

CONTEMPORARY TECHNOLOGIES IN SUSTAINABLE TOURISM MANAGEMENT

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Abstract

Contemporary technology is used as a key resource in which business organizations can provide increased revenues and increase competitiveness in the market in the long run. Technology in sustainable tourism management is particularly important because new technologies should find alternative solutions to the use of natural resources. The work will explore the impact of modern technologies in managing sustainable tourism. The application of modern information and communication technologies makes tourism products and services complementary, and the tourist offer is more attractive and competitive. This paper seeks to show how to manage sustainable tourism, through new technologies, and thereby positively affect the competitiveness of the tourist destination in order to make progress in the long run and benefit from its business.

Key Words: *contemporary technology, sustainable tourism, management, resources management*

JEL classification: *M14, M15, O32, L83*

Introduction

Tourism is one of the largest drivers in the world, and as such is seeking its place in sustainable development. The intensive development of tourism sector has a strong impact on natural resources and environment, so that the survival of tourism requires responsible behavior and preservation of nature. Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland Report, 1987).

Contemporary technologies add value to sustainable tourism, and as such can be part of the solution to the problems of environmental protection

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and the establishment of sustainable development. The very nature and significance of the local population in sustainable tourism is great, because the main initiative and action must start from them. Managers must also be equipped with practical tools and mechanisms to make sure they use the best possible decision that will be in line with the sustainable tourism of the destination, as well as with the business itself. Today, the world is extremely focused on application of technologies, and tourism sector must recognize and use the advantages of such business. Instead of limiting the number of tourists using certain resources, sustainable tourism has to manage existing resources and change the behavior of tourists (Ali & Frew, 2013).

Contemporary technologies in today's world are extremely important in sustainable business due to the synergy existing between technologies and the main components of sustainable tourism (economic, environmental, socio-cultural component) (Basiago, 1999). Economic component of sustainability can be applied using technologies for better management, as well as for mapping and monitoring economic performance. Ecological sustainability technologies can also help identify vulnerable areas, control destination development, and provide quick and accurate information to decision makers. Technologies related to socio-cultural sustainability help the local community to have the right to vote in terms of tourism development processes, which today represents one of the major problems of development and promotion of the very destination.

Concept and importance of sustainable tourism

Tourism and sustainable development are interconnected and dependent, as for tourism, sustainability of resources is the foundation of development (Liburd & Edwards, 2010). Tourism, as one of the leading and fast-growing branches of industry, is the main source of income for many countries, and its development entails the development of other industries (Marinović Matović, 2017). Such an overall development of the economy is desirable for each country because it brings profit, but it can also have certain consequences. These consequences can be detrimental to the tourist destination if everything is focused solely on making a profit, while resources remain neglected.

There is a need for sustainable tourism to meet the needs of current tourists and the entire local community, as well as to protect and enhance opportunities for future generations (Scutariu et al., 2017). In order to do

this, many strategies and principles have been developed to show how to operate in a sustainable way and how to develop such tourism (Butler, 1999). The main idea is that tourism will cease to be an environmental pollution generator in tourist destinations, and that it will not destroy the tourist offer of destinations in which future generations of tourists will enjoy. Tourism is developing in a highly competitive environment, bringing together a large number of private and state entities that offer a wide range of products and services for different tourist segments (Reige & Perry, 2000). With the aim of maintaining sustainable development of tourism in present and future, it is necessary to provide a quality strategy, as well as financial resources for tourism management. There are three most important components of sustainable development that should be applied: economic, environmental and socio-cultural sustainability (Basiago, 1999).

There are 17 main objectives of sustainable development that are described in the publication of the World Tourism Organization (UNDP, 2015). The first important goal is to end poverty and all its forms everywhere. The second goal is to end hunger, achieving food security and improved nutrition and promoting sustainable agriculture. The third goal is to ensure healthy lives and promote well-being for all ages. The fourth objective is to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. The fifth goal of sustainable development is to achieve gender equality and empower all women and girls. The sixth objective relates to ensuring availability and sustainable management of water and sanitation for all. The seventh objective relates to the welfare of the community, i.e. ensuring access to affordable, reliable, sustainable and modern energy for all. The eighth goal is related to the promotion of sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all. The ninth goal relates to building resilient infrastructure, promoting inclusive and sustainable industrialization and foster innovation. The tenth target is related to the previous one, and refers to reducing inequality within and among countries. The eleventh goal is focused on making cities and human settlements inclusive, safe, resilient and sustainable. The twelfth objective is to ensure sustainable consumption and production patterns. The thirteenth goal is to take urgent action to combat climate change and its impacts, while the fourteenth is to conserve and sustainably use the oceans, seas and marine resources for sustainable development. The fifteenth goal is to protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage

forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss. The sixteenth goal is to promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels. The last, seventeenth goal is to strengthen the means of implementation and revitalize the global partnership for sustainable development (UNDP, 2015). Each of these seventeen goals is extremely important in the implementation of sustainable tourism development and they are all mutually dependent on one another (Figure 1). Fulfilling all the goals leads to the long-term development of sustainable tourism and the creation of positive effects on tourist destinations. It is therefore important that each destination is analyzed through these seventeen goals in order to state the situation and possibly deviate from the stated standards.

Figure 1: *Sustainable development goals*



Source: UNDP (2015). *Sustainable Development Goals*. Retrieved from https://www.undp.org/content/dam/undp/library/corporate/brochure/SDGs_Booklet_Web_En.pdf

UNWTO (the UN World Tourism Organization) proposes measurement of indicators of sustainable development in the segments of satisfaction of the local population by tourism, the effects of tourism on the local community, the satisfaction of tourists, the seasonality of tourism and the economic benefits of tourism WTO (2004). It also proposes measuring indicators in the category of energy management, availability and preservation of water, quality of drinking water, treatment of waste water from households, solid waste management, development control and control of the intensity of tourism (Table 1).

Table 1: *Baseline indicators of sustainable tourism*

Baseline Issue	Baseline Indicator(s)
Local satisfaction with tourism	➤ Level of local satisfaction with tourism (Questionnaire)
Effects of tourism on communities	➤ Ratio of tourists to locals (average and peak period/days)
	➤ % of those believing that tourism has helped bring new services or infrastructure (questionnaire-based)
	➤ Number and capacity of social services available to the community (% of those attributable to tourism)
Sustaining tourist satisfaction	➤ Level of satisfaction by visitors (questionnaire-based)
	➤ Perception of value for money (questionnaire-based)
	➤ Percentage of return visitors
Tourism seasonality	➤ Tourist arrivals by month or quarter (distribution throughout a year)
	➤ Occupancy rates for licensed (official) accommodation by month (peak periods relative to low season) and % of all occupancy in peak quarter or month)
	➤ % of business establishments open all year
	➤ Number and % of tourist industry jobs which are permanent or full-year (compared to temporary jobs)
Economic benefits of tourism	➤ Number of local people (and ratio of men to women) employed in tourism (also ratio of tourism employment to total employment)
	➤ Revenues generated by tourism as % of total revenues generated in the community
Energy management	➤ Per capita consumption of energy from all sources (overall, and by tourist sector – per person/day)
	➤ Percentage of businesses participating in energy conservation programs, or applying energy saving policy and techniques

	<ul style="list-style-type: none"> ➤ % of energy consumption from renewable resources (at destinations, establishments)
Water availability and conservation	<ul style="list-style-type: none"> ➤ Water use (total volume consumed and litres per tourist per day)
	<ul style="list-style-type: none"> ➤ Water saving (% reduced, recaptured or recycled)
Drinking water quality	<ul style="list-style-type: none"> ➤ Percentage of tourism establishments with water treated to international potable standards
	<ul style="list-style-type: none"> ➤ Frequency of water-borne diseases: number/percentage of visitors reporting water-borne illnesses during their stay
Sewage treatment (wastewater management)	<ul style="list-style-type: none"> ➤ Percentage of sewage from site receiving treatment (to primary, secondary, tertiary levels)
	<ul style="list-style-type: none"> ➤ Percentage of tourism establishments (or accommodation) on treatment system(s)
Solid waste management (Garbage)	<ul style="list-style-type: none"> ➤ Waste volume produced by destination (tonnes) (by month)
	<ul style="list-style-type: none"> ➤ Volume of waste recycled (m³) / Total volume of waste (m³) (specified by different types)
	<ul style="list-style-type: none"> ➤ Quantity of waste strewn in public areas (garbage counts)
Development control	<ul style="list-style-type: none"> ➤ Existence of a land use or development planning process, including tourism
	<ul style="list-style-type: none"> ➤ % of area subject to control (density, design, etc.)
Controlling use intensity	<ul style="list-style-type: none"> ➤ Total number of tourist arrivals (mean, monthly, peak periods)
	<ul style="list-style-type: none"> ➤ Number of tourists per square metre of the site (e.g. at beaches, attractions), per square kilometre of the destination, mean number/peak period average

Source: WTO (2004). *Indicators of Sustainable Development for Tourism Destinations: A Guidebook*. World Tourism Organization, Madrid, retrieved from <http://www.adriaticgreenet.org/ficareforeurope/wpcontent/uploads/2013/11/Indicators-of-Sustainable-Development-for-Tourism-Destinations-A-Guide-Book-by-UNWTO.pdf>, pp.244-245.

In order to manage the development of sustainable tourism, it is necessary to determine the current situation in relation to all three components of sustainability (economic, environmental and socio-cultural). Only by assessing the status and continuous monitoring, they create the necessary information for effective development management in a sustainable direction (Basiago, 1999).

Tourism, if properly managed, can be an economic activity that is one of the most sustainable ways of using natural resource in existing economy (Kline, 2001). Healthy and attractive environment is among the basic resources for most types of tourism, because tourism has the opportunity to use preserved nature and the environment as an economic value, and thus has a direct interest in preserving and increasing this value (Kent, 2003). Although there is awareness of the importance of preserving natural and cultural values, it often comes to their destruction. Because of this, there is a growing regulation and a more pronounced change in legislation, especially when introducing standards and certificates that regulate quality. It is impossible to completely eliminate wastes, but rather to keep it minimized by sustainable approach. In tourism, there is insufficient awareness and information about the abovementioned possibilities, i.e. there is no established effective model of planning and management of destination development, and lack of leadership and provision of timely support (Kent, 2003).

Use of technology in sustainable tourism

Each country in the world, in accordance with its national circumstances and priorities, has at its disposal various approaches, visions and means for achieving sustainable development. Sustainable development should contribute to the eradication of poverty and continuous economic growth, with the improvement of people's well-being and the creation of employment opportunities for all, while maintaining the healthy functioning of ecosystems. Sustainable development should contribute to overcoming technological differences between developed and developing countries (Hall & Ashford, 2012). The implementation of sustainable development in all countries is a common task with the possibility that each country chooses the appropriate approach in line with national plans, strategies and priorities for sustainable development.

There are several possible approaches to technological innovations in the tourism sector, which help attract tourists. These are primarily the use of

solar energy; hybrid or electric vehicles in traffic; virtual walks; and a software solution to reduce food waste (Styles at al., 2013).

Solar energy - Using cleaner and cheaper energy sources helps reduce operational costs and increase competitiveness and sustainability (Owusu & Asumadu-Sarkodie, 2016). The solar rays offer a huge potential source of energy that can be used for heating and cooling. Continuous improvement of technology makes solar energy more convenient and more profitable. The Solar Thermal Market in the European Union showed a strong growth in 2008 with an increase of over 60% (Green Hotelier Newsletter, 2009). Solar technology is constantly evolving, as governments and manufacturers invest large amounts of money in research and development.

Hybrid and electric vehicles - Hybrid or electric vehicles are road motor vehicles that produce less harmful environmental effects than comparable conventional vehicles with internal combustion to petrol or diesel (Leitman & Brant, 2008). Using hybrid or electric cars increases traffic safety and reduces environmental pollution by noise. By December 2020, each EU member state should have a minimum set of electric vehicle chargers with a special emphasis on the construction of infrastructure in cities (Mathieu, 2018).

Virtual walks - Virtual reality becomes more important in the world of tourism, both as a tool for promoting tourism as well as for the tourist destination itself (Simić & Marinović Matović, 2018). It can be expected that virtual tourism will improve over time and meet some of the traveler's demands for travel experiences. It is likely that tourism experience will increasingly become a blend of reality and virtual reality, which will meet sustainability requirements (Just Traveling, 2016). Virtual reality devices become more and more available and various applications for this type of technology began to develop, and the tourism industry quickly recognized them and accepted them. Virtual reality offers a realistic tourist experience to those who are not able to travel due to physical, financial or time constraints. The virtual reality application can also provide travel assistance to tourists and travelers in real time, and based on this, the virtual assistant can provide additional information about nearby locations (Simić & Marinović Matović, 2018).

Software solutions for reducing food waste - Software designed to help restaurants limit their waste is doing everything from collecting real-time

data to waste, to seeing potential cost savings for the rest of the food (Tuppen, 2014). Power Knot Company has launched a solution for the management of food residues that does not affect the environment (Shine, 2016). It is a Liquid Food Compostor (LFC) that exploits microorganisms that help decompose food residues into wastewater, which is then safely released into the sewage system within 24 hours. The product can have a significant impact on business in terms of cost reduction, improvement of hygiene conditions, and easing of the business itself. By 2030, the task is to halve global food waste per capita at consumer and retail level and reduce food loss to production and supply chains (Shine, 2016).

Sustainable technologies will improve the ability to manage natural resources in a sustainable manner and with less negative impact on the environment and will increase the efficiency of resource use and waste reduction. Various innovations in sustainable development would encourage all stakeholders to work together and to exchange experience and knowledge. That would greatly help countries to learn from one another in finding appropriate sustainable development policies in an open and transparent manner. Governments should create the circumstances that encourage ecological technologies, research, development and innovation.

Managing the sustainable tourism technologies in developed economies

Developed economies are oriented towards the adoption of sustainable tourism-related technologies. They strive towards a sustainable way of life, that is, towards innovations that will be sustainable. A survey conducted on the attitudes of tourists from the United States on sustainability and tourism, shows that tourists who have a sustainable tourism trip on average spend more money on average, stay longer on vacation and contribute more to the development of local communities (Penz et al., 2017). The survey also shows that more and more tourists are considering traveling to destinations that pay attention to environmental protection. With the help of sustainable tourism, developed economies can have competitive market positioned, as it is already implemented in several countries.

Energy sustainable town in Italy - The Italian town of Varese Ligure in La Spezia province is a sustainable tourist destination known for its ecological production based on sustainable energy sources. In 1980, the

city's industry was on the verge of collapse, which led to a decision to restore the agricultural sector and protect the environment itself. The vision of the town was to create a sustainable tourist destination by introducing renewable energy sources. Initially, an educational system was created that pointed to the importance of sustainable development for the future (Greenbiz, 2014). The city demonstrates its sustainability through the use of solar panels, wastewater treatment plants, and eight kilowatts of hydroelectric systems that contribute to local energy production. The population returned to the city to join in organic farming, beekeeping and cheese production (Lamialiguria, 2014).

Luxury eco camp in Antarctica - Camp Whichaway, a luxury eco-camp located in Antarctica is the first and only luxury camping in the Antarctica, which is powered exclusively by the sun and the wind. It has no environmental impact and consists of several glass fiber dome that can withstand weather problems. It has a sleeping area, a dining room, and a private bathroom with a toilet. In addition to private cabins, the guests have common rooms that are filled with seating areas, a dining room, and a wood-burning oven. Visit to the camp includes meetings with local wildlife as well as exploration of blue ice caves (<https://www.naturalworldsafaris.com/polar-regions/antarctica/whichaway-camp>).

A Spanish hotel powered by renewable energy sources - ViVood Landscape Hotel is located in the Spanish city of Guadelest near the city of Alicante. It consists of 25 prefabricated modular apartments powered by renewable energy sources (Designboom, 2015). The hotel operates in an energy-sustainable way where the local materials and workforce were used during the construction. The hotel is ecologically oriented, the kitchen and restaurant on the roof have installed solar panels, and recycling is used in all the activities of the building. The hotel is designed in such a way that all objects are wood-lined and raised from the surface of the ground to avoid changing the original topography (www.vivood.com).

Energy-sustainable hotel in Argentina - Hotel Palo Santo in Argentina is the first boutique hotel built according to LEED standards. The LEED certificate refers to the creation of energy efficient buildings and sustainable accompanying content and environment (<https://new.usgbc.org/press/about-leed>). The Palo Alto Hotel stands out with a 20-meter waterfall that collects irrigation rainwater, locally-

produced furniture and a specific facade, where more than 800 different types of plants are planted, which besides visual give additional insulation to the hotel and oxygen. Floors are made of local wood and all textiles used in the hotel are also locally produced without the use of harmful chemicals (<http://www.region.com.ar/productos/semanario/archivo/1130-noticias-la-pampa/hoteles-mas-verdes-edicion-2014-1130.html>).

Treehotel - Tree Hotel was founded in 2010 in Sweden (The Cultureist, 2014). The hotel consists of various wooden houses that have a unique structure built on an aluminum frame. House logs are built on and around living trees. There were no trees removed in the construction of buildings, small paths are built to reach the houses, which fit perfectly into the woods. Each house made of wood is made of environmentally friendly materials and construction techniques. The electricity is generated by the daily operation of the building is carried out through a local hydroelectric power plant. It consists of a low-energy LED system. Instead of the sewage system, the rooms are equipped with stainless electric incinerators that burn waste (www.welcomebeyond.com/property/treehotel/).

Morgan's Rock Resort - Morgan's Rock Resort is located 15 miles north of the Costa Rica border. It is located on 4,000 hectares of the width of the Nicaraguan jungle and almost half of Morgan's Rock is a private protected reservation (Ecosalon, 2011). Access to bungalows may require staircase climbing or crossing the bridge. The resort is one of the oldest and best ecological resorts in the country (<http://www.morgansrock.com/sustainability/>).

H2 Hotel - H2 Hotel, California, is designed with ecological awareness and the latest environmental technology. It is located in the immediate vicinity of the square, at a walking distance from social services, shops and restaurants. The hotel offers bicycles and bicycle parking for guests and staff. Sustainable technologies used in the hotel relate to innovative heating and cooling systems, underground water storage tanks, construction using sustainable and local materials (<http://archityperewiew.com/project/h2hotel/>).

Chumbe Island - Chumbe Island is a private island of 16 hectares and an ecological refuge located 8 miles from the southwestern coast of Zanzibar. On the island is the Coral Park Resort, an exclusive and secluded accommodation, stunning natural wildlife. One of the main attractions of Chumbe Island Coral Park is its ecological infrastructure.

Since there is no groundwater source on the rocky base of the island, each bungalow collects its own fresh water from the rain during the rainy season. This rain passes through a complex filtration system and is stored in underground tanks located below each living room. The water is then pumped manually through the solar heating system into hot and cold water showers in the bathroom. Used water from the showers of the bungalow is filtered through particulate filters, and ends in specially sealed vegetable beds. Beds are planted with species that require water and nutrients, and therefore easily absorb all remaining nitrates and phosphates (<https://chumbeisland.com/>).

Conclusion

If the fundamental values and characteristics of the area are violated, if natural and social attractive resources are destroyed, not only will the interest of tourists be reduced to that destination, but tourism may also disappear. Sustainable development is essentially dependent on long-term preservation of the quality of the natural environment and vital resources such as water, food, air, energy. Namely, without this component, social and economic welfare and sustainability can not be discussed at all. The development of tourism on the principles of sustainable development must take into account the interests and attitudes of different stakeholders, groups, organizations and institutions that directly or indirectly influence the development of tourism. They must therefore be educated in the field of environmental management where strong cooperation is needed between all fields of science and experts.

Despite the availability, attractiveness and preservation of natural resources, sustainable tourism in the Republic of Serbia is still very poorly developed. Modern technologies as such substantially support the concept of sustainability in tourism. But the difference between the Republic of Serbia and developed economies is that in domestic practice, the concept of a sustainable tourism is poorly understood and implemented than in the world. Sustainable development requires a new way of thinking about sustainability itself. In achieving sustainability, in the Republic of Serbia, institutions and state administration bodies do not participate sufficiently in the promotion of sustainable technologies. The biggest problem is the insufficient attraction of funds that would enable the development of sustainable technologies and innovations in the Republic of Serbia. Likewise, our state needs the laws that determine and regulate sustainable tourism. Local self-government bodies play an

important role in achieving the main goals at the local level. Residents of a specific destination and tourists are equally important stakeholders as state institutions, as they have the ability to direct and encourage processes, for example by selecting products that are produced in accordance with the principles of sustainability.

Continuous development of sustainable technologies contributes to the development of business, especially in tourism. Contemporary technologies as such greatly support the implementation of the concept of sustainability in tourism. They influence the reduction of costs, but also time savings for all stakeholders in tourism. The communication of all stakeholders, from the individual to the authorities, is essential in order to better apply technologies related to sustainable development. The Republic of Serbia, looking at positive examples from the practice of developed economies, has to focus its future on the use of sustainable technologies because, over time, tourism becomes one of the main branches, which greatly affects the economy of a given country.

With the help of sustainable tourism, countries can achieve competitive position on the market. The growth of tourism by itself is a matter of sustainability. Sustainability as such would contribute to the Republic of Serbia, as more jobs would be created, and with the help of enriched offer, tourism seasonality would be reduced. Sustainable technologies as such offer a wide range of services for the tourists themselves. The guests in time become more and more demanding and in that sense it is important that sustainability be accepted as such for all branches, not just for tourism. It is important that the Republic of Serbia finds the best possible approach to sustainable tourism that suits her. It is also important to carry out preliminary research and create the necessary prerequisites to avoid the negative effects of sustainability.

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