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Making hotels more energy efficient: the managerial perception

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ABSTRACT

The boom of the tourism industry has led to a huge interest in investing largely in hotel lodgings. Tourists have become aware and started considering new and far from ordinary tourist issues, like environmental protection, waste treatment measures, energy efficiency, renewable energy, green-house gas emissions, etc. The aims of the study are three-fold: (i) to assess the application of energy efficiency practices in the hotel industry; (ii) to explore the determinants of energy consumption; and (iii) to pose valuable recommendations for boosting development of eco-friendly hotels. The research was conducted in Macedonia for the purpose of identifying the impacts of several factors of managing environmental protection practices, in the first line by measuring their current level of influence. The data were obtained by an online survey conducted among managers of three-, four- and five-star hotels and processed by descriptive statistics. The results showed that managers have high positive perceptions on environmental protection issues and pose high awareness of the benefits produced by this concept, thus supporting the European environmental impact assessment regulation. The study recommends new approaches in challenging the hotel industry to decrease the operating costs and suggests that managers are in need for better understanding of the importance of energy efficiency.

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1. Introduction

Hotels are one of the most energy intensive facilities, with correspondingly high energy costs. They are ranked among the top five in terms of energy consumption in the tertiary building sector (Solutions, 2011). It is even noted that energy efficient practices are extremely important to hotels, since they provide savings of 20% or more, due to the fact that, among all operating costs, those of energy utilities are the ones of the most controllable (Natural Resources Canada, 2003). Consequently, there is an inevitable relationship between the hotel industry development and the environmental and energy efficiency impacts.

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The main intention of the management is to focus its activities in the line of reducing operating costs by introducing new sources of energy that preserves the environment by creating an eco-friendly establishment. Cutting the operating costs increases the profit and allows improved competitiveness in the tourism market. The introduction of the energy efficient practices allows enriched guests comfort, increased hotel aesthetic value, reduced maintenance system failures and so forth. These practices enable the environment protection by reducing carbon dioxide, methane, nitrous oxide and other harmful emissions that provoke global-warming and climate changes. Yet, despite gain in efficiency, emissions from tourism are predicted to grow by 135% over the three decades from 2005 to 2035 (United Nations World Tourism Organization, United Nations Environment Program, World Meteorological Organization, 2008). On the other hand, a clean and well-preserved environment is one of the main preconditions for high quality service generally in the hospitality-oriented facility. As a result, the dependent nature of the hotel development may be concluded.

Furthermore, the vast majority of tourists have become aware and started considering not only the quality of the lodgings and tourism-related services, but also some new and far from ordinary tourist issues, like environmental protection, waste treatment measures, energy efficiency, usage of renewable energy sources, green-house gas emissions, etc. In general, they started to seek and would gladly pay more for 'green tourism' or 'eco-friendly tourism' rather than just to select a simple low-cost ordinary hotel that offers standard services. In particular, the hotel managers had to re-arrange quickly their priorities and to implement various measures to meet guest's requests in respect of their increased environmental needs. This means starting with education and training of the hotel personnel, followed by step-by-step implementation of a set of measures towards improvement of services, and finally obtaining green or eco-certificates for the business in order to easily cope with the ever growing competition.

This study is designed to meet the following aims:

(i) To assess the application of the energy efficiency practices in the hotel industry. This is done by providing information on the extent the hotels meet this issue in terms of the current level of involvement;
(ii) To explore the determinants of the energy consumption. This is done by investigating the general nature of the environmental protection, solid waste management, resource usage and protection, as well as the benefits and constraints in applying the energy efficient practices; and
(iii) To pose valuable findings and recommendations to the hotel management for cutting the operational costs, based on saving energy, and to boost development of eco-friendly hotels.

Although this paper adds to the current research on energy efficiency in the hotel industry, its main contribution to the literature lies in its highlighting of the connection between the high managerial awareness for the benefits of applying an energy efficient concept in the business work of hotels on the one hand and the high operational costs as profound limits on the other hand.

The research assessing the managerial perception of hotel managers in Macedonia from this perspective has, thus far, been limited. Some studies focus on only the five-star ranked hotels category (Petrevska & Cingoski, 2015a), putting an accent only to the application

of the renewable sources of energy as a precondition for developing sustainable tourism (Petrevska & Cingoski, 2015b) or becoming an eco-friendly hotel establishment (Petrevska & Cingoski, 2016). So, the current work pays little or no attention to such a comprehensive approach like this paper explores, which represents its novelty. The research that we did has a practical significance since recommends new approaches in challenging the hotel industry to decrease the operating costs and suggests that managers are in need for better understanding the importance of the energy efficiency. The study praises that hotels should induce more pro-environmental attitudes among managers, which is easily manageable if preparing various types of plans that may assist in initiating, monitoring and tracking the energy savings.

Macedonia was selected as the focus of this study because, as a new emerging country, virtually no academic studies have thus far been published on this topic in Macedonia. This article assesses the energy efficiency and environmental awareness among the hoteliers, in the first line by measuring the level of influence of several factors that affect management of environmental protection practices. The next section offers a brief overview of the literature addressing the environmental performance and energy practices, as well as benefits for the hotel industry. Section 3 encompasses the study's methodology and research frame and section 4 provides our main findings and discussion. The article's final two sections offer conclusions and recommendations, as well as limitations of the current study and future work.

2. Literature review

The literature contains a large body of work exploring environmental protection programmes in hotels. So, reducing the energy consumption, recycling or composting food scraps is argued by Bowe (2005), Bruns (2000), Chen, Legrand, and Sloan (2005), Dodd, Hoover, and Revilla (2001), Kallbekken and Saelen (2013), Karagiorgas et al. (2006), Pirani and Arafat (2014), Radwan, Jones, and Minoli (2012), Lu, Wei, Zhang, Kong, and Wu (2012) and Xin, Lu, Zhu, and Wu (2012). Furthermore, hotels have noticed the benefits of improving environmental performance generally by reducing operational costs (Forbes, 2001; Kirk, 1998), sustaining a competitive advantage or increased demand for eco-friendly hotels (Bohdanowicz, 2005a, 2005b; Le, Hollenhorst, Harris, McLaughlin, & Shook, 2006; Vazques, Santos, & Alvarez, 2001).

Even more, some studies found that tourists prefer to consume green products and are willing to pay for eco-friendly services rather than for ordinary hospitality services (Do Valle, Pintassilgo, Matias, & André, 2012; Han & Kim, 2010; Roberts, 1996; Vandermerwe & Oliff, 1990). They have high environmental concerns and perceive a moral obligation to visit green hotels (Chen & Tung, 2014). Moreover, the environmentally-conscious and adequately informed tourists are more willing to pay for renewable energy than others (Kostakis & Sardianou, 2011).

On the other hand, the academia and researchers spent a lot of research efforts and published extensively on the investigated subject. So, the issue of application of the renewable energy sources in tourism and the hotel industry is a relatively well studied area (Ali, Mustafa, Al-Mashaqbah, Mashal, & Mohsen, 2008; Arthur, Baidoo, & Antwi, 2011; Bohdanowicz, 2005a; Butler, 2008; Chen, Duic, Alves, & da Graça Carvalho, 2007; Dalton, Lockington, & Baldock, 2008; Khemiri & Hassairi, 2005; Kim & Han, 2010; Michalena, Hills, & Amat,

2009; Oikonomou et al., 2009). Previous studies were also focused on the green economy and acceptance of renewable sources of energy (Ek, 2005; Jobert, Laborgne, & Mimler, 2007; Mallett, 2007; Zoellner, Schweizer-Ries, & Wemheuer, 2008).

Furthermore, Chou (2014), Khemiri and Hassairi (2005), along with Kirk (1998) and Wang (2012), argue the necessity of the energy use and the hotel environmental performance. All this led to changes in tourists' attitudes towards eco-friendly business establishments (D'Souza & Taghian, 2005) as well as to modifications in purchase, production and operation processes and procedures resulting in an increase in ecological consciousness (D'Souza & Taghian, 2005; Wolfe & Shanklin, 2001).

Additionally, various regulations serve as primary instruments of action for hotels for fulfilling obligatory health and safety regulations, environmental taxes or building leading to industry benchmarking (Kozak, 2004; Pyo, 2001; Wöber, 2001). Even more, some academics put an accent on developing a management system that is in compliance with the legislation, education and economic development policy (Mayaka & Akama, 2007; Warnken, Bradley, & Guilding, 2005), while others point to the environmental planning and management (Ayuso, 2007; Claver-Cortes, Molina-Azorin, Pereira-Moliner, & Lopez-Gamero, 2007; Erdoğan & Baris, 2007; Erdoğan & Tosun, 2009). Although the majority of studies have generally tended to support the findings that hotel businesses succeed in managing a sustainable environment, a smaller number indicated that the mode of hotel industry production, distribution and consumption contribute to environmental crises (Duffy, 2000; Wilson, Harris, & Small, 2008).

3. Methodology

The study followed qualitative and quantitative methods. The qualitative approach included a review of the literature and an analysis of relevant publications. New insights were also gained from websites on environmental protection initiatives and the energy efficiency concept. The quantitative approach covered data obtained from an online survey. A self-administered questionnaire was developed for managers and department supervisors of three-, four- and five-star hotels in Macedonia. The online survey was emailed to the general manager's address, giving a brief description about the aim and objective of the survey. To determine the sampling frame, a list of hotel types was provided by the Sector of Tourism and Hospitality within the Ministry of Economy of the Government of Macedonia. This frame consisted of the necessary information for the sampling units (hotels), which were, further on, divided in three strata by the classification of each hotel (Table 1). This kind of stratification provides homogeneity within each stratum.

A stratified sample was drawn from the classified sampling frame, which consisted of 127 potential respondents. Although the research was ambitious and foreseen to survey all identified managers/department supervisors, only 45 responded, representing a 35.4%

Table 1. Hotels' frame.

Hotel class (stratum)	Number of hotels
Three-star hotels	67
Four-star hotels	44
Five-star hotels	16
Total	127

Source: Ministry of Economy of the Government of Macedonia, Sector of Tourism and Hospitality (www.moe.gov.mk).

response rate. This included 16 out of 67 three-star hotels, 19 out of 44 four-star hotels and 10 out of 16 five-star hotels. The distribution of responses is presented in Figure 1.

A pilot test was launched in order to check the validity of the questionnaire. The survey was conducted during May–June 2015, with a follow-up reminder to each non-respondent approximately each week. The low overall response rate was expected due to the lack of personal contact and less binding (Bohdanowicz, 2005b; Jeong, Oh, & Gregoire, 2003; Medina-Munoz & Garciá-Falcón, 2000).

The questionnaire was based on 32 indicators which were selected among the ones already applied and discussed by Erdoğan (2012), Montoro-Sánchez, Mas-Verdu, and Soriano (2008) and YCELP and CIESIN (2012). The questions were structured in five sections, whereas some included two-choice questions, while in others a five-point Likert scale was applied. The questionnaire structure was as follows:

- Section I addressed the general hotel data, consisting of four open-ended questions referring to hotel category, working history, number of employees, etc.;
- Section II was comprised of 12 questions defining the environment policy;
- Section III incorporated nine questions for measuring indicators for solid waste management;
- Section IV included 11 questions for assessing the usage and savings of resources; and
- Section V covered 10 questions in the line of measuring the managerial perception on benefits and constraints for applying the energy consumption concept.

The statistical evaluation of obtained data was performed by the software package SPSS. The novelty of this study is that the Likert items are observed as ordinal and not interval data, which is a less applied approach in tourism research (Cohen, Manion, & Morrison, 2000; do Valle, Mendes, Guerreiro, & Silva, 2011; Hair, Black, Babin, Anderson, & Tatham, 2010; Jamieson, 2004; Knapp, 1990; Mogey, 1999; Smith, 2010). In terms of multivariate data analysis method, we used the Categorical Principal Component Analysis (C.A.T.P.C.A.) technique to reduce the number of variables, while the reliability of the components is checked by the Cronbach Alpha. The scores of three perception components were compared by Kruskal–Wallis tests. The hotels' classification, in terms of indicators for benefits and

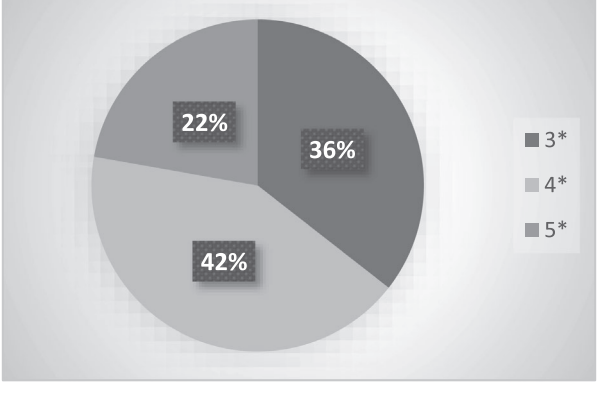

Figure 1. Distribution of responses by hotel type. Source: Authors.

constraints for applying the energy efficiency practices, is made by establishing medians in the components scores.

4. Findings and discussion

Table 2 presents the general hotel data obtained from four-open ended questions for identifying working history, number of employees and the number of rooms. The data on hotel type has been previously visually presented in Figure 1, whereas it is found that 42% are four-star hotels, 36% five-star and 22% three-star hotels. Table 2 reveals that the vast majority of the surveyed hotels (67%) have over 15 years of working history, meaning that they are very-well established and positioned on the tourism and hospitality market in Macedonia. More than half of the surveyed hotels work with 11–30 employees, pointing to a conclusion for taking care about the optimisation of the work force. In terms of accommodation capacity, they are predominantly medium-sized hotels with 21–50 rooms (45%), although one-third are large hotels with more than 50 rooms. According to the Macedonian tourism legislation, one- and two-star hotels can have up to 10 rooms only, three-star hotels can have 15 rooms, while four and five-star hotels should have 20 rooms as a minimum. So, well positioned, with optimum work force and medium-sized hotels, are the surveyed sample.

Further on, we identified the influencing factors of energy efficiency in the hotel industry in Macedonia according to the managerial perception. Table 3 reports the most important summarised results, i.e., only those loadings exceeding 0.5, representing the correlations between the items and components. The last column reports the most frequent response to each attitude statement. The findings suggest that, in general, the management hold a positive attitude towards the energy efficiency concept. The C.A.T.P.C.A. indicates three components accounting for 60.1% of total variance and the Cronbach Alpha coefficients are above 0.6, pointing to acceptable reliability of each component.

Component 1, in Table 3 referred to as Environmental policy, addresses the indicators for interventions and knowledge on environmental protection. The managers perceive the prevention interventions and the employees' training as the most important indicator, due to the fact that employees are ideally positioned not only to identify drafts, leaks, unnecessary lighting and other signs of energy waste, but to provide energy efficiency advice. Yet, both determinants are assessed with medium influence on the hotel's business, so hoteliers provide limited staff environmental training. This is very disappointing when considering that staff training and awareness may cut hotels energy costs by 2–10% in addition to other energy efficiency measures (Natural Resources Canada, 2003: 5). Furthermore, the management claims to have medium knowledge of the environmental protection standard ISO 14,000, which points to rather a modest and limited environmental awareness and concern. The most surprising element is the final item in this component. It addresses the hotels'

Table 2. Summarised results regarding general hotel data.

	1–5	6–10	11–15	Over 15	
Working history (years)	22%	/	11%	67%	
Number of employees	≤ 10	11–30	31–50	51–100	100+
	11%	56%	—	11%	22%
Number of rooms	≤ 10	11–20	21–50	Over 50	
	—	22%	45%	33%	

Source: Authors.

Table 3. Summarised key results.

Component	Sub-component	Item	Loading	Mode*
I. Environmental policy (Alpha = 0.81)	Environmental protection	I_1 -Prevention interventions	0.834	3
		I_2 -Employees training	0.718	3
		I_3-ISO 14,000	0.664	3
		I_4- Hotel's surrounding pollution	0.606	2
II. Resources (Alpha = 0.74)	Usage and savings	I_5 - Changing towels	0.571	5
		I_6 - Central control cooling/heating	0.499	5
		I_7 -Key-card control	0.485	4
		I_8 - Saving lights	0.479	4
		I_9 - Solar	0.466	3
III. Perception (Alpha = 0.63)	Benefits	I_{10} - Environmental protection	0.642	4
		I_{11} -Improved image	0.612	4
		I_{12} - Reduced operational costs	0.579	4
		I_{13} -Enhanced competitiveness	0.514	4
		I_{14} -More guests	0.502	3
	Constraints	I_{15} - Lack of subsidies	0.667	4
		I_{16} - Cost increase	0.511	3
		I_{17} - Technical limits	0.447	3
		I_{18} - Not informed	0.441	3
		I_{19} - Not interested	0.440	3

*Mode (level of influence) 2 = low; 3 = medium; 4 = strong; 5 = very strong.
Source: Authors.

surrounding pollution, resulting as the only factor with a very low influence on the hotels' business. The surveyed hotels stated having an extremely small amount of environmental pollution in the surroundings, so this factor has a low impact when assessing the extent of activities related to environmental protection.

Component 2, referred to as Resources in Table 3, reflects the managerial perception on the energy use and resource conservation (savings). Due to the fact that the use of energy is a cost factor, a priori it was expected that hotels take measures to reduce and replace it with some renewable sources. However, the findings are alarming since they point to extremely limited use of alternative energy sources and new innovative approaches in saving energy consumption. The loadings for the items referring to geothermal energy, bio fuel, photocell lighting, 'smart rooms', dimming system and the use of treated water are far below the critical values, so they are missed from Table 3. The low impact of these determinants indicates that they are meaningless for the hotels' energy efficiency concept. The guest demands for linen and towel changes along with the central cooling/heating system are assessed as very strong factors of an influence on the business. The guests' awareness of energy efficiency is constantly rising by having the choice to use the same towels and linens for the duration of the stay rather than to incur the environmental costs of laundering them each day. This conservative measure is practiced by each hotel and simultaneously increases the guest satisfaction and loyalty by showing their care for energy efficiency and climate change. Similarly, hotels pay large attention to the use of energy saving systems that control every appliance in rooms and a key-card control system that provides no power unless the room-key is inserted. This, along with energy saving light bulbs, is found to be a resource with a strong impact. Not surprisingly is the medium usage of solar energy.

Component 3 in Table 3, referred to as Perception, gathers the benefits and constraints in applying the energy efficiency concept. The first sub-component identifies the benefits as the most intensive factor with strong impacts on the hotels' business. More precisely, the

managers perceive the items which refer to the environmental protection, improved image, reduced operational costs, and enhanced competitiveness as strong determinants, in order to introduce and sustain the energy efficiency practices. So, the surveyed hotels assessed the above items as of better interest than an increase in the number of guests. The summarised results confirm the findings, as in Cunningham (2005), Erdoğan and Baris (2007), Mbaiwa (2003), Trung and Kumar (2005) that, although being aware of the importance of the energy consumption and environmental protection, its stewardship is not a top priority. This is most likely because generally hotels are driven by increasing the number of tourists, regardless of the environmental concerns and with little or no environmentally friendly practices. Namely, the problem is the gap between the environmental awareness and the daily practice of the hotels. The transformation from awareness into practice is constrained by the high costs for applying the energy efficient practices.

The second sub-component of the Perception component identifies the main constraints by their power of limits. As expected, only the lack of subsidies by the local and central government is identified as a factor with a strong influence. It is logical that the hotels will apply the energy saving methods and solid waste management only if they minimise the related expenditures. Furthermore, we found that an average of 59.2% of total surveyed hotels make waste selection. It is interesting to note that 100% of the managers responded that their hotel will select the waste only if the local government provides subsidies. This supports the market postulate for minimisation of costs and maximisation of profit, so that the hotel can survive. All other surveyed indicators in this sub-group (the increase of costs, technical limitations of the hotel facility, as well as the lack of information and interest) are perceived as medium influencing factors for the hotels' business.

The scores of the hotels for each item component, along with the mean value, are visually presented in Figure 2.

Table 4 indicates the percentages of managers classified as having a more positive perception when addressing the surveyed items. The median of each component was computed by Kruskal–Wallis tests, indicating the differences among perception of managers of different hotel types. The managers of five-star hotels strongly perceive the energy efficiency concept. The Mann–Whitney U-tests ($p < 0.01$) show statistical significance of differences between the medians and the χ^2 independence tests perform statistical dependency between hotel type and managerial perception. The non-parametric correlations (Spearman's rho = 0.67: $p = 0.000$) between the hotel's type and managerial perception score (in terms of the components resulting from the C.A.T.P.C.A.) point to: (i) a positive correlation between hotel type and managerial perception; and (ii) a positive and significant correlation between five-star hotels and the energy efficiency concept.

5. Conclusions and recommendations

Hotels consume a substantial quantity of energy, water and other non-durable products, thus provoking substantial environmental impacts. On the other hand, they rely on clean nature and unpolluted environment as a core value for the hotel industry. Tourists often abandon tourism destinations in poor environmental conditions and search for hotels with ecolabel, eco certificate and a certificate for energy efficiency. They are fully aware of numerous environmental concerns the tourism development is facing, so they have shifted their accommodation preferences towards eco-friendly hotel establishments by preferring green

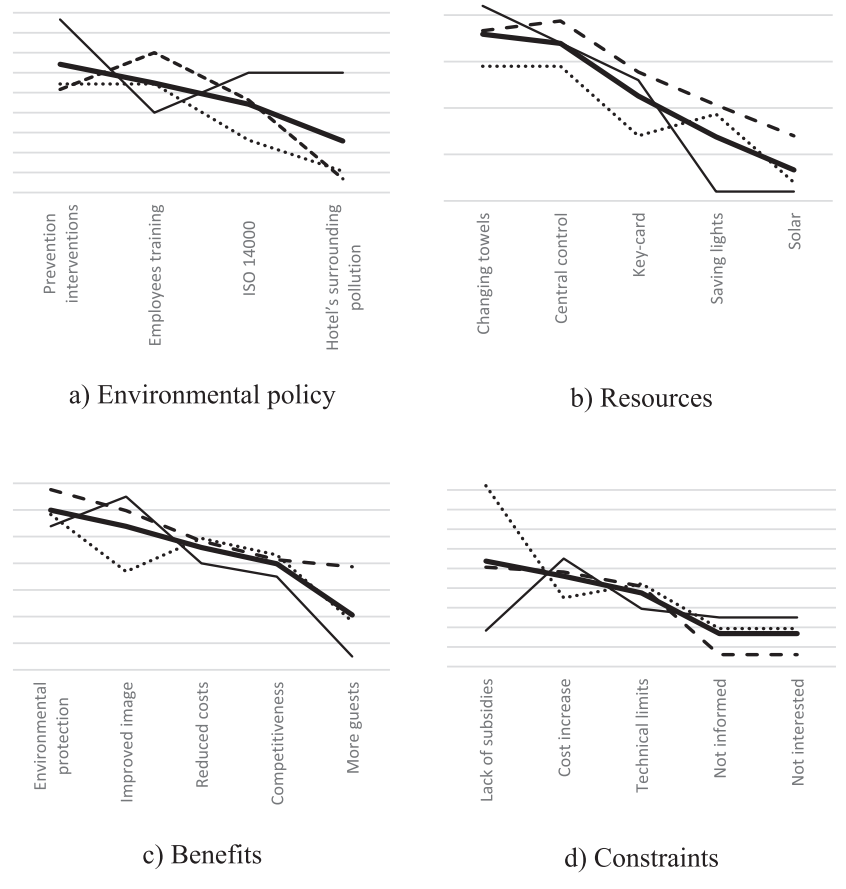

Figure 2. Comparing scores. Source: Authors.

Table 4. Positive managerial perception by hotel type (%).

Component		Overall	Three-star hotels	Four-star hotels	Five-star hotels
Environmental policy		46.8	42.6(1)	43.7(2)	
	Rating*				
$p = 0.004$					45.9 (3)
Resources		59.2	42.4(1)	52.2(3)	
	Rating*				
$p = 0.004$					49.8(2)
Perception		50.3	44.3(1)	48.1(2)	52.4(3)
	Rating*				
$p = 0.000$					

*Rating: 1 = the least positive, 3 = the most positive.
Source: Authors.

products and showing a willingness to pay for 'green' services. Contemporary tourists expect an environmentally responsible hotel to meet their environmental needs and expectations. This provokes a profound modification in the hotel industry, which has steadily recognised

the necessity for becoming greener in order to be well positioned in the competitive tourism market. Consequently, the hotel industry is becoming increasingly environmentally responsible by taking care of energy efficiency. Greater emphasis is put on intense hotel engagement in incorporating environmental policies, human resources management and provision of environmental education for employees.

The study attempted to identify approaches to make the hotels in Macedonia become more energy efficient according to the perception of the managers of three-, four- and five-star hotels. It determined and discussed five types of indicators for perception of: (i) activities related to the environmental protection; (ii) solid waste management; (iii) resource usage and protection; (iv) benefits; and (v) constraints. In this line we found that 56.7% of surveyed hotels hold a Certificate for energy efficiency and 69% prepare written plans for environmental protection. However, 67.3% do not prepare reports on environmental protection and 50.5% do not have an employee responsible for activities related to environmental protection. This is not in favour of supporting the European environmental impact assessment regulation, but the possession of partial documents reflects rather a social responsibility. A large number of hotels do not have an ecolabel (60.9%) nor an ecocertificate (64.6%), although they are widespread tools for policy and marketing tourism strategies. If hotels do hold it, it may provide technical information to tourists in ways that induce them to change relevant behaviours. Consequently, tourists would understand that information, appreciate its significance, trust its reliability, and know how to act more sustainably. Despite the awareness for the benefits of the concept, 96.3% of hotels have never received an award related to environmental protection.

We also found that hotels may benefit from environmental pro-activeness, which is important for tourism development. Yet, the top management is lacking interest in the energy efficiency concept, blaming the restricted financial resources and high operation costs for limited application of renewable resources. Due to overall economic and socio-political problems in Macedonia, hotels are often faced with existential difficulties. Hence, the environmental issues have just recently come to attention, unlike the Scandinavian countries where environmental protection is of high importance and quality and has long received political and financial support at local and national level.

Based on the survey findings, we may recommend that hotel managers in Macedonia should focus on shifting their professional ethics by developing and exerting a wide range of energy efficient practices. This can be easily done by introducing renewable energy sources which will result in reducing hotel energy consumption. Recently, the number of tourists visiting Macedonia increased dramatically, mostly as a result of intensive campaigns, as well as promotion at international tourism fairs. However, this positive trend could not last long if hotels do not follow the modern trends and standards specifically by investing in environmentally friendly hotels and tourism services. Furthermore, the ecolabelling and eco-certification of hotel establishments, along with the utilisation of organic food and penetration of sophisticated information technology at any hotel level, is a priority to the Macedonian hotel industry.

Consequently, the hotels may benefit from the energy conservation measures, not only by saving money, but also in ensuring comfort to the guests and staff. These kinds of measures are good investments in terms of:

- Quick low-cost or no-cost solutions, like a dimming system; Heating, Ventilating and Air Conditioning (HVAC) settings in lobbies, offices and peripheral rooms; covering the pools and hot tubs to diminish heat loss; setting housekeeping procedures to motivate the staff; training the registration staff to book rooms in clusters, etc.; or
- Longer-term solutions, like recommissioning; an upgrade to more-efficient lighting (compact fluorescent lamps, light-emitting diode bulbs, 'group re-lamping' etc.); an instalment of occupancy sensors; an upgrade of the chiller; the use of smart vent hoods in the kitchen; the use of efficient water heating systems; ozone and tunnel washers; heat-recovery systems; heat pumps in swimming pools; adjusting the building management system; control vending machines, etc.

In addition, the study urges a need for applying the environmental protection as well as the energy efficient concept and more frequent penalising of environmentally unsound concepts practiced in hotels. Instead of being focused on quick economic benefits, the hotels should induce more pro-environmental attitudes among managers. This is particularly effective if Macedonian hotels prepare an Energy Management Plan (E.M.P.) as a tool that assists them in initiating, monitoring and tracking the energy savings. These kinds of activities are generally focused on measuring the results which cut the operating costs of hotels.

In this line, we recommend that hotels in Macedonia must implement a three-fold approach in their everyday business:

(i) Technological change – Meaning to introduce and upgrade technologies that are constantly improving and becoming more efficient;
(ii) Behavioural change – Meaning to influence the behaviours of guests and employees, as well as to improve knowledge and skills; and
(iii) Organisational change – Meaning to set up policies, procedures and practices that can assist in driving down the utility costs.

6. Limitations and future work

The research was limited by several factors that can also serve as productive starting points for future work. First, it employed a relatively small set of indicators and could be enhanced by the addition of additional significant indicators to better identify how Macedonian hotels can work more efficiently when addressing energy consumption. Because the data was collected using an online questionnaire survey, the research may also suffer representation of the overall hotel industry in Macedonia. As our research was characterised by a relatively small sample size, future work could focus on increasing the response rate, introducing other aspects of investigation, as well as spreading the target location to other countries. Some new insights on research perspectives may be found in the work of Xin et al. (2012), who argue for the establishment of an energy consumption quota for developing building energy efficiency; Lu et al. (2012) discuss defining total and sub-entry energy consumption indicators; Chou (2014) is focused on the concept of 'green organisational climate' for exploring the hotel's employees' environmental behaviour; while Chen and Tung (2014) suggest developing an extended theory of the planned behaviour model to predict the consumer's intention to visit green hotels.

Finally, instead of using one research technique, future research could employ multiple models and theories relevant to the assessment of the managerial perception on increasing energy efficiency in hotels. Notwithstanding the difficulties involved with assessing the managerial perception on making Macedonian hotels more energy efficient, this article helps us better understand the symptoms and indicators upon which the serious redesigning of the hotels' business strategies should be based. Overall, the research generated useful findings and points to valuable directions for further work.

Disclosure statement

No potential conflict of interest was reported by the authors.

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