

# Integrated Application of Selected Elements of Sustainability, Circular Economy, Bioeconomy, and Environmental Management System in Guesthouses

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Efforts to minimize negative effects on the environment are manifested in the hospitality sector in the form of integrated application of elements of sustainable business, circular economy, bioeconomy, and environmental management. Those who run accommodation facilities are becoming environmentally aware and feel that they should be more involved in sustainable practices and thus contribute to improving the environment both locally and nationally. The main goal of this study is to identify and evaluate the application of selected elements and measures of sustainable business, circular economy, bioeconomy, and environmental management in guesthouses of the Czech Republic. A questionnaire survey ( $n_1 = 343$ ) was carried out together with a qualitative focus group method ( $n_2 = 5$ ); the data evaluation was carried out using advanced statistical methods (Tukey HSD test, Kruskal-Wallis test, correspondence analysis). The results showed that a higher classification in the guesthouse is associated with an increasing trend in the number of environmentally friendly operating methods used. Measures related to waste sorting containers (74%) and energy-saving and LED light bulbs (68%) showed the highest values. The results are useful for the practice of national professional associations that support the careful handling of resources and thereby influence the entire hospitality sector.

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## INTRODUCTION

The COVID-19 pandemic has taught many companies in the hospitality sector to rethink their traditional view of the business. This involves not just an intentional focus on profit but also a change in management and more rigorous monitoring of the effectiveness of the resources spent. Social responsibility and the expectations of local communities, focusing on local suppliers or intensifying cooperation, are coming to the fore.

The hospitality sector encompasses establishments such as canteens, elderly care hospitals, collective accommodation establishments (hotels, motels, guesthouses, *etc.*), schools, restaurants, bars and universities (Malefors *et al.* 2019). As Bux *et al.* (2022) state, from a food system perspective, the hospitality sector is complex in that it has a plethora of actors ranging from small privately-owned restaurants on street corners to global chains present in almost all countries of the world. The same applies to lodging. These are not

only hotels but also, for example, cottage villages, campsites, and tourist hostels. The concept of hospitality in tourism has been defined predominantly from a service encounter perspective, as a dyadic relationship between the service provider and service recipient in a commercial hospitality environment (Munasinge *et al.* 2022). Considering the high heterogeneity of the hospitality sector, the present research considered accommodation establishments, only guesthouses in this manuscript, to obtain as accurate results as possible.

The hospitality sector is considered to be among the most competitive industries (García-Gómez *et al.* 2023), but this sector is responsible for significant amounts of waste (Amicarelli *et al.* 2022). A majority of accommodation establishments are beginning to be environmentally conscious and are aware that hotels and guesthouses should be more engaged in sustainable practices and thus contribute to improving the environment at both the local and national level (Tran 2009). Although environmental practices are expected to be socially beneficial, they often impose additional costs on establishments and hotel guests. Businesses may have to change their production inputs or processes to be environmentally friendly and accept lower profitability, at least in the short term. Guests may be forced to pay extra for a more environmentally-friendly product or service or sacrifice their comfort (Kim *et al.* 2016).

The research results bridged certain gaps in the existing literature. No study has dealt with measures in guesthouses in such a comprehensive manner in the context of sustainability, circular economy, bioeconomy, and environmental management system, not even in the Czech Republic. The research is also useful for practically oriented readers who can be inspired in their business activities in the hospitality sector. For the accommodation services market, the research fulfills an informational function in deciding on the introduction of elements and measures of environmental management. At the same time, the research can be used as a resource when deciding which accommodation facilities can be implemented, in what time frame, and with what positive effect.

## LITERATURE REVIEW

Nowadays, many companies, not only in the hospitality sector, are built on sustainable (green and socially responsible) principles (Cerchione and Bansal 2020; Han 2021). This is in addition to their focus on building long-term relationships and maintaining guest loyalty (Assaker 2020). Sustainable development is based on three pillars (Klarin 2018; Horbach *et al.* 2022): the concept of development (socio-economic development following environmental constraints), the concept of needs (allocation of resources to increase the quality of life), and the concept of future generations (sustainable use of resources in line with the needs of future generations). Vrabcová and Urbancová (2021) add that it is about managing the triple profit, which Belz and Binder (2017) define in the definition of sustainable business as economic, social, and ecological. The circular economy, whose principle lies in the alternative reuse, recycling, and recovery of materials (Saidani *et al.* 2018), is an integral part of sustainable development (Brais Suárez-Eiroa *et al.* 2019; Corona *et al.* 2019; Dantas *et al.* 2021) and represents one of the possible ways to ensure a sustainable business in the hospitality sector (Jones and Wynn 2019; Rodríguez Antón and Alonso Almeida 2019). Bux and Amicarelli (2022) state that research in hotels have been mainly interested in food waste, water and energy consumption, and operators' and consumers' perceptions. These indicators were the most topical concerns from 2011 to

2021, whereas ecosystems protection, rural development, and urban development need more care. There is growing concern about the role that the circular economy, and natural capital could play in transitioning to a more sustainable tourism and hospitality sector. Although both concepts have attracted attention in the academic, professional, and policy literature, several leading hospitality companies (*e.g.*, Marriott, Hilton, Wyndham) have publicly adopted the two concepts to inform their sustainability programs (Jones and Wynn 2022).

Closely connected with sustainable development is a multidisciplinary field called bioeconomy, which has a short historical development (Bugge *et al.* 2016) and represents one of the main paths of sustainable development (Liobikiene *et al.* 2019; Wohlfahrt *et al.* 2019; Linser and Lier 2020; Vrabcová *et al.* 2021). A bioeconomy can be defined as an economy where the basic building blocks for materials, chemicals, and energy come from renewable biological resources (McCormick and Kautto 2013). The circular bioeconomy, whose ambition is the sustainability and efficient use of resources with a low carbon footprint (D'Amato *et al.* 2020; Falcone *et al.* 2020), integrates bioeconomic principles with those of the circular economy (Falcone *et al.* 2020).

The environmental management system according to the international standard ISO series 14000 significantly helps to apply the above directions systematically (Yang *et al.* 2019; Tudoran and Condrea 2020). The basis for integration can be the main requirements, which include the responsibility of top and middle management, a systematic structure of documentation, the goal of continuous improvement, compliance with the requirements of the standard, and, last but not least, the maintenance and operation of systems (De Santis 2021). During its growth, a guesthouse standardizes the above processes and forms a system of a fixed structure of declared powers and responsibilities, which considers cost minimization, high performance in transparent processes, and a flexible information system as the core of its success. Emphasis is particularly placed on agile management (Antlová 2014; Revutska and Maršíková 2021).

The operation of accommodation facilities that integrate the elements of sustainability, circular economy, bioeconomy, and environmental management system can have several positive impacts (Osiako and Kummitha 2020). It is significantly manifested in the field of marketing (Al-Aomar and Hussain 2017; Fuentes-Moraleda *et al.* 2019), as it creates an image, influences current and potential guests, and shapes the positioning of the accommodation facility. Another impact can be perceived in the economic and operational areas (Choi *et al.* 2019), where environmental elements can reduce the costs of operating an accommodation facility in the long term. The societal impact is evident in the saving of resources and thus maintaining the sustainability of the environment in which guesthouses are operated (Han 2021).

A significant emphasis is placed on the application of environmental sustainability in research. Ecological policies at all levels of management, careful production, and frugal use of renewable and non-renewable resources are linked to the environmental pillar. So far, no research has examined the integrated application of elements of sustainable business, circular economy, bioeconomy, and environmental management in guesthouses in the Czech Republic and elsewhere based on the methodological procedures listed below, in which the authors see a significant knowledge gap. However, it is possible to examine other studies dealing with similar issues in the hospitality sector (collective accommodation facilities) abroad (see results and discussion).

**Table 1.** Simplified Comparison of Guesthouses in the Czech Republic

<b>Tourist</b>	<ul style="list-style-type: none"> <li>- Breakfast offer on request</li> <li>- Contact person present at times indicated, non-stop reachable by phone</li> <li>- Shower + WC in the corridor for max. ten rooms (if not in the room)</li> <li>- Washbasin in room</li> <li>- Chair, wardrobe, shelves or drawers for linen</li> <li>- Soap or liquid body soap, one towel per person</li> <li>- Change of bed linen and towels at least once a week</li> <li>- Publicly accessible telephone for guests</li> <li>- Possibility to store valuables</li> <li>- Beverage offer (available anywhere in the guesthouse)</li> </ul>
<b>Economy</b>	<ul style="list-style-type: none"> <li>- Breakfast offer on request</li> <li>- Guest reception or suitable area</li> <li>- Contact person present at times indicated, available 24 hours a day by phone</li> <li>- Shower + WC in the corridor for max. ten rooms (if not in the room)</li> <li>- Washbasin in a room, storage area</li> <li>- Soap or liquid body soap, one towel per person, towel on request, glass</li> <li>- Table, one seating option per bed, reading lamp by each bed</li> <li>- Color TV including remote control (can be rented if not in the room)</li> <li>- Wake-up service</li> <li>- Possibility to store valuables</li> </ul>
<b>Standard</b>	<ul style="list-style-type: none"> <li>- Extended breakfast offer</li> <li>- Guest reception or suitable area, seating in the house</li> <li>- Contact person present at times indicated, available by phone 24 hours a day, foreign language communication</li> <li>- Shower (WC in room, shower curtain), bath screen</li> <li>- Offer of toiletries</li> <li>- Luggage drop-off point (suitcase box in room), mirror at body height</li> <li>- Lighting at a table, bedside table, a reading lamp at each bed</li> <li>- Shampoo, shower gel, tissues, hair dryer</li> <li>- Telephone with call-out / on request /stationery</li> <li>- Change of bed linen and towels at least two times a week</li> <li>- Public PC with Internet</li> <li>- Safe in the building (if not in the room)</li> </ul>
<b>First Class</b>	<ul style="list-style-type: none"> <li>- Breakfast buffet, evening meals on request</li> <li>- Guest reception area with seating, contact person present 24 hours a day</li> <li>- Shower/WC in room, shower curtain/ bath screen</li> <li>- Beauty products, cosmetic mirror, hairdryer, bathrobe on request</li> <li>- Change of bed linen daily on request /respecting ecological principles/</li> <li>- Sofa with a coffee table in the room</li> <li>- Washing machine for guests (laundry &amp; ironing service, ironing board and iron)</li> <li>- Internet connection, Wi-Fi in the room</li> <li>- Safe in room</li> <li>- Parking (on the premises)</li> </ul>

Source: Hotelstars, n.d.

The main goal is to identify and evaluate the application of selected elements and measures of sustainable business, circular economy, bioeconomy, and environmental management in guesthouses of the Czech Republic. A guesthouse is a specific accommodation facility with a minimum of 5 and a maximum of 20 rooms for guests, with a limited range of social and additional services, and is divided into four classes (Tourist, Economy, Standard, First Class). The limited catering services consist of the absence of a restaurant, but a guesthouse must have at least a room for catering, which can be used for guests' daily rest. Furthermore, the guesthouse can have the attribute Superior (*e.g.*, First

Class Superior), which indicates an accommodation facility with more equipment than required. It can be, *e.g.*, a children's corner, playground, garden, sauna, wellness, grill, *etc.*). A guesthouse is usually understood to denote smaller establishment, often family business with a more intimate atmosphere. Table 1 provides a simplified comparison of the guesthouse category classes.

In 2019 there were over 700,000 hotels and resorts worldwide. In 2022, there were 17.5 million guestrooms in 187,000 hotels worldwide, but nobody knows the precise data. As of December 31, 2021, the number of collective accommodation establishments in the Czech Republic was 10,898. The share of all hotels, motels and botels of all classification classes (Tourist, Economy, Standard, First Class, and Luxury) was one-quarter (2,790). The share of guesthouses was over 43% (4,736). Guesthouses were chosen because this is the most numerous category of collective accommodation establishments in the Czech Republic and the fastest-growing category. In 2012, the number of guesthouses was 3,768. Ten years later, there were almost a thousand more (4,736). Even if the guesthouse has a limited range of social and additional services, it is crucial to examine the circular economy, sustainable strategies, *etc.* This category is widely used in the Czech Republic, especially by undemanding tourists, families with children, or one-day business travelers. Since these are essentially micro-enterprises with up to 9 employees, sustainability should be addressed. The research of apartments and hotels in Bulgaria also confirms this fact (Scholz 2019a,b; Scholz *et al.* 2022).

The impact of global tourism growth on the environment has become a major topic in the hospitality sector (Bastič and Gojčič 2012; Chou 2014; Cingoski and Petrevska 2018) in the context of:

- Waste production (Obersteiner *et al.* 2021) and waste management (Filimonau 2021);
- The impact of air transport and other transport options to get to the accommodation facility on the carbon footprint (Ben Youssef and Zeqiri 2022) and the implementation of comprehensive programs to reduce their carbon footprint (Chan 2021);
- The consumption of a large amount of non-durable products, water, and energy (Erdogan and Baris 2007; Ben Youssef and Zeqiri 2022) concerning the application of, *e.g.*, ISO 14001 principles or the reporting of non-financial indicators;
- Employee awareness and environmental behavior of employees (Stacho *et al.* 2022; Xu *et al.* 2022) concerning green human resource management (Umrani *et al.* 2020);
- Irresponsible consumption behavior of hotel guests (Bt Mohamed Sadom *et al.* 2021).

Many environmental measures (following the principles of sustainability, bioeconomy, circular economy, and environmental management) are aimed at reducing the consumption of energy, water, chemicals, and office materials, limiting the generation of waste (including perishable food), increasing the proportion of natural materials, beautifying the environment, reducing noise, and reducing greenhouse gas emissions.

However, according to Jevons (1865), more economical technologies do not lead to the expected reduction in the consumption of fossil resources but they stimulate further demand (Jevons paradox). According to the Jevons paradox, the application of energy-efficient measures in tourism will almost certainly mean that more and more tourists will use them, which will lead to an overall intensification of the impact of tourism on natural

resources, which was confirmed by Chakraborty (2021).

If tourism is to be sustainable within the planetary dimension, the following applies:

- The sustainability of tourism must not be considered as a goal (Chakraborty 2021), but as a means to achieve sustainable business;
- It is necessary to evaluate policy alternatives (Tal 2017) – sustainable budget priorities, political reforms that will help to face the force of the Jevons paradox;
- Emphasis must be placed on the transformation of consumption patterns, consumer education, and education related to sustainable consumption not only in households but also when traveling (Han 2021; Wu *et al.* 2021; He *et al.* 2022);
- It is appropriate to develop the concept of sustainable human resource management and set up a system of environmental education for employees (Hitka *et al.* 2021; Xu *et al.* 2022);
- The Jevons paradox must be overcome in the field of transport (Tal 2017) through technological innovation, new modes of mobility, and refusing transport-dependent culture.

Hotel managers must also pay considerable attention to whether gentle practices do not threaten the satisfaction of guests and their comfort. Although environmental practices are expected to be socially beneficial, they often entail additional costs for accommodations and hotel guests (Kim *et al.* 2016). Regarding the consequences of adopting proactive environmental strategies integrating elements of sustainable business, bioeconomy, circular economy, and environmental management, the results show (Singjai *et al.* 2018) that these strategies positively affect both environmental performance and the performance of the organization that is more competitive.

## RESEARCH METHOD

Quantitative research was conducted from January 2020 to June 2022. The authors are aware of the longer timeframe for data collection, but most guesthouses were closed due to the COVID-19 pandemic, and some closed down, so data collection was then primarily in person. A questionnaire survey was used in cooperation with the Association of Hotels and Restaurants of the Czech Republic, and semi-structured interviews were conducted with owners, general directors, or employees of TOP management of guesthouses. The Association currently has 1,788 members, is stable, and more than 70% of its members have been members for more than five years. The Association had sent an e-mail to all its members who operate accommodation asking them to complete a questionnaire. To increase the return rate of the questionnaire, guesthouses were contacted by email to complete the questionnaire. In addition, the authors had arranged meetings with guesthouse owners or managers to complete the questionnaires through the CAPI and PAPI methods.

The following formula was used to determine the minimum sample size (Krejcie and Morgan 1970),

$$s = \frac{z^2 N r (1-r)}{d^2 (N-1) + z^2 r (1-r)} \quad (1)$$

where  $s$  represents the required minimum sample size,  $z^2$  is the required degree of certainty, reliability (= coefficient 1.96 for a degree of certainty 95%),  $N$  is the total size of the basic

set,  $r$  is the expected degree of deviation, or the expected level of the sample (= 4%, *i.e.*, 0.04), and  $d$  is the permissible degree of deviation (= 3%, *i.e.*, 0.03). The size of the basic set (number of guesthouses in the Czech Republic) is 4,736. The minimum sample size was 159 respondents. For that reason, it can be stated that the sample of respondents was representative, and the research can be generalized to all guesthouses in the Czech Republic.

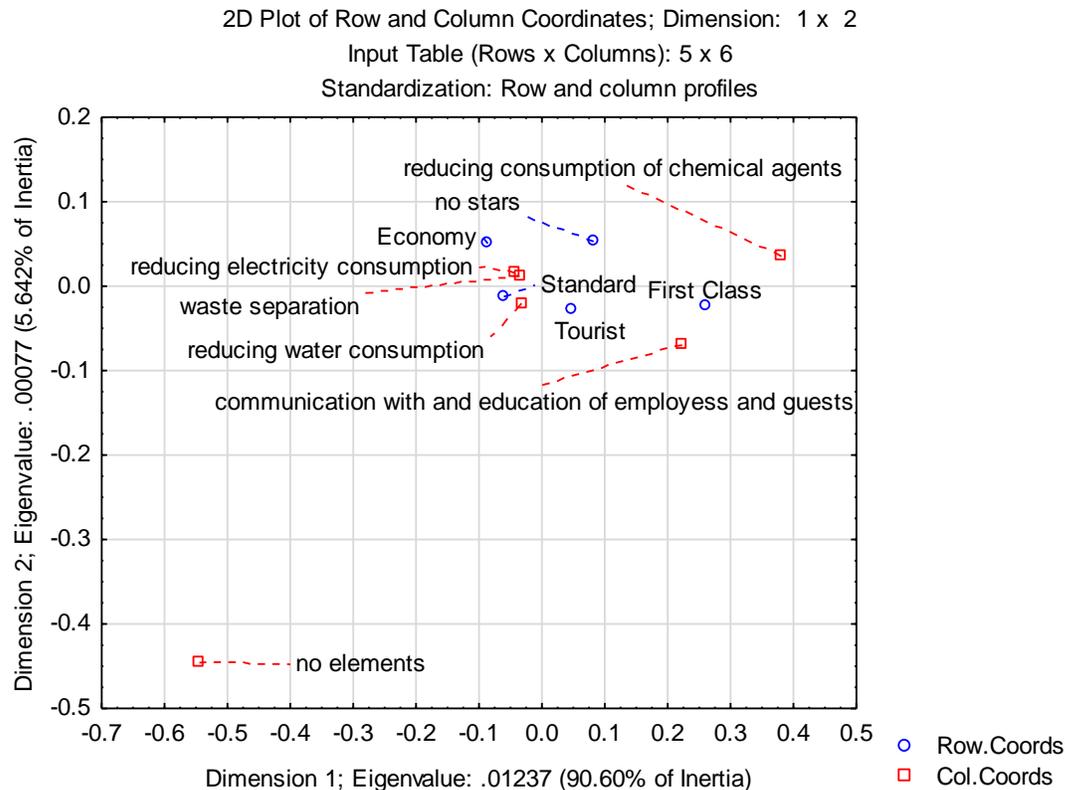
From the sample set ( $n_1 = 343$ ), all classes were included, *i.e.*, Tourist ( $n_3 = 5$ ), Economy ( $n_4 = 31$ ), Standard ( $n_5 = 222$ ), and First Class ( $n_6 = 35$ ). Some guesthouses ( $n_7 = 50$ ) did not have any class (stars). The questionnaire consisted of fifteen questions. The first four questions were general and were used to identify the respondent, *i.e.*, the accommodation facility – categorization and class, number of rooms, *etc.* (Tiwari *et al.* 2020; Yoon *et al.* 2022). The next section of the questionnaire dealt with individual measures and elements of environmental management (Sangeetha and Rebecca 2020; Moise *et al.* 2021; Švec *et al.* 2021). The questions were formulated in such a way that respondents could choose from several options. In addition to the options offered, respondents could also choose the “other” option and express their own opinion or position on the issue. An important question was whether the hotel had an environmental management concept (Tourkoulas *et al.* 2020; Rawashdeh and Al-Ababneh 2021). The questionnaire also asked whether the hotels considered implementing environmental management as an advantage and whether they would seek to obtain an environmental management certificate. All participants remained informed about the research and the privacy of the questionnaire; they were willing to participate in the research and had the opportunity to contact the interviewer *via* the email address provided in the questionnaire list to inquire about the research results. The CAWI (Computer Assisted Web Interviewing), CAPI (Computer Assisted Personal Interviewing), and PAPI (Pen and Paper Interviewing) methods were used to collect the questionnaires (Baker 1992; Weeks 1992; Schröppler *et al.* 2010):

Semi-structured interviews were conducted mainly in cities and towns that have a larger number of collective accommodation establishments, *i.e.*, Prague (910), Karlovy Vary (153), Brno (146), České Budějovice (61), Olomouc (60), but also in other selected regional towns, *i.e.*, Liberec (54), Hradec Králové (35) and Jihlava (27).

The interviews were focused on the use of environmental elements and operational measures of the collective accommodation facilities under investigation. Qualitative research – focus group ( $n_2 = 5 +$  interviewers) took one hour and was based on individual interviews with owners and managers of guesthouses following the results of quantitative research. The focus group method was focused on questions regarding the use of individual environmental measures, the attitudes of guesthouse managers, the fulfillment of legislative obligations, eco-innovation, experience with food waste, and measures that support corporate social responsibility. This method takes advantage of the fact that a group atmosphere can help to relax certain stereotypes and attitudes regarding implementing environmental measures and environmental management. Focus group input supported the results from the questionnaire survey. In the data analysis phase, methods of correspondence analysis, ANOVA test, Levene's test, Kruskal-Wallis test, and Tukey's HSD test were used. IBM SPSS Statistics 22 and STATISTICA 12 were used for graphic representation.

## RESULTS AND DISCUSSION

Among the most used environmental elements in guesthouses, elements reducing the consumption of electricity (93%), waste separation (89%), and water consumption (86%) were evaluated. The least used elements were in the area of reducing the consumption of chemical agents (21%) and communication with and education of employees and guests (21%; Table 2).



**Fig. 1.** Environmental elements in guesthouses

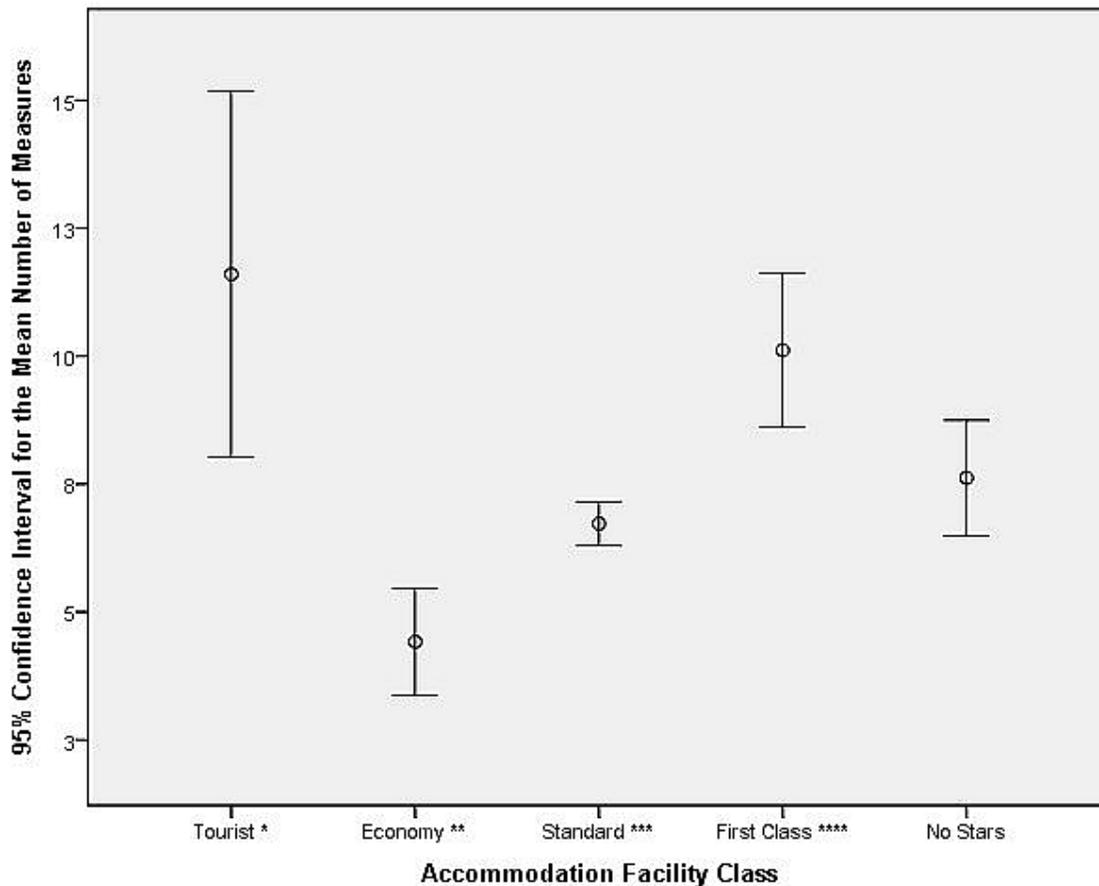
The surveyed Tourist class guesthouses achieved the highest score in the area of waste separation, reduction of water consumption, and reduction of electricity consumption. First Class guesthouses ( $n_6 = 35$ ) achieved the highest score for all five elements of environmental management (except for the first three elements, where Tourist class guesthouses scored 100%) and overall. It is logical that the higher the class of the accommodation facility, the more environmental elements the guesthouse should apply, or the more often the elements should be used. Guesthouses of the Standard class ( $n_5 = 222$ ) achieved average results and recorded slightly lower values than the First Class, but the number of guesthouses was more than six times higher. However, for the element of reducing the consumption of chemical agents, the difference was almost two-thirds (13% vs. 37%), and for the element of communication with and education of employees and guests, more than half (14% vs. 31%). Guesthouses in the Economy class ( $n_4 = 31$ ) achieved satisfactory results only for the element dedicated to waste separation (77%) and the element in the area of reducing electricity consumption (74%). Out of the total number of guesthouses examined ( $n_1 = 343$ ), only 0.29% of guesthouses did not use any

environmental element (Fig. 1). Guesthouses that did not have stars ( $n_7 = 50$ ) achieved comparable results (58%) with the Standard class (Table 2).

**Table 2.** Environmental Elements in Guesthouses in the Czech Republic (Relative Frequencies, %)

Class/ Environmental Element	Waste Separation	Reducing Water Consumption	Reducing Electricity Consumption	Reducing Consumption of Chemical Agents	Communication with and Education of Employees and Guests	Average
Tourist *	100.00	100.00	100.00	20.00	20.00	68.00
Economy **	77.42	67.74	74.19	9.68	9.68	47.74
Standard ***	85.07	85.97	92.31	12.67	14.48	58.10
First Class ****	97.14	97.14	97.14	37.14	31.43	72.00
No stars	80.00	78.00	92.00	22.00	16.00	57.60
Weighted average	88.53	86.44	93.43	20.65	21.48	--

Figure 2 provides a clear overview of the individual classes and the range of error bar intervals, where the Standard class represented the smallest interval range, and the Tourist class had the highest range.



**Fig. 2.** Error bars of individual classes and relevant environmental measures

Guesthouses in the Tourist class applied 18 environmental measures (69%), while 8 measures were not used at all. The highest results were achieved with 6 measures, namely the installation of lever faucets and aerators, the use of two-stage toilet flushing, the regulation of heating and air conditioning in the room separately, the thermal insulation of the building, the use of energy-saving and LED light bulbs and central lighting switches in the rooms and motion sensors. For instance, in the case of the thermal insulation of the building, the other classes of guesthouses did not reach more than 50%. Very good results were achieved with measures related to waste sorting containers (80%), installation of energy-saving shower heads (80%), and thermal insulation of windows (80%). When measuring the use of energy-saving appliances (minimum Class A), guesthouses in this class achieved the highest score of all classes (60%). The same applied to waste sorting bins for plastic, paper, *etc.* in individual rooms (40%) and the separation of biological waste (40%). In addition, the Tourist class dominated (60%) in the measure dedicated to rainwater harvesting, as it obtained a higher value than the sum of the other classes.

The Economy class was lower when comparing the application of environmental measures with the Tourist class. Measures related to waste sorting containers (74%) and energy-saving and LED light bulbs (68%) turned out the highest values. No other measure reached 50%, the highest being the measure dedicated to two-stage toilet flush (45%). Guesthouses in this class did not use 5 measures at all.

Guesthouses in the most numerous class, which was represented by the Standard class, achieved the highest score in the area of waste sorting containers (82%), energy-saving and LED light bulbs (78%), two-stage toilet flushing (71%) and change of bed linen and towels on request (65%). It was the only class to apply all environmental measures. However, concerning other measures, as with the Economy class, it did not reach at least 50%. It is only worth mentioning the measure related to the support of employees in using public transport, *e.g.*, through a travel allowance. Only the Standard class (0.5%) applied this measure.

First Class achieved the highest values for measures related to waste sorting containers (94%), two-stage toilet flushing (86%), change of bed linen and towels on request (83%), and energy-saving and LED light bulbs (77%). Just the measures regarding waste sorting containers and changing bed linen and towels on request achieved the highest values within all the investigated guesthouse classes. For some environmental measures, the First Class achieved several times higher results than the Standard class. The surprising findings were measures regarding the preference for products that are environmentally friendly and can be proud of the “eco” brand (17%) as well as educating employees to apply individual elements of environmental management (23%). Both of these measures scored higher than the sum of all classes.

The second highest number of collected data in the guesthouse category was represented by guesthouses ( $n_7 = 50$ ) that do not have any stars. The highest results were achieved with measures focused on energy-saving and LED light bulbs (90%), waste sorting containers (58%), energy-saving appliances (58%), two-stage toilet flushing (56%), and individual room heating and air conditioning control (54%). The remaining environmental measures did not even reach 50%; however, the results were average to below average in this group (Table 3).

**Table 3.** Use of Individual Measures in Guesthouses (%)

Measure/Class of Accommodation Facility	Tourist * $n_3 = 5$	Economy ** $n_4 = 31$	Standard *** $n_5 = 222$	F. Class **** $n_6 = 35$	No stars $n_7 = 50$
Waste sorting containers	80.00	74.19	81.53	94.29	58.00
Waste sorting bins for plastic, paper, etc. in individual rooms	40.00	3.23	7.66	5.71	24.00
Biological waste sorting	40.00	9.68	16.67	37.14	30.00
Installation of lever faucets and aerators	100.00	16.13	31.08	62.86	42.00
Installation of energy-saving shower heads	80.00	35.48	40.54	62.86	32.00
Using two-stage toilet flushing	100.00	45.16	71.17	85.71	56.00
Rainwater harvesting	60.00	6.45	4.95	17.14	28.00
Individual heating and air-conditioning control in the room	100.00	19.35	33.33	54.29	54.00
Thermal insulation of the building	100.00	9.68	21.62	48.57	32.00
Thermal insulation of windows	80.00	6.45	28.38	40.00	44.00
Using solar energy (solar panels)	0.00	0.00	3.15	2.86	8.00
Using energy-saving appliances (min. class A)	60.00	32.26	40.54	51.43	58.00
Energy-saving LED light bulbs	100.00	67.74	77.93	77.14	90.00
Central lighting switches in the rooms (hotel card), motion sensors	100.00	19.35	35.59	51.43	40.00
Changing bed linen and towels on request	0.00	38.71	65.32	82.86	34.00
Using environmentally friendly (eco) cleaning agents	20.00	9.68	12.61	37.14	22.00
Minimization of single-use products (e.g., soap, butter...)	20.00	6.45	17.57	37.14	22.00
Preferring "eco" products	0.00	0.00	4.05	17.14	2.00
Reuse of recycled materials	0.00	0.00	11.26	20.00	10.00
Using recycled paper	20.00	22.58	32.88	42.86	16.00
Promotion of "eco" program to the public	20.00	6.45	4.95	11.43	8.00
Informing guests about environmental efforts	0.00	6.45	6.31	17.14	12.00
Employee education on environmental management	0.00	3.23	9.46	22.86	0.00
Rewarding employees for environmental improvement proposals	0.00	0.00	0.45	2.86	0.00
Supporting employees to use public transport (e.g., travel allowance)	0.00	0.00	0.45	0.00	0.00
Expanding the menu to include organic meals	20.00	3.23	10.81	28.57	14.00

ANOVA can be used to compare individual classes regarding measures, but there are several assumptions, *e.g.*, homogeneity of variances. Therefore, Levene's test cannot be used (3.052,  $df1 = 4$ ,  $df2 = 338$ , Sig. = 0.017). Therefore, the Kruskal-Wallis test was used, which states that at the 5% level of significance, individual classes were statistically different from each other (Table 4).

**Table 4.** Comparison of Individual Classes

Class of the Accommodation Facility		N	Mean Rank
Measure_total	Tourist *	5	288.90
	Economy **	31	97.18
	Standard ***	222	164.89
	First Class ****	35	243.93
	No stars	50	187.92
	Total	343	

**Table 5.** Tukey HSD test

(I) Class	(J) Class	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Tourist *	Economy **	7.181*	1.667	0.000	2.61	11.75
	Standard ***	4.875*	1.565	0.017	0.58	9.17
	First Class ****	1.486	1.654	0.897	-3.05	6.02
	No stars	3.980	1.623	0.104	-0.47	8.43
Economy **	Tourist *	-7.181*	1.667	0.000	-11.75	-2.61
	Standard ***	-2.306*	0.663	0.005	-4.13	-0.49
	First Class ****	-5.695*	0.853	0.000	-8.04	-3.35
	No stars	-3.201*	0.791	0.001	-5.37	-1.03
Standard ***	Tourist *	-4.875*	1.565	0.017	-9.17	-0.58
	Economy **	2.306*	0.663	0.005	0.49	4.13
	First Class ****	-3.389*	0.629	0.000	-5.11	-1.66
	No stars	-0.895	0.542	0.465	-2.38	0.59
First Class ****	Tourist *	-1.486	1.654	0.897	-6.02	3.05
	Economy **	5.695*	0.853	0.000	3.35	8.04
	Standard ***	3.389*	0.629	0.000	1.66	5.11
	No stars	2.494*	0.763	0.010	0.40	4.59
No stars	Tourist *	-3.980	1.623	0.104	-8.43	0.47
	Economy **	3.201*	0.791	0.001	1.03	5.37
	Standard ***	0.895	0.542	0.465	-0.59	2.38
	First Class ****	-2.494*	0.763	0.010	-4.59	-0.40

When using the Tukey HSD test, differences between individual classes were visible (Table 5). The individual classes varied significantly from each other in terms of the number of implemented measures. At the 5% level of significance, the Tourist class had differences compared to the Economy class (0.000) and Standard class (0.017), which corresponded to the differences in the means in these classes (7.181 vs. 4.875). However, the Tourist class was not significantly different from the First Class and also from the guesthouses that did not have any stars. There were differences between the Economy class and the other classes. The Standard class also achieved differences from the other classes, except for the guesthouse category, which did not have stars (0.465). This difference in averages (-0.895), the 95% confidence interval for this difference (-2.38 and 0.59), also

corresponded to this. There were differences between individual regions of the two most numerous classes (Standard and First Class, Table 6).

**Table 6.** Average Number of Measures in Guesthouses of Combined Classes (Standard and First Class)

Region	Mean	N	Std. Deviation
Prague	8.00	4	2.160
South Bohemian	8.29	24	3.689
South Moravian	8.00	26	3.476
Karlovy Vary	5.71	14	4.027
Vysočina	6.60	20	2.664
Hradec Králové	10.10	29	3.277
Liberec	8.19	27	4.549
Moravian-Silesian	5.45	20	1.877
Olomouc	7.36	25	3.134
Pardubice	5.27	11	1.009
Plzeň	6.33	27	3.932
Central Bohemian	6.33	9	4.123
Ústí nad Labem	4.60	15	2.197
Zlín	5.67	6	1.506
Total	7.19	257	3.615

According to the conducted focus group, guesthouses found the greatest benefit of environmental management in the protection and improvement of the environment, which was confirmed in individual classes and as a whole (weighted average 4.28). The Tourist class recorded the highest value of all guesthouse classes (4.80) for the aforementioned benefit. There is more information regarding the contribution of environmental management in Table 7.

**Table 7.** Benefits of Environmental Management in Guesthouses

Benefit/Class	Tourist *	Economy **	Standard ***	F. Class ****	No stars	Weighted Average
cost savings	3.40	1.45	1.96	2.43	2.74	2.41
increase sales	1.00	1.29	1.66	1.94	1.58	1.73
higher satisfaction of current employees	1.00	1.84	1.69	1.89	1.04	1.62
guest preferences	1.80	1.52	1.96	2.51	2.22	2.13
higher quality of guesthouse	2.60	1.71	1.85	2.49	2.30	1.97
promotion of the guesthouse	1.00	1.65	1.80	2.17	1.48	2.13
competitive advantage compared to other accommodation facilities	1.80	1.68	1.99	2.57	2.16	1.84
protection and improvement of the environment	4.80	3.84	4.01	4.57	4.24	4.28
Average	2.18	1.87	2.12	2.57	2.22	--

Note: 1 – minimum benefit, 5 – maximum benefit

As for the environmental certificate, almost no guesthouse was interested in this type of certificate. Only 2 guesthouses (0.6%) showed an effort to obtain the environmental certificate. As stated by Green Hotel Association (2020), it is not entirely desirable to have an environmental certificate from a financial and time point of view. According to the focus group respondents, it is important that accommodation facilities apply various elements and measures of environmental management, and thus be environmentally friendly even without possessing an environmental certificate. The focus group also showed that it does not matter how the accommodation facility will rely on an environmental certificate or use eco-products when it accommodates those who do not behave environmentally responsibly at home, and even on vacation.

From the focus group, it was found that the topic of sustainable business is interesting, but in some guesthouses, there is a problem with the clientele. Guesthouses are often visited by seniors and families with children, and even if the guests receive information from the owner about sorting waste and reducing water flow, in some cases they are not interested, and the guests behave in an unsustainable way.

Although individual accommodation facilities affect only a small part of the global environment, they can contribute to a certain extent to the solution of major ecological global problems and can be considered as a manifestation of socially responsible behavior towards the local community. The key driving forces of sustainability in the hospitality sector include, according to research results, selected elements of sustainability, circular economy, bioeconomy, and environmental management system, which is in line with the research of Cingoski and Petrevska (2018); Fuentes-Moraleda *et al.* (2019); Cerchione and Bansal (2020); Filimonau (2021). The implementation of pro-environmental measures brings a number of advantages, especially of a non-financial nature (Vrabcová and Urbancová 2021). Among these advantages, especially in the hospitality sector, good relations with investors and customers, improvement of one's own reputation, increase of competitive advantage, increase in brand value, new business opportunities can also be included according to focus group respondents.

However, the stated driving forces are implemented in a certain tool mix, as they are applied in an integrated manner, which is in line with the research of Aboramadan *et al.* (2022). Guesthouses in the Economy class achieved satisfactory results only for the element dedicated to waste separation and the element in the area of reducing electricity consumption. On the other hand, the Waste Act (541/2020 Coll.) states the obligation to sort waste, so the achieved value should be even higher. Out of the total number of guesthouses investigated, a negligible 0.29% of guesthouses did not use any environmental element, which is in line with the researches of Hoogendoorn *et al.* (2015); Fehrest *et al.* (2020).

In the area of communication and the system of environmental education of employees and guests, they are used only in 18% of monitored guesthouses, so there is significant room for improvement, which is in line with the research of Umrani *et al.* (2020); Xu *et al.* (2022).

## CONCLUSIONS

The limit of the research is the selection sample only at the level of the Czech Republic; however, the sample is representative (according to the Krejcie and Morgan methodology) and it is possible to conduct a comparative study with the Visegrad Four

countries in the future, which is the ambition of the authors. Another limit is the risks associated with a quantitative questionnaire survey when some respondents could portray themselves as environmentally responsible in their answers. However, in the cover letter, the authors of the research emphasized not only the anonymity of the research investigation, by explaining the purpose of the study in detail, but also by supplementing the quantitative research with the focus group method.

1. Guesthouses in the Standard class minimized adverse environmental impacts to the greatest degree in the area of waste sorting containers, energy-saving and LED light bulbs, two-stage toilet flushing, and change of bed linen and towels on request.
2. Among the most used environmental measures in guesthouses, based on those that were evaluated, were the elements of reducing the consumption of electricity and water and separating waste. The least used elements were in the area of reducing the consumption of chemical agents and communication with and education of employees and guests.
3. The presented research advances the contribution of tourism (more precisely, guesthouses) research to the understanding of environmentally responsible business in the hospitality sector. The adoption of environmental measures in guesthouses undoubtedly supports the achievement of environmental sustainability and the goals of sustainable development.
4. This study provided: detailed conceptualization of the environmental measures of guesthouses in the Czech Republic; a detailed evaluation of the environmental measures used in guesthouses as a specific form of accommodation within the entire hospitality sector; a discussion of the key drivers of sustainability in the hospitality sector.

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