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Energy Management in Four and Five Star Hotels in Algarve (Portugal)

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Abstract

Tourism is the sector of the global economy that has grown faster, in such way that the United Nations World Tourism Organization (UNWTO) predicts a global average annual growth between 1995 and 2020, around 4.1%. This growth should contribute to a sustainable development and, be accompanied by environmental awareness of all stakeholders, and strategies of change pointing towards the preservation of environment, so as not to endanger the natural resources of future generations.

Energy Management in tourism is the central theme of this research. The setting was 4 and 5 star hotels in Algarve, the most important tourist destination of Portugal. The main objectives of the study were to assess the current state of energy management in those hotels, understand the policies and strategies followed to optimize energy management, and analyze best practices.

Results show a higher level of implementation of practices directly related to the optimization of energy than those related to reducing environmental impacts. In general, respondents consider that energy management is part of the concerns of those responsible for the hotels, the level of implementation of good practices in this area is high (78%) and that both employees and tourists attach great importance to this issue.

Keywords: *Management; Energy; Efficiency; Tourism; Environment;*

Introduction

The recent economic crisis led to a wave of minimizing costs, not only within individuals but also amongst companies and governments. The impacts of such behaviour are being felt all over society. Furthermore, the environmental changes the planet is suffering (such as global warming, greater natural catastrophes, among others) are starting to modify the way we live and do business.

People are increasingly becoming more environmental consciousness and companies feel the need to adapt to this new reality. Therefore, companies in all sectors are naturally becom-

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ing more and more involved in the community, and their problems and concerns. The importance of being efficient is not just because of the economic perspective of cutting costs, but also in a long-term perspective about the development of a company.

Tourism is the sector of the global economy that has grown faster, in such way that the United Nations World Tourism Organization (UNWTO) predicts a global average annual growth between 1995 and 2020, around 4.1%. This growth should contribute to a sustainable development and, be accompanied by environmental awareness of all stakeholders, and strategies of change pointing towards the preservation of environment, so as not to endanger the natural resources of future generations (Mendes, 2012).

Hence, one of the most important challenges of a company working in Tourism is to operate as efficient as possible. Energy is a very expensive resource and an essential one in this sector, which makes energy management in tourism a very important and current problematic. Despite of its importance, the theme has poor focus at national level, in Portugal. This study aims to understand how energy management influences the 4 and 5 star hotels of the most touristic areas of Portugal, Algarve. It is also intends to analyze if energy management is perceived to be an essential or important factor and what are the state-of-the-art policies of companies operating in tourism.

The structure of this article is divided into 7 sections. The first one introduces the theme and its main topics. The second part is the literature review, and the third describes the methodology and strategy used to analyze the topic. The third part will also address the research questions and explain the main motivations to this research. After that, segment 4 and 5 present respectively an analysis of the gathered results, and their former discussion with comparison to other studies. Finally, the last sections will discuss the conclusions reached and present some future areas of investigation.

Literature Review

Corporate Social Responsibility and Energy Efficiency

Environmental consciousness is increasingly gaining importance and, as a result, clients, communities, NGOs (Non Governmental Organizations), suppliers, shareholders, among others, are demanding more from companies. This commitment that is being demanded from companies is the businesses contribute towards a sustainable development and, it is known as Corporate Social Responsibility (CSR) (Petkoski, Twose, 2003). As Hopkins (2004: 1) defines, CSR is:

"CSR is concerned with treating the stakeholders of the firm ethically or in a responsible manner. Ethically or responsible' means treating stakeholders in a manner deemed acceptable in civilized societies. Social includes economic and environmental responsibility. Stakeholders exist both within the firm and outside. The wider aim of social responsibility is to create higher and higher standards of living, while preserving the profitability of the corporation, for peoples both within and outside the corporation."

This commitment demands companies to be pro-active and involve themselves in the improvement of social and environmental conditions, beyond what is required by law (Auld, et al., 2008). Furthermore, companies pursuing a CSR strategy can create a competitive advantage over their competitors. Through investing in environmental development, production costs can be reduced in the medium and long term as they would be investing in

solutions that avoid/minimize waste and ineffective consumption of energy and raw materials (Young, 2007). Besides that, it improves the image of the company and its products among consumers (Young, 2007). Another environmental initiative defends a "top-line value" approach, which sees environmental concerns as a tool towards increasing revenues rather than only to reduce costs (Kashmanian, et al., 2010).

Energy is a fundamental resource for the simplest activities in any company. It is an expensive resource with a constant price fluctuation due to the perishable nature of its origins (mostly non renewable sources). The first energy crisis in the beginning of 1970s drove energy end-users to look for substantial operation costs reduction and new ways to control and measure energy consumption (Okay,Akman, 2010). This was the first step that initiated energy efficiency discussion, since companies began to realize that it was possible to save costs and improve the environment.

As Patterson (1996: 1) explains, energy efficiency is "*using less energy to produce the same amount of services or useful output*". So, if less energy can be used to produce the same service or output, there is room to reduce costs and save money. The basic idea of energy efficiency is to enhance the level of service per unit of energy and/or diminish the energy use per unit of activity (Jollands et al., 2010). In other words, the productivity remains the same with less energy being consumed or it augments with the same level of energy. Several authors have argued that energy efficiency is the most cost-effective strategy to reduce costs and to reduce polluted emissions (Stanford, 1997; Jollands, et al., 2010; Martin, et al., 2011; Abulfotuh, 2007).

Energy Management

In a scenario where companies, industries and governments are under remarkable economic and environmental stress (Turner, 2004), such as the one we face nowadays, this discussion becomes even more relevant. The same author argues that organizations have to survive in global market while they are also pressured to diminish their air and water contamination, which implies the need for investments in technologies. In addition, companies who have already reduced cost from downsizing and still need to improve their economic performance are looking for other solutions such as energy management, which is a viable opportunity with an upcoming tendency for companies to adopt (Turner, 2004). Energy management is "*the strategy of adjusting and optimizing energy, using systems and procedures so as to reduce energy requirements per unit of output while holding constant or reducing total costs of producing the output from these systems*" (Bureau of Energy Efficiency, 2005: 1).

Another interesting definition is presented in the Guide of Energy Management (Capehart, et al., 2003:15), and it considers energy management as a form to "*enhance competitive positions*". Thus, the objectives of energy management, according to the Bureau of Energy Efficiency (2005) are:

- To reduce energy costs/waste with no disruption of production & quality.
- To diminish environmental impacts.

To achieve these objectives an energy management plan or program should be developed. Kannan and Boie (2003) suggest a structure of energy management program that is described in Figure 1.

In addition, the energy management program should be permanent as opposed to a temporary campaign and the enterprise's structure should reflect that (Kannan, Boie, 2003). The Energy Management Handbook presents a structure of a company alongside of an ener-

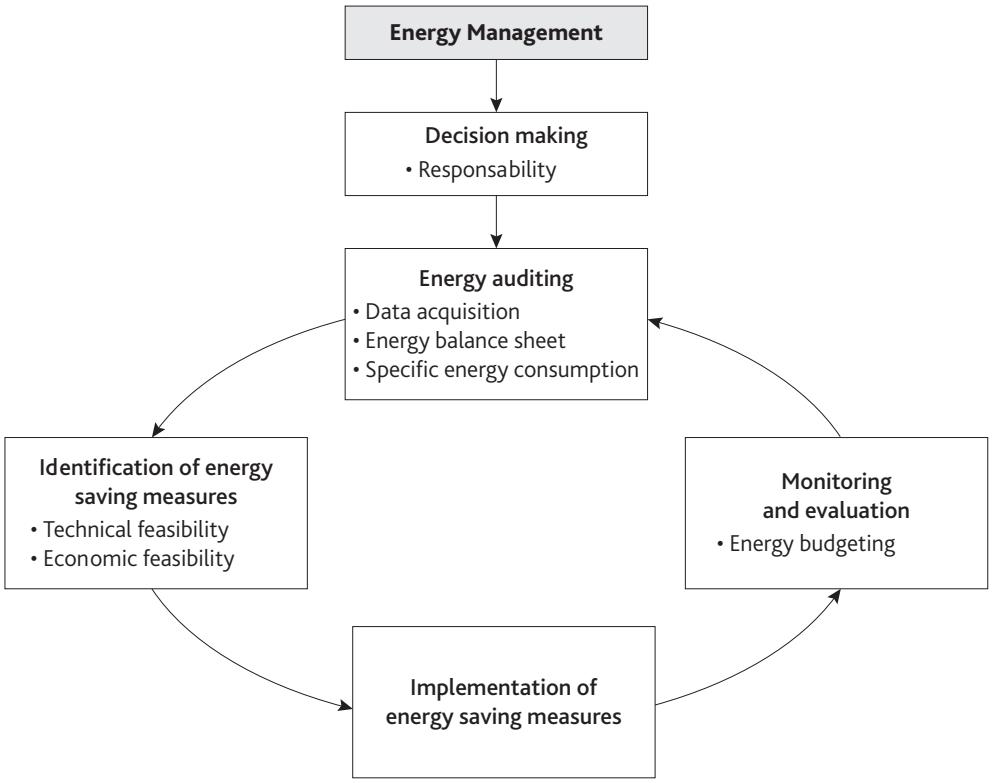

Figure 1. Energy Management Program
Source – "Energy Management Practices in SME - case study of a bakery in German" (Kannan, Boie, 2003)

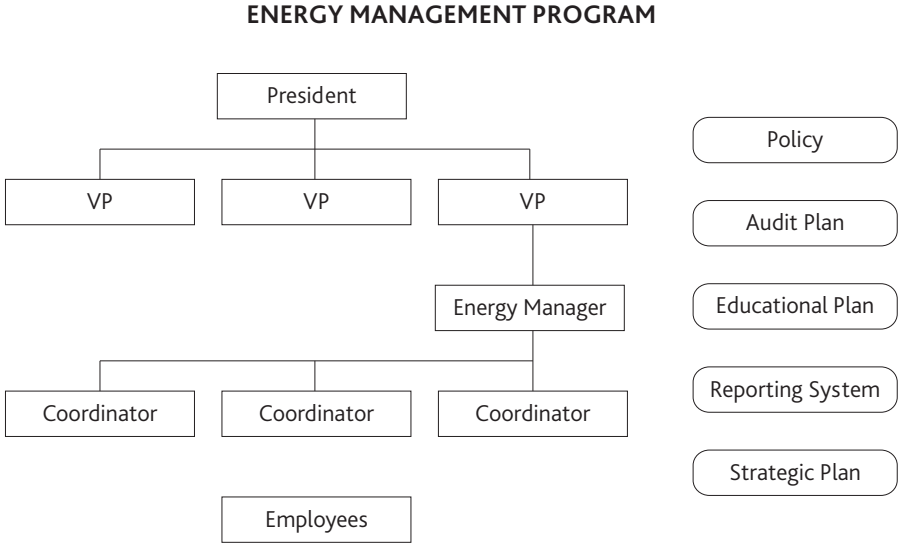

Figure 2. Energy Management Program and the structure of a company
Source –Energy Management Handbook (Turner, 2004)

gy management program, as expressed in Figure 2. It is a broader picture of a program and adds some strategic levels to the previous one shown by Kannan and Boie in Figure 1.

Several authors emphasize the importance of the top management commitment to energy management programs (Kannan, Boie, 2003; Capehart, et al., 2003; Turner, 2004). In fact, the Energy Management Handbook (Turner, 2004) goes one step further and says that without leadership, any energy program is destined to have little results. Moreover, the proximity of the energy manager with the CEO of the company influences the amount of climate practices adopted, that is, the closest this relationship is the more practices should be implemented (Martin, et al., 2011). Under Turner (2004) the effectiveness of these programs can be enhanced if four basic principles are adopted:

1. "*Control the costs of the energy function or service provided*"
2. "*Control energy functions as a product cost, not as a part of manufacturing or general overhead*"
3. "*Control and meter only the main energy functions, the roughly 20% that make up 80% of the costs*"
4. "*Put the major effort of an energy management program into installing controls and achieving results*"

Another aspect that determines the success of the energy management plan is the energy manager. If this person is not selected, chances are that the efforts developed are considered low priority and, consequently, nothing is developed (Capehart, et al., 2003). Therefore the role of the Energy Manager is extremely important and central to the continuous development of the program.

Despite of all these knowledge, there are many profitable energy efficient projects that are not implemented (Kleindorfer, 2010), being possible to find cases where companies refuse investments that allow more energy savings than they cost (Jackson, 2010). This inefficiency of the market is often called the "efficiency gap" (Jackson, 2010; Martin, et al., 2011) and it is the difference between the actual level of investment in energy efficiency and the higher level that would be cost advantageous from the customer's point of view (Brown, 2001). The fundamental reasons for these "efficiency gap" are appointed as market failures and barriers (Goldman, et al., 2005). In this context, the main differences between countries result from their current development and its openness to environmental concerns.

Risk Management and Market barriers

The risk perceived with the implementation of energy management programs is one barrier that countries and their businesses need to acknowledge and overcome. This risk often comes from misinformation, or lack of comparable data when considering new projects. The main barriers identified by Martin et al. (2011: 209) are:

- *"Credit constraints,*
- *Uncertainty about the future,*
- *Managerial factors such as: lack of information, managerial resources or attention to cost-cutting projects outside the scope of the firm's main business, short run optimization behaviour or the application of different hurdle rates to energy related projects".*

Regarding the financial barrier of such projects, Kleindorfer (2010) states that energy performance contracting constitutes a way to mitigate the risk often perceived by investors.

Some of the risks perceived rise from the possibility of disruption of daily routine, the lack of knowledge of the factors that influence energy consumption, the relatively large initial investment, and the uncertain payback period (Kleindorfer, 2010). Energy Service Companies (ESCOs), Shared Savings Providers, Performance Contractors, and other similar companies are already providing services (auditing, energy and economic analyses, capital and monitoring) that assist other companies in these tasks of decreasing their energy consumption and expenditures on energy services (Turner, 2004). This author also adds that these organizations guarantee and share the savings from enhanced energy efficiency and productivity, therefore being an advantage for both parties involved.

Further exploiting market failures and barriers, Sovacool (2009) draw attention to the cultural and social nature present in these barriers, in the renewable energy and energy efficiency sectors in the United States. He argues the idea that people nowadays treat electricity as a commodity, a product abundantly available that combined with changing power stations away from urban centres, lead to an apathy and misunderstanding attitude towards energy. Besides that, Sovacool (2009) points out the existence of misinformation and, in some cases, the wish to remain uninformed. So, if one doesn't know the basics of electricity, its production and how it affects the environment, it is more difficult to convince such person to adopt more efficient habits or to embrace renewable technologies.

The long term success of a company and the proactive energy management is directly connected to its productivity and quality, in a sense that these variables are all connected when addressing energy management in order to endure long term success of a company. Consequently, when organizations implement new energy efficiency technologies, new materials and/or manufacturing processes, and use new technologies in equipment and materials they are not only improving their energy efficiency levels but also their productivity and product or service quality (Turner, 2004).

Total Quality Management, Energy and Employees

Improve productivity and quality, while decreasing environmental emissions and energy costs constitute a great motivation for businesses to put into practice energy management (Turner, 2004). According to Martin et al. (2011) organizations handle the pressure of improving the product and fulfilling the growing market demands, at the same time as decreasing the environmental footprint, through increasing their energy efficiency. Total Quality Management (TQM) is one example of a program that helps companies develop with a broad and integrated approach on how to operate a business thus energy costs should be included in this model (Turner, 2004). This author outlines that the main idea of TQM is that front-line employees should have the power to make modifications and other decisions at the smallest operating level. As a result, if these employees have energy management training, they can easily make educated and rational decisions and advices on energy operating costs (Turner, 2004).

The idea that employees may have a crucial role to play in this energy management program is very important and often not mentioned enough. Employees are part of the structure of any company and are frequently the most unexploited resource for these kinds of programs (Turner, 2004). Involving employees and solicit their ideas on how to use energy in a more efficient manner can be the most fruitful effort of the entire program (Turner, 2004). The author also states that the team that is coordinating the program should be doing so for a specific amount of time, and then rotate. This alternation brings a dynamic component to the

program as new people came with new ideas and approaches, but also it provides the opportunity to diplomatically move non-performers, and to engage a superior number of people (Turner, 2004).

Operational Costs of a Building and Energy Management Systems

The central driver in determining the performance of a building is its operation (Thorpe, Kerr, 2011). This underpins the importance of involving employees in an energy management program. Managing an energy program is not only a technological challenge but also, and the key aspects, dealing with economic limitations and without disrupting the normal course of company's daily operations (Turner, 2004; Thorpe, Kerr, 2011). In order to attain a permanent energy management and, consequently, achieve the potential energy and cost savings a building Energy Management System (EMS) is vital (Doukas, et al., 2007). These systems usually control active systems (lightning, heating, ventilation and air-conditioning, among others) and decide their functioning schedules (Doukas, et al., 2007).

Prior to the EMS, Rikhtegar (2011) defends that an initial strategic phase is essential in optimizing an energy program. The author explains that this strategic phase, named Strategic Energy Review (SER), consists in several actions from *"benchmarking to gap analysis, metric identification, and 'road map' development"* (2011: 32). He then adds that building a SER allows the development of a specific individual EMS for the company. The EMS simply includes information of enhanced best-practices, improved managerial requirements and monitoring tools which make possible for the operator to put in practice and maintain the energy optimization strategies from the SER (Rikhtegar, 2011).

The performance of these systems is logically connected to the quantity of energy used and the comfort of its occupants (Doukas, et al., 2007). It is also a directly related to the quality of system designed (Turner, 2004). More precisely, it is proportional to the activities designed to accomplish the exact monitoring and control needed. So, the strategic energy review phase is crucial and places great influence in the final outcome of the entire program. Turner (2004) highlights the idea that this integration of the SER and EMS should be customized to meet the user's needs. On the other hand, Thorpe and Kerr (2011) argue that EMSs are excellent in gathering vast amount of data, but that data has to be analyzed and transformed into information capable of being used by operators or managers to make informed choices. EMSs are failing to do this transformation in numerous cases and not being able to support in the selection of energy-saving measures (Doukas, et al., 2009). Managers, and the team in charge of coordinating the program, need to make decisions based on information that Hansen (2006) says should be current codes, viability, cost-effectiveness, financial advantage, health and safety needs, and improving the facilities and the work environment.

Undeniably that effective energy management is based on instruments and methodologies that assist the decision-making process in the selection of proposed energy efficiency strategies that aspire to reduce operational costs and reduce environmental harm (Doukas et al., 2009). Hence, the manager and its decisions can affect in a great manner the business and the community in which is involved. For this reason, and with no surprise, energy management across companies within a certain sector is mostly connected to assessable differences in management strategies and practices, than to various climate policy measures (Martin, et al., 2011).

In this sense, Tourism is frequently seen as a clean industry due to its leisure and entertainment aspects. The availability of a fresh natural environment with no the contamination

as is the image of industry in general. However the lodging sector, because of its very particular function, operating features and services provided, consumes vast amounts of energy, water and non-durable products (Min, 2011).

On the other hand, the idea of environmental degradation and natural resources depletion is also frequently associated to tourism. Nevertheless, it is only very recently that literature started to study energy consumption by tourist activities and the resulting greenhouse gas emissions (Bakhat, Rosselló, 2011). Measuring environmental impacts is vital if the sustainability of tourism is to be enhanced. So, it is important to assess the extent of environmental impacts and their associated costs, in order to determine proper development strategies and solutions (Bakhat, Rosselló, 2011). Further on, in the critical discussion, there will be comparisons between the results obtain in this and in similar studies.

When analyzing tourism in New Zealand, Patterson and McDonald (2004:11) acknowledge that traditional studies and policy responses are inclined to ignore the "tourism sector" due to its debatable nature as a sector per se. Tourism is the fastest growing sector in the current economy, the second largest energy consumer and the major CO_2 emissions producer", which calls for special attention in policies regarding energy use and CO_2 emissions (Gössling, 2013).

Reference Framework

Objectives

Tourism is one of the most promising industries and it's expected to grow 3% to 4% worldwide in 2012 according UNWTO (Kester, 2012). In Portugal, tourism is a strategic sector for the economy representing 9.2% of the 2010 GDP (Turismo de Portugal, 2010). Algarve is the main touristic destination of Portugal representing 26.2% of total number of guest in the third quarter of 2011 (Turismo de Portugal, 2010). Moreover, approximately 76% of the total overnights in hotels in 2010 in Algarve were in 4 and 5 stars hotels (Turismo de Portugal, 2010). Consequently, the scenario of this study was 4 and 5 stars hotels in Algarve.

On one hand, is the general "environmental consciousness" that economic growth should be complemented with environmental quality towards sustainable development. On the other hand, is the key player's response that can and are in the right place to begin this change, which means, not only governments but also businesses and industries. Energy management is one example of a solution, and the current importance of this topic seems to be getting an enduring aspect of managing any facility rather than a fashionable subject.

The central question in addressing this topic is to evaluate the state-of-the-art of energy management in 4 and 5 star hotels in Algarve, to understand which policies and strategies are in place to maximize or optimize energy management, and to analyze good energy management practices in hotels that can serve as reference for others. This question has a strong effect in the structure of costs of a hotel since operational costs are very relevant on the overall cost structure.

Research Question

To address these topics the research was divided into two questions that will be answered via testing hypotheses as expressed below.

Research Question 1: Is energy management an established practice in 4 and 5 star hotels in Algarve?

Hypotheses tested:

1. Hotels whose top/senior management have a commitment to improve energy performance have an energy policy officially instituted.
2. The energy management practices adopted are influenced by the category of the hotel.
3. Hotels do have ongoing plans to improve energy efficiency

Research Question 2: What are the main reasons that lead those hotels to implement energy management practices?

Hypotheses tested:

1. The respondents felt that customers attach importance to the issue of energy efficiency.
2. The respondents felt that employees attach importance to the issue of energy efficiency.
3. Hotels are more focused on energy management as a form of improving energy efficiency (cutting costs) rather than as a form of decreasing the environmental impact.

Method

Through crossing the databases of Algarve Tourism Association (Associação de Turismo do Algarve – ATA) with Portuguese Hotel Guide from MaisTurismo, it was possible to count 132 Hotels, where 35 were 5 star and the remaining 97 were 4 star hotels. Since the population was considered small, a questionnaire was sent to all the elements in the population that was possible to contact and obtain information.

The questionnaire contains two distinct parts. The first one related to the managers perspective of operational and strategic aspects of the hotel, the structure of the hotel and its view one employees and customers. The second part related to characterization of the hotel per se. It was developed on an online platform and sent to General Managers and Directors of organizations whose information was available.

Data Analysis

The survey had 51 respondents, which represents a response rate of 38.6%. The 51 respondents were divided between 39 hotels with 4 stars (76%) and 12 with 5 stars (24%). For the 4 star hotels: 34 had less than 100 employees, 3 had between 100 and 250, and 2 had between 251 and 500 (see Table 1). In the case of the 5 star hotels: 5 had less than 100 employees and 7 had between 100 and 250 (see Table 1). There were no hotels with more the 500 employees.

The questionnaire was targeted to the General Manager of the hotel, and in approximately 60.8% of the cases it was the general manager that answered the survey. Close to 23.5%

Table 1. Number of employees

Hotels	Number of employees			Total
	< 100	100 – 250	251 – 500	
4 stars	34	3	2	39 (76%)
5 stars	5	7	0	12 (24%)
Total	39 (76%)	10 (20%)	2 (4%)	51

chose not to identify (NS/NR) and the remaining 15.7% are divided among: Director's Assistant, Finance Director, and Maintenance Director. After having briefly described the characterization of the respondents, the next sections aim to respond to the two research questions that are the focus of this research.

Research Question 1:
Is energy management an established practice in 4 and 5 star hotels in Algarve?

The first research question simply analyzes if energy management is an established practice in this population. It was answered by testing 3 hypothesis: the impact of the commitment from top/senior management, the influence of the category of the hotel in the energy management practices adopted, and the existence of an ongoing action plan to improve energy efficiency.

Hypothesis 1 – Commitment and energy policy

Hypothesis 1 was intended to test the relation between the commitment of top/senior management and the actions developed under energy management. So the hypothesis examined if "hotels whose top/senior management have a commitment to improve energy performance have an energy policy officially instituted".

This particular hypothesis addresses a more strategic aspect of energy management. It has already been stressed the magnitude, for the success of energy management activities within companies, of a clear and official commitment from top management. So, the idea was to know if the hotel had this commitment and its relation with the existence of an energy policy, a manual of good practices, and an energy manager or energy management department.

The hypothesis was supported by the data in relation to the existence of an energy policy and a manual of good practices. This means that if there is a commitment from top/senior management to improve energy performance, the hotel will most likely have an energy policy officially instituted or a manual of good practices implemented.

The hypothesis was not supported by the data in relation with the existence of and energy manager or energy management department, which is to say that, in this population, the commitment is an independent force to the fact that hotels have or not such managers or departments. However, regarding the hotel category, it is more probable for 5 star hotels to have this kind of managers or departments.

Hypothesis 2 – Practices and category of the hotel

Hypothesis 2 intended to test if "the energy management practices adopted are influenced by the category of the hotel". The hypothesis was supported for practices number 7, 14, 15, 16 and 18 (see the entire group of practices in Table 2). These 18 practices being analyzed were develop based on interviews with a general manager and two maintenance directors. These included general, strategic and operational levels, and are presented in the order they were tested.

Results show that, it is more probable for 5 star hotels to have investments aimed at reducing their CO_2 emissions (number 7), automatic internal temperature regulators (number 16), and systems that utilize energy from renewable sources or cogeneration (number 18), than the 4 stars. On the contrary, it is more probable that 4 star hotels have energy class A equipments (number 15), and encourage its employees to turn off the lights when a space is empty (number 14).

Table 2. Group of practices

1	Identification of energy costs
2	Internal communication of the implemented solutions that improve energy efficiency
3	Integration of energy management topics in external reports
4	Identification of energy consumption levels
5	Information search about energy efficiency
6	Investments aimed at reducing their energy consumption
7	Investments aimed at reducing their CO_2 emissions
8	Management of energy consumption through systematic monitoring
9	Evaluation of the systems that generate, transform and utilize energy
10	Measurement of CO_2 emissions
11	Fulfilment of energy efficiency criteria in the structure of their buildings
12	Optimization of the use of daylight
13	Existence of effective lighting systems
14	Encouragement of its employees to turn off the lights when a space is empty
15	Existence of energy class A equipments
16	Existence of automatic internal temperature regulators
17	Existence of a plan for waste optimization
18	Implementation of systems that utilize energy from renewable sources or cogeneration

Hypothesis 3 – Action Plan

Hypothesis 3was intended to test if "The majority of hotels have an ongoing plan to improve energy efficiency". This hypothesis was not supported by the data.

The goal in this hypothesis was to analyze if hotels had an ongoing action plan to improve energy efficiency and, if so, what were the core actions being implemented. The data obtained allowed to conclude that only half of the Hotels had an ongoing plan to improve energy efficiency (approximately 49%). Within these, 16 hotels had 4 stars (64%) and 9 5 stars (36%), which means that 75% of all 5 star hotels had an ongoing plan, while within 4 star hotels there were only 41%.

The main actions involved in these plans were: replacing lightning in 52% of the plans; 20% had measures such as installation of solar panels, monitoring energy consumption, and management of spaces; installation of motion detectors, and changing energy supplier in 12% of the plans; and 8% related to temperature regulation and replacing equipments.

Research Question 2:
What are the main reasons that lead those hotels to implement energy management practices?

The second research question complements the analysis of this research through understanding motivations and reasons that lead hotel managers and operators to implement energy management actions. Three motives were studied under this research question: the commitment of customer, the commitment of staff, and the problematic of energy efficiency versus environmental impact.

Hypothesis 4 – The commitment of Customers

Hypothesis 4 aimed to test if "The respondents felt that customers attach importance to the issue of energy efficiency". The hypothesis was supported by the data. The goal was to understand the opinion of hotel management about the importance that customers attached to energy efficiency. In the respondents' opinion, customers consider energy efficiency to be important (81.2% or 4.06 in a scale of 1-5).

Hypothesis 5 – The commitment of Employees

The purpose of hypothesis 5 was to test if "The respondents felt that employees attach importance to the issue of energy efficiency". This hypothesis was supported. Hypothesis 5 was designed to study the views of managers regarding the importance attributed by employees to energy efficiency. The results indicate that managers perceive that employees consider energy efficiency important (87% or 4.35 in a scale of 1-5).

Hypothesis 6 – Energy efficiency versus decreasing environmental impact

Hypothesis 6 aimed to test if "Hotels are more focused on energy management as a form of improving energy efficiency rather than as a form of decreasing the environmental impact". The hypothesis was supported. In order to analyze the implementation of energy management process and to understand if the driver for the hotels was energy efficiency or the willingness to decrease their environmental impacts, the hotels were asked about their behaviour in relation to 18 different practices, expressed in Table 2.

The average level on the implementation of all practices in hotels is around 78%, or 3.92 in a scale from 1 to 5. This means that, on average each hotel of the population implements near 78% of energy management practices or, in other words, implements approximately 14 of the 18 practices that were being studied.

For the practices directly linked with optimization of energy efficiency this level increases to approximately 83% while, in the practices related with the environmental impact, it falls to 60.9%. Meaning that, the group of practices related to environmental impact was among the less implemented ones.

Best practices

In a scale of 1 to 5, where 5 is the highest level of implementation, the best practices identified in this population were considered to be the ones whose classification was above 4 (or 80%). Consequently, the best practices identified in this study are constituted by 10 measures present in Table 3, and are all related to improving energy efficiency. There are no measures to decrease the environmental impacts in this top. It is important to underline that this top 10 constitutes the best practices that are in place to deal with energy management in this population.

Regarding the nature of these practices, there are three aspects to enhance: the general, the strategic and the operational level present in these practices. The general aspect of energy management was analyzed in the identification of energy costs and energy consumption levels, and in the information search on energy efficiency. All practices were in the top 10 of implementation, which means that, the basic and general aspects of energy management are generally adopted in this population.

The strategic practices are related to the internal and external communication of hotels, and to the investments performed by them. Of this group, three of the four practices reached

Table 3. Best practices

Practice	Level of implementation	
14 – Encouragement of its employees to turn off the lights when a space is empty	4.86	97.3%
1 – Identification of energy costs	4.80	96.1%
4 – Identification of energy consumption levels	4.69	93.7%
2 – Internal communication of the implemented solutions that improve energy efficiency	4.47	89.4%
5 – Information search about energy efficiency	4.25	85.1%
12 – Optimization of the use of daylight	4.24	84.7%
6 – Investments aimed at reducing their energy consumption	4.20	83.9%
13 – Existence of effective lighting systems	4.12	82.4%
3 – Integration of energy management topics in external reports	4.10	82%
8– Management of energy consumption through systematic monitoring	4.02	80.4%

the top 10 implemented ones: internal communication of the implemented solutions that improve energy efficiency (practice number 2), investments aimed at reducing their energy consumption (practice number 6), and integration of energy management topics in external reports (practice number 3). The other strategically practice is not present in this table refers to the investments aimed at reducing CO2 emissions, which is the 4th less adopted practice perhaps because it is related to decreasing environmental impacts.

The operational level aimed to analyze the extent to what hotels agree to have certain practices or behaviours that were more related to the day-to-day actions of a company. This level was constituted by the remaining 11 practices (practices number 8 to 18, see Table 2). Management of energy consumption through systematic monitoring (practices number 8), optimization of the use of daylight (practice number 12), existence of effective lighting systems (practice number 13), and encouragement of employees to turn off the lights when a space is empty (practice number 14), reached the top 10 implemented measures and are therefore considered to be best practices.

Critical Discussion

It is important to compare the findings on this research with the finding of other studies and articles related to energy management in the tourism industry. Min (2011) developed a study about environmental consciousness and performance in Chinese Hospitality Industry, and had a similar response rate (35%). The response rate of this study was approximately 39%. Additionally, the results regarding the occupation of the respondent were very similar in Min (2011). In his analysis, Min (2011) had 62.3% managers, and 15.7% anonymous interviewees, whereas in this study 60.8% where managers and 23.5% chose not to identify (NS/NR).

Kapiki (2010) developed a similar study in 4 and 5 star hotels in Thessaloniki, Greece whose purpose was to identify the energy saving systems as well as to explore whether these systems reduce the energy consumption, and, consequently, the operating costs of the hotels. The results had some similar analogies with the analysis of this research, thus extolling the importance of this issue in an international setting. The magnitude of energy management in a hotel is simply as the following rational: operating a hotel that is not sustainable can cost much more (Kapiki, 2010).

The level of importance assigned by staff in Kapiki's (2010) study was around 50%. In this study the relation between energy efficiency and employees was tested through the perspective of the manager. This research is directed to the manager's point of view and results indicate that the level of importance given was 87%. Still, the difference in the results is very significant which implies that either Portuguese employees are more committed to energy efficiency or Portuguese managers are oblivious from reality.

Choosing 4 and 5 star hotels in Algarve as population of the study may have proven to avoid deviated results. That is, some authors (Assaf, et al., 2012; O'Donnell, et al., 2007) argue that combining different groups of hotels in a sample can deform the efficiency results. For example, there are aspects that differentiate small and large hotels such as: economies of scale, access to technology and market share (Assaf et al., 2012) that clearly have an impact on energy efficiency and environmental impacts.

The homogeneity or heterogeneity of energy efficiency studies in hotels is far from having an accepted and converged conclusion in literature (Assaf et al., 2012). Nevertheless, in a study on Portuguese hotels Barros (2005) concluded that size affected efficiency. Although size was not a variable studied in this study, the group of 4 star is not drastically different in this matter from 5 star hotels. In fact, 76% of the hotels had less than 100 employees, which can relate to the similar size of the structure of the hotels. Thus, small and medium sized 4 and 5 star hotels were the population that mostly constituted this research.

Viegas (2008) developed a study on environmental practices in the hospitality sector in Algarve that comprised 2, 3, 4 and 5 star hotels. The purpose of Viegas (2008) was to understand if the environmental practices of these hotels were contributing to a sustainable development for the touristic destination. In Viega's article, the conclusion reached was that environmental practices were far from being well implemented much less to be able to contribute to the sustainable development of the region. Moreover, most hotels classified as medium-high (80%) in all areas related with the conservation, efficiency and management of energy. In 2012, results from this research also indicate that overall hotels classified as medium-high (78.3%).

Viegas (2008) tested the possibility of energy management practices being well classified due to its strong impact on the cost structure of the hotel. The author discovered that energy related practices rated better with 3.5, in a scale from 1 to 5, or 70%, and that environmental practices were badly implement with a 3.17 level or 63.4%. 4 years later, this study reaches the same conclusion, that is, energy efficiency practices rated 83.3%, and environmental practices 60.9%. In Portugal hotels are forced by legislation to have an energy certificate, which, as Viegas (2008) already predicted, influences the type of practices adopted.

Viegas (2008) already alerted for the fact that environmental practices that were not legislated were less implemented. This was exactly what was being tested with hypothesis 6, which, according to the results obtained, is supported. In this research, this group of practices is among the less implemented ones. In fact practice number 10, measurement of CO_2 emissions, was the least implement measure (49%).

Another example are the renewable energy sources and cogeneration had an implementation level of 50.2%.This is much lower than Kapiki's (2010) study where 76% hotels admit to use renewable energy sources. Min (2011) stated that installation of renewable energy systems was a very frequently implemented measure. So, it is an extremely important practice and the low level of implementation in Algarve is a complete waste of a natural abundant, renewable and clean resource.

In her study, Kapiki (2010) also found that only 13% of hotels admitted to use automatic regulators as opposed to the 63.5% of implementation in this research. Both studies focus on 4 and 5 star hotels so the scope of the population is not an explanation for this difference. Automatic temperature regulators are a more widely expanded practice in Algarve than in Thessaloniki, Greece.

Conclusion

Returning to the first research question initially posed, "Is energy management an established practice in 4 and 5 star hotels in Algarve", the answer in a global perspective is positive. Generally speaking, each hotel implements near 78% of energy management practices or, in other words, implements 14 of the 18 practices that were being studied. Within energy management practices, the practices directly linked with optimization of energy efficiency, are better established (83%) than the practices related with the environmental impact (60.9%).

Regarding the practices studies the category of the hotel was an influence in five measures. It is more probable that 5 star hotels have investments aimed at reducing their CO_2 emissions, automatic internal temperature regulators, and systems that utilize energy from renewable sources or cogeneration, than the 4 stars. On the contrary it is more probable that 4 star hotels to have energy class A equipments, and to encourage its employees to turn off the lights when a space is empty.

Furthermore, only 49% of the hotels in the study have an ongoing plan to improve energy efficiency. Those hotels will more probably have implemented: a commitment to improving energy performance; an energy policy; a manual of good practices; or an energy manager or department.

Generally speaking, if the hotel has a commitment to improve energy efficiency it will be more likely to also have an energy policy or a manual of good practices. Thus, in these hotels, once top management has established a commitment they will probably have paperwork to support it instead of energy managers or departments to accomplish them. The commitment is an independent force to the existence energy manager or energy management department, which means that there is no relation. Nonetheless, it is more probable that 5 star hotels have an energy manager or energy management department than the 4 stars hotel.

To complement the first question, a second one was analyzed so as to know "the main reasons that lead those hotels to implement such practices". Three main reasons were studied in this research: clients, staff, and operational costs versus environmental impacts. Customers and employees attribute a high level of importance to energy efficiency according to the opinion of the interviewees. Since the respondents felt that both stakeholders attach value to energy efficiency, they constitute in fact a reason to implement energy management programs.

The other reason is to increase energy efficiency and consequently reduce operational costs. Decreasing environmental impacts is not a strong reason that leads hotels to implement such practices as it was shown with the considerably lower level of implementation.

Future Areas of Research

From the literature review that accompanied this research all along, and from the analysis of the results and their subsequent, derives the following suggestions for future research:

- Expand the scope of the study to other dimensions of tourism, such as touristic activities and transportation, so as to engage the tourism industry as a whole.
- Further explore the problematic of energy in tourism. Its consumption, measurement and record keeping. This is a very complex topic since it is very hard to obtain data and then be able to make comparisons.
- Understand what can be done to educate tourists into include an environmental perspective in their choices, and to make them acknowledge that their actions have consequential impacts on the local environment, and future development on the tourism industry. In sum, to proactively develop and implement strategies instead of waiting for a mass tourist evolution into 'green tourists'.
- Development of models that help managers to make more assertive choices when considering investments in new technologies or equipments.

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