

SUSTAINABLE HOTEL DEVELOPMENT

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ABSTRACT

Environmentally sound or "green" hotels – perspective business. Active transition to environmentally sound methods, involving protective attitude to natural resources, use of renewable energy sources and recycling, can increase the hotel revenue. Effective use of resources, improve human well-being and ensure social justice, stability with a significant decrease of ecological risks and perspective deterioration of the environment. Social responsibility of the hotels will lead not only to minimization of cost and to decrease the pressure on the environment, but also to consumer demand, which can pay more, to rest in eco-hotels. Hotels working with outdated technologies deliver devastating effect on the environment, however, in condition of stiff competition, risk to lose the opportunity to organize accommodation, and the main risk is to come to general global crisis. Today, the main competitive advantage of a hotel company is the implementation of green technologies and the sooner the hotels go on these technologies, will be better their situation on competitive market.

Keywords Green Tourism, Hotels, Tourist, Vacation Spots, Sustainable Development, Ecology

INTRODUCTION

At the present time, there are a number of ecological problems, such as destruction of natural forest, plants and animals, agricultural mismanagement, including the use of toxic chemicals and pesticides, pollution of water bodies by industrial enterprises, world ocean pollution by petroleum products, air pollution, household and radioactive wastes problem, global climate change as a result of the greenhouse effect. Generally, enterprises, which do not use "green" technologies, can be dangerous for the environment. Unfortunately, humanity can't live without waste and air emissions, the only solution it is minimize harmful effect on the environment and to use alternative energy sources: sun, wind, water and etc.

Thus, in the modern hotel business, in order to stay competitive, owners of large hotels find a way out in the use of green technologies, digitalization and other innovative solutions, to create additional advantages for their hotels and stand out from the competitors. Also, modern consumers, especially with high income, pay attention to ecological constituent of hotel and its location in the nature zone. Not many hoteliers have been persuaded yet by interest of tourists for ecological clean tourism to introduce green technologies, but today they see a direct benefits for your own business.

Since, satisfaction of touristic demands by providing higher consumer, ecological value of the good, which leads to maximization of public good.

In this way, use of new technologies in the industry of the hospitality is one of source of competitive advantages of hotel enterprises because hotel not only meet the requirements of modern market to their products and services, but to convince people choose ecological clean hotels. Accordingly, task of applying «green technologies» in its capacity as integrated technical solution for hotel business is highly relevant.

Ecological picture in the world continues to deteriorate, that is leading to further development of ecological crisis in the world. With developing of industrial activities of people, interference in the natural environment has increased, consequences are expressed in the air and water pollution, soil, forest dieback, which means, all this affect on the life support of population, social condition, health and life expectancy of people.

All global community is protecting the environment, and hospitality sector is not exception. Hotels actively promote the care of the environment and health of their guests. It is not only help to protect the environment, but also attract wealthy clients. Fashion for healthy lifestyle, opportunity to stop in the extraordinary place to make clients change their behavior to choose accommodation facilities.

Transition to the new course of «green» economy—is care about safety of people and protection of the environment, it is an integral part of developing the hospitality industry. In order to protect the natural environment from the developing hospitality industry, it is necessary to affect on the segment of innovative technologies. However, there are enough companies in the hospitality industry that do not know their level of sustainability or their status in the consumption of energy and resources. The greening industry of the hospitality is needed, the arrangement and operation of complex systems are required, which require specially trained staff. Hoteliers who guide hotels to green technologies, will have competitive advantages over other market players and will get long-term sustainable development. That is, the higher level of ecological culture in a society the more balance towards the producer of goods and services.

Therefore, stable development not only contributes the cost reduction and increase energy effectiveness, but also meets consumer demand and improve their loyalty.

The purpose of this study is the development of "green" technologies and their impact on hotel industry.

This research is aimed to determine the advantages of using "green" technologies for safe environment and evaluate the effectiveness of the application of the new technologies in hotels, and also to reveal the preferences of consumers to ecological place of accommodation.

In line with goal, I have set the following tasks of the research

- Determine the influence of green technologies on the hotel industry;
- Explore the consumer demand on eco-hotel services;
- Determine problems of eco-hotels in the market of hotel services;
- Identify privileges from the implementation of green technologies and to propose ways of their implementation in the hotel industry;
- Predict further demand on the services of eco-hotels

LITERATURE REVIEW

Literature review, related to the topic of green technologies in the hotel industry was based on the period of the last 5 years. The scientific issue of the work is the research of the problems of the development of green technologies in the hotel industry, in the search for which databases of peer-

reviewed magazines and modern library databases about green hotels relevant for the research have been used. This allowed us to clarify the terminology and classification of eco-hotels. For the purpose of deeper research and to ensure the reliability of the data, scientific internationality recognized sources have been studied. Studies about green technologies were initially considered as an effective method to reduce costs (Hsieh, 2012). However, the experience of implementing these technologies has significantly reduced the negative impact on the environment, so that has gained high popularity. Thus, studies on the implementation of green technologies in the sphere of hospitality focused by scientists, who identified three main advantages for moving to eco-hotels "financial benefits" (Tzschentke et al., 2004; Singal, 2013), consumer demand (Hu & others, 2010; Martínez & Bosque, 2013) and relations with the interested parties (Chan & Hawkins, 2010; Raub & Blunschi, 2014). In addition, green initiatives are not only positive image of hotels, they also enlightened consumers in the area of environmental protection and provided ecological clean products and services (Hsiao, 2014). However, "market forces have seemingly evolved to a point where sustainable and socially responsible business practices either break even or prove profitable" (Sneirson et al., 2009). Certainly, the successful implementation depends on wish and clients preferences, from their willingness to acquire environmental placements that ultimately ensure sustainable development and highly relevant to the entire world (Abraham & Sibi, 2017). The increased attention of consumers to environmental issues were emulated by large companies in every sector (Сэмюэл Вич, 2019). In general, the sequence of research was logical, that is, from drawing up a plan, tasks, selecting sources, collecting and analyzing information, and all this in accordance with the purpose and activities of the study. This allowed us to identify problems and find solutions, to forecast the activity of eco-hotels for the next 5 years. Improvements in accommodation should focus on indicators that can contribute to the ecological level of hotels (Moslem et al., 2020).

METHODOLOGY

Data Collection and Data Sources

Sources of information representing both primary and secondary data, which were based on studies of hotels that have applied green technologies in the hotel industry.

The observation revealed a link between hoteliers seeking to cut costs by adopting green technologies and the desire of consumers to use eco-hotels in order to reduce the negative impact on the environment.

While collecting data, information published on the websites of peer-reviewed journals was used, the advantage is accurate and credible data that is reliable, because they are taken from Ebsco, ProQuest, Emerald databases, library databases, as well as publications of official international organizations, research institutes, program documents of various levels, information from representatives of the scientific community, universally recognized hoteliers and experts in the field of hotel business.

For its part, the survey and questionnaire were carried out among people of different social status, age and gender, obtaining information from them is essential for forming a complete and reliable picture of the situation in the hotel industry and people's attitude to eco-hotels. Web-tool of data extraction was used for the survey, that provided direct access to structured data in regime of real time by scanning online sources.

Thus, the information collected from various sources allowed not only to identify the features of the hotel industry market that uses green technologies, but also to identify existing problems and creatively approach the search for new solutions.

Research Methods

The main goal of humanity is to minimize the impact on the environment, and in the framework of this study, we found out how green technologies will affect the sustainability of the hotel, what benefits will the hotel industry receive from the transition to renewable energy sources, what will be the demand from the consumer, etc. Therefore, the secondary data was information collected from text reviews about hotels that have already implemented green technologies, which were collected to identify hotel problems and were based on the research of modern experts. Also, the availability of websites allowed us to study the world ratings of eco-hotels in order to find out the demand of consumers in the services of the eco-hotels. While collecting data, all types of green technologies and materials that have a minimal impact on the environment were taken into account.

In this study, a quantitative method was used, in particular, the trend analysis approach, and the hypothesis test regarding the coefficients of the linear trend equation was carried out by applying the Fisher Criteria. That allowed us to predict further demand for eco-hotel services and further trends and patterns of consumer behavior.

Since there is a need to extract specific information about eco-hotels, information for the classification of eco-hotels has been collected, which has been grouped by synthesis from various reliable sources.

The qualitative research was based on data obtained by understanding the reasons, opinions and motivations, in particular, trends in the thinking and opinions of real and potential consumers of eco-hotel services were identified, in-depth study of the problem, semi-structured methods were applied.

At the same time, a qualitative analysis showed a contradiction in the opinions of consumers, because some tourists are still wary of objects that position themselves as eco-hotels, because they are afraid of "not receiving" a set of services to which they are accustomed and believe that an eco-hotel is trying to economize on cleaning, laundry and other standard hotel services. Another category of tourists on the contrary give preference to privacy with wildlife nature staying in a hotel with green technologies.

The presented statistics indicate the dynamics of demand growth for eco-hotels, which corresponds of the proposed hypothesis, which is based on the assumption that potential consumers will prefer staying in the eco-hotels which minimize waste, maximize energy efficiency and provide excellent quality in terms of health and well-being.

It should be mentioned that to confirm or refute the hypothesis, analytical and statistical methods were used, as well as data from reviews available on the site www.tripadvisor.ru.

DATA ANALYSIS

Classification of Eco-Hotels and Their Functional Features

The interest in the environmentally friendly tourism has pushed hoteliers to promote an ecological culture and meet the needs of the consumer by providing manufacturers with a higher consumer, environmental and ethical value of the product, leading to the maximization of public benefits.

With the development of eco-tourism in the market of recreational services, a new type of hotels has appeared — eco-hotels, the main goal of which is to provide a respectable rest with minimal impact on the environment. Ecological hotels differ from others in practical features of functioning, such as reduction of the environmental pollution, implementation of new innovations and technological solutions that contribute to reducing emissions of hydrocarbon gases into the atmosphere, implementation of a number of international and regional environmental and energy-

saving programs make popular the implementation and use of non-traditional sources of heat and energy, such as solar panels, solar collectors, wind generators, obtaining heat from reservoir waters.

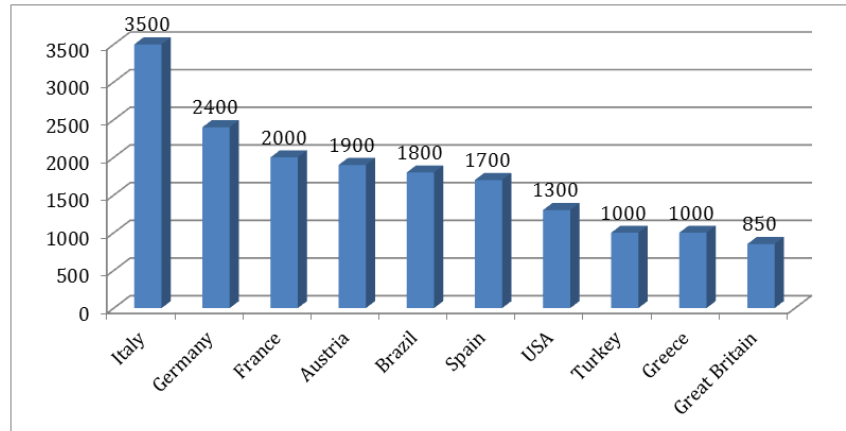


FIGURE 1
RATING OF COUNTRIES WITH THE LARGEST NUMBER OF ECO HOTELS

The ranking of the Top 10 countries with the largest number of eco-hotels is headed by Italy 3500, second place Germany 2400, France 2000, Austria 1900, Brazil 1800, Spain 1700, USA 1300, Turkey 1000, Greece 1000, Great Britain 850 ecotels. Accor Group, Expedia Group and UNESCO are bringing together 3,358 Accor Group hotels under a strategic tripartite agreement and will promote the environmental agenda and sustainable tourism around the world. The experience of developed western countries shows that strategies and mechanisms for limiting the harmful effects of the activities of hospitality enterprises are quite achievable and effective.

In modern eco-hotels, less water comes out of the tap per minute, because hotels use bamboo trays and waste baskets (Bamboo is actually a grass and has a high growth rate, which qualifies it as a renewable resource) key cards, dishes and appliances (can be used after recycling, do not pollute the soil) chemically safe washing and cleaning products, as well as the latest goods. Also, the used spectral glass helps to limit the infrared waves, which reduce the amount of heat not limiting the passage of light.

Thus, the tool for increasing the profitability and competitiveness of the hotel enterprise will largely depend on the desire of the hotel to minimize the cost through the implementation of green technologies. That is, hotels must manage the resources within their reach in a sustainable way, ensuring a balance between economic growth, environmental protection and social welfare.

Problems in the Development of Hotels Based on Green Technologies

Persistently recurring crises have put hotel companies in a situation of survival, so hoteliers around the world recognize the importance and attractiveness of using innovative technologies in the field of ecology.

However, there are problems in the green development of the hotel industry: inefficient and inflexible organizational management structures that do not try to adapt to modern conditions, insufficient use of information resources, especially in terms of service quality management, etc., environmental technologies are not sufficiently used in hotels. Hotels practically do not offer solutions to improve the environmental situation, water, electricity and other resources are not fully saved. Only large hotel chains take care of the environment.

In the context of an environmental disaster, it is important to inform about the benefits of using green technologies. For example, providing the hotel with electricity, water and heat accounts for at least 20 % of all operating costs, another 45% of all energy costs of the hotel falls under the system of air conditioning, ventilation and heating system. Moreover, this share is steadily increasing, because utility tariffs in all countries are growing by at least 10-20% annually. Most of the hotels were built on old building standards and do not meet the modern requirements of energy and resource conservation.

Another problem is that many tourists are still wary of objects that position themselves as eco-hotels, because they believe that they will not receive the set of services that they are used to, and for them eco-labeling is a veiled way to save on cleaning, laundry and other standard hotel services.

To solve this problem, hoteliers need to gain the trust of tourists, because some are still wary of objects that position themselves as eco-hotels, since they are afraid of "not receiving" a set of services that they are used to.

The identification of problems in the development of eco-hotels is the basis for the formation of an algorithm for the development of the hospitality industry based on the use of a unique natural landscape and historical heritage. In this connection, was compiled a SWOT analysis in order to identify the strengths and weaknesses, threats and opportunities for creating eco-hotels.

Table 1 SWOT ANALYSES	
Strengths	Weaknesses
Prime location	Insufficient range of tourist services
Favorable natural conditions	High price of tourist product in the national and international markets,
Sufficiently large resource and raw potential of the regions and the availability of own energy resources	Seasonality of tourist services related to climate conditions,
Availability of all transport routes	Low occupancy of the hotel fund during the slump season
(road, rail, river, sea) and good communication with international seaports, airports, convenient air traffic and moderate air transport prices	Lack of accommodation inventory during the tourist season
Availability of recreational areas, health-improving and sanatorium resort areas	Insufficient branding of travel products
Significant reserves of highly mineralized thermal waters	Lack of reconstruction of tourism facilities
Unity of the language of communication ethnic and cultural traditions	Lack of information base on tourism activities
Availability of a qualified workforce and an actively developing system of training and retraining of personnel	Lack of stimulating factors for the development of inbound and domestic tourism
Big industrial potential and presence of exporting enterprises	Low level of infrastructure development in some regions
Creating a favorable investment climate	Under development of the industry from competing countries
Progressive and legislative framework for attracting investment	
Possibilities	Threats
Growing interest in eco-hotels	Imperfect regulatory framework; stiff competition
Using a systematic approach in the provision of services by organizations	The emergence of new strong competitors
Supporting the development of tourism	The emergence of substitute products at a lower price ;
Development of international tourism	Use of new technologies to reduce the cost of services by competitors

Active use of advanced IT technologies	the complexity of the climate difficulties; epidemics
Use the opportunities of international,national	
Regional and local tourism development programs	
Attracting investments to co-finance joint business projects,	
Development of different areas of tourism,	
Conducting active information and advertising activities abroad.	

The SWOT analysis showed that the reorientation to green technologies will provide a large number of advantages and opportunities for creating eco-hotels. In modern highly competitive conditions in the hotel business, hotel owners are constantly trying to find innovative solutions to create additional advantages for their hotel and stand out from the competition. Eco-hotels need to follow the eco-concept of the four RS-refuse, reduce, reuse & recycle and make eco-certification of hotels mandatory in all countries.

One of the ways to solve the problems in the development of eco-hotels is to implement a tax preference, with the help of which reduce the tax burden on entrepreneurs and create conditions for sustainable development.

S.no	Green technologies	A 10% reduction in the total tax rate of added value	A 30% reduction in the total tax rate of added value
1.	water and energy saving;	Save up to 30% %	Save up to 30% %
2.	separate waste disposal;	Division into 3 types	Division into more than 3 types
3.	economical/reusable use of some items;	from 20% of used items	from 50% of used items
4.	applications of environmental/recycled materials;	from 30% environmental/ recycled materials	from 50% environmental/ recycled materials
5.	use of hypoallergenic bed linen;	From 70%	From 90%
6.	use of chlorine-free products;	From 80%	From 90%
7.	alternative energy sources;	Equipment from 30%	Equipment from 55%
8.	landscaping of the territory;	the territory is 85% green, with no visible open areas and slopes	Both sides of the road are 95% green, with no visible open areas or slopes
9.	informing and encouraging hotel guests;	necessarily	necessarily
10.	interaction with local residents.	necessarily	necessarily

Thus, hotels in many countries of the world that have applied green technologies have become more efficient and socially active, it has helped to attract additional income, reduce costs, identify competitive advantages in the market, increase market share, improve the service process and improve the efficiency of the hotel.

The Effect of the Implementation of Green Technologies in the Hotel

The effect of the implementation of green technologies in the hotel industry:

Save energy by installing energy-saving lamps, motion sensors, and using access keys to supply electricity to the room. Conducting an energy audit is necessary to identify heat losses in the building, which will reduce losses due to the insulation of floors, walls, ceilings and the introduction of resource-saving technologies, new materials.

Water-saving solution: the installation of water flow regulators, self-closing mechanisms, electronically controlled faucets, as well as water management systems, automatically take over the saving function. Hot water savings are accompanied by energy savings and reduced CO₂ emissions. The Proximity Hotel, Greensboro, USA is equipped with solar panels that heat 60% of all the water used in the hotel. At Hacienda Tres Rios, Mexico, the hotel's fresh water is obtained from seawater by operating a desalination plant 3. The implementation of heat and cold automation systems can solve many of these problems and minimize unexpected costs.

The Hotel Hacienda Tres Rios, Mexico, has a special cooler that works on the basis of water from a deep well, and the heat generated by the air conditioning system is used to heat the water in the hotel rooms.

Solid Household Waste (SHW) is a waste of biological origin and household garbage that has an artificial origin. In order to reduce the annual amount of garbage, the hotel should minimize the amount of its waste through separate collection of recyclables and composting of food waste.

The use of innovative care products aimed at cleaning and servicing the room stock, as well as the corridors and halls of the hotel. Encourage guests to re-use bed linen and towels, and not to give the textiles to the laundry immediately after the first application. This will help to minimize the impact of harmful chemicals on guests and staff.

Innovative design and operation of complex systems requires specially trained personnel.

In general, the implementation of intelligent systems in hotels can save electricity consumption to 30% and water to 20 %, and in the summer period, energy savings to 75%, that is, the rational use of material resources is an effective tool to increase the profitability of the hotel on the basis of reducing production costs.

Consumer Demand for Eco-Hotel Services in the Hotel Services Market

The awareness and education of tourists are growing every year, which means that customers are willing to pay for the use of eco-technologies and prefer such hotels. Today the trend of eco-friendliness is rapidly increasing in the world. Therefore, eco-hotels have become very popular among travelers. People now care not only about their good rest, but also about the environment. More often they choose hotels that are not indifferent to environmental issues. But at the same time they do not want to lose in comfort.

The interest in environmentally friendly tourism has prompted hoteliers to introduce environmental marketing, the essence of which is the joint activity of the consumer, the manufacturer and the state through the formation of an ecological culture and meeting the needs of the consumer by providing manufacturers with a higher consumer, environmental and ethical value of the product, leading to the maximization of public benefit. For example, more than 60 % of American tourists can afford to pay the high cost for hotel accommodation if they participate in programs that promote environmental protection.

In order to identify the interest of potential consumers, their tastes and preferences, I conducted one of the methods of marketing research – a sociological survey, which was conducted online by a survey in which 100 people (78 of them women and 22 men) aged 19 to 65 years took part.

No of question	Question	Answer option	Result
1	What is ecotourism?	1 Acquaintance with wildlife	31
		2 Learn about local customs and culture	11
		3 Promoting nature conservation and the local socio-cultural environment	30
		4 Immersion in nature	21
		5 Immersion in the culture of the local population, indigenous people	7
2	Are the interviewees familiar with eco-tourism?	Yes, I rested	5
		Only heard, read	90
		No	5
3	Do you want to try yourself as an eco-tourist?	1 Yes, interested	70
		2 Maybe, but I'm used to a more traditional vacation	33
		3 No, I'm not interested	7
4	Would you book an eco-villa even if it is more expensive or would you prefer a " non-green " hotel?	1 Yes	53
		2 Yes, if not too expensive	33
		3 No	14
5	Would you allow the hotel to change the towels in your room less often?	Yes	86
		No	14
6	Do you agree to pay more, but eat in an eco-kitchen?	Yes	91
		No	9
7	Should ecotourism be with a high level of comfort?	1 Yes	60
		2 Not obligatory	30
		3 No	10

As a result of the survey, it turned out that many people are familiar with the concept of ecotourism, the desire to try yourself as an eco-tourist was answer " Yes " 70% of travelers around the world say that they would be more likely to book an eco-villa if they learned about the relevant status of the object when searching for accommodation options. However, if it is more expensive, 53% responded positively, if the price is not much too high, then 33% would prefer an eco-hotel. Special attention of potential consumers is focused on the quality of food during the holiday, so consumers are willing to pay more, but relax in an eco-hotel. 98% agreed to change the towels in the room less often, so that chemically unsafe detergents and cleaning products are used less often. 91% of respondents said that they are ready to pay more, but eat in eco-restaurants, that is, every third of the surveyed people is ready to pay 12% more. However, not all travelers are ready completely abandon the benefits of civilization, 60% believe that eco-tourism should be with a high level of comfort, so they need to provide a standard set of facilities and services, stylized as traditional homes.

According to the results of the study, people (especially those with a higher income and education level) continue to worry about the environment and the impact on it of their own actions, as well as the peculiarities of the work of the enterprises with which they are connected and whose services they use. This opens up excellent opportunities for green hotels to attract wealthy guests.

Since consumers confidently let businesses know that they are even willing to overpay for environmentally responsible companies. This in itself is a direct privilege for hotels that decide to use green technologies in their work, as well as reduce costs and, accordingly, maximize profits. Consumers are increasingly paying attention to the environmental damage caused by various business activities, so if guests find out that the discarded bottles, cans and paper are sent for recycling, and not to landfill, if they know that the restaurant serves food from organic (but not genetically modified) products, and a bus with an eco-friendly engine was used for the transfer, this will certainly significantly add points to their personal rating of hotels. People are interested in the subtleties, how they help nature, how they mitigate the damage caused by visitors and hotel activities.

The positioning of the hotel as an eco-hotel gives its owner a number of competitive advantages, among which, first of all, it is necessary to highlight the possibility of using the eco-status for advertising purposes, the formation of a favorable microclimate for staff and guests, and the increase in the occupancy rates of the room stock.

DISCUSSION OF RESULTS

Eco-hotels have emerged as a result of the increased demand for nature recreation, which has formed in the hotel business over the past 20 years. As the number of travelers opting for sustainable travel options is increasing, what will be the dynamics of growth for eco-friendly accommodation in the world? According to research, today, those wishing to book eco-lodging are increasing (Figure 1).

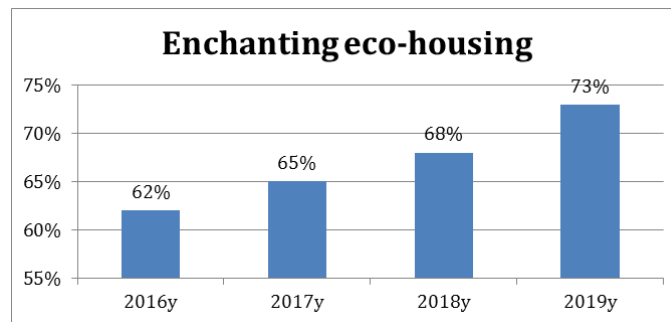


FIGURE 2
DYNAMICS OF GROWTH OF THOSE WISHING TO BOOK ECO-HOUSING

From Figure 10, we see a steady growth trend in those wishing to book eco-housing, so for 2016-2019: from 62% in 2016 to 65% in 2017 and from 68% in 2018 to 73% in 2019. booking eco-lodging averaged 11%.

According to Figure 1, there is an increase in the number of people wishing to book eco-accommodation, I decided to predict further demand for eco-hotel services using trend analysis. Applying, in this case, Fisher's criterion.

The linear trend equation is calculated by the formula $y=bt+a$, then:

Find the parameters of the equation using the least squares method.

OLS system of equations:

$$an + b \sum t = \sum y$$

$$a \sum t + b \sum t^2 = \sum y^* t$$

Table 4				
LEAST SQUARES CALCULATIONS				
t	y	t²	y²	t y
1	2016	1	4064256	2016
2	2017	4	4068289	4034
3	2018	9	4072324	6054
4	2019	16	4076361	8076
10	8070	30	16281230	20180
Average	2017.5	7.5	4070307.5	5045

For our data, the system of equations is as follows:

$$\begin{aligned} 4a+10b &= 8070 \\ 10a+30b &= 20180 \end{aligned}$$

From the first equation we express a and substitute it into the second equation

$$\text{We get } a=2015, b=1$$

Trend equation:

$$y=1 t+2015$$

The empirical trend coefficients a and b are only estimates of the theoretical coefficients β_i , and the equation itself reflects only the general trend in the behavior of the variables under consideration.

The trend coefficient $b=1$ shows the average change in the effective indicator (in units of y) with a change in the time period t per unit of measurement. In this example, as t increases by 1 unit, y will change on average by 1.

Average values:

$$\bar{t} = \frac{\sum t_i}{n} = \frac{10}{4} = 2.5$$

$$\bar{y} = \frac{\sum y_i}{n} = \frac{8070}{4} = 2017.5$$

$$\bar{t.y} = \frac{\sum t_i y_i}{n} = \frac{20180}{4} = 5045$$

Dispersion

$$D(t) = \frac{\sum t_i^2}{n} - \bar{t}^2 = \frac{30}{4} - 2.5^2 = 1.25$$

$$D(y) = \frac{\sum y_i^2}{n} - \bar{y}^2 = \frac{16281230}{4} - 2017.5^2 = 1.25$$

Standard deviation

$$\sigma(t) = \sqrt{D(t)} = \sqrt{1.25} = 1.118$$

$$\sigma(y) = \sqrt{D(y)} = \sqrt{1.25} = 1.118$$

To assess the quality of the parameters of the equation, we construct a calculation table 4.

Table 5				
CONSTRUCT A CALCULATION				
t	y	y(t)	(yi-ycp)2	(yi-y(t))2
1	2016	2016	2.25	0
2	2017	2017	0.25	0
3	2018	2018	0.25	0
4	2019	2019	2.25	0
		8070	5	0

The variance of the error of the equation.

$$S_y^2 = \frac{\sum (y_i - y_t)^2}{n - m - 1}$$

Where m=1 is the number of influencing factors in the trend model.

$$S_y^2 = \frac{0}{2} = 0$$

Equation standard error.

$$S_y = \sqrt{S_y^2} = \sqrt{0} = 0$$

Interval forecast.

Let's define the mean square error of the predicted indicator.

$$Uy = yn + L \pm K$$

Where

$$K = t_a \cdot S_y \cdot \sqrt{1 + \frac{1}{n} + \frac{3(n + 2L - 1)^2}{n(n^2 - 1)}}$$

L is the lead period;

yn+L - point forecast according to the model at the (n+L) -th moment in time;

n is the number of observations in the time series;

Sy is the standard error of the predicted indicator;

Ttabl is the tabular value of the Student's test for the significance level α and for the number of degrees of freedom equal to n-2.

Using the Student's table, we find Ttabl

$$T_{table}(n-m-1; \alpha/2) = (5) = 6.205$$

$$\text{Point forecast, } t=5: y(5) = 1 \cdot 5 + 2020 = 2025$$

$$K_1 = 6.205 \cdot 0 \cdot \sqrt{1 + \frac{1}{4} + \frac{3(4 + 2 \cdot 1 - 1)^2}{4(4^2 - 1)}} = 0$$

Interval forecast for 2025:

$$t=5: (2025; 2025)$$

Testing hypotheses regarding the coefficients of the linear trend equation.

2) F-statistics. Fisher's criterion.
Determination coefficient.

$$R^2 = 1 - \frac{\sum (y_i - y_t)}{\sum (y_i - y)^2} = 1 - \frac{0}{5} = 1$$

$$F = \frac{R^2}{1 - R^2} \frac{n - m - 1}{m} = \frac{1}{1 - 1} \frac{4 - 1 - 1}{1} = 0$$

We find from the table $F_{kp}(1; 2; 0.05) = 18,5$

Where m is the number of factors in the trend equation (m=1).

Since $F < F_{kp}$, the coefficient of determination (and the trend equation in general) is not statistically significant.

The time dependence of Y on time t has been studied. At the specification stage, a linear trend was chosen. Its parameters were estimated by the least squares method. The statistical significance of the equation was tested using the coefficient of determination and Fisher's test. It was found that in the studied situation, 100% of the total variability of Y is explained by a change in the temporal parameter. An economic interpretation of the parameters of the model is possible - with each time period t, the value of Y increases on average by 1 unit of measure.

Thus, according to the calculations of the Fisher Criteria, in this study, I found that the growth in the number of those wishing to book eco-housing will increase in the next 5 years by 18.5%. This means that eco-hotels will increase all over the world.

In some countries, in the last decade, the greening of hotels has become a concept of their activities, marking the beginning of the creation of so-called eco-hotels as a modern direction of innovation and has become a new trend in the field of hotel management, which give competitive advantages in the global tourist market.

The use of energy resources, including alternative ones, and ways to use it economically, allows to reduce costs. The necessary conditions for ensuring resource saving in hotels are: accounting of resource consumption by devices, the use of resource-saving equipment and automation of management of all engineering services and building systems, the implementation of intelligent systems in hotels.

In my opinion, it is necessary to have encouraging measures for the reorientation of outdated hotels by hoteliers and the construction of eco-hotels, in particular, to provide subsidies, to set extremely low tax rates for the "greening" of hotels. Prohibit the construction of facilities using old technologies that harm the environment, as well as from 2025 prohibit advertising in the media the activities of hotels that do not have green technologies, and from 2030 close all hotels in the country that do not work with modern technologies. Also provide tax preferences to encourage the development of eco-hotels.

In order to follow an eco-friendly concept by all hotels in the world, it is necessary to make eco-certification of hotels mandatory in all countries. Also organize an aid fund for the creation or reorientation of outdated hotels in underdeveloped countries to eco-hotels, as in an effort to develop economically; these countries are destroying the entire environment.

Thus, honesty, focus on the health of society, involvement in improving the environment, partnership with both public and private organizations, and also with the consumer ensure the positioning of the hotel as a socially responsible enterprise, improve the quality of services, increase competitive advantages.

Improvement of the environmental situation in the world has always been and remains an urgent topic that forces the implementation of new technologies and innovations in various spheres of human life, including the hotel industry.

While using eco-technologies, costs are reduced, the negative impact on the environment is decreased, the image of the hotel is improved, and customers who take care of their health are attracted.

It is important for hotels to "build a relationship" with the nature through basic strategies focused on minimizing the impact on the world around them:

1. Use of renewable energy sources;
2. Cultivation and use of local food and life products;
3. Maximum use of natural materials in construction;
4. Use harmless chemicals in household services.

Hotels, according to European standards, must meet the following requirements. Exactly: to have an environmentally friendly heating system, own waste water treatment facilities, to classify all waste, to use electricity generated with environmentally safe fuel, energy-saving lamps are used for lighting, food in such hotels is prepared from environmentally friendly products, sometimes even grown on a specially designated territories.

My research has confirmed the hypothesis of the global trend in the demand for eco-hotels and the need for outdated hotels to move to green technologies. Those hotels that are reoriented to modern technologies will be able to stay in a highly competitive market, as the consciousness of people in environmental distress will tend to stay only in eco-hotels.

My main recommendations were based on the need to follow the eco-concept of the four RS-refuse, reduce, reuse & recycle, in order to make eco-certification of hotels mandatory in all countries. Making mandatory obtaining an eco-certificate, making the development of the hospitality industry with a focus on the so-called "Internet of Things" (IoT) and blockchain technologies, is rapidly changing the approaches that will be applied to business activities in the hospitality industry in the future. Smart connected devices are rapidly becoming competitive factors in business. Such ideas are usually given a powerful boost by the use of digital and other new technologies that promote democratic thinking and culture and create an appropriate environment, as well as combine financial sustainability and social, environmental and economic impact.

Organize a world aid fund to reorient outdated hotels into eco-hotels for underdeveloped countries. Incentive measures for the establishment or reorientation of outdated hotels, provide subsidies, set extremely low tax rates for the "greening" of hotels. Ban the construction of facilities

using old technologies that harm the environment, as well as from 2025 prohibit advertising in the media the activities of hotels that do not have green technologies.

CONCLUSIONS

The analysis of the data should have revealed the following results:

- The research presents the classification of eco-hotels by various criteria;
- the impact of green technologies on the hotel industry has been determined;
- consumer demand for eco-hotel services has been studied
- the problems and privileges of eco-hotels in the hotel services market have been identified and ways of developing eco-hotels in accordance with modern requirements have been suggested
- forecast of further consumer demand for eco-hotel services has been provided.

Using the method of deduction, we determined the impact of green technologies on the hotel industry by studying the experience of different countries that effectively use these technologies. The result showed that the introduction of green technologies for hospitality enterprises is quite achievable and effective. Thus, I came to the conclusion that the path of sustainable development of the hotel industry, of course, leads eco-hotels to increase profits by minimizing costs, while having a negligible burden on the ecosystem.

After analyzing the consumer demand for eco-hotel services, the growth dynamics of those who wants to book eco-hotels was derived. I used a survey to identify consumer demand for eco-hotel services, which confirmed the interest of tourists in eco-services, but under the condition of high comfort and a large list of services.

The applied trend analysis approach made it possible to predict the future demand for eco-hotel services.

In conclusion, the goal of the study was achieved, the tasks were expanded, the classification of eco-hotels was considered, consumer demand was justified, direct benefits from the use of green technologies were determined, problems and privileges of eco-hotels were identified, and a forecast of the demand for eco-hotel services was given.

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