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APPLICATION OF ERGONOMICS TOOLS IN THE USE OF TOURIST ATTRACTIONS

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Abstract: *There is an absence of ergonomic study in tourist attractions in the specialized literature. The purpose of this study is to assess how tourists use and perceive the ergonomic experience of attractions based on reviews found on Google Maps. For the current study we examined a total of 3302 reviews from six popular tourist attractions from Brasov. The first part involved analyzing the reviews to determine the frequency of established words. Pareto diagrams were created in the second phase to help comprehend the data that was collected. Tourists tend to use eight terms most frequently: visiting, staff, kind, language, friendly, information, hall, and space. The analysis of the tourist's experience presents a chance to enhance the ergonomics of tourism destinations.*

Key words: *tourism, ergonomics, efficiency, qualitative analysis, tourist attractions.*

1. PROBLEM DESCRIPTION

Over time, ergonomics has acquired various definitions. One such definition, provided by the Romanian Explanatory Dictionary, describes ergonomics as "the discipline that deals with the study of working conditions to achieve optimal adaptation of humans to these conditions" [1]. An accepted definition of ergonomics, as proposed by multiple authors, is a concise etymological transfer derived from the Greek language. In Greek, "ergos" signifies work, while "nomos" connotes law or norm [2]. Additionally, there are authors who describe the Greek word "organiros" as signifying organize [3]. As noted by the authors in their study, we concur that the application of ergonomic principles to various fields positions ergonomics as a foundational discipline that undergoes continuous evolution and significantly enhances the human experience. In order to ensure the enduring relevance of this field in contemporary society, it is essential to adapt to emerging challenges and promote the widespread adoption of efficient ergonomic practices [2].

A preliminary search conducted in the Web of Science database using the keyword "ergonomics" reveals approximately 52,548

entries. However, after applying the database's filters and refining the search to "ergonomics in tourism," only 136 relevant entries are found. Nevertheless, the literature research indicates that an important contributing factor to the reduced quality of industry products is the inadequacy of their workstations. To enhance both productivity and worker well-being, it emphasizes the imperative of integrating ergonomic principles into workplace design [4]. Ergonomics can be examined from several perspectives, namely: work ergonomics, physical ergonomics, organizational ergonomics and cognitive ergonomics [5].

The literature demonstrates a notable interest in studies concerning both workers and customer ergonomics in tourism industry. It is important to highlight that the focus on employees tends to be more pronounced, as enhancing productivity in the workplace can subsequently address and meet the needs of customers [6]. This interest is increasing due to the continuous growth and development of the tourism industry. By integrating ergonomics into tourism practices, operators can enhance the quality of their services, thereby differentiating themselves in the marketplace and effectively addressing the needs of customers [7]. As the authors noted:

”The application of ergonomics in the tourism and hospitality industry involves designing work environments, tools, and tasks to align with the capabilities and requirements of employees. By embracing ergonomic principles, businesses in this sector can establish work settings that prioritize the well-being, comfort, and safety of their staff” [8].

Nonetheless, a significant number of entries in our research do not closely correspond with the primary focus of our study, which is the examination of ergonomics in tourist attractions. While a number of articles pertain to the hospitality industry, only a limited few are pertinent to our particular area of interest, which encompasses three topics concerning heritage [9, 10, 11] and also found topics regarding people with disabilities [12, 13]. “The basic principle of an ergonomic space for people with disabilities is a barrier-free living environment, a sustainable construction, adaptable and comfortable. People with limited mobility and communication can live comfortably in an ergonomic house or flat” [14].

In the existent literature review, there are authors who, in addition to their focus on workspace design, have successfully demonstrated the contribution of ergonomics to sustainable objectives [15]. In the context of sustainability, several authors emphasize the importance of ergonomics in both indoor and outdoor activities, leading to the emergence of the concept of green ergonomics [16]. A case study demonstrated that plants are incorporated within the ergonomic spectrum due to their positive impact on visual quality [17]. Additionally, related to the positive visual impact, there exist case studies on traffic signs that specifically address the effective and clear conveyance of information [18].

This research topic, which centers on the application of ergonomics in tourist attractions, is evidently underexplored or inadequately addressed; thus, we aim to fill this gap.

We selected a pilot city to validate our hypothesis: The Google Maps reviews of tourist attractions in Brasov, Romania, have the potential to identify relevant aspects related to the ergonomic experience in tourist attraction reviews, demonstrating a noteworthy consideration for comfort and usability in user

feedback. Our research objective is to evaluate usage patterns and users' perceptions of the ergonomic experience in tourist attractions, as inferred from the analysis of reviews available on Google Maps.

Chapter two provides a more comprehensive description of the chosen city and the rationale behind our study. Chapter three elaborates on the methodology employed, outlining the tools and techniques employed to address the ergonomics of tourist attractions for tourists. The findings of the ergonomic analysis are presented in the fourth chapter. Finally, a brief conclusion wraps up the study.

2. APPLICATION FIELD

2.1 Tourist attraction

According to a study conducted by TripAdvisor's Best of the Best Destinations, the city of Brasov is positioned among the elite group of the top 21 most frequented cities worldwide [19]. It is worth noting that this esteemed ranking encompasses various internationally acclaimed tourist destinations. Given the city's prominent global standing and its notable achievement of securing the third position in terms of overnight stays in 2023 [20], there exists a compelling and legitimate justification for subjecting Brasov to rigorous analysis. The chosen tourist attractions are, in, cultural heritage assets. These encompass historical monuments within the city of Brasov, whereas the remaining attractions are comprised in the list of museums [21]. Nevertheless, the selection criteria were primarily influenced by their popularity on the Google search engine.

Among the attractions, as detailed in the description provided by the Ministry of Culture are [21]:

- Black Church (Biserica Neagra), Code: BV-II-m-A-11412.01. An Evangelical church known as the Black Church, dating from 1383-1477, with significant additions from the 16th and 18th centuries;
- Weavers' Bastion (Bastionul Tesatorilor), Code: BV-II-m-A-11294.01. Period: 14th-17th centuries. Located in Southwest side;
- Bastion Graft (Bastionul Graft), Code: BV-II-m-A-11294.02. Period: 14th-17th;

- Catherine's Gate (Poarta Ecaterina), Code: BV-II-m-A-11294.01. Period: 14th-17th centuries. Located on the Southwest side;
- Muresianu House (Casa Muresenilor), Code: BV-II-m-A-11582. Period: 15th-19th centuries;
- First Romanian School (Prima Scoala Romaneasca);
- Brasov Art Museum (Muzeul de Arta Brasov).

2.2 ISO 26800:2011 (en)

“This International Standard presents the general ergonomics approach and specifies basic ergonomics principles and concepts. These are applicable to the design and evaluation of tasks, jobs, products, tools, equipment, systems, organizations, services, facilities and environments, in order to make them compatible with the characteristics, the needs and values, and the abilities and limitations of people” [22]. As the UNWTO said: “Ensuring that the information is accessible, is without any doubt a key to communicating successfully with visitors in all stages of their journey, particularly with regards to travelers with disabilities and special needs” [23]. Based on this established standard, we aimed to conduct this study to adapt it to tourist attractions.

3. RESEARCH STAGES

For the present study, we conducted a qualitative research, followed by two Pareto diagrams, in order to assess the validity or invalidity of the following hypothesis.

H1: The Google Maps reviews of tourist attractions in Brasov, Romania, have the potential to identify relevant aspects related to the ergonomic experience in tourist attraction reviews, demonstrating a noteworthy consideration for comfort and usability in their feedback.

3.1 Research objective

O1: Evaluation of usage patterns and users' perception of the ergonomic tourist attractions experience, as inferred from the analysis of reviews accessible on Google Maps.

We selected the Google search engine for the purpose of identifying prevalent tourist destinations. This choice aligns with the findings of other scholars who have verified that Google Maps boasts the most extensive repository of online reviews tailored to tourists [24]. The research commenced when we initiated a search for tourist attractions in Brasov on the Google search engine. On the specified date, numerous tourist attractions were presented.

For this study, we have specifically selected tourist attractions that belong to the historic center of Brasov. This deliberate choice enables us to concentrate on the fundamental historical and cultural landmarks that are situated in the very heart of the city. The attractions have been categorized into the following groups: Outdoors - Catherine's Gate; Churches: Black Church; Museums: Muresianu House, First Romanian School, Brasov Art Museum; Bastions and Fortifications: Weavers' Bastion, Bastion Graft. We decided to exclude the introduction of Street Sforii in the research due to the fact that other tourist attractions offer more diverse and intricate experiences. This objective provides a relatively limited experience.

Also we have made the decision not to incorporate Piata Sfatului into the classification due to its inclusion of reviews for numerous attractions and places in Brasov. The objective of this classification is to categorize distinct tourist attractions. Moreover, the reviews pertaining to Piata Sfatului are of a general nature and lack specific details concerning individual attractions.

Before initiating the data collection process, a comprehensive identification of relevant keywords pertaining to ergonomic usability was conducted. Through an extensive search conducted across various platforms, we came across the ISO 26800:2011 (en) [22], which provides valuable resources for the design or assessment of interactions with a system, or service.

As a result, for the purpose of this study, we have identified a set of categories derived from the standard for ergonomics. These include evaluation of the accessibility, environmental factors, efficiency and satisfaction.

3.2 Sampling and data collection

To conduct a systematic analysis of the reviews involved in this study, a centralized database was established, encompassing the comprehensive set of data necessary for the research. The reviews of tourist attractions were analyzed in a descending order. All reviews, regardless of the language they were written in, were included in the analysis since Google offers individual translations for each review. Therefore, it was decided to translate all the reviews into English to facilitate their utilization in the NVivo software during a later phase.

As a preliminary measure, we began the process of compiling all reviews into Microsoft Word documents, with distinct files allocated for each tourist attraction. We obtained eight distinct Microsoft Word documents (in Times New Roman font/size 10/justified alignment).

Tourist attractions, in contrast to other platforms, are primarily assessed based on a rating system that assigns a numerical value, ranging from 1 to 5 stars, without providing a detailed account of the visitor experience. The disparity between reviews lies in the fact that the ones displayed and analyzed solely presented a rating. In Table 1, we present the tourist attractions analyzed, accompanied by the total number of reviews recorded, which include both experiential descriptions and star ratings provided by tourists. The final column indicates the number of reviews selected for analysis, specifically focusing on those reviews that detail the visitor experience.

3.3 Methods

All reviews were analyzed using the NVivo software. The word documents for each attraction were processed, and a search for frequently occurring words was conducted.

Table 1

Reviews.		
Tourist attraction	Total	Analyzed
First Romanian School	3073	1374
Black Church	2621	942
Weavers' Bastion	2015	553
Brasov Art Museum	550	220
Muresianu House	292	115
Bastion Graft	225	81
Catherine's Gate	33	17

We have developed a set of keywords based on the criteria outlined in the standard and subsequently identified their frequency in relation to specific tourist attractions. The criteria we used to classify the terms based on standard: accessibility, environmental factors, efficiency, and satisfaction in order to better understand the experiences of the tourists. After selecting the criteria from the standard and based on the definitions, we utilized also the Pantou scheme to identify relevant keywords for each criterion. "Pantou has been developed to meet the need for a reliable and comprehensive international guide to all kinds of accessible tourism services, helping to make tourism everywhere Accessible for All. This web site presents the Directory of suppliers of accessible tourism services, covering the whole tourism and travel value chain. Until Spring 2017 the site was funded by the European Commission and its focus was on European businesses and destinations and service providers offering Europe-inbound tours" [25].

The finding of these keywords was conducted to ensure that the selected criteria are adequately met. The following terms apply to the accessibility: information, hall, space, access, furniture, map, sign and accessible. For environmental factors: interior, quiet, relaxing, easy, clear and light; For efficiency category: visiting, staff, kind, language, times, friendly, wait, waited, visits, languages, personal, service, services and kindness; And for satisfaction: interactive, understand, souvenirs, purchased and elements. An Excel database was established to record the frequencies of each word. For the subsequent phase, a secondary research endeavor was undertaken to classify these words into the aforementioned categories. Finally, two Pareto diagrams were developed to address the identified categories.

4. RESULTS

First, the frequency of the data analysis has been calculated and observed. For this study, we selected criteria extracted from the ISO 26800:2011 (en) standard and adapted them to the context of tourist attractions.

Tabel 2

Standard categories.

Categories	Count
Efficiency	682
Accessibility	289
Environmental factors	145
Satisfaction	143

Tabel 3

Frequency words.

Word	Count	Word	Count
visiting	279	waited	13
information	168	easy	12
staff	74	furniture	12
interior	73	map	12
kind	70	sign	12
language	59	visits	12
interactive	58	clear	11
times	56	languages	11
friendly	51	light	11
understand	49	personal	11
hall	30	purchased	11
space	29	service	11
quiet	23	services	11
access	16	accessible	10
relaxing	15	elements	10
souvenirs	15	kindness	10
wait	14		

Additionally, we utilized the Pantou scheme to identify further keywords that may be relevant in reviews. Table 2 illustrates the total occurrence rate of these criteria based on the selected tourist attractions.

Second, the frequency analysis has been developed. Table 3 illustrates the total of each word using the standards-selected criteria. We found 34 after these divisions, and the frequency is displayed in the table 3. The NVivo program proved to be valuable in this context, as it allows users to select frequency based on synonyms and plural forms, ensuring comprehensive coverage of all searches.

We did not categorize them based on sentiment analysis because our goal was to find pertinent ergonomic factors. However, a general study of the NVivo-processed review documents reveals that the ratio of negative and moderately negative terms was larger than that of very positive and moderately positive words. It is clear from the comprehensive study that visitors have a tendency to provide negative feedback. The most frequently encountered terms are visting and information, see also Figure 1.

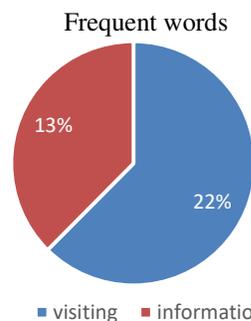


Fig. 1. Most frequent words.

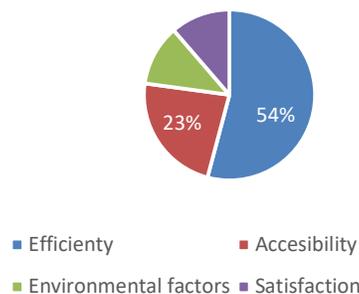


Fig. 2. Categories analysis.

In the third research stage, the categories analysis has been developed. When it comes to reviewing, efficiency is the most crucial factor to consider (Figure 2). Depending on the aforementioned phrases, tourists are interested in how far they can fulfill their demands and reach their aims. The degree to which a tourist attraction is easily accessible to all types of visitors and how simple it is to take advantage of all the resources the tourist destination has to offer is reflected in its accessibility. This is not limited to the topic of accessibility for individuals with disabilities, though it is a factor that all tourism destinations need to take into account. The researchers indicates that the potential for art to have a positive effect is comparable to the potential for ergonomics to create enjoyable experiences for individuals with disabilities [8]. Although they are less discussed, the surrounding elements are nevertheless significant and help to make the experience more enjoyable. Similar to satisfaction, having a variety of souvenirs to choose from improves the entire experience.

In the fourth stage of the research the Pareto analysis has been developed, which is considered an effective tool, to accurately

identify the parts that all the tourist attractions currently need to pay more attention to provide a more accurate interpretation. Some to put into practice, others to enhance.

We conducted a generic Pareto analysis because we had multiple categories with multiple keywords. This allowed us to determine that the accessibility and efficiency category needed to be addressed.

We recognize which keywords need attention based on how often they appear, but we are unable to determine which ones require a greater degree of attention. Figure 3 illustrates the most significant keywords for efficiency category: visiting, staff, kind, language and the fifth word follows right. In actuality, the most frequently used word visiting expresses the overall perception of tourists. In the current environment, "visiting the Black Church in Brasov was an amazing experience that left me absolutely hypnotized" has significance and worth.

It can also be present in the form of endorsement "I'm not saying that the monument isn't worth visiting, I'm just saying that the whole experience might be a little disappointing for someone who has seen the majestic European cathedrals." The interaction with personnel is best described by the words that follow visiting, staff, kind, language and friendly. For tourist attractions to be as efficient as possible and provide visitors with enjoyable experience, the ergonomics of the work area must be considered.

Figure 4 illustrates the second accessibility category. Information, the hall, and space are the key phrases in this specific situation.



Fig. 3. Pareto chart for efficiency category.

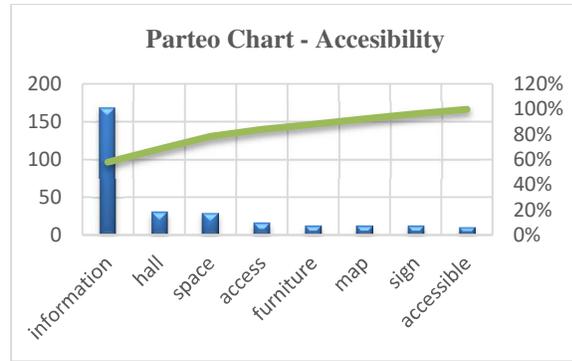


Fig. 4. Pareto chart for accessibility category.

5. CONCLUSION

The ergonomic evaluation of Brasov's prominent tourist attractions is presented in this article. These evaluations were conducted using the NVivo program and the reviews that have been placed on Google Maps. There is opportunity for tourist attractions to enhance these elements or be more ergonomic. The tourists confirmed the hypothesis we detected by mentioning the words that we had established using the standard. There are eight keywords that have been identified to be the most crucial and that tourists should consider.

There exists a gap in the specialized literature, particularly with regard to tourist destinations. However, we have shown that in order to fully capture the tourist experience, the staff must be further explored, as evidenced by the fact that staff, kindness, language, and friendliness are among the most important keywords. To better convey what appeals to travelers, the terms can also be used at the level of social media promotion. Furthermore, those can add more information by using the websites. Further research will aim to clarify the manner in which these identified terms convey either a positive or negative experience. But there's no way for us to quantify the effect they have. For the time being, we were able to pinpoint areas in which ergonomics improvement would be required and how it might be achieved

Following this research, we can also derive practical implications to assist tourism managers and policymakers in enhancing the efficiency and accessibility of tourist attractions. For visiting to be clearly defined, all pertinent details regarding both the destination and online.

Additionally, any changes to the program should be explicitly documented online. Staff attitudes significantly influence perceptions of service quality and the overall visitor experience; therefore, it is essential to implement regular training programs to maintain these standards. should be equipped to address any issues that visitors may encounter in an efficient and courteous manner; the use of a polite tone of voice is also recommended.

It is essential for all tourist attractions to furnish comprehensive information pertinent to the attraction for all categories of tourists. In instances where this is unfeasible, it is important to articulate the reasons for such limitations and to offer alternative information that may facilitate the process.

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Aplicarea instrumentelor ergonomice pentru promovarea atracțiilor turistice

Literatura de specialitate privind ergonomia destinațiilor turistice este insuficient dezvoltată. Scopul acestei cercetări este de a evalua modul în care turiștii utilizează și percep experiența ergonomică a atracțiilor turistice, în funcție de recenziile postate pe Google Maps. În cadrul studiului actual, au fost examinate 3302 recenzii referitoare la șase atracții turistice populare din Brașov. Analiza recenziilor a constituit prima etapă a studiului, având ca obiectiv determinarea frecvenței cuvintelor utilizate. În a doua etapă, au fost elaborate diagrame Pareto pentru a facilita interpretarea datelor colectate. Opt termeni au fost identificați ca fiind cei mai frecvent utilizați de către turiști: vizită, personal, amabil, limbaj, prietenos, informații, sală și spațiu. Rezultatele sugerează că există posibilități de îmbunătățire a ergonomiei destinațiilor turistice prin analiza experiențelor turiștilor.

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