COLLECTION OF PAPERS
NEW ECONOMY
Volume 3, No. 1, 2025

BIBLIOMETRIC ANALYSIS AS A BASIS FOR RESEARCH ON SUSTAINABILITY IN TOURISM IN BOSNIA AND HERZEGOVINA

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Received 27.03.2025. | Send to review 08.04.2025. | Accepted 15.07.2025.

Original Article

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JEL Classification:
Q01, Q56, L83, Z32, C51

Doi: 10.61432/CPNE0301057a

UDK: 502.131.1:338.48(497.6)

ABSTRACT

This work is focused on easier understanding of the ambitions of sustainable tourism. The research was conducted through two contexts. The first is the analysis of scientific literature with the aim of establishing indicators that were used in the quantitative part of the research, which represents the second context of the work. A wide systematic review of the literature provided ideas for the construction of indicators from the three dimensions of sustainability, on the basis of which a composite index of sustainability was later established. This index is a useful tool that enables combining multiple indicators into a single, synthetic measure.

The goal of the overall research is to create a more innovative approach to the analysis of sustainable tourism, while respecting the importance of previous scientific works. The results of the regression analysis point to the controlled impacts of tourism, but in the short term, given that an increase in tourist arrivals would lead to an increase in the composite index. However, increasing the average length of stay would reduce sustainability. The purpose of the work is to contribute to future research in the field of sustainable tourism, the guidelines of which are set by the results of the analysis.

Keywords: *sustainable tourism, bibliometric analysis, regression analysis, Bosnia and Herzegovina*

1. INTRODUCTION

Sustainability as a term became popular in the late 1980s, yet it has still not been fully incorporated into all forms of tourism, nor into its strategies and policies. Although the concept has been defined, it is still not entirely applicable in practice. This is mainly due to the lack of consensus on the acceptance of the concept of sustainable tourism development, or more commonly, the lack of coordination among the large number of stakeholders involved in the tourism value chain. By emphasizing tourism growth, tourism management tends to neglect sustainability goals and traditionally pays more attention to environmental and economic aspects, while giving less consideration to social development and the impact on the local community. This threatens essential resources, leading to a situation where sustainable development is seriously compromised: economic prosperity declines, environmental conditions deteriorate, social injustice increases, and tourist satisfaction also diminishes (Briassoulis, 2002). Existing academic literature highlights various focuses and interpretations of sustainable tourism, most often suggesting reforms required by the concept and the degree of its applicability in practice. This paper aims to present a methodology for measuring and monitoring sustainable tourism through the construction of a Composite Index of Sustainable Tourism, as a synthesis of economic, environmental, and social indices. The introduction of a composite

index of sustainable tourism is a necessary step toward a comprehensive and objective monitoring of tourism's impact on the economic, social, and environmental dimensions of development. Since sustainability encompasses several interrelated factors, individual indicators often fail to provide a complete picture. A composite index allows for the integration of different indicators into a single metric, facilitating comparison among destinations, monitoring progress over time, and informing policy decisions important for the implementation of sustainable development.

2. REVIEW OF PREVIOUS RESEARCH

The term "*sustainable tourism*" emerged in the late 1980s and has since become firmly embedded in all initiatives, tourism policies, and tourism strategies. Therefore, tourism was one of the first sectors to establish definitions and principles for "sustainable tourism," as well as strategies and action plans (Budeanu et al., 2016). Due to its potential to provide economic benefits without extensive extractive activities, tourism is often seen as a means of achieving sustainable development (Chakraborty, 2021).

Previous research has highlighted hedonistic experiences as synonymous with social sustainability, creating a short-term sense of happiness (Nawijn & Filep, 2016), while more recent studies increasingly focus on eudaimonic tourist experiences, which are associated with long-term psychological benefits (Dragija & Franić, 2024). Unforgettable tourist experiences are closely linked to the concept of sustainability, and any form of tourism based on them lays the foundation for sustainability. Some studies suggest that the use of metaversal tourism products represents a new approach to implementing sustainability goals (Go & Kang, 2023).

Sustainable tourism requires effective management, including appropriate institutions, decision-making rules, and practices for policy evaluation and monitoring, if it is to meet the economic, sociocultural, and environmental dimensions of sustainable development (Bramwell & Lane, 2011). The management of sustainable tourism development must maintain a high level of tourist satisfaction, ensure meaningful experiences for consumers, increase their awareness of sustainability issues, and promote sustainable tourism practices among them (Streimkiene et al., 2021). As an integral part of analyzing sustainable tourism, indicators emerge as reference points that show the degree of fulfillment of sustainable development. Most of these indicators are dedicated to the economic, environmental, and social dimensions, while the governance dimension is often overlooked, as is the case with SDG reports under the United Nations Agenda (Rasoolimanesh et al., 2023).

As a way to address such shortcomings, Hall et al. (2021) recommend managerial ecology, which entails the instrumental application of science and economically utilitarian approaches in the service of resource use and economic development. As noted by Mazziotta and Pareto (2013), it is necessary to find an adequate framework for monitoring sustainable tourism development, suggesting the use of a composite index.

In the context of tourism, the use of a composite sustainability index is particularly useful, as tourism activities impact multiple spheres — from economic gains and effects on the local community to pressure on natural resources. Choi and Sirakaya (2006) propose a set of indicators for measuring the sustainability of tourist communities, emphasizing the need to involve local residents in the process of defining and assessing sustainability. Tanguay et al. (2010) also demonstrate that combining local indicators into a composite index can support informed decision-making in destination management. Some authors shift their focus to issues of carrying capacity, tourism development control, and the relevance of the term in the context of mass or conventional tourism (Butler, 1999). Others, examining crises that affect the tourism sector, emphasize the importance of certain factors for strengthening resilience in the tourism industry: government response, technological innovation, local belonging, and the trust of consumers and employees (Sharma et al., 2021).

Therefore, new technologies or new products, as well as smarter ways of doing business and managing operations, are needed. In this way, not only is the financial prosperity of destinations supported, but it also paves the way toward sustainable and smart development (Vidak & Sindik, 2015). Moreover, some authors conclude that new policies should be developed—ones that can, in the short term, promote changes in consumer leisure habits in a more environmentally friendly direction, and

in the long term, alter the existing strong link between economic growth and leisure consumption (Aall et al., 2011).

3. RESEARCH METHODOLOGY

The fundamental steps in applying a scientific methodological approach to research include defining the problem and objectives, collecting relevant data, and processing that data. This study consists of two research components, each with multiple phases. The first part of the research involves a systematic literature review (SLR), accompanied by a bibliometric analysis using VOSviewer software. The first step was to select bibliometric sources, followed by defining the research period and key terms. After that, the creation of the co-authorship network was initiated—identifying key authors and collaborations. To expand the analysis, a "density map" was created to represent the concentration of key terms in the research. Visualizations from VOSviewer were used to identify the main themes, co-authorship networks, and most prominent works. Based on this, an interpretation of selected works by key authors was made to extract indicators relevant for further processing. In the second part of the research, a quantitative analysis of the indicators was conducted using the example of Bosnia and Herzegovina. Analyzing previous research that points to the unbalanced development of tourism in Bosnia and Herzegovina and competitiveness defined primarily through two categories of natural and cultural resources, and less through created resources (Mrkaić Ateljević et al., 2024), revealed the need to interpret certain indicators more precisely and use them as input data for further analysis (salaries, number of employees, environmental index and others).

The primary hypotheses of this part of the research are:

H_0: An increase in tourist arrivals negatively affects the composite sustainability index.

H_1: Longer stays may negatively affect the composite sustainability index.

The first part of the quantitative analysis involved establishing a composite sustainability index based on social, economic, and environmental indicators. The main research instrument for the quantitative analysis was regression correlation analysis. The components of the regression analysis included the "composite sustainability index" as the dependent variable and "tourist arrivals" and "average length of stay" as the independent variables. In this part, the standardization of the indicators used to create the dependent variable was first performed. The independent variables were not standardized, as their interpretations in natural units (number of tourist arrivals and average length of stay) are relevant to the research objectives. This allows for the direct application of the results in real-world tourism conditions.The regression analyses resulted in equations and scatter diagrams for predicting the movement of the dependent variable.

In addition to the aforementioned methods, historical methods, analysis, and synthesis were also used.

4. BIBLIOMETRIC NETWORK ANALYSIS

4.1. PHASE I OF BIBLIOMETRIC RESEARCH

VOSviewer is a software tool used for constructing and visualizing bibliometric networks in research. Its purpose is to establish a network of researchers, journals, or publications based on specific criteria related to a given topic in order to identify which authors most frequently cite particular terms and how interconnected the authors are. Based on this, a co-authorship map can be created, and author clusters can be formed. Members of a single cluster are interconnected authors who either cite each other or are co-authors of scientific papers. Additionally, this type of analysis provides insight into the most prominent authors in the researched field.

Google Scholar was selected as the primary database for this research, and the chosen keywords were sustainable tourism, development, and sustainability. However, since Google Scholar does not support direct data export to VOSviewer, the initial step of this research involved the use of software that provides insight into the citation impact and productivity of academic publications—appropriately named "Publish or Perish."

The time frame for the publications included in the analysis was set between 2020 and 2025. A total of 201 highly cited papers were selected from the database, with a combined citation count of 21,678. The results of this preliminary research are presented in Table 1.

Table 1. Citation Metrics for the Selected Research

Publication years	2020-2025
Citation years	5
Papers (total number of papers)	200
Citations (total number of citations)	21678
Cites/year (average number of citations per year)	4335.60
Cites/paper (total citations/total papers)	108.39
Cites/author (citations for each publication divided by the number of authors)	10448.57
Papers/author (average number of papers per author)	83.95
Authors/paper (average number of authors per publication for a certain author)	3.10
h-index	82
g-index	141

Source: Author's analysis using Harzing's Publish or Perish, with explanation available at https://libguides.ru.nl/publishorperish/authormetrics, accessed on 01/04/2025

The **h-index**, as a substitute for the impact factor, reflects the *scientific performance of a researcher* by simultaneously taking into account both the researcher's *scientific productivity*, measured by the number of published papers, and *impact*, measured by the number of citations those papers have received in other works (https://kobson.nb.rs/vrednovanje/vrednovanje/h_-_index.120.html). The value of **h** is equal to the number of papers (**N**) on the list that have **N** or more citations. This metric is useful because it reduces the disproportionate influence of highly cited papers or papers that have not yet been cited (https://support.clarivate.com/ScientificandAcademicResearch/s/article/Web-of-Science-h-index-information?language=en_US). For the selected set of papers, the h-index is 82. Since many researchers believe that the **h**-index ignores the number of citations of highly cited papers, the **g**-index is often used alongside it, as it gives more weight to highly cited works. The **g**-index is always at least equal to the **h**-index and is usually higher—as is the case in the selected sample, where it reaches 141.

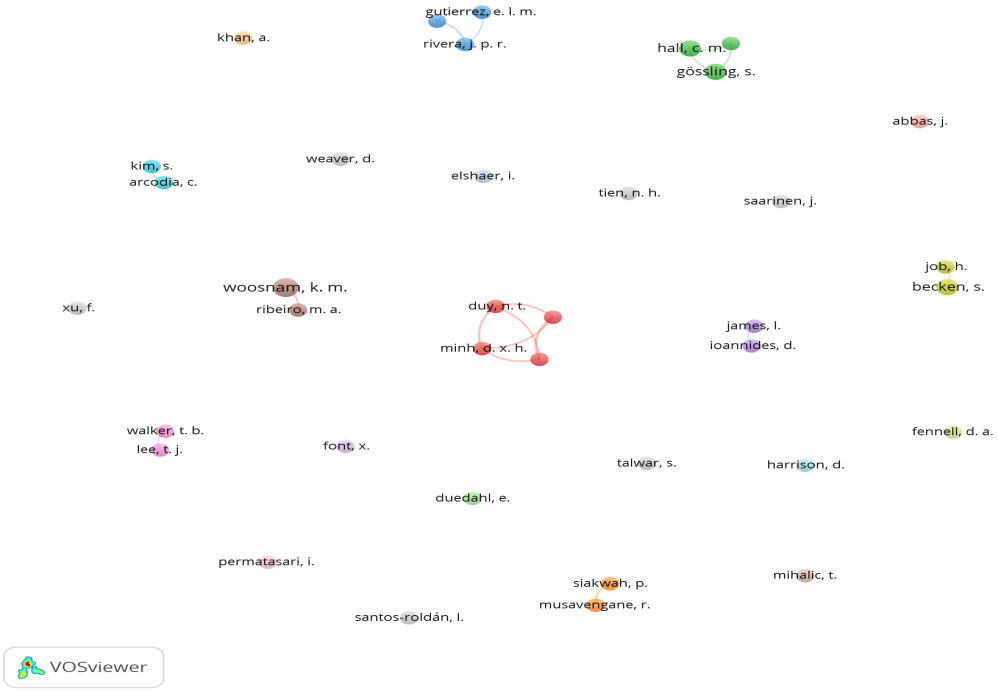
4.2. PHASE II OF BIBLIOMETRIC RESEARCH

After completing the citation metrics, data was exported and formatted into a format compatible with VOSviewer. Using the ZoteroBib software, the data was transferred from CSV format to structured bibliographic data (RIS format). After importing the structured data into VOSviewer, a map was created based on the selected bibliographic units. For a more detailed analysis, the authors chose co-authorship, that is, the author network. This analysis shows the connections between authors based on co-authoring papers. Authors who frequently collaborate on papers are connected with stronger lines and closer nodes. An author with more collaborations with other authors appears as a larger node. For the purpose of creating the map and identifying co-authorship connections, the software automatically selects authors with the strongest overall link strength. Optionally, documents with a higher number of authors were excluded.

In the selected group, which consists of 201 papers, VOSviewer recognizes a total of 462 authors. As the minimum number of documents, respecting the research keywords, two papers per author were selected, indicating that the researcher has seriously engaged with the topic derived from the keywords. As a result, 37 authors were identified met this criterion. This means that the strength of co-authorship links with other authors was observed for these 37 authors. In addition, bibliometric clusters were formulated to group papers with similarities. Clusters in this program are represented by nodes, with each node representing one cluster. A minimum cluster size of two documents was set, with the research condition that any clusters below the minimum size should be merged into larger clusters. After this analysis, 24 clusters were obtained.

The visualization of the obtained data is presented with two types of maps. The first is network visualization, which shows the connections between authors and can include a temporal dimension that explains how the collaboration between authors has evolved over time. The second map is density visualization, which visualizes the density of the researched area, i.e., the frequency of certain authors' appearances in the sample.

Figure 1. Network Visualization

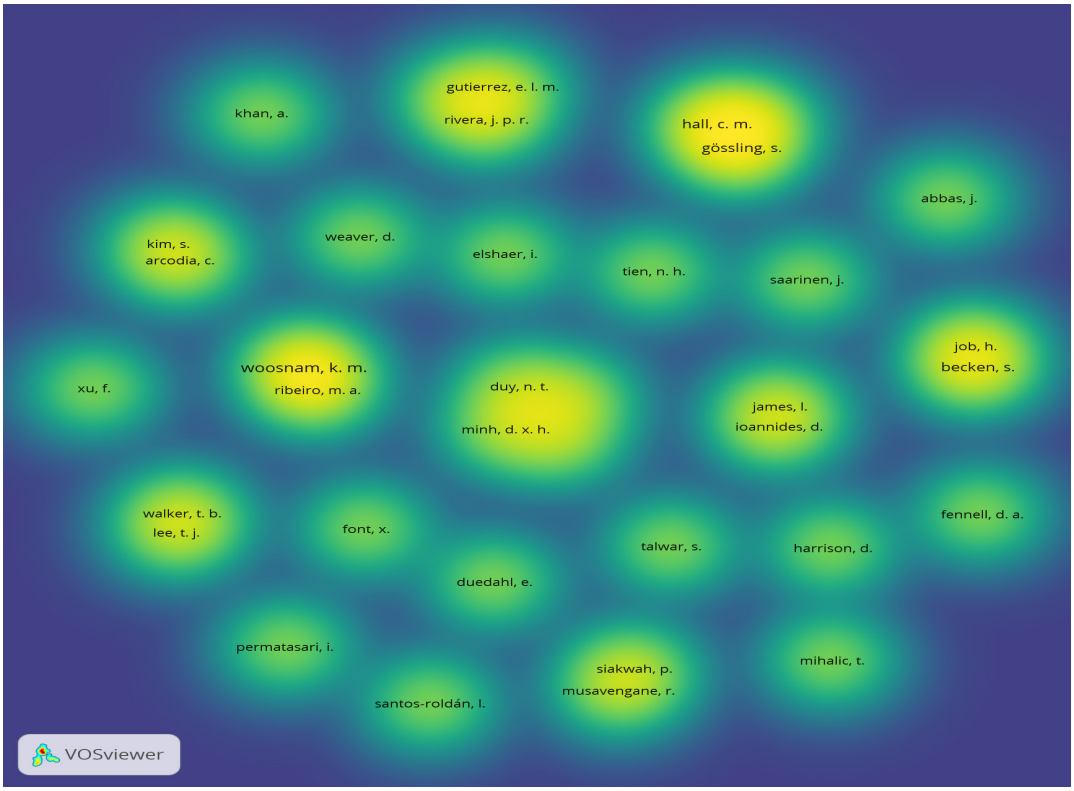


Source: Author's own processing in VOSviewer

This is the co-authorship network from VOSviewer, showing authors who have conducted research in the field of sustainable tourism and their interconnections. Observing the structure of the network, it is evident that most authors are not directly connected, indicating the presence of multiple independent research groups. A larger node on the map indicates more frequent occurrences of the previously defined keywords, which in this case applies to the author Hall, meaning he is one of the most influential authors in the dataset. The thicker lines connecting the nodes also indicate stronger connections. Smaller and more distant nodes (e.g., Abbas, J. or Weaver, D.) represent authors with lower connectivity in the analysis.

A total of 24 research groups, or clusters, were identified. The red cluster consists of authors Duy, T. T. and Minh, X. H., who are strongly connected, indicating frequent co-authorship in publications. The green cluster includes Hall, C. M. and Gössling, S.—both well-known for their research on sustainable tourism and ecotourism. The blue cluster comprises Gutierrez, E. L. M. and Rivera, P. R. The yellow cluster includes authors whose research focuses on the economic sustainability of tourism, such as Job, H. and Becken, S. The purple cluster includes James, L. and Ioannides, D., where further research on tourism policy and management is possible. Authors with the largest nodes are the most influential, meaning they have published the highest number of papers in the sample with strong scientific impact—specifically, the authors from the green cluster: Hall, C. M. and Gössling.

Figure 2. Density visualization



Source: Author's own processing in VOSviewer

Higher density is represented by light yellow and indicates the most frequently cited and connected authors, with Hall and Gössling standing out in particular. Lower density is shown in blue and may point to potential research areas or authors who are not central but still relevant.

4.3. PHASE III OF BIBLIOMETRIC RESEARCH

After identifying the connections between authors and the frequency of their appearance—visualized through the maps—the most influential authors were selected based on the mentioned criteria. According to this analysis, the key researchers with a high level of collaboration across a significant number of papers are:

- Hall, C. M. – One of the most cited researchers in sustainable tourism. He focuses on sustainable development policies, destination management, and ecological aspects of tourism.
- Gössling, S. – Focused on sustainable transport, climate change, and the environmental aspects of tourism.
- Becken, S. – Researches destination sustainability, energy policies, and climate change in tourism.
- Ioannides, D. – Focused on tourism policy, economic impacts, and sustainable destination development.

As the selected bibliometric sample contains a larger number of works by the mentioned authors, the most relevant ones were selected based on the highest number of citations, in which they are either the main authors or co-authors. The aim of this part of the research is to:

- Conduct a systematic review of the selected literature sources,
- Identify the trade-offs between sustainable tourism and overall sustainability,
- Identify the key indicators to be subjected to further analysis,
- Provide guidelines for future research based on the interpretation of the results.

Tourism fully reflects the past, present, and future economic, environmental, and social impacts (UNWTO-UNDP, 2017), making the metaphor of human impact the central focus of sustainable tourism as a concept (Hall, 2019). Some studies on sustainable tourism are grounded in the SDG (Sustainable Development Goals) ideology. "The SDGs are a global call to action to achieve a better, more sustainable future for all" (Al Abbadi et al., 2025). For example, Hall (2019), referencing

Bavington & Slocombe (2002), argues that managerial ecology is particularly important—expressed through the management of the environment and resources—which includes the instrumental application of science and utilitarian economic approaches in the service of resource use and economic development. However, in the same work, Hall also offers criticism, suggesting that "initiatives such as the SDGs fail because they do not challenge the way neoliberal rationalities are embedded in many tourism policy practices" (2019). Hall (2019) argues that the managerial approach promoted by the UNWTO is rooted in the context of capitalist exploitation of available resources, where tourism growth often results in failure—for example, in the form of uneven development or various environmental pressures. In more recent studies, Hall, as a co-author, continues to address the issues surrounding the SDG ideology, emphasizing the importance of specific goals—particularly: Goal 8 – Inclusive and sustainable economic growth, Goal 12 – Sustainable consumption and production, and Goal 14 – Sustainable use of oceans and marine resources (Rasoolimanesh, Ramakrishna et al., 2023). Due to its emphasis on generating employment and tourism-related jobs, a modified form of SDG 8 will be used in this study as the most relevant goal.

Table 2. Sustainable Development Goals

GOAL 1: No Poverty	GOAL 2: Zero Hunger
GOAL 3: Good Health and Well-being	GOAL 4: Quality Education
GOAL 5: Gender Equality	GOAL 6: Clean Water and Sanitation
GOAL 7: Affordable and Clean Energy	GOAL 8: Decent Work and Economic Growth
GOAL 9: Industry, Innovation, and Infrastructure	GOAL 10: Reduced Inequality
GOAL 11: Sustainable Cities and Communities	GOAL 12: Responsible Consumption
GOAL 13: Climate Action	GOAL 14: Life below Water
GOAL 15: Life on Land	GOAL 16: Peace and Justice Strong Institutions
GOAL 17: Partnerships to Achieve the Goals	

Source: https://tourism4sdgs.org/, accessed 03/04/2025

In his works, the second most influential author typically addresses climate change, the transition of management towards green practices, energy, or issues of carbonization. His most cited work in the bibliometric sample is "Pandemics, tourism and global change: A rapid assessment of COVID-19", which highlights the negative impact of the pandemic on the sustainability of tourism. The authors emphasize that "the COVID-19 pandemic should lead to a critical reconsideration of the global volume growth model of tourism," which increasingly resembles overtourism and poses a threat in the context of climate change (Gössling, Scott, & Hall, 2020). Therefore, respecting the integrity of the aforementioned work, this research also includes the period of the pandemic in order to account for the consequences of that crisis. Considering the research focus of the mentioned author, this paper also provides an overview of the EPI – Environmental Performance Index – in order to summarize the impact of numerous environmental sustainability indicators, which represent one of the dimensions of sustainability in tourism. Gössling, in his earlier works (2002, 2015), also emphasized the need to implement more sustainable forms of tourism that would reduce the consumption of water, energy, or land. Therefore, presenting the Environmental Performance Index of Bosnia and Herzegovina is fully justified.

Moreover, Becken (2017), in her earlier research, devoted special attention to new approaches to managing natural ecosystems, which are often disrupted under the influence of tourism. Tourism in protected areas is seen as a way to move toward sustainable development. In her more recent research (Becken, 2020), her area of interest remains the ecological dimension of sustainability in tourism, with a focus on climate change, particularly emphasizing strategies and policies that document and underscore the importance of climate change.

Table 3. Environmental Performance Index, Bosnia and Herzegovina 2024

Index 2024	Rank	Score
Environmental Performance Index - total	87	46.0
Ecosystem Vitality	76	52.1
Environmental Health	118	36.1
Climate Change	67	45.9

Source: https://epi.yale.edu/country/2024/BIH, https://epi.yale.edu/measure/2024/PAE , accessed 02/04/2025

Table 3 shows the position of Bosnia and Herzegovina on a list of 180 countries, along with weighted scores for specific index categories expressed as a percentage of the total score. Based on this, it is possible to determine where the country lags in environmental performance compared to others. Within the Ecosystem Vitality component, there is an indicator for protected areas, which measures the percentage of the country's terrestrial protected areas where the area of arable land and buildings increases by more than 0.5% annually. According to this indicator, Bosnia and Herzegovina was ranked 47th for the year 2024 (www.epi.yale.edu). The importance of human capital as the main driver in tourism is explored by Ioannides in several of his works. Acknowledging the "precarious and marginal status of tourism labor," he raises the question: "What should sustainable work in tourism look like?" (Ioannides, 2021).

The same author, referencing Winchenbach (2021), notes that in the pursuit of profit maximization, the tourism workforce is often exploited, receiving minimal wages and being overworked. Given that the situation in Bosnia and Herzegovina is similar, employment and average wages in tourism have been taken into consideration for this research in order to examine the social dimension of sustainability.

5. QUANTITATIVE PART OF THE RESEARCH – CONSTRUCTION OF A COMPOSITE SUSTAINABILITY INDEX AND REGRESSION ANALYSIS

In contemporary sustainable development literature, there is an increasing need to quantify the complex and interrelated dimensions of sustainability. In this context, composite sustainability indices integrate economic, environmental, and social indicators, thus providing a holistic approach to assessing sustainable development. The application of a composite sustainability index in this research enables the quantification of the overall sustainability status of the destination over time, as well as the examination of the relationship between sustainability and tourism activity, contributing to a better understanding of tourism development dynamics.

The quantitative part of the research was conducted in phases. In the first phase, a composite sustainability index was created. It represents the sum of the average standardized values of the social, economic, and environmental indices. The indicators selected for the construction of these indices are derived from the bibliometric foundation presented in the previous section of the paper. The years selected for analysis were 2020, 2022, and 2024, as data were available for these years (e.g., the EPI index for 2023 was not available). The input indicators, along with the corresponding data, are presented in Table 4.

Table 4. Input Data for Constructing the Composite Sustainability Index

Type of Indicator	Year		
Indicators for Social Index	2020	2022	2024
% of employees in tourism	4.73%	4.78%	4.93%
Wages in tourism (BAM)	596	749	927
Indicators for Economic Index	2020	2022	2024
Number of registered tourism businesses	930	1209	1297
Gross value added of tourism (% of total)	1.70%	2.26%	2.40%
Indicators for Environmental Index	2020	2022	2024
EPI index	78	102	87
Tourist arrivals – Independent Variables	500916	1477371	1935745
Length of stay – Independent Variables	2.5	2.2	2.1

Source: https://bhas.gov.ba, https://www.rzs.rs.ba, https://www.rzs.rs.ba, https://epi.yale.edu, accessed on 22/04/2025

Since the data is expressed in different units (convertible marks, %, number, etc.), the first step is to standardize the data using the Z-score. This removes the influence of different units and makes

comparison and interpretation easier. The Z-score calculation is achieved using the following formula (Gravetter, 2017, p. 136):

$$Z = \frac{X-\mu}{\sigma} \quad 1)$$

X = value for the indicator/year,

μ = average value of the entire series – arithmetic mean,

σ = standard deviation

For the purpose of standardization, the arithmetic mean was first calculated in Excel using the statistical formula (Gravetter, 2017, p. 76):

$$\mu = \frac{1}{n}\sum_{i=1}^{n} x_i \quad 2)$$

x_i = individual value (observation)

n = number of observations

The sample standard deviation (in Excel: stdevs or simply stdev.s) is calculated using the following formula (Gravetter, 2017, p. 113):

$$S = \sqrt{\frac{SS}{n-1}} \quad , \quad SS = \sum_{i=1}^{n} (x_i - \mu)^2 \quad 3)$$

Based on Formula 1, new standardized values were obtained in Excel for each of the three years individually: Z_emp (percentage of employees in tourism), Z_salaries (salaries in tourism), Z_nrc (number of registered tourism enterprises), Z_gsv (gross social value in tourism), Z_epi (EPI index). Based on these, the arithmetic means of the indicators were calculated to obtain the Z_Social Index, Z_Economic Index, and Z_Environmental Index. The arithmetic mean of these three standardized indices actually represents the Composite Sustainability Index for each year individually.

Table 5. Standardized Values of Individual Indices (Variables)

Indicators for the Social Index	2020	2022	2024	Mean	stdevS
Z_ emp	-0.80064077	-0.320256308	1.120897077	4.81%	0.001041
Z_salaries	-0.97389826	-0.050304662	1.024202921	757.3333333	165.6573
Z_Social Index	-0.88726951	-0.185280485	1.072549999		
Indicators for the Economic Index	2020	2022	2024	Mean	stdevS
Z_nrc*	-1.12384203	0.332281467	0.791560562	1145.333333	191.6046
Z_gsv	-1.13389342	0.377964473	0.755928946	2.12%	0.003704
Z_ Economic Index	-1.12886772	0.35512297	0.773744754		
Indicators for the Environmental Index	2020	2022	2024	Mean	stdevS
Z_epi (Z_environmental Index)	-0.90726471	1.072221928	-0.16495722	89	12.12436
Z_Composite Index	-0.97446732	0.414021471	0.560445844		

*Data from 2023, as later data is not available

Source: Author's own calculation in Excel

During 2024, an increase in the index is noticeable, likely due to the post-pandemic recovery, which resulted in a higher number of employees and greater economic output for the population in terms of generated gross value added. The Environmental Index was understandably highest during the pandemic, given that tourist movements and environmental pressures were significantly reduced.

To examine the impact of the observed phenomena, regression analysis was used, with an equation indicating the functional relationship between the dependent and independent variables. The Composite Sustainability Index in Bosnia and Herzegovina was selected as the dependent variable, as it is influenced by the independent variables. The independent variables chosen were tourist arrivals during the research years and the average length of tourist stays, each used separately in simple regression to avoid the problem of multicollinearity, as the predictors have similar effects. The functional and stochastic relationship is represented by the least squares mathematical expression (Lovrić et al., 2017).

$$Y = a + bx + \varepsilon \qquad 4)$$

Y – dependent variable,

a – regression constant (intercept on the y-axis),

b – regression coefficient (slope of the simple linear regression),

x – independent variable,

ε – random disturbance, error.

5.1. DISCUSSION OF REGRESSION ANALYSIS RESULTS

The results of the regression analysis between the composite index and the number of tourist arrivals, along with the ANOVA variance interpretation, indicate that the correlation coefficient of 0.97 shows a strong correlation between the variables. The positive sign of the coefficient suggests a direct, positive correlation, meaning that the observed phenomena exhibit similar variations, and that an increase in tourist arrivals leads to an increase in the composite sustainability index.

Figure 3. Results of the Correlation and Regression Analysis of the Relationship Between the Composite Index and the Number of Tourist Arrivals

Regression Statistics								
Multiple R	0.973314397							
R Square	0.947340915							
Adjusted R Square	0.894681831							
Standard Error	0.274901883							
Observations	3							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	1.359528826	1.359529	17.99008	0.147402271			
Residual	1	0.075571045	0.075571					
Total	2	1.435099872						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-1.46782611	0.380725062	-3.85534	0.161566	-6.3053967	3.369744477	-6.3053967	3.36974448
tourist arrivals	1.13E-06	2.6525E-07	4.241471	0.147402	-2.2453E-06	4.49537E-06	-2.2453E-06	4.4954E-06

Source: Author's own calculation based on the data from Table 5

The coefficient of determination of 0.94 indicates that 94% of the variability is explained by the model, while the remaining variability is influenced by other factors. Since the significance F is greater than the reliability level of α = 0.05, this suggests a high level of caution in applying the model and variables.

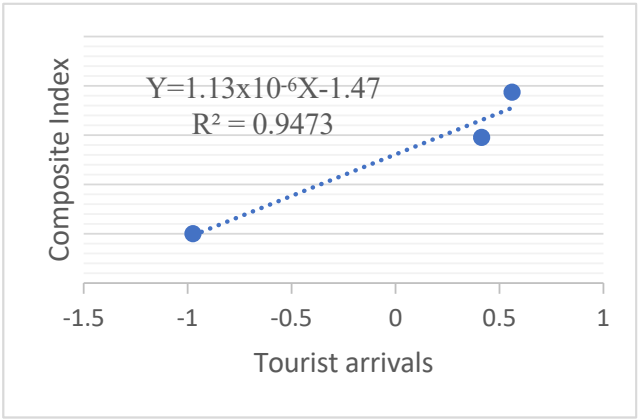
Figure 4. Results of the Correlation and Regression Analysis of the Relationship Between the Composite Index and the Average Length of Stay

Regression Statistics								
Multiple R	0.987852408							
R Square	0.975852381							
Adjusted R Square	0.951704761							
Standard Error	0.186156508							
Observations	3							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	1.400445626	1.400446	40.4119497	0.099330091			
Residual	1	0.034654245	0.034654					
Total	2	1.435099872						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	9.111601913	1.437333007	6.339242	0.09960444	-9.15144555	27.37464938	-9.1514456	27.37464938
Average Length of St	-4.019824374	0.632342216	-6.35704	0.09933009	-12.05449404	4.014845293	-12.054494	4.014845293

Source: Author's own calculation based on the data from Table 5.

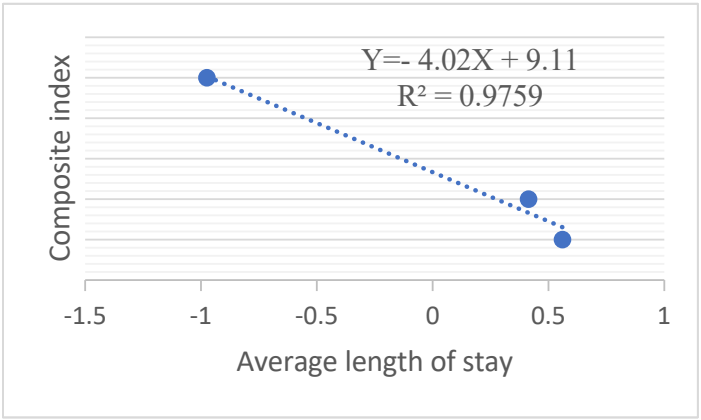
In the second regression analysis, the correlation coefficient is 0.98, indicating a strong correlation between the variables with variations moving in the same direction. Since this is a simple regression, the coefficient of determination (R Square) is observed, and it shows the percentage of the dependent variable explained by this analysis. It can be concluded that approximately 97% of the changes in the dependent variable – the Composite Sustainability Index – are explained by variations in the independent variable – the average length of stay.

Chart 1. Composite Index vs Tourist Arrivals



Source: Author's own calculation in Excel

Chart 2. Composite Index vs Average Length of Stay



Source: Author's own calculation in Excel

The first regression equation suggests that each additional tourist arrival leads to an increase in the composite sustainability index, given that the regression coefficient has a positive sign, assuming all other factors remain unchanged. The coefficient of 1.13×10^{-6} indicates that an increase of one tourist arrival leads to a rise in the composite sustainability index by 0.00000113. Practically, this means that if the number of arrivals increases by 100,000 tourists, the composite index would rise by approximately 0.113. This result suggests that the impacts of tourism on all three dimensions of sustainability—social, economic, and environmental—are still un der control.

The second regression equation shows that an increase in the average length of stay by one day would lead to a decrease in the composite index, implying that longer stays reduce sustainability.

Based on all the above, it is concluded that the first hypothesis — regarding the negative impact of the increase in tourist arrivals on the composite index — cannot be accepted. However, the second hypothesis is accepted and indicates that tourist overnight stays and the average length of stay are

more significant indicators than arrivals. Longer stays clearly have a detrimental effect on the composite sustainability index.

6.CONCLUSION

This research provides a valuable contribution to understanding the relationship between sustainable tourism and its impact on the overall sustainability of a destination, with a focus on Bosnia and Herzegovina. By applying bibliometric tools such as Publish or Perish and VOSviewer, a relevant scientific foundation was identified, including a total of 201 scientific papers and 462 authors. Among these, 37 authors have published at least two scientific papers in the fields of sustainable tourism, development, or sustainability.

To ensure the sample was as representative as possible, a smaller group of authors was selected using the commands within the aforementioned VOSviewer software. These authors were selected based on significant citation metrics and publications in journals such as *Taylor & Francis*, *Elsevier*, and *Emerald*. Their studies served as the conceptual basis for defining indicators relevant to Bosnia and Herzegovina.

Three indicators were created encompassing the ecological, economic, and social dimensions of sustainability. Based on the available statistical data, a composite sustainability index was developed as the arithmetic mean of the three standardized sustainability indices. This index was used as the dependent variable in regression analyses.

The results of the first regression analysis indicate a positive and relatively strong relationship between the number of tourist arrivals and the composite sustainability index. The obtained coefficient suggests that each additional tourist arrival contributes to an increase in the sustainability index, implying that the growth of tourism traffic—when conducted in accordance with the principles of sustainable development—can have a positive impact on the overall level of destination sustainability.

An increase in the sustainability index points to an improvement in the overall balance between tourism development and the long-term well-being of the local community and the environment. This means that a rise in the value of the composite sustainability index does not necessarily pose an obstacle to advancement across different dimensions of sustainable development—including economic stability, social inclusivity, and environmental conservation.

On the other hand, the negative correlation between the average length of stay and the sustainability index suggests that longer stays, in the absence of sustainable practices, may negatively affect certain aspects of destination sustainability. Given the small number of years observed, these findings should be interpreted with caution. It is necessary to further expand the sample in order to ensure greater statistical reliability and enable a more robust validation of the results. Despite this, the significance of this study lies in:

- Interdisciplinary Approach: By combining bibliometric analysis and econometric modeling, the study integrates theoretical and empirical insights from the fields of tourism, sustainability, and development.
- Use of Modern Software Tools: The application of VOSviewer and Publish or Perish enabled the objective identification of the most relevant authors and publications, thereby enhancing the scientific validity of the selected indicators.
- Development of a Composite Sustainability Index: Using available data for Bosnia and Herzegovina, a concrete quantitative indicator was created to serve as a basis for policymaking in the field of sustainable tourism.
- Practical Applicability of Results: The findings can be valuable for decision-makers in the tourism sector, offering insight into how tourism flows affect sustainability and what measures should be taken to achieve a balance between development and resource conservation.

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