



## COMPARATIVE SCORING OF LOCAL TRAVEL AGENCIES AND TOUR OPERATORS' WEBSITES: THE CASES OF ESTONIA AND BULGARIA

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### ABSTRACT

**Objectives:** This study aims to evaluate the quality and effectiveness of travel agency and tour operator websites in Estonia and Bulgaria, focusing on technical performance, accessibility, and user experience. The goal is to identify strengths and weaknesses to improve marketing, customer engagement, and competitive positioning in local tourism markets. **Methods/Approaches:** The research employs a multi-criteria evaluation model using a fuzzy inference system, combining numerical data and expert assessments. Free and open-source tools were used to assess technical, functional, and user-facing aspects of websites, and practical calculations were implemented in MATLAB to enable comparative analysis across different agencies. **Results:** The analysis revealed that Estonian tour operator websites generally perform better in technical components, while Bulgarian travel agency websites require improvements in accessibility, particularly relevant for mass beach tourism. Some agencies demonstrated consistent performance across all indicators, whereas others showed significant variation in website quality, affecting overall ratings. **Conclusions:** The study confirms the importance of evaluating local tourism websites to enhance marketing effectiveness and operational efficiency. The proposed fuzzy-based methodology provides an accessible and practical tool for generating integrated numerical assessments of website quality, helping management identify problem areas, benchmark against competitors, and guide website development and improvement strategies.

**Keywords:** tourism agency, website quality, internet user, site usability, visitor with disabilities, web traffic parameters.

**JEL classification:** L86, M31, Z32

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### INTRODUCTION

The rapid digitalization of the global economy has fundamentally transformed the tourism industry, with websites emerging as central components of tourism ecosystems. Recent academic literature (2021–2026) conceptualizes tourism websites not merely as informational tools but as multifunctional digital infrastructures that influence decision-making, reshape market structures, and support innovation and sustainability.

In the context of the digital transformation of the economy, the website of any service organization is becoming a key marketing and customer engagement tool, especially in the service sector (Verhoef et al., 2021; Hollebeek et al., 2022; Alalwan et al., 2023). Unlike tangible goods, services are intangible, cannot be pre-tested, and depend heavily on customer trust. Therefore, an official website serves not only as an information platform but also as a means to shape the company's image, increase brand awareness, and stimulate demand.



Modern websites perform several functions simultaneously. First, they present services, providing potential clients with information about features, pricing, purchase terms, and additional service options. Second, a website serves as a communication channel between the company and the client, enabling feedback, online consultations, reservations, and order placement. The development of digital technologies, mobile applications, and online payment systems has significantly expanded the functionality of corporate web resources, transforming them into fully-fledged e-business tools (Dwivedi et al., 2021; Kannan & Li, 2021; Rita, Oliveira, & Farisa, 2022).

Websites play a significant role in the tourism industry, where the purchasing decision process is directly linked to searching, comparing, and analyzing information. The most current investigations show that websites are fundamentally changing the structures of tourism businesses. The rise of digital platforms and company websites has allowed suppliers to bypass traditional middlemen and engage directly with their customers. However, this disintermediation has paradoxically led to the emergence of new intermediaries like online travel agencies and aggregators (Gretzel et al., 2020; Petrova et al., 2018; Pavlov et al., 2024). Empirical evidence suggests that digitalization—including website adoption—positively correlates with tourism sector growth and economic performance (Zhang, 2025). By implementing online booking and dynamic pricing, websites open up a worldwide market, leading to considerably lower transaction costs and increased operational efficiency. From an economic viewpoint, this shift can be understood using transaction cost theory, where websites serve to reduce the expenses of searching for and coordinating services, thus reshaping the tourism industry's value chains.

Potential tourists actively use online resources to select destinations, tour operators, and travel agencies (Mollik et al., 2024; Godina, Sokolovskaya, & Samakaeva, 2025). Ease of navigation, the quality of visual content, the comprehensiveness of the information presented, the availability of interactive services, and the level of trust in a website significantly influence consumer behavior and their willingness to use a company's services. According to empirical findings, tourism websites have a substantial impact on destination selection, travel arrangements, and booking choices (Martins et al., 2025). The availability of real-time pricing, reviews, and destination content on websites effectively lowers information asymmetry and reduces perceived risk. Theoretically, this aligns with established models of consumer decision-making in digital contexts, wherein information accessibility and perceived usefulness exert a direct influence on behavioral intentions (Xiang et al., 2021). Consequently, websites operate as decision-support mechanisms, impacting the cognitive (knowledge-based) and affective (emotion-based) elements involved in the construction of a destination's image. The evolution of digital technologies has boosted the performance of tourism websites. The synergistic convergence of artificial intelligence (AI), advanced big data analytics, virtual reality (VR) technologies, and the pervasive Internet of Things (IoT) infrastructure facilitates the creation of user experiences that are not only highly tailored to individual preferences but also profoundly engaging and immersive (Buhalis et al. 2023). Through the implementation of these advanced technological solutions, websites gain the ability to curate customized recommendations for their visitors, strategically adjust their pricing models, anticipate



forthcoming demand trends, and significantly improve user interaction and satisfaction. From a theoretical viewpoint, this situation illustrates the ongoing advancement and development of sophisticated tourism environments, often referred to as smart tourism ecosystems, wherein interconnected systems that are powered by data facilitate immediate and dynamic exchanges among travelers, various commercial entities, and the locations they visit.

Furthermore, a website is an important competitive tool in the tourism market. Travel agencies that develop digital communication channels gain additional advantages by expanding their customer base, increasing user satisfaction, and streamlining business processes. Thus, the quality and functionality of a website are significant factors in the effectiveness of tourism organizations and their market sustainability (Gretzel et al., 2020; Shariffuddin et al., 2023; Alekseeva & Shafigullina, 2024). The concept of sustainability has become a key focus in recent tourism research, with websites playing a dual role. Supporting sustainable tourism, digital platforms draw attention to green alternatives, enhance resource efficiency, and foster traveler awareness (Hall et al., 2015). Websites offer a way to guide tourists to areas with fewer crowds and to foster environmentally conscious actions. Conversely, academics express concern that websites might intensify over-tourism by boosting the profile and desirability of destinations already facing high visitor numbers (Buhalis et al., 2019). This dichotomy underscores the critical importance of ethical digital oversight and well-planned content strategies. From a computational and systems perspective, tourism websites are understood as elements within intricate digital ecosystems. Interconnected platforms, including booking systems, transportation services, and review sites, form these ecosystems that collectively influence the tourist experience (Gretzel, Werthner et al., 2015). Travel agencies and tour operators have a number of unique characteristics that make websites increasingly important components of their operational and commercial activities. A tourism product is a comprehensive service that encompasses transportation, accommodation, excursions, insurance, and other services (Buhalis & Leung, 2023; Yang et al., 2024). This complexity requires providing clients with detailed, structured, and regularly updated information, making the website a crucial platform for presenting the tourism product. Travel company websites integrate various elements of the tourism offer into a unified digital environment. Through online platforms, users can browse a range of tours, compare offers for various destinations, and evaluate accommodations, travel itineraries, and additional services. Websites not only inform consumers but also personalize offers based on client preferences, seasonality, and price factors (Diaz-Castillo et al., 2025; Tan et al., 2025; Alrasheedi, 2025). A key feature of travel agency and tour operator websites is their role in building trust with potential clients. Travel services typically involve financial costs and certain risks, including uncertainty about service quality and dependence on external factors. Therefore, the availability of reliable information, transparent booking terms, customer reviews, certificates, and partnership agreements help reduce perceived risk and increases the likelihood of a purchase decision. Furthermore, travel agency websites play a vital role in optimizing business processes.

The use of online booking systems, automated tour price calculators, request management systems, and integration with global distribution systems improves customer service efficiency and reduces administrative



costs. In a highly competitive travel market, digital website functionality is becoming a key factor in improving company performance and expanding its presence in international markets (Shin & Kang, 2020; Xiang et al., 2021; Li et al., 2021). Thus, travel agency and tour operator websites serve not only as promotional tools but also as strategic elements in managing customer interactions, building competitive advantage, and ensuring the sustainable development of the travel business.

With the rapid development of digital technologies and increasing competition in the tourism market, systematically assessing the quality of travel company websites is particularly important. The effectiveness of an online presence is largely determined by the comprehensiveness of the information provided, the functionality of the resource, the user-friendliness of the user interface, and the quality of its visual design. These characteristics directly affect user experience, customer trust, and customers' willingness to use the company's services (Almakayel, 2023; Turgut, 2025; Ranjithkumar & Sivaprasad, 2025).

Functional characteristics of websites, including ease of navigation, page loading speed, online booking, and mobile responsiveness, determine the accessibility and practical value of the resource for users. In turn, visual elements such as design, content structure, quality of graphic materials, and logical presentation of information contribute to a positive brand perception and enhance the attractiveness of the tourism product. Evaluating these parameters helps identify the strengths and weaknesses of travel agency and tour operator digital platforms and formulate recommendations for improvement.

Furthermore, a comparative analysis of company websites from various countries provides an opportunity to identify specific developments in digital marketing in the tourism industry and to identify best practices for organizing online services (Panoiu et al., 2024; Wahab et al., 2025; Dorokhova et al., 2026).

## **MATERIALS AND METHODS**

The quality of a travel agency's website is directly related to its competitiveness in the marketplace. Modern consumers increasingly choose travel products based on information available online, so website usability, informative content, the functionality of online services, and the visual appeal of the resource significantly influence customer choice. A high-quality website enhances trust in the company, fosters a positive image, and increases the conversion of inquiries into actual sales. At the same time, insufficient digital platforms can reduce a travel agency's appeal and limit its ability to compete in both the national and international tourism markets (Qatawneh & Alkhasawneh, 2023; Nawrot & Skublewska-Paszkowska, 2024; Ghosh et al., 2025).

In a context of increasing competition and rapid digital technology development, the need for a comparative analysis of local tour operator websites is growing. Travel companies operating in national and regional markets often face similar economic and institutional conditions, yet their levels of digital development can vary significantly (Pourabedin, 2021). Conducting a comparative analysis allows us to identify differences in the quality of web resources, determine factors influencing the effectiveness of online customer communication, and identify best practices for organizing digital platforms. A comparative approach enables an objective assessment of the functional, informational, and visual characteristics of travel company websites.



The use of standardized evaluation criteria allows us to compare the level of tour operators' digital presence, identify their strengths and weaknesses, and pinpoint areas for improvement. Furthermore, the results of a comparative analysis can serve as a basis for developing recommendations to improve the quality of digital travel services and enhance interaction with their consumers.

Comparative analysis is particularly important when studying the tourism markets of different countries (Magoutas et al., 2024; Rashid & Dawood, 2024). Comparing the websites of tour operators operating in different national tourism systems allows us to identify the impact of the level of economic digitalization, the specific development characteristics of the tourism industry, and differences in consumer behavior on the structure and functionality of web resources. This facilitates a deeper understanding of the digital transformation of the tourism industry and the development of effective development strategies for tourism companies. Thus, a comparative analysis of local tour operator websites is an important tool for studying the digital competitiveness of tourism organizations and helps identify trends in the development of online services in the tourism industry (Marchi, Lovrečić, & Brščić, 2023; Bayraktar, 2024).

For comparative contexts, such as analyzing travel agency websites in Estonia and Bulgaria, a structured framework is needed to ensure consistent and meaningful analysis. Existing comparative scoring systems, which draw on information systems and services models, provide the theoretical foundation for establishing such a framework, for example: E-S-QUAL, the Technology Acceptance Model (TAM), and multidimensional evaluation approaches. The traditional SERVQUAL framework has been extended to the E-S-QUAL model, specifically tailored for digital environments. It evaluates online service quality through dimensions such as efficiency, technical reliability, accuracy of service delivery, and data protection and security. Parasuraman et al. (2005) indicated that these dimensions effectively represent the fundamental facets of user interaction on online platforms. Current implementations in tourism demonstrate the utility of E-S-QUAL for the analysis of online booking systems and travel websites, with a focus on measuring reliability and trust (Rita et al., 2019; updated applications continue in 2021–2024 studies). For building applicable comparative criteria, the model can be used to define the operational, digital and business dimensions of the comparison. The TAM model, originally developed by Davis (1989), remains highly relevant in digital tourism research. It posits that user adoption of technology is primarily determined by perceived usefulness and perceived ease of use (Dwivedi et al., 2021). Tourism studies (Xiang et al., 2021) confirm that these factors strongly influence user satisfaction, intention to book, and loyalty. Websites that are easy to navigate and provide valuable information are more likely to achieve higher engagement and conversion rates. In a comparative context the TAM framework refers to usability, users experience, visual components and personalization. Thus, TAM contributes a behavioral perspective, linking website features to user responses. Using these models, we created a criteria matrix for comparing local tour operators in Estonia and Bulgaria (Table 1).

Estonia and Bulgaria are of interest for a comparative analysis of local tour operators due to differences in the level of digital development of their economies, the structure of their tourism markets, and the specifics of organizing tourism services. While both countries actively participate in international tourism exchanges, their



tourism industries have been shaped by distinct economic, technological, and institutional factors, which influence their development strategies and the use of digital tools for customer interaction.

Estonia is traditionally considered one of the most digitally advanced countries in Europe. The high level of ICT adoption, a developed infrastructure of electronic services, and the high digital literacy of the population create favorable conditions for the development of online platforms for tourism companies (Litavniece, 2023; Montvydaitė & Labanauskaitė, 2024; Laučienė & Labanauskaitė, 2026; Pilving et al., 2021; Veliverronena et al., 2023; Saluveer et al, 2020).

Bulgaria, in turn, is one of the leading tourist destinations in Eastern Europe, focusing primarily on mass inbound tourism. The country's tourism market is characterized by a large number of local tour operators specializing in beach, cultural, educational, and health tourism (Vladimirov, 2012; Zvetanova, 2023; Mincheva & Stoyanova, 2025; Gospodinova & Zheleva, 2025; Varadzhakova et al., 2025).

The choice of Estonia and Bulgaria for the comparative analysis was motivated by the opportunity to compare two tourism markets with distinct tourism industry development models. This comparison allows us to identify the specifics of tourism company website development across countries with varying degrees of digital transformation, determine the impact of national conditions on the structure and functionality of web resources, and identify promising areas for developing digital tools in the tourism industry. Table 1 shows the features, similarities, and differences between local tour operators in Estonia and Bulgaria.

**Table 1.** Comparison of Bulgarian and Estonian local tour operators.

Comparison criteria	Estonia	Bulgaria	Similarities	Differences
Level of digitalization	high level of electronic services and digital infrastructure	uneven levels of digitalization, differences between companies	active implementation of digital technologies in tourism	<i>Estonia:</i> systemic digitalization <i>Bulgaria:</i> more uneven development
Role of websites in business	full-fledged digital service platforms	focus on the presentation and marketing functions	important channel of interaction with customers	<i>Estonia:</i> focuses on functionality <i>Bulgaria:</i> focuses on visual promotion.
Using online booking	automated booking and payment systems are widely used	online booking is used, but often in the form of applications	digital booking services are being introduced	<i>Estonian</i> companies are increasingly using fully automated systems
Orientation of the tourism market	mainly international and individual travel, business tourism	mass inbound tourism, beach and health holidays	both participate in international tourism exchange.	<i>Bulgaria:</i> focus on mass resort tours <i>Estonia:</i> individual and niche tours
Structure of the tourism market	small and medium-sized companies predominate	many local tour firms of various sizes	high proportion of local tourism firms	<i>Bulgaria:</i> market is more traditional <i>Estonia:</i> it is more digitally integrated
User experience and design of websites	good level of user-friendly interfaces and navigation	may vary significantly between companies	desire to improve user experience	<i>Estonia:</i> more standardized design and functionality
Visual component of websites	significant emphasis on minimalism and functionality	emphasis on visual content and demonstration of tourist attractions	visual appeal is used as a marketing tool	<i>Bulgaria:</i> websites more often use an emotionally oriented visual style



Personalization of tourism services	use of digital personalization technologies	used mostly in standard tourist packages.	desire to take into account customer preferences	<i>Estonia</i> : personalization is more technologically advanced
Institutional and market conditions	support of innovations and the digital economy at the state level	active development of tourism infrastructure and international promotion of resorts	tourism is an important sector of both countries' economies.	<i>Estonia</i> : focus on digitalization <i>Bulgaria</i> : on developing tourist destinations
Prospects for the development of travel companies websites	integration of artificial intelligence, service automation, and online platforms development	improving website functionality and expanding digital services	the role of digital technologies in tourism is expected to grow	The pace of digital transformation in <i>Bulgaria</i> is higher than in <i>Estonia</i>

Source: Composed by authors based on literature sources.

Website quality assessment in modern research is based on a comprehensive approach that combines analyses of the technical, functional, visual, and user-friendly characteristics of digital resources.

Traditionally, both academic and practical research use expert evaluation methods to analyze a website's structure, navigation, design, and content. Usability testing methods aimed at assessing user experience with a website are also widely used, including assessing the performance of typical tasks, information search time, and user satisfaction (Allison et al., 2019; Nasir, 2024; Morales-Vargas et al., 2023; Habib et al., 2023; Chiriboga-Casanova et al., 2025).

Quantitative evaluation methods based on the analysis of technical website parameters have become widespread. These include measuring page loading speed, mobile responsiveness, SEO optimization, interface accessibility, and the stability of online booking services. An important area of research is the use of web analytics tools to analyze user behavioral metrics, such as page views, session duration, and conversion rates.

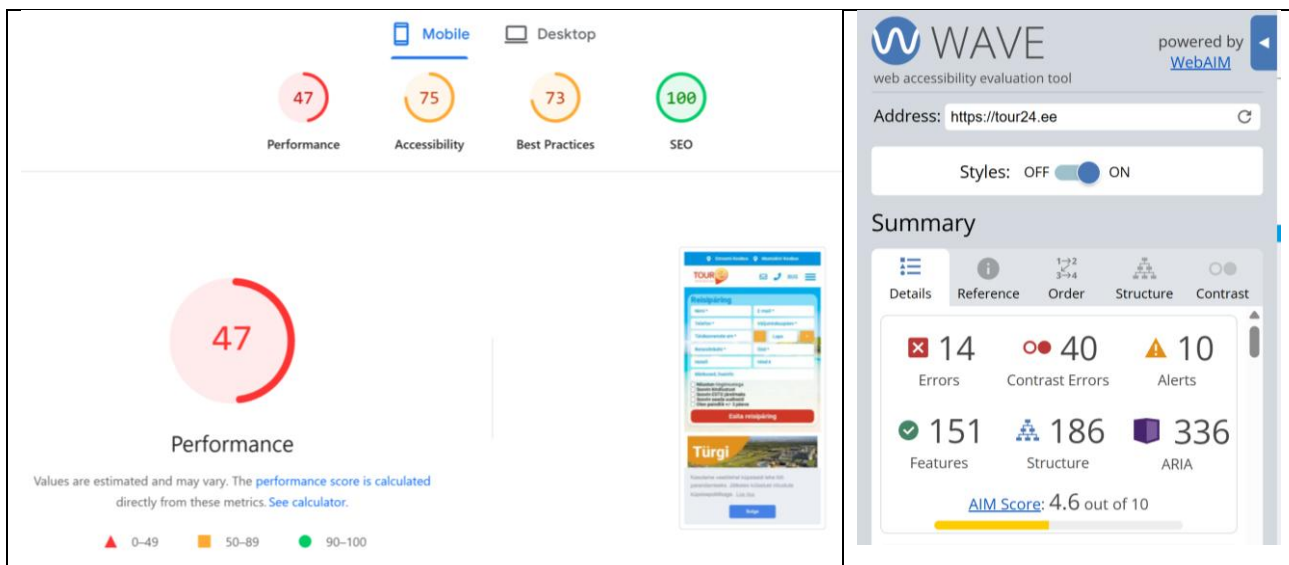
Promising approaches to website evaluation involve integrated scoring models that combine multiple sets of criteria into a single system for quantitatively assessing the quality of digital platforms. Additionally, artificial intelligence and big data analytics technologies are increasingly being used to automate the identification of user experience issues, analyze the visual perception of the interface, and evaluate the quality of text content. The use of integrated evaluation methods improves the objectivity of research results and allows for a more accurate assessment of the competitiveness of travel company websites.

Modern website quality research actively uses specialized software and analytical tools to ensure an objective, quantitative assessment of the technical and user characteristics of digital resources. The use of such tools minimizes the subjectivity of expert assessments and provides measurable indicators of web platform effectiveness. Performance testing and optimization tools such as *Google PageSpeed Insights*, *GTmetrix*, and *Lighthouse* are widely used to analyze technical website performance metrics. These tools enable evaluation of page loading speed, mobile responsiveness, content display accuracy, and code optimization. SEO analytics systems, including *SEMrush*, *Ahrefs*, and *Screaming Frog*, are also used to analyze website structure, metadata accuracy, and search engine visibility.

User experience is assessed using web analytics and UX research tools, such as *Google Analytics*, *Hotjar*, and *Crazy Egg*. These software solutions analyze user behavioral characteristics, including navigation paths,

page views, click maps, and interactions with interface elements. A promising approach is to use comprehensive software platforms and artificial intelligence tools that integrate technical analysis, UX research, and visual interface assessment results into a unified website-quality scoring system. The use of such tools facilitates the development of objective, integrated quality indicators for tourism web resources and increases the reliability of comparative studies of digital platforms.

To obtain the initial numerical data for our model, we will use the free software *Google PageSpeed Insights* (<https://pagespeed.web.dev>) and *WAVE Web Accessibility Evaluation Tools* (<https://wave.webaim.org>). Screenshots of the main result windows for it are presented in Figure 1.



**Figure 1.** Examples of result windows for parameter-level finding by special software  
 Source: Elaborated by authors

The mobile and desktop versions of the site will be assessed separately, using 4 parameters for each, and an accessibility level assessment will be added in accordance with the general requirements.

## RESULTS AND DISCUSSION

For evaluation, we selected 10 travel agency websites for each of the countries under consideration—Estonia and Bulgaria. Their names, web addresses, and brief descriptions are presented in Table 2.

**Table 2.** Websites set for evaluation (Estonia, Bulgaria)

N	Agency name	Website address	Additional information
E1	Tour24 Reisibüroo	<a href="https://tour24.ee">https://tour24.ee</a>	over 22 years of experience, specializing in selling ready-made tour packages from Estonia's largest operators
E2	SuperTours OÜ	<a href="https://supertours.ee">https://supertours.ee</a>	registered in 2019 and specializes in package tours, last-minute deals, and hotel bookings
E3	Fly Tours OÜ	<a href="https://flytours.ee/">https://flytours.ee/</a>	founded in 2014, it specializes in organizing vacations, booking airline tickets, and processing related documents.
E4	Estravel Eesti	<a href="https://www.estravel.ee">https://www.estravel.ee</a>	the largest and oldest travel agency in Estonia and the Baltic States, operating on the market since 1988
E5	Turismo OÜ	<a href="https://turismo.ee">https://turismo.ee</a>	sales of package tours, last-minute travel deals, and booking services, based in Tartu



E6	OtsiReisi	<a href="https://www.otsireisi.ee/">https://www.otsireisi.ee/</a>	offers of leading tour operators and finding the best prices and last-minute tours with no additional fees for the client
E7	Reisibüroo Wris	<a href="https://www.wris.ee/">https://www.wris.ee/</a>	oldest travel agency (1991), 100% Estonian-owned, specializing in business trips, exotic tours, individual travel
E8	Go Travel	<a href="https://gotravel.ee/">https://gotravel.ee/</a>	(1992), one of the four leading tour operators in Estonia, offering package tours, air tickets, hotel reservations, and off-site event planning in the Baltic countries
E9	Reisibüroo Reisiexpert	<a href="https://www.reisiexpert.ee">https://www.reisiexpert.ee</a>	(1995), offering a full range of services for organizing leisure, business trips, and conferences
E10	Travibest OÜ	<a href="https://travibest.ee/ru/">https://travibest.ee/ru/</a>	package tours, air tickets, organization of group programs for individuals and organizations, based in Narva
B1	Travel Club Bulgaria	<a href="https://www.travelclub.bg/">https://www.travelclub.bg/</a>	specializes in organizing holidays, excursions, and business trips, based in Varna
B2	RealAdvance	<a href="https://realadvance.bg/">https://realadvance.bg/</a>	thematic and event-based travel with a focus on active recreation and exclusive events, based in Burgas
B3	Verso Travel	<a href="https://verso.bg/">https://verso.bg/</a>	holidays in Bulgaria and abroad, package tours, excursions, and hotel reservations, based in Sofia
B4	Away	<a href="https://away.bg/">https://away.bg/</a>	traveling around Europe, sightseeing tours by bus and plane
B5	GlobalTour	<a href="https://www.globaltour.bg">https://www.globaltour.bg</a>	one-day excursions in Bulgaria, VIP tours, and multi-day trips for foreign tourists
B6	Red Tours	<a href="https://redtours.bg/">https://redtours.bg/</a>	(2011), organization of holidays, excursions, and business trips both within Bulgaria and abroad
B7	Bulgaria Travel	<a href="https://bulgariatravel.bg">https://bulgariatravel.bg</a>	tours to Turkey and the Balkans, based in Burgas
B8	Bohemia	<a href="https://www.bohemia.bg">https://www.bohemia.bg</a>	(1994), cultural, educational, and beach tourism both within Bulgaria and abroad.
B9	Abax	<a href="https://www.abax.bg/">https://www.abax.bg/</a>	(2008), operates only through a network of partner travel agencies and does not sell tours directly to end customers
B10	Ekvator	<a href="https://ekvator.bg/">https://ekvator.bg/</a>	Air and bus tours to Africa and Europe, key destinations include Egypt, Tunisia, Morocco, Jordan, Dubai, Sicily, Sardinia, and Spain, based in Plovdiv

*Source:* Collected from the Internet by the authors.

For the evaluation of websites, we used special software *Google PageSpeed Insights* and *WAVE Web Accessibility Evaluation Tools*, and the results are given in Table 3. In this table, the smallest and largest values for each input variable are shown in bold, and these values define the lower and upper bounds for the corresponding linguistic variable (its membership functions) in the model.

**Table 3.** Results of the website evaluation by specialized web-analysis computer tools (on 0-100 point scale)

N	Agency name	Website address	PRM	ACM	BPM	SOM	PRD	ACD	BPD	SOD	WCA
E1	Tour24 Reisibüroo	<a href="http://tour24.ee">tour24.ee</a>	47	75	73	<b>100</b>	55	81	73	<b>100</b>	4,6
E2	SuperTours OÜ	<a href="http://supertours.ee">supertours.ee</a>	62	82	96	100	92	82	96	100	5,1
E3	Fly Tours OÜ	<a href="http://flytours.ee">flytours.ee</a>	54	84	73	100	64	89	73	100	4,5
E4	Estravel Eesti	<a href="http://www.estravel.ee">www.estravel.ee</a>	56	87	96	100	90	<b>92</b>	96	100	3,1
E5	Turismo OÜ	<a href="http://turismo.ee">turismo.ee</a>	52	83	92	100	62	83	92	100	6,1
E6	OtsiReisi	<a href="http://www.otsireisi.ee">www.otsireisi.ee</a>	58	72	88	92	96	72	88	92	8,2
E7	Reisibüroo Wris	<a href="http://www.wris.ee">www.wris.ee</a>	56	83	73	100	71	79	77	100	1,8
E8	Go Travel	<a href="http://gotravel.ee">gotravel.ee</a>	58	79	96	92	77	76	96	92	2,4
E9	Reisibüroo Reisiexpert	<a href="http://reisiexpert.ee">reisiexpert.ee</a>	38	71	88	100	<b>40</b>	73	92	100	7,2
E10	Travibest OÜ	<a href="http://travibest.ee">travibest.ee</a>	56	89	69	100	80	80	<b>100</b>	92	5,6
B1	Travel Club Bulgaria	<a href="http://www.travelclub.bg">www.travelclub.bg</a>	75	73	96	<b>50</b>	81	79	100	<b>50</b>	8,2
B2	RealAdvance	<a href="http://realadvance.bg">realadvance.bg</a>	71	82	<b>100</b>	92	80	78	100	92	2,5
B3	Verso Travel	<a href="http://verso.bg">verso.bg</a>	50	<b>93</b>	77	100	82	89	77	100	9,3
B4	Away	<a href="http://away.bg">away.bg</a>	<b>27</b>	89	96	85	58	90	96	85	1,1
B5	GlobalTour	<a href="http://www.globaltour.bg">www.globaltour.bg</a>	72	68	96	75	96	68	96	75	6,6
B6	Red Tours	<a href="http://redtours.bg">redtours.bg</a>	<b>83</b>	<b>54</b>	96	83	<b>99</b>	61	100	92	8,2



B7	Bulgaria Travel	<a href="http://bulgariatravel.bg">bulgariatravel.bg</a>	59	79	<b>69</b>	82	91	75	<b>69</b>	82	5,0
B8	Bohemia	<a href="http://www.bohemia.bg">www.bohemia.bg</a>	54	56	100	83	49	<b>50</b>	100	83	1,0
B9	Abax	<a href="http://www.abax.bg">www.abax.bg</a>	78	78	88	85	96	78	92	85	6,9
B10	Ekvator	<a href="http://ekvator.bg">ekvator.bg</a>	54	79	96	92	83	90	96	92	8,2

Source: Collected from the internet by the authors; reports from Feb 18, 2026  
 (Google PageSpeed Insights; <https://pagespeed.web.dev/>)  
 (WAVE Web Accessibility Evaluation Tools; <https://wave.webaim.org/>)

The next columns are given in Table 3: *Performance* - PRD and PRM, *Accessibility* – ACD and ACM, *Best Practices* – BPD and BPM, *Search Engine Optimization* – SOD and SOM, and *Web Content Accessibility* – WCA. The last letter *D* indicates these indicators for the desktop version of the site, and *M* indicates these indicators for the mobile version. For all mentioned parameters, the higher numerical value is better.

The *Performance* metric is a comprehensive evaluation of a webpage’s loading speed and technical optimization. It reflects how quickly users can see the page content, start interacting with it, and how stable the page remains during loading. The score is based on a combination of key user experience metrics.

These include the time until the first visual element appears (FCP), the speed at which the largest and most important element on the screen is displayed (LCP), the visual stability of the layout during loading without unexpected shifts (CLS), and the responsiveness of the interface to user interactions (INP or TBT), which indicates whether there are delays caused by heavy scripts. Each metric has a specific weight in the overall calculation, and the system then generates a final score on a scale from 0 to 100. A score of 90–100 indicates high performance, 50–89 represents an average level, and anything below 50 signals the need for significant optimization.

It is important to understand that *Performance* is not simply the total page load time measured in seconds, but a comprehensive assessment of real user experience. Even if a site appears to load quickly, the score may be reduced if elements shift unexpectedly, buttons are not immediately clickable, or the interface responds with noticeable delays. The test results may also vary slightly between runs, as they depend on testing conditions such as network speed, device performance, and server load. In most cases, the analysis simulates an average mobile device with a throttled network connection to reflect real-world usage conditions.

A high *Performance* score is important not only for user convenience but also for search engine optimization, as page speed and stability are considered in ranking algorithms. Regular monitoring and technical optimization — including image compression, code minification, deferred script loading, proper caching configuration, and the use of a CDN — help improve the overall score, increase conversions, and reduce bounce rates.

The *Accessibility* metric is an evaluation of how well a website or web application is adapted for people with disabilities. This score highlights opportunities to improve a digital product's accessibility and inclusivity for users with visual, auditory, motor, or cognitive impairments. The assessment is based on a series of automated checks aligned with widely recognized accessibility standards, such as proper use of semantic HTML, sufficient color contrast between text and background, alternative text for images, correct labeling of form elements, logical heading structure, and keyboard navigability. The tool also checks whether interactive



elements are properly identified for screen readers and whether ARIA attributes are used correctly.

The final score is presented on a scale from 0 to 100. A higher score indicates better compliance with accessibility best practices, while a lower score signals issues that may prevent some users from fully interacting with the website. However, it is important to understand that this evaluation is based only on automated testing. Automated tools can detect only a subset of potential accessibility issues and cannot fully assess the real user experience. For example, a tool may verify that images have alternative text, but it cannot determine whether the descriptions are meaningful or helpful. Similarly, automated checks cannot fully assess how intuitive navigation feels for users who rely on assistive technologies such as screen readers.

Therefore, while the *Accessibility* score provides valuable guidance and identifies technical improvements, it does not guarantee full accessibility compliance. Manual testing — including keyboard-only navigation, screen reader testing, and usability reviews — is strongly recommended to ensure that the web application is truly accessible to all users. Improving accessibility not only supports inclusivity and legal compliance but also enhances overall usability and user satisfaction.

The *Best Practices* metric evaluates how well a website adheres to modern web development standards, security requirements, and technical implementation guidelines. This score helps identify technical issues and potential risks that may negatively affect a website's security, stability, and overall reliability.

The evaluation is based on a set of automated checks. These include verifying the use of the secure HTTPS protocol, detecting outdated or vulnerable JavaScript libraries, identifying browser console errors, ensuring secure loading of external resources, and confirming proper use of modern web APIs. The tool also analyzes technical aspects, such as proper image sizing, avoidance of unsafe requests, and adherence to current development standards, to ensure a high-quality implementation.

The final score is presented on a scale from 0 to 100. A high score indicates that the website follows current best practice recommendations and does not contain critical technical violations. A low score signals issues that may create security vulnerabilities, reduce user trust, or cause functional errors on the page. It is important to note that *Best Practices* does not evaluate design quality, content strategy, or marketing effectiveness. Instead, it focuses specifically on technical correctness, security, and compliance with modern development standards. Like other audit categories, it relies on automated analysis and does not replace a comprehensive technical review performed by specialists. Overall, a strong *Best Practices* score indicates that a website is built according to up-to-date web standards, provides a secure browsing experience, and is technically implemented in a reliable and sustainable manner.

The *SEO* metric evaluates how well a page follows basic search engine optimization guidelines. This audit helps ensure that a website is technically prepared for proper indexing and display in search engine results.

The score is based on automated checks of fundamental *SEO* best practices. These include a correct title tag and meta description, proper heading structure, server response status, the absence of indexing blocks via robots.txt or meta tags, correct use of hreflang for multilingual pages, proper canonical link setup, mobile usability, and other technical factors that affect search visibility.



The final score is presented on a scale from 0 to 100. A high score indicates that the page meets essential technical *SEO* requirements, while a low score highlights issues that may hinder indexing or proper display in search results. It is important to note that this metric covers only basic technical *SEO* aspects. Many additional factors that can significantly influence rankings are not included in this audit, such as content quality, backlink profile, user behavior, competitive landscape, and performance metrics, including Core Web Vitals. Detailed guidance on site requirements is provided in Google’s Google Search Essentials.

Overall, a high *SEO* score indicates that a page has a solid technical foundation for search engine visibility, but achieving strong, stable rankings requires a comprehensive approach that includes content strategy, technical optimization, and attention to external ranking factors.

The *Web Content Accessibility Guidelines (WCAG)* is a widely recognized standard for making web content accessible to people with disabilities. Tools use *WCAG* to automatically identify many accessibility issues, but their role goes beyond simple detection—they also help guide human evaluation of web content. The philosophy behind this approach is to focus on issues known to affect real users, such as missing alternative text for images, insufficient color contrast, or forms that cannot be navigated with a keyboard. Automated checks flag potential problems and provide explanations, facilitating manual assessment and ensuring that content is understandable and usable for people relying on assistive technologies.

At the same time, these tools serve an educational role, offering guidance on best practices and raising developers' awareness of inclusive design. In this way, *WCAG*-based evaluation helps both technically improve websites and foster a deeper understanding of accessibility, ensuring that web content is more inclusive, user-friendly, and compliant with recognized accessibility standards.

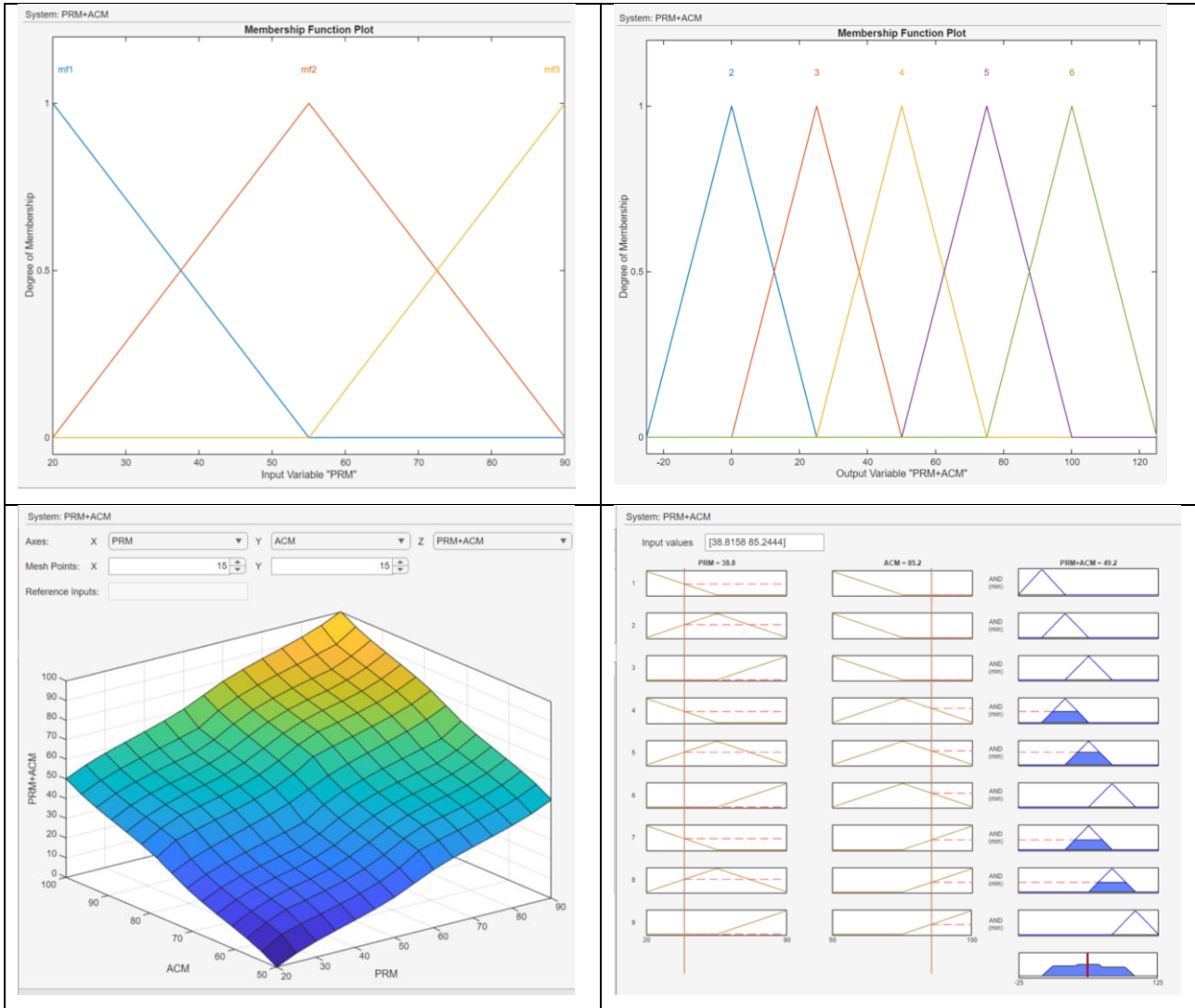
Based on the Table 3 data, we determined the boundary values for each input parameter, shown in Table 4.

**Table 4.** Results of the website evaluation by specialized web analysis computer tools

Indicators	Min	Max	Indicators	Min	Max
Performance - PRM	20	90	Performance - PRD	30	100
Accessibility – ACM	50	100	Accessibility – ACD	40	100
Best Practices – BPM	60	100	Best Practices – BPD	60	100
Search Engine Optimization – SOM	40	100	Search Engine Optimization – SOD	40	100
Web Content Accessibility – WCA	0	10			

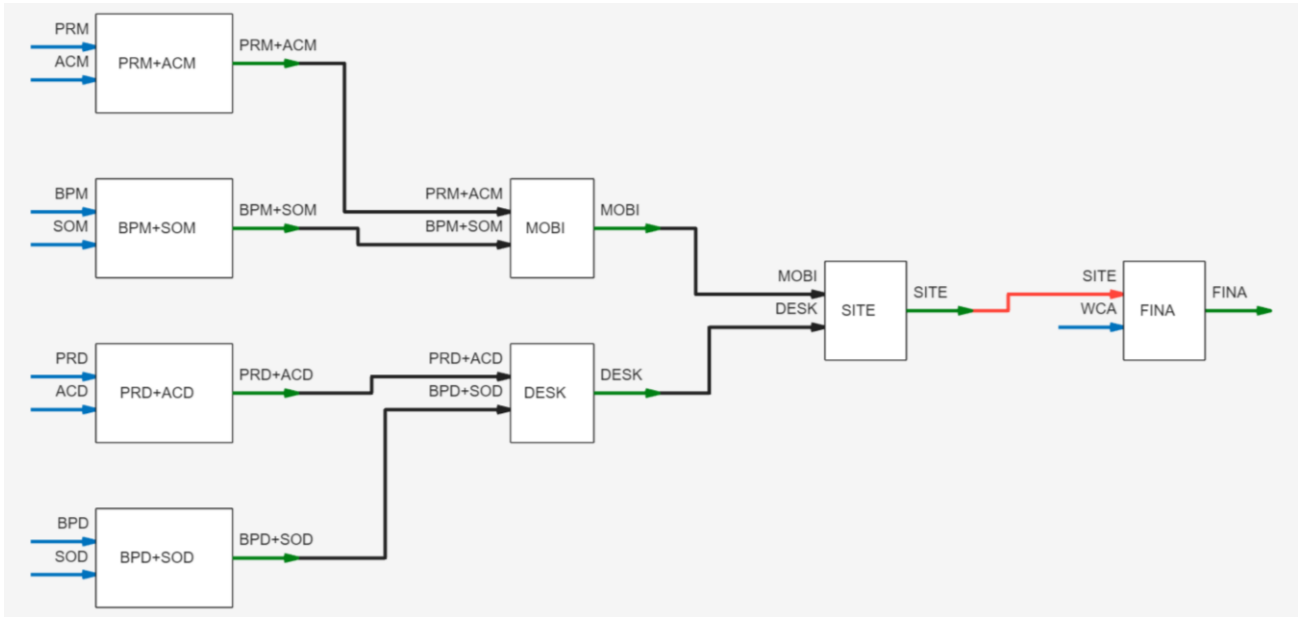
Source: Elaborated by the authors

Next, to obtain an integrated assessment for each site, we use the *FIS* approach, which consists of constructing a corresponding fuzzy inference system. The assessment for each site is then calculated using this fuzzy model, implemented in *MATLAB*. In our case, we will use three triangular membership functions for each input variable, as shown in Figure 2, and the resulting set of decision rules predicts a higher assessment that is directly proportional to the input variables' values. The same figure shows the appearance of the output functions and a fragment of the decision rule set.



**Figure 2.** Components of the model in *MATLAB*  
 Source: Developed by authors

The developed model is a decision tree that reflects the sequential integration of partial input assessments into a generalized integrated assessment. The model, already implemented in *MATLAB*, is given in Figure 3.



**Figure 3.** The model tree in *MATLAB* software  
*Source:* Developed in *MATLAB* by the authors

The intermediate results of the calculations and the final integrated assessment, along with the corresponding place in the general list for the 20 travel agency websites considered, are presented in Table 5.

**Table 5.** Intermediate and final results of the website evaluation by *MATLAB* model

N	Agency name	Website address	MOBI	DESK	SITE	WCA	FINA
E1	Tour24 Reisibüroo	<a href="http://tour24.ee">tour24.ee</a>	54	60	60	4,6	53
E2	SuperTours OÜ	<a href="http://supertours.ee">supertours.ee</a>	79	84	80	5,1	65
E3	Fly Tours OÜ	<a href="http://flytours.ee">flytours.ee</a>	65	68	69	4,5	57
E4	Estravel Eesti	<a href="http://www.estravel.ee">www.estravel.ee</a>	79	86	80	3,1	53
E5	Turismo OÜ	<a href="http://turismo.ee">turismo.ee</a>	73	74	74	6,1	69
E6	OtsiReisi	<a href="http://www.otsireisi.ee">www.otsireisi.ee</a>	63	75	71	8,2	76
E7	Reisibüroo Wris	<a href="http://www.wris.ee">www.wris.ee</a>	66	70	70	1,8	46
E8	Go Travel	<a href="http://gotravel.ee">gotravel.ee</a>	72	75	74	2,4	50
E9	Reisibüroo Reisiexpert	<a href="http://reisiexpert.ee">reisiexpert.ee</a>	56	60	61	7,2	69
E10	Travibest OÜ	<a href="http://travibest.ee">travibest.ee</a>	66	81	74	5,6	66
B1	Travel Club Bulgaria	<a href="http://www.travelclub.bg">www.travelclub.bg</a>	59	67	66	8,2	74
B2	RealAdvance	<a href="http://realadvance.bg">realadvance.bg</a>	81	80	78	2,5	51
B3	Verso Travel	<a href="http://verso.bg">verso.bg</a>	68	74	72	9,3	82
B4	Away	<a href="http://away.bg">away.bg</a>	61	71	68	1,1	42
B5	GlobalTour	<a href="http://www.globaltour.bg">www.globaltour.bg</a>	65	72	71	6,6	70
B6	Red Tours	<a href="http://redtours.bg">redtours.bg</a>	64	79	72	8,2	76
B7	Bulgaria Travel	<a href="http://bulgariatravel.bg">bulgariatravel.bg</a>	54	60	60	5,0	56
B8	Bohemia	<a href="http://www.bohemia.bg">www.bohemia.bg</a>	56	54	57	1,0	37
B9	Abax	<a href="http://www.abax.bg">www.abax.bg</a>	73	77	75	6,9	73
B10	Ekvator	<a href="http://ekvator.bg">ekvator.bg</a>	69	79	75	8,2	77

*Source:* Calculated by the model, developed by the authors

We then sorted the resulting numerical results in descending order, as shown in Table 6. The left side displays only the site's quality scores, while the right side displays the overall final score, which also factors in compliance with accessibility requirements.



**Table 6.** Results sorting

N	Agency name	Website address	Score	N	Agency name	Website address	Score
E2	SuperTours OÜ	supertours.ee	80	B3	Verso Travel	verso.bg	82
E4	Estravel Eesti	www.estravel.ee	80	B10	Ekvator	ekvator.bg	77
B2	RealAdvance	realadvance.bg	78	E6	OtsiReisi	www.otsireisi.ee	76
B9	Abax	www.abax.bg	75	B6	Red Tours	redtours.bg	76
B10	Ekvator	ekvator.bg	75	B1	Travel Club Bulgaria	www.travelclub.bg	74
E5	Turismo OÜ	turismo.ee	74	B9	Abax	www.abax.bg	73
E8	Go Travel	gotravel.ee	74	B5	GlobalTour	www.globaltour.bg	70
E10	Travibest OÜ	travibest.ee	74	E5	Turismo OÜ	turismo.ee	69
B3	Verso Travel	verso.bg	72	E9	Reisibüroo Reisiexpert	reisiexpert.ee	69
B6	Red Tours	redtours.bg	72	E10	Travibest OÜ	travibest.ee	66
E6	OtsiReisi	www.otsireisi.ee	71	E2	SuperTours OÜ	supertours.ee	65
B5	GlobalTour	www.globaltour.bg	71	E3	Fly Tours OÜ	flytours.ee	57
E7	Reisibüroo Wris	www.wris.ee	70	B7	Bulgaria Travel	bulgariatravel.bg	56
E3	Fly Tours OÜ	flytours.ee	69	E1	Tour24 Reisibüroo	tour24.ee	53
B4	Away	away.bg	68	E4	Estravel Eesti	www.estravel.ee	53
B1	Travel Club Bulgaria	www.travelclub.bg	66	B2	RealAdvance	realadvance.bg	51
E9	Reisibüroo Reisiexpert	reisiexpert.ee	61	E8	Go Travel	gotravel.ee	50
E1	Tour24 Reisibüroo	tour24.ee	60	E7	Reisibüroo Wris	www.wris.ee	46
B7	Bulgaria Travel	bulgariatravel.bg	60	B4	Away	away.bg	42
B8	Bohemia	www.bohemia.bg	57	B8	Bohemia	www.bohemia.bg	37

*Source:* Calculated by the authors

An analysis of the presented results allows us to draw several conclusions, namely: Estonian companies' websites have slightly higher ratings for technical components, as confirmed by the top five results. This means that, in general, Estonian tour operator websites are designed and function somewhat better technically. At the same time, Bulgarian travel agency websites should better meet accessibility requirements, which are particularly important for mass beach tourism. This result is expected, given the specific characteristics of each of the local tourism markets under consideration. In both markets, there are operators whose websites are fairly consistent across all indicators, and agencies whose website characteristics vary greatly in quality, which, in any case, significantly lowers their overall ratings.

## CONCLUSIONS

In summarizing the proposed approach and the developed model, the following points should be noted.

The need to evaluate local tour operator websites to improve the marketing component of business activities, particularly to attract potential clients and strengthen their position in the local tourism market, has been confirmed. Free and open-source software enables quantitative assessments of both technical and user-facing aspects of website usability. This software is simple to use and accessible to even the most inexperienced users, making it suitable for use in tourism management.

To integrate elementary numerical estimates, this article proposes a fuzzy inference system based on fuzzy set theory. A strength of this methodological approach is the ability to directly use input parameters measured and represented on various measurement scales, without intermediate additional transformations. Another advantage is the ability to combine numerical data and expert assessments, including those expressed in linguistic and verbal form, in a single model for computer calculations. The article presents the implementation



of this model in *MATLAB* and demonstrates practical calculations for Estonian and Bulgarian travel agencies. The numerical results illustrate the similarities and differences, strengths and weaknesses, of the websites of the reviewed travel agencies. This allows management to identify problem areas for each agency, compare their agencies with competitors, and identify areas for development and improvement of their own websites.

Thus, the theoretical implication of this approach is to develop a simple yet sufficiently substantiated methodology for multi-criteria evaluation of travel agency websites, while the practical usefulness is expressed in providing numerical assessments of the technical and user characteristics of websites in an integrated form for further analysis and for making necessary management decisions.

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