-star urban hotels? To answer this question, the following hypotheses were delineated:

1. Most 4- and 5- star urban hotels in Lisbon are in a stage where they already have not only sustainability initiatives, but also a Sustainability Management System.
2. Most hotels have at least two initiatives in waste management and several in other practices.
3. Most hotels address their employees and guests in a sustainability-directed way.
4. The adopted sustainability initiatives are implemented by most hotels in at least three stages of the supply chain.
5. Most hotels show some knowledge and interest in this issue by pointing out internal and external motivations to integrate sustainability initiatives within the hotel's supply chain.
6. Most hotels are willing to further develop and amplify the current initiatives.
7. Most hotels have not internalized their approach to sustainability as part of their culture.

The present study also addresses whether there are differences in the degree of implementation between 4- and 5-star hotels. As for the additional objective, that of employee awareness, a gap in the literature was found, as most research focuses on how sustainable hotels are more attractive in terms of employability and how it contributes for employee productivity. However,

it is also relevant to assess the knowledge and level of concern of employees, since ultimately their mentality may impact hotels' ability and willingness to implement initiatives.

## **3.2 Methodology**

### **3.2.1 Overview**

An anonymized survey was sent to several 4- and 5-star urban hotels in Lisbon, initially via email and later in person. A total of 54 surveys were sent, producing 25 responses. To avoid duplicates, respondents were asked to email back to confirm they had completed the survey. The email asked that the respondent should preferably be someone responsible or knowledgeable of the sustainability decisions within the hotel.

### **3.2.2 Survey description**

The survey began with three questions about the stars of the hotel, the position of the respondent as well as how long had they been working on the hotel for. It then followed with section I, where 6 questions addressed the personal view and awareness of the respondent regarding the issue of sustainability within the hospitality industry. The last part of the survey, section II, proceeded with 19 questions about the hotel itself in the context of sustainability.

### **3.2.3 Data treatment**

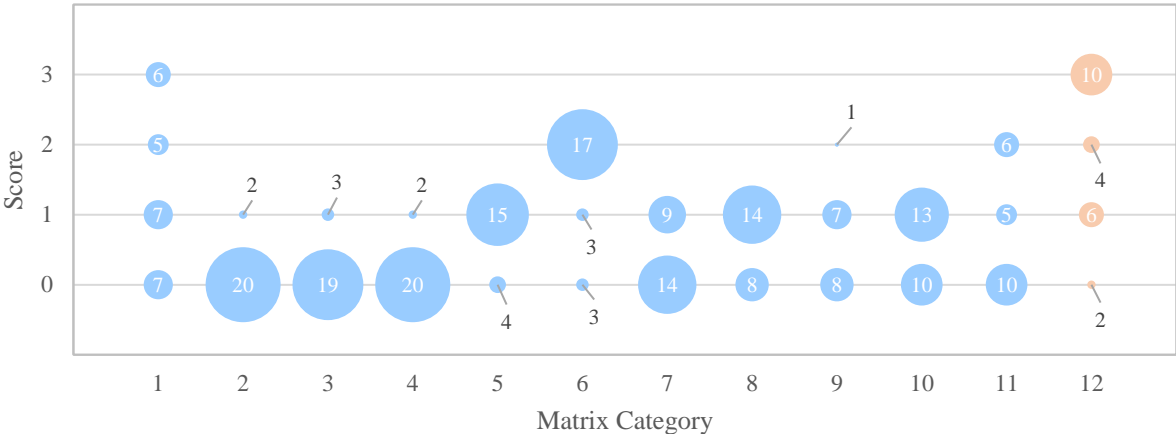
The survey responses were analysed question by question. Additionally, a matrix was constructed to facilitate data analysis (see appendix), by aggregating survey questions into different categories, based on their interdependence, the similarity of content and the perspective of evolution that some questions represented together, and scoring each category according to specific criteria. Due to the reduced sample size and the diversity of answers, it was not possible to conduct statistical hypothesis testing. In some cases, there were only few positive answers, which would make statistical tests unreliable. Consequently, a descriptive

analysis was conducted instead, which, although not as robust as hypothesis testing, provides some clues about possible development paths in terms of sustainability.

**4 Results**

Of the 25 responses, 44% (11) are from 4-star hotels and, 56% (14) from 5-star hotels. The respondents performed mostly functions in the areas of the front office (48%, 12), reservations (12%, 3) and top management (8%, 2). When asked for how long they had been working on the hotel, the most common answers were: one year (20%, 5), two years (20%, 5) or three years (16%, 5). Several of the 19 questions of section II were not mandatory and therefore, few of those questions have the total of 25 answers.

The first three questions of the section II were aggregated in the aforementioned matrix (appendix; see also **Figure 1**). These questions concern the presence of (1) sustainability initiatives throughout the supply chain, (2) a Sustainability Management System (El-Haggar, 2019), and (3) a specific department to handle sustainability issues. These three aspects can be



**Figure 1** - Graphical representation of the analysis matrix (see appendix). Each value on the horizontal axis refers to a different matrix category, while each value on the vertical axis refers to a different score. Bubble width and labels indicate number of hotels with a given score for a given category.  
 Legend: 1—Sustainability department, SMS & Initiatives; 2—Waste Management; 3—Other Practices; 4—Certificates; 5—Willingness to develop current initiatives; 6—Motivations to implement initiatives (internal vs external); 7—Sustainability training for employees; 8—Incentivizing employees; 9—No. of ways to incentivize employees; 10—Bringing awareness to guests; 11—No. of ways to bring awareness to guests; 12—Obstacles to implement sustainability initiatives (Internal vs Stakeholders).

said to represent a progression in the commitment to sustainability: on a more introductory stage, hotels might start with loose sustainability initiatives, followed by a stage where these are formally organized through a Sustainability Management System, and finally a stage where the hotel already has the latter two plus a sustainability department. Thus, a score of 0 was given to hotels that lack sustainability initiatives, a score of 1 was to hotels that merely have sustainability initiatives, a score of 2 to hotels that also have a Sustainability Management System, and lastly a score of 3 to hotels that have both plus a dedicated department. Out of the 25 answers, the most common scores are 0 (7 hotels, 28%) and 1 (7 hotels, 28%), followed by a score of 3 (6 hotels, 24%). There is not a difference concerning the organizational level between 4- and 5-star hotels, even though 4-star hotels show higher variability (see **Figure 1**).

Secondly, respondents were asked to list the hotel's sustainability initiatives. 7 stated having no initiatives, while other 3 did not answer this question. From the 15 that have initiatives, only four of them provided an extensive and diversified set of initiatives. The other 11 hotels listed few initiatives. Three categories emerged from a new aggregation, Waste Management (WM), Other Practices (OP) and Environmental Certificates (EC). Within WM, three distinct listed initiatives were aggregated, those being reduce, reuse, and recycle initiatives, waste treatment and food waste management. Based on the literature, waste management is usually the most addressed category by hotels integrating sustainability at a more developed level (Al-Aomar & Hussain, 2017). Hence, the attributed scores were 0 to hotels who have none or only one initiative and a score of 1 to hotels with two or all three initiatives. The most common score is 0 (20 hotels, 91%) with only two hotels covering at least two different waste management initiatives.

Regarding the OP, six different initiatives were aggregated (controlling energy, water, and gas consumptions; substitution of materials and procedures for more sustainable ones; alerting guests to have a conscious stay; preference for local suppliers; use of zero carbon website and

employee participation in social and environmental actions). A score of 0 was given to hotels with none, one or two initiatives, and a score of 1 to hotels with either three, four, five or all six initiatives. Once again, the most common score is 0 (19 hotels, 86%), with only three hotels covering at least three different initiatives within OP. As for the EC, a score of 0 was given to hotels that did not claim to have certificates and 1 to hotels with at least one certificate. The most common score is 0 (20 hotels, 91%), with only two hotels receiving a score of 1 for having an ISO 14001 certificate (see **Figure 1**). Given that few 5-star hotels answered this question it is not possible to determine if there is a difference between 4- and 5-star hotels.

Of the total of nine initiatives (three from WM and six from OP) the one that is most adopted by hotels is the WM initiative Reduce, Reuse, Recycle (9 hotels, 41%), followed by the three OPs of (1) controlling energy, gas, and water consumption, (2) substituting materials and procedures for more sustainable ones, and (3) alerting guests to have a conscious stay (each with 5 hotels, 23%). Moreover, most of the adopted initiatives belong to the OP category (18 initiatives, 56%). Lastly, most of the 15 hotels adopt initiatives from only one of the categories, with only 4 (26,7%) adopting initiatives belonging to both categories (WM & OP).

The survey also asked hotels about their willingness to develop and amplify current initiatives attributing a score of 0 whenever hotels were unwilling and 1 when hotels expressed an interest (see **Figure 1**). Out of 19 answers, the most common score is 1 (15 hotels, 79%). Of the ten 4-star hotels that answered, 90% of them are willing to develop current initiatives, and of the nine 5-star hotels 67% want to do so. Next, respondents were asked about the motivations that led the hotel to implement sustainability within the supply chain (23 answers). To aggregate and score this category the following perspective was considered: hotels can be at a stage where the main concern is their internal operation, with motivations such as improving operational performance and decreasing costs and waste, or at a stage where hotels are also concerned with the aspects of the overall business, including external motivations, such as social concern and



responsibility. Hence, a score of 0 was given to hotels with no motivations, a score of 1 to hotels with only internal motivations, and a score of 2 to hotels with external motivations (see **Figure 1**). Most hotels scored 2 (17 hotels, 74%), however it must be noted that two go against the described rationale, with the respondents claiming to have external but not internal motivations, and therefore these might be skewing the result. The difference between 4- and 5-star hotels is that all 4-star hotels chose both internal and external motivations, while some of the 5-star hotels chose only internal ones.

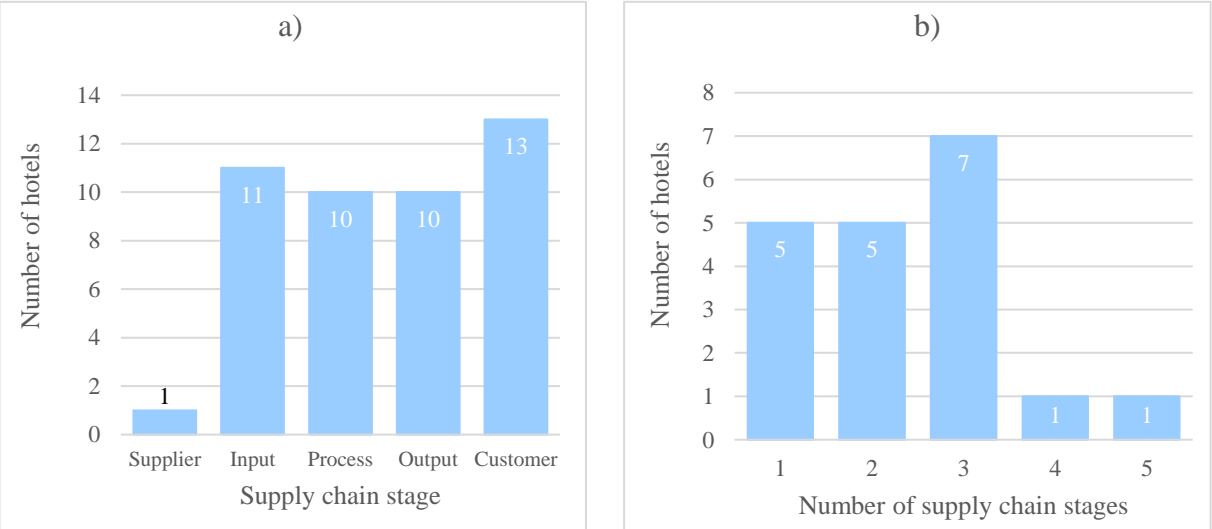
The survey proceeded to ask if hotels give sustainability training to their employees (23 answers) and if they are incentivized to incorporate sustainability initiatives into their daily tasks (22 answers). Both categories scored 0 if hotels do not give training or incentivize employees and 1 if they do. Most hotels (14 hotels, 61%) score 0 in what it concerns the employees' sustainability training and score 1 (14 hotels, 64%) when asked if they incentivize them to incorporate sustainability initiatives into their daily tasks (see **Figure 1**). When compared to 5-star hotels, 4-star hotels are more likely to give sustainability training, but no significant difference found in terms of incentives. Additionally, hotels were also asked to state how employees are incentivized. Of the 14 hotels, only 8 stated the ways to incentivize, such as sustainability training, awareness actions, existence of mandatory readings about the required procedures, daily briefings, among others. Only one hotel stated two different kinds of incentive. Once again, most 5-star hotels did not provide an answer to this question, and thus no comparison can be made.

Similarly, hotels were asked if they bring awareness to guests to have a more conscious stay (23 answers) and how (21 answers). Hotels that do not bring awareness were scored with 0 and those who do with 1 (see **Figure 1**), the latter being the most common score (13 hotels, 57%). There is no difference between the results of 4- and 5-star hotels. As for the ways to bring awareness 11 hotels did not mention any, while the other 10 answers provided some examples,

such as: making information available and visible to guests through fliers or brochures on the reception or left in the rooms, informing that towels (sometimes bed sheets as well) should be reused during the stay, being changed only if requested or if left on the floor; informing that daily room cleaning and amenities' re-stock are only provided through request; among others. Hotels with no way to bring awareness to guests were scored with 0, hotels with only one were scored 1, and hotels using various perspectives were scored 2 (see **Figure 1**). The most common score is 0 (10 hotels, 48%), followed by 2 (6 hotels, 29%).

Finally, the survey inquired about which obstacles managers face when implementing sustainability initiatives (22 answers). These were separated into internal obstacles and obstacles derived from the stakeholders. Most respondents state both internal and stakeholder related obstacles (10 hotels, 43%), followed by those who only mentioned internal obstacles (6 hotels, 27%). The results show no relevant difference between 4-and 5-star hotels. The most cited obstacles are low guest adherence to proposed guidelines (10 hotels, 50%) and increase in costs from the implementation of initiatives (10 hotels, 50%).

Considering the sustainability initiatives and the efforts to bring awareness to guests, it is possible to identify the stages of the supply chain being addressed in terms of sustainability. To



**Figure 2** – Results of the Supplier-Input-Process-Output-Customer (SIPOC) analysis. a) number of hotels that incorporate initiatives in each stage of the supply chain. b) number of hotels per number of supply chain stages addressed.

do so, each initiative was classified in terms of the supply chain stages in which it is comprised (SIPOC—Supplier, Input, Process, Output, Customer), as shown in **Figure 2**. Based on that analysis, of the 19 hotels which have initiatives related to the supply chain, only one hotel (5%) has initiatives throughout all stages, as it is the only one to include the supplier stage. Additionally, 53% (10 hotels) only cover one (5 hotels) or two stages (5 hotels) of the supply chain. Of the hotels covering only one stage, the customer stage is the most addressed (60%), whilst the hotels addressing two stages focus more on Input and Customer (60%). Of the 19 hotels, 7 (37%) cover three stages of the supply chain, and of these, most include initiatives in the Process, Output and Customer stages (3 hotels). Of the 5 different stages, the one most addressed by hotels is Customers (13 hotels, 68%) followed by the Input stage (11 hotels, 58%), with the supplier stage being the least addressed (1 hotel, 5%).

### **Results—Additional research**

When rating a sentence about a higher energy consumption in the hotel industry in comparison with other industries, 40% (10) of the respondents chose “neither agree nor disagree”, and 40% (10) chose “agree”. Next, the statement that in the hotel industry there is a high waste of food, paper, and water, 44% (11) of respondents chose “agree” and 24% chose “totally agree”. All respondents stated that implementing sustainability initiatives within a hotel’s supply chain is important, having as main motivations, the sense of responsibility in terms of social sustainability (23 votes), and the achievement of a competitive advantage (7 votes). The degree of importance of that implementation was evaluated by 64% (16) of respondents as being “indispensable” and by 32% (8) as “important”. Finally, from a list of 5 concepts most respondents chose “Waste Management” (21 votes, 44%), and “Green Supply Chain Management” and “Green Manufacturing” (6 votes each, 24%) as the ones they had implemented or dealt with. Reverse Logistics and Green Design received the least votes, 1 (4%) and 3 (12%) respectively.

## **5 Research Limitations**

Given the low response rate, the sample of the present investigation is limited, which conditions the generalization of results, and constrains the study to a descriptive analysis, rather than statistical hypothesis testing. Furthermore, for most “yes or no” questions a justification was asked for afterwards, and not only were a significant amount of those questions given no justifications, but also some of the justifications provided were vague, making it difficult to substantiate some of the results. Finally, a significant part of the surveys were answered by employees working in front office or reservations, which might mean that they are not fully knowledgeable of their hotel’s sustainability practices.

## **6 Discussion**

To assess the degree of implementation of sustainability initiatives in the supply chain of 4-and 5-star urban hotels in Lisbon, the defined hypotheses will be tested, based on the previously presented results. The goal is to find which of the hypotheses are supported, complementing this analysis with informative data from the survey and matrix.

Firstly, looking at the stage in which hotels are in terms of having only initiatives, or organizing them through a Sustainability Management System or already having a dedicated department, results show that 56% of hotels are equally spread between stages 0 and 1, instead of most of them being already in stage 2 as stated by the first hypothesis, and thus the hypothesis is not supported. Secondly, looking at the areas of sustainability initiatives, based on the results these hotels have very few, given that both on WM and OP most hotels scored 0. Not only do most hotels have less than two different initiatives within WM, but also within SP most hotels have less than 3 initiatives, and hence the second hypothesis is also not supported. On top of that, 7 hotels do not have any sustainability initiatives, which contradicts Alemão (2019), who found that all respondents had at least one initiative. Also, in terms of the specific sustainability

initiatives that hotels have adopted, the most common is Reduce, Reuse, Recycle (part of WM), which is in accordance with Al-Aomar & Hussain (2017) for hotels in the UAE.

Furthermore, looking at how guests and employees are addressed, it can be concluded that, while most employees do not receive sustainability training (61%), most hotels still incentivize them to include sustainability initiatives within their daily tasks (64%), although the number of ways to incentivise is low. As for guests, most hotels bring awareness to having a conscious stay (57%), with a small portion doing so in more than one way (29%). Consequently, both the guests and employees are addressed in a sustainability-directed way, and so the third hypothesis is supported, which is in accordance with Alemão (2019).

Through the SIPOC analysis (**Figure 2**) one can test the hypothesis that most of the implemented initiatives cover at least three stages of the supply chain. Results show that 53% of hotels with sustainability initiatives incorporate them either in one or two stages of the supply chain, and hence this hypothesis is not supported. Similarly, to Al-Aomar & Hussain (2017), the results also show that hotels must extend green practices to their suppliers. However, contrasting with their results, which found the Input, Process and Output stages of the supply chain to be the most addressed by hotels in the UAE, of the hotels that only address one stage in the present work, this stage is most commonly the Customer.

The hypothesis stating that most of these hotels point out both internal and external motivations to integrate sustainability within their supply chain, showing knowledge and interest in sustainability, is supported by the results, since 74% of hotels chose both internal and external motivations (considering, however, the possibility of skewed results in this specific matter). On another positive note, the hypothesis that most hotels are willing to develop and amplify current initiatives is also supported, since 79% of respondents demonstrated interest in doing so.

Finally, regarding the last hypothesis, the overall results show that hotels have not yet internalized sustainability as part of their culture: very few hotels have sustainability departments, most have implemented few initiatives (considering mostly only one of the possible categories of sustainability initiatives), almost none of the hotels provide their employees with sustainability training and only minimal incentives, and, finally, the set of sustainability initiatives and practices are mostly focused on one or two stages of the supply chain, missing several important stages that could bring a more significant impact. Besides this, the hotels covering only one stage most often address the Customer stage, showing that they do not view this issue as an operational responsibility of the hotel. Moreover, the two most cited obstacles to implementing sustainability initiatives are low guest adherence to guidelines and increase in costs, which once again shows a diversion of responsibility to the Customer, and, in accordance with Al-Aomar and Hussain (2017), reveals that managers do not view sustainability as a long-term investment. Therefore, the results support the last hypothesis.

Thus, 3 out of the first 6 hypotheses are not supported while the 7<sup>th</sup> is, meaning that these 4- and 5- star urban hotels in Lisbon have a low or introductory degree of implementation of sustainability initiatives in their supply chains, which is in accordance with Alemão (2019). Possibly, this degree derives from the fact that most of hotels mentioned both internal obstacles and obstacles caused by the stakeholders when implementing these initiatives. Some other results warrant highlighting: despite the fact that only one hotel addresses the supplier stage when referring to Other Practices, few (2 hotels) mentioned the low openness of suppliers as an obstacle. Therefore, it is not possible to find a root cause for hotels to not consider sustainability when dealing with their suppliers. However, there are some traces of commitment in moving towards a medium degree, given that most hotels are willing to develop and amplify current initiatives, and even though it is not a significant part, some hotels (6) are already in stage 3 regarding the first category, which might incentivize others to evolve as well.

Additionally, most hotels can identify both internal and external motivations to implement sustainability initiatives. Comparing between 4-and 5-star hotels, overall, the results do not show any major differences, which is expected due to the limited sample size.

Considering results regarding employees, it is possible to state that most of them, independently of their functions, show availability and openness to consider sustainability issues into their daily tasks and in the overall operation of the hotels. However, two aspects must be emphasized: on the one hand, these employees know few concepts related with sustainability in the supply chain. On the other hand, most of these employees only chose the sense of social responsibility and sustainability as a motivation to implement sustainability initiatives, instead of also mentioning the achievement of competitive advantage, which is also relevant, given that sustainability is widely recognized as a strategic decision for hotels. This can be justified by the fact that most of the respondents have functions related to front office and reservations, not finance or management, meaning their sensibility to recognize competitive advantage as a motivation is lower, as well as the fact that most have been working on the hotels for few years, having less of a concern with the hotels' finances.

## **7 Directions for future research**

The present study reveals multiple potential avenues for future research. One important aspect to improve upon would be to increase the sample size, allowing for statistical hypothesis testing and for a better comparison between the results of 4- and 5-star hotels. It could also be relevant to study whether hotels with environmental certificates have a higher degree of implementation in comparison to hotels addressing sustainability without external partners. Additionally, researching the difference between the degree of sustainability practices of hotel chains and independent hotels could also reveal interesting results.

Other possible avenues are applying these research methods to non-urban hotels, to understand the impact that the surrounding natural environment may have in the willingness to implement sustainability initiatives, and to other Portuguese regions, such as Norte or Algarve. The lack of initiatives within the suppliers' stage of the supply chain also deserves more attention, to find which obstacles are preventing hotels from addressing their suppliers in a sustainability-directed way. Finally, since the supply chain is characterized by interdependent relations and flows of information, future research could study how different stages of the supply chain affect each other in terms of sustainability.

## **8 Conclusion**

The present work project finds that the degree of implementation of sustainability initiatives in 4- and 5-star urban hotels in Lisbon is low. Although surveyed hotels show some knowledge and understanding of the relevance of sustainability as strategic path for the business, they are not yet fully implementing it throughout their supply chain.

In fact, the results reveal that the issue of sustainability is not a priority for surveyed hotels. Most hotels lack a Sustainability Management System and have either loose sustainability initiatives or none at all, lacking initiatives in the categories of both Waste Management and Other Practices. The majority of hotels only address one or two stages of the supply chain, depending too much on the customer stage and mostly ignoring the suppliers. Furthermore, hotels have not internalized sustainability as part of their culture. However, and on a positive note, most hotels address their employees and guests in a sustainability-directed way, recognize both internal and external motivations to implement sustainable practices, and show interest in developing and amplifying current initiatives in the future.

To conclude, surveyed hotels have a long way to go in what concerns sustainability, especially because the real impact will only come from an implementation that covers most of the supply



chain stages—otherwise it will be insufficient. Nevertheless, if hotels do integrate sustainability at more developed levels, considering and maintaining it as part of their culture, in the long run the overall performance will improve, encouraging hotels to keep up with that process.

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## Appendix



**Table 1 - Analysis matrix used in the evaluation of the degree of sustainability initiatives of surveyed hotels.**

Hotel	Hotel stars	Sustainability department SMS Initiatives	Waste Management	Other Practices	Certificates	Willingness to develop current initiatives	Motivations to implement initiatives (internal vs external)
H1	4	0	0	0	0	n/a	0
H2	4	3	1	1	0	1	2
H3	4	1	0	0	0	1	2*
H4	4	0	0	0	0	1	2
H5	4	1	0	0	0	1	2
H6	4	1	0	0	0	1	2
H7	4	2	0	0	0	0	2*
H8	4	2	0	0	0	1	2
H9	4	1	0	0	0	1	2
H10	4	3	0	0	1	1	2
H11	4	3	1	1	1	1	2
H12	5	0	0	0	0	n/a	0
H13	5	1	n/a	n/a	n/a	0	1
H14	5	0	0	0	0	n/a	2
H15	5	1	0	0	0	0	1
H16	5	3	0	0	0	1	2
H17	5	2	n/a	n/a	n/a	1	2
H18	5	2	0	0	0	n/a	n/a
H19	5	3	0	0	0	1	2
H20	5	0	0	0	0	1	2
H21	5	0	0	0	0	n/a	n/a
H22	5	0	0	0	0	n/a	0
H23	5	3	n/a	n/a	n/a	1	2
H24	5	1	0	0	0	0	1
H25	5	2	0	1	0	1	2
<b>Criteria</b>	--	0-No Sus. initiatives 1-Sus. initiatives 2-Sus. Initiatives + System 3-Sus. Initiatives + System + Department	0-None/Only 1 1-At least 2 initiatives	0-None/Only 1 1-At least 3 initiatives	0-No 1-Yes	0-No 1-Yes	0-None 1-Internal 2-Internal + External

\* outliers: report external but not internal motivations

**Table 2 - Analysis matrix used in the evaluation of the degree of sustainability initiatives of surveyed hotels (continuation).**

<i>Hotel</i>	<i>Hotel stars</i>	<i>Sustainability training for employees</i>	<i>Incentives for employees</i>	<i>No. of ways to incentivize employees</i>	<i>Bringing awareness to guests</i>	<i>No. of ways to bring awareness to guests</i>	<i>Obstacles in the implementation (internal vs stakeholders)</i>
<i>H1</i>	4	0	0	0	0	0	0
<i>H2</i>	4	1	1	1	1	1	1
<i>H3</i>	4	0	0	0	0	0	1
<i>H4</i>	4	1	1	n/a	0	0	3
<i>H5</i>	4	1	0	0	1	2	3
<i>H6</i>	4	0	1	1	1	2	3
<i>H7</i>	4	0	0	0	0	0	2
<i>H8</i>	4	1	n/a	n/a	0	0	3
<i>H9</i>	4	0	1	2	1	1	3
<i>H10</i>	4	1	1	1	1	2	1
<i>H11</i>	4	1	1	1	1	2	3
<i>H12</i>	5	0	0	0	0	0	0
<i>H13</i>	5	0	1	n/a	0	0	1
<i>H14</i>	5	0	1	n/a	0	0	1
<i>H15</i>	5	0	0	0	0	0	3
<i>H16</i>	5	1	1	1	1	1	3
<i>H17</i>	5	0	1	n/a	1	1	2
<i>H18</i>	5	n/a	n/a	n/a	n/a	n/a	n/a
<i>H19</i>	5	1	1	1	1	1	3
<i>H20</i>	5	0	1	n/a	1	n/a	2
<i>H21</i>	5	n/a	n/a	n/a	n/a	n/a	n/a
<i>H22</i>	5	0	0	0	0	0	2
<i>H23</i>	5	1	1	n/a	1	n/a	3
<i>H24</i>	5	0	0	0	1	2	1
<i>H25</i>	5	0	1	1	1	2	n/a
<i>Criteria</i>	--	0-No 1-Yes	0-No 1-Yes	0-None 1-One way 2-Several ways	0-No 1-Yes	0-None 1-One way 2-Several ways	0-None 1-Internal 2-Stakeholders 3-Internal + Stakeholders