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Participatory Multi-Criteria Decision-Making Analysis for Assessing the Potential of Ecotourism Development in Prespa Park

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Abstract: In this study, an approach based on an integrated and participatory multi-criteria decision-making analysis was developed and used to identify the best option for tourism development and the main priority factors supporting the ecotourism industry in Prespa Park. The study was based on different empirical analyses and conducted in two parts. In the first part, the PROMETHE II technique coupled with a fuzzy Delphi survey was applied to identify the best type of tourism development. The obtained result indicated that the ecotourism option, was the best one, followed by agritourism, cultural tourism, rural tourism, and finally the "tourism as usual". In the second part, the ecotourism aspects were compared, and the main priority factors supporting the development of a sustainable ecotourism industry were identified using the fuzzy Delphi method and fuzzy analytical hierarchy process. Comparing various aspects of ecotourism, economics seems to be the main driver behind the industry, with social and environmental aspects coming in second and third. We also identified six priority factors supporting ecotourism, to which attention needs to be paid. The findings may aid policymakers and decision-makers in developing long-term strategies to boost the ecotourism industry and reduce environmental damage in Prespa Park and other similar areas.

Keywords: ecotourism; fuzzy Delphi method; fuzzy Analytic Hierarchy Process; multi-criteria analysis; Prespa Park; PROMETHEE method.

JEL Classification: Z32; Q57; D70; R11.

Introduction

The term "ecotourism," born in the late 1960s and early 1970s (Swarbrooke 1999; Fennell 2020), emerged in academic literature in the early 1980s primarily as a reaction to growing concerns about mass tourism's impact on the natural environment (Ceballos-Lascuráin 1993; Gössling and Scott 2012). Since the 1990s, it has been considered one of the fastest-growing segments of tourism (Honey 2008), and now it is a global phenomenon (Kitheka and Davidson 2020).

There is a growing body of studies aimed at showing that analyzing tourism issues, because of those multiple dimensions, requires multiple-criteria decision making analysis (MCDA) techniques (Mihalič 2000; Hawkins 2004; Liu *et al.* 2013; Stević *et al.* 2019). On the other hand, the tourism sector is complex, incorporating a network of interrelated stakeholders and organizations, both public and private, who work together, increasing the dimensions of ecotourism planning, and forcing the use of participatory techniques (Drumm and Moore 2005; Proctor and Drechsler 2006). MCDA was used in this research as a methodological framework.

Tourism, which is an important economic activity at least in North Macedonia and Greece (Fremuth and Shumka 2013), is currently at an early stage in the case study of Prespa Park, but it is still an important source of income and employment with the potential to grow in the future (Grazhdani 2010; Latinopoulos 2020). However, this potential is unexploited, because tourism is seasonal, low-intensity, and basically limited to mainly local people. Karagiannis *et al.* (2010) argue the area has the potential to become an international destination. There is no real trans-boundary tourism on offer at present. Freimuth and Shumka (2013) highlight that Prespa Park is just in the beginning stages of ecotourism and is thus still "muddling through" without a clear plan or strategy. A

strategy for tourism development is lacking. There is an urgent need for the development of functional tourism in the region because the status quo of tourism can have a serious impact on local people's well-being as well as their cultural and natural heritage. This problem was addressed by this research.

Two of the best-known methods in the field of MCDA, namely PROMETHEE and the Analytic Hierarchy Process (AHP), were adopted and employed in the concrete conditions of Prespa Park. The PROMETHEE II method, coupled with the traditional Delphi survey, was used to evaluate five different options (types) for tourism development and identify the best one from an integrated and inclusive perspective. Once the best type of tourism development (ecotourism) was identified, the priority factors supporting its future development were developed, and then six main ones were identified through an expert questionnaire survey, the fuzzy Delphi method (F-DM) and the fuzzy analytic hierarchy process (F-AHP).

This study is unique and excels in two areas: it employs PROMETHEE and the Analytic Hierarchy Process (AHP) in conjunction with the Delphi method for the same collected data, and it applies fuzzy theory to evaluate the potential development of ecotourism in Prespa Park. The study is novel in the fact that it can use an integrated and participatory multi-criteria decision-making approach to find both the best option for tourism development and the most important factors supporting the ecotourism industry in a protected area simultaneously. This represents a modest contribution in the field of participatory multi-criteria decision-making modeling within the ecotourism literature.

1. Literature Review

Making decisions in the field of ecotourism is connected with numerous factors, *i.e.*, criteria, and complex situations involving multiple and often intangible and conflicting criteria (Saaty and Ergu 2015) that stakeholder groups and/or decision makers may assess differently. Using participatory multi-criteria decision-making analysis methods can effectively assist ecotourism planning and management. In this context, various mathematical modeling techniques of various levels of complexity, have been applied to solve participatory multi-criteria problems in the field of ecotourism (Kumar *et al.* 2017; Akbulut *et al.* 2018; Çetinkaya *et al.* 2018; Sahani 2019).

The PROMETHEE methods are part of the outranking methods group. This group was first introduced by Brans (1982) in the form of a partial ranking of alternatives and was then expanded by Brans and Vincke (1985) into a full ranking approach named PROMETHEE. According to Behzadian *et al.* (2010) and Brans and De Smet (2016), several versions of the PROMETHEE methods were developed and adapted to complex decision-making to solve a variety of multi-factor and multi-person decision-making problems and to take into account inputs from a group of stakeholders and decision makers. One of them was PROMETHEE II. According to Macharis *et al.* (2015), it provides a clear picture of each stakeholder's preference as well as the group as a whole, providing strong support for deliberation and negotiation within a common space.

Numerous researchers have solved different ecotourism management and planning problems by applying PROMETHEE techniques. Lopes *et al.* (2018), for example, applied the PROMETHEE method within a competitiveness study of eight tourist destinations located in the Northern Region of Portugal. On the other hand, Kaya *et al.* (2013) proposed a fuzzy multi-criteria approach for the selection of the most appropriate site(s) for promoting ecotourism activities in urban areas using a modified PROMETHEE methodology, and made a prioritization among seven different districts of Istanbul. The goal of the study by Koliouska *et al.* (2023) was to promote and investigate the Prespa National Parks area in Greece as an ecotourism destination. This study uses the PROMETHEE II multi-criteria analysis method to analyze and classify the websites that advertise the local tourism enterprises.

The Analytical Hierarchy Process (AHP) has a significant place in the mathematical description of complex processes arising in decision-making (Gunduz and Alfar 2019). It was developed by Thomas L. Saaty in the 1970s (1980) and has been refined since then. AHP is a mathematical approach, the prime goal of which is to determine the normalized weights (importance) of criteria based on experts' opinions (Thirumalaivasan *et al.* 2003; Garfi *et al.* 2011) that are collected using questionnaires. For Saaty (2008), AHP is a method of measurement through pair-wise comparisons and relies on the judgments of experts to derive priority scales.

Kumar *et al.* (2017) argue that AHP gains worldwide attention for its flexibility and effective use and is applied among different multiple-criteria decision analysis methods in different fields (Vaidya and Kumar 2006) and for various purposes (Garmendia and Gamboa 2012; Emrouznejad and Marra 2017). In the publication of Vaidya and Kumar (2006), a literature review of the broad areas of AHP application and its integration with different techniques can be found.

Several researchers (Forman and Gass 2001; García-Melón *et al.* 2012) recommend using the AHP technique to assess different aspects of ecotourism. The AHP method was applied by Bunruamkaew and

Murayama (2011) and Roque Guerro *et al.* (2020) for identifying and prioritizing potential ecotourism sites, the first in Surat Thani Province, Thailand, and the second in a Brazilian municipality. Meanwhile, Kumari *et al.* (2010) used AHP to identify potential ecotourism sites in the West District (a district in the Indian state of Sikkim) based on environmental parameters. Mobaraki *et al.* (2014) used GIS and AHP to assess the capacities and power of ecotourism in Isfahan Township (central Iran). Božić *et al.* (2018) applied AHP to assess the attractiveness of six cultural heritage sites in Phuket, Thailand. The Analytic Hierarchy Process (AHP) and Delphi analysis have been effectively employed to assess critical aspects in the advancement of the Taiwan cruise tourist sector (Teng *et al.* 2020).

Although AHP is one of the most extensively used multiple criterion decision-making techniques (Saaty 1990), it has certain drawbacks, particularly in its inability to capture the ambiguities or mistakes associated with group decision-making. Meanwhile, it has the ability to be easily integrated with multiple techniques, such as fuzzy Logic. As Chen (2000) states, to address these deficiencies and abilities, the integration of AHP and fuzzy theory developed by Zadeh (1965) has been realized. These issues are addressed in the Fuzzy AHP (F-AHP) (Saaty 1987), which, as Torfi *et al.* (2010) emphasize, makes it a robust and flexible decision-making tool. As stated by Ahmed and Kilic (2019), it is utilized to represent human judgments more realistically and to find a balance between ease of computation and accuracy of results. Chan *et al.* (2019) demonstrate the conditions relating to differences between the triangular fuzzy AHP and classical AHP from both a quantitative and qualitative perspective.

F-AHP became a suitable tool for solving real problems in the field of ecotourism. For example, Zabihi *et al.* (2020) used an F-AHP to evaluate the relative importance of physical, natural, environmental, and socio-economic factors for determining the suitability of ecotourism sites in the case study of Babol in Iran. Using Fuzzy-ANP and Fuzzy Delphi methods, Lin and Chuang (2012) evaluate the sustainability of Taiwan's coastal wetlands ecotourism, and Lee *et al.* (2011) develop key success factors of the ecotourism industry in Taiwan.

2. Materials and Methods

2.1. Case Study: Prespa Park

The current study was conducted in Prespa Park (Fig. 1). The Prespa Park region is a good case study, as it is a wetland area of high biodiversity and long human history (Grazhdani 2014a). The trilateral Prespa Park (Albania, North Macedonia, and Greece), which includes both the Micro and Macro Prespa Lakes and their surrounding areas, covers an area of approximately 2,519 km^2 (Hollis *et al.* 1997). The park was declared on World Wetlands Day, February 2, 2000. The area is designated as a Wetland of International Importance under the Ramsar Convention (Ramsar 2013). Ohrid-Prespa area was declared a Transboundary Biosphere Reserve under the UNESCO Man and the Biosphere Programme in 2014 (Unesco 2014).

Figure 1. Prespa Park region

The three countries that share the Prespa Park basin, have designated parks and/or protected areas within their own territories. For Fremuth and Shumka (2013), they are the strongest tourism assets at present.

According to Grazhdani (2018), Prespa Park is a protected ecosystem that provides significant ecosystem services, boasts a plethora of natural, historical, cultural, and ecotourism attractions and artifacts, and is known for its abundant biodiversity of plants and animals, as well as its attractive landscapes. The territory of the Prespa Park includes both the terrestrial portion and the entire aquatic component of the two Prespa Lakes. Park is a particularly vulnerable environment in which it is difficult to balance socioeconomic and environmental protection (Grazhdani 2023).

In the Albanian part of Prespa Park, approximately 5,370 people live in 12 villages. The majority of the population works in labor-intensive agriculture (farming and livestock production), which accounts for approximately 75% of the local gross product (Grazhdani 2024a), and is supplemented by some fishing as the primary source of subsistence income. Grazhdani (2015) notes that the Albanian part of the Prespa Park region was traditionally an agricultural region, but recently a notable tourism "boom" began on its coast. Tourism in the area is reported by Grazhdani (2024b) to be seasonal visits, especially during holidays, and small-scale rural and family tourism, based on a few small hotels, private accommodations, and restaurants. For overnight stays, there are 53 hotel beds, 50 private accommodations, and 385 seats in 13 restaurants. Desires to grow and develop the tourism sector in the Albanian part of Prespa Park exist, especially during the last two years, achieving tourism presence multiple times its population, but steps need to be made to enable this growth to be sustainable.

Rural depopulation and unemployment have characterized this region in Greece. According to Sdrali *et al.* (2015), 65 percent of the population in the Greek part (about 1,200 people in 13 villages) continues to rely on agriculture, especially monocultures of beans, for their livelihoods. However, tourism is seen as an alternative means of income generation. The Greek part of Prespa Park has the most developed tourism product in the region and attracts the most visitors. As Sdrali *et al.* (2015) note, there are 25 accommodations with a total capacity of about 570 beds, most of which are affected by seasonality.

The portion of the basin within the territory of North Macedonia is the most densely populated. Over 17,500 people live in one town (Resen) and 40 villages, despite the fact that strong rural-urban migration is causing an aging and declining population. Fruit growing and fishing are the most important economic activities. There is also a small manufacturing base. The tourism industry in the Prespa region of North Macedonia is also very small and seasonal at present, with 7 hotels (201 beds) and an auto camp (334 beds). The lake's pollution load, both here and in Greece, is primarily caused by agricultural chemical and fertilizer run-off.

The productive system in Prespa Park as a whole is not balanced and equally developed in all sectors. A more diverse economy is required to provide the locals with employment possibilities and income sources. The current level of tourism development is village-based and small-scale. There is no real trans-boundary tourism on offer at present. The area has very few private sector tour activities, despite the growth of a few modest activity tour firms in Greek Prespa. The rate of development of this tourism potential has been slow due to a lack of proper planning and financial constraints. According to Fremuth and Shumka (2013), despite these challenges, the Prespa Park basin may unquestionably provide a tourism product to satisfy the demands of an expanding tourism market (Grazhdani, 2024c). The environment needs to be better protected, and awareness of alternative tourism options (including ecotourism) in the area needs to be created.

Both North Macedonia and Albania suffer from a widespread shortage of adequate infrastructure, including roads, water supplies, and sewage facilities. If there is a deficiency in basic infrastructure, we must improve or develop it. However, maintaining the current infrastructure can present additional challenges at times. Thus, sustainable tourism, of which ecotourism is a component, is bettering living conditions for the population of Prespa Park by enhancing the infrastructure for the benefit of tourists. Grazhdani (2010) has shown that the Prespa has a developing ecotourism product. The guiding strategy for the Prespa Park's ecotourism development, according to Karagiannis *et al.* (2010) and Latinopoulos (2020), is to manage natural and human resources in a way that improves local benefits, maximizes tourist satisfaction, and minimizes any developing negative consequences. For rural and semi-urban Prespa Park communities that are keen on improving their socioeconomic welfare while also preserving nature and the region' cultural heritage, ecotourism could be the perfect medium.

There are a number of advantages to Prespa Park in terms of developing ecotourism. Firstly, Prespa Park possesses an abundance of unique natural resources, especially famous mountains, lakes, rivers, natural reserves, forest parks, scenic areas, and caves. There are many activities offered in Prespa Park, such as wildlife observation, bird watching, and hiking and trekking, fishing, hunting, rock climbing**,** cave exploring**,** and camping, among others that directly involve nature. Secondly, it has a rich and diverse cultural and ethnic heritage, which can provide tourists with distinctively attractive traditional customs and festivals. Several Neolithic and Bronze Age hermit chapels, churches, and prehistoric homes can be found in the region, as well as historical layers of

Byzantine and Ottoman monuments (Grazhdani 2014b) with a high potential for tourism (Freimuth and Shumka 2013; Grazhdani 2016). Thirdly, in February 2010, an international agreement was signed between the Ministries of Environment of the three countries sharing the Prespa Lakes basin and the European Commission. Under this agreement, the three states are legally bound to establish permanent structures of cooperation in order to develop a common strategy and to apply measures both for the protection of the natural environment and the human activities in the area.

On the other hand, Prespa Park could potentially benefit from tourism studies to gather reliable data that can guide the industry's growth, especially the ecotourism. Countries must unify their policies and management plans, both vertically and across issues. Protecting natural areas is a cross-border effort that necessitates cooperation among neighboring countries. Coordinated efforts in planning, development, management, and marketing are crucial to Prespa's success as a tourism destination.

As a conclusion, the Prespa Park has the potential to thrive as an ecotourism hotspot, bringing economic growth that will help increase the residents' well-being as well as conserve the sociocultural and natural resource heritage.

2.2. Data Collection

The study was carried out over a two-year period (2017–2018) and used a number of methods to collect data and information. In operational terms, the following inclusive activities were conducted: a field survey, consultations with experts and authorities, and two one-day participatory workshops.

In May-June 2017, a field questionnaire survey, which was based on samples taken following the strategy to meet statistical reliability and validity objectives, was conducted in Prespa Park. The survey used in this study was administered following the Dillman (2011) method. 400 questionnaires were distributed to the residents selected randomly in the Prespa Park watershed. The questionnaire have to be returned by the respondents within 5-7 days. The initial packet included the questionnaire, a contact letter, a booklet of the survey, and a pre-addressed and stamped return envelope. The completed questionnaires were mailed back. The number of usable questionnaires was 226 (56.4%).

The questionnaire items were accurately written and then sent to a panel of experts (including survey researchers, tourism industry experts, economists, environmentalists, and specialists specific to statistic design) to check the content and construct validity. To refine the questionnaire, a pilot field test was conducted to clarify the questionnaire's comprehensiveness, content validity, and potential areas of ambiguity (Fink 2013; Nardi 2013). 30 residents within the watershed were chosen to make comments on the questionnaire's clarity and ease of use. The final version of the questionnaire was adjusted to include the suggestions provided by the expert panel and the field test.

In order to measure the questionnaire's internal consistency, Cronbach's alpha was used: the closer the alpha is to 1.0, the more reliable it is (Nardi 2013). The Cronbach's alpha for this study was 0.83. All of the questions were checked to make sure they were appropriate for the research before being placed into the database. For data analysis, was employed SPSS 21.0.

The field survey was then followed by consultations with stakeholders and authorities and was complemented with two one-day workshops.

2.3. Data Analysis Methods Applied

2.3.1. Fuzzy Delphi Method (F-DM)

The Delphi multi-round survey is a widely and successfully used procedure based on a group of experts arriving at an acceptable degree of consensus regarding the attributes of interest. As Angus *et al.* (2003) and Mirhosseini (2016) emphasize, the Delphi technique, according to Powell (2003), is a sequence of successive questionnaires or "rounds" that alternate with regulated feedback, with the aim of finding the most trustworthy consensus among the viewpoints of a "group of experts." According to Richey *et al.* (1985), they reach consensus by iteratively administering and subsequently applying data from questionnaires, using highly ranked items from one questionnaire to formulate the next.

It is a flexible method that is useful in achieving consensus in large, complex problems with uncertainty, and as Landeta (2006) notes, it is accepted as a valid technique for a variety of research purposes, including environmental management and planning (Angus *et al.* 2003; Curtis 2004; Hayes 2007), recreation (Austin *et. al*. 2008), tourism research (Garrod and Fyall 2005; Donohoe and Needham 2009), and ecotourism (Donohoe 2011; Mirhosseini 2016). Finally, as Kaynak and Macauley (1984) claim, the Delphi technique is not a decision-making

tool, but rather a tool of analysis, and as such, the aim is not to achieve a definitive answer, but instead to aid in the development of possible solutions based on the Delphi results.

Because the traditional Delphi method has limitations such as vagueness, uncertainty, the impreciseness of human decisions (Ocampo *et al.* 2018), and a lengthy procedure time (and the associated high research costs), scientific research frequently employs its modification, the fuzzy Delphi method. It was proposed about three decades ago by Ishikawa *et al.* (1993). According to Roldán López de Hierro (2021), the Fuzzy Delphi Method (F-DM) is a modified and enhanced version of the traditional Delphi technique that incorporates fuzzy data in experts' opinions and utilizes triangulation statistics to determine the distance between the levels of consensus within the expert group.

In this research, F-DM was employed. The key steps implied in this study were as follows: During Step 1, each Delphi expert provides possible interval values for each evaluated criterion. The minimum value of this interval represents the most conservatively perceived value, while the maximum value represents the most optimistically perceived value of the assessed criteria.

During Step 2, an analysis of 'the most conservative perceived values' and "the most optimistic perceived values," given to each assessed criteria *i* by all of the experts, was performed. After the extreme values falling outside the "two times the standard deviation" are eliminated, the minimum value C^i_L, the geometric mean C^i_M, and the maximum value C^i_U of "the most conservative perceived value" that has not been eliminated, as well as the minimum value O^i_L, the geometric mean O^i_M and the maximum value O^i_U of "the most optimistic perceived value," are determined.

During Step 3, through the foregoing steps, the triangular fuzzy number Ci = (C^i_L; C^i_M; C^i_U) of "the most conservative perceived value" and the triangular fuzzy number Oi = (O^i_L; O^i_M; O^i_U) of "the most optimistic perceived value" of each assessed item *i*, were established.

During Step 4, the following methods were used to verify the degree of consensus among experts: a) no grey zone exists; b) the grey zone exists but there is a small difference between the experts' advice; and c) the grey zone exists but there are large differences between the experts' advice.

During Step 5, based on Step 4, Gi (the importance of the consensus degree) equal to the mean value of C^i_M and O^i_M for each criterion, was calculated. The higher the Gi value, the higher the experts' common conscious level. Finally, the arithmetic mean of all Gi values was calculated. This was used as a threshold value to select a suitable number of assessed items. More information about the fuzzy Delphi survey methodology can be found in Gil-Lafuente *et al.* (2014).

Twenty experts were chosen for the current study to participate in the Delphi process and to answer the questionnaires via email. The experts were from tourism organizations, tourism travel agencies, protected area management units, agriculture agencies, tourism and environmental NGOs, and academics in the fields of leisure and tourism.

2.3.2. PROMETHEE Method

The PROMETHEE method belongs to the family of outranking methods and represents one of the most frequently used methods of multi-criteria analysis (Silva *et al.* 2010; Lu *et al.* 2007; Brans and Mareschal 2005; Figueira *et al.* 2005). It is a pair-wise comparison methodology to evaluate and compare a finite set of *n* alternatives A = (a_1, a_2, . . ., a_n) in terms of *m* multiple criteria C = (c_1, c_2, . . ., c_m).

The PROMETHEE method is based on a mutual comparison of each alternative pair with respect to each of the selected criteria (Brans and Mareschal 2005). In order to perform option ranking by the PROMETHEE method, it is necessary to use the preference function between two alternatives, a_i and a_k under each criterion c_j provided by decision-makers. The larger the function value is, the bigger the difference between alternatives (Brans and Mareschal 2005). After defining the value of function preference of alternative a_i in relation to alternative a_k for each criterion, it is necessary to calculate the index of preferences of alternative a_i in relation to alternative a_k. After determining index preference, it is finally possible to calculate an alternative flow index, whose value represents the significance of the alternative.

Brans and Vincke (1985) developed an extended method of PROMETHEE II, for complete ranking from the best to the worst of a fixed set of possible alternatives. It is based on a calculation of the net outranking flow value (Φ) that represents the balance between the positive (Φ^+) and negative (Φ^-) outranking flows. Positive (Φ^+), negative (Φ^-), and net flows (Φ) were calculated by the software according to the equation established by Brans and Mareschal (1985). According to the preference index, the positive flow $\Phi^+(a_i)$ and negative flow $\Phi^-(a_i)$ of each alternative a_i can be defined. The corresponding net flow $\Phi(a_i)$ can then be calculated as follows: $\Phi(a_i) = \Phi^+(a_i) - \Phi^-(a_i)$, which can be positive or negative. Φ is used to obtain an impact ranking based on the principle that the

higher the net flow value, the higher the priority of the impacts. For more details, see Brans and Vincke (1985), Anand and Kodali (2008), and Brans and De Smet (2016).

Based on the net flow values, the preference relationships between two alternatives can be determined. The higher the net flow, the better the alternative (Brans and Mareschal, 2005). So, if $\Phi(a_i) > \Phi(a_k)$, then alternative a_i will be ranked before alternative a_k; while if $\Phi(a_i) = \Phi(a_k)$, then the two alternatives a_i and a_k will have the same rank. For more details about the PROMETHEE methodology, Brans and Mareschal (2005) and the PROMETHEE 1.4 Manual (2013) can be consulted.

The key steps implied in this study were as follows: The procedure began by identifying the tourism development options and associated criteria through consultations with stakeholders and authorities, a panel of experts, and a one-day workshop. In step two, the pair-wise comparisons of options for every criterion were calculated. Meanwhile, in step three, the preference function was obtained. During the fourth step, the global preference index was calculated. In step five, the positive, negative, and net outranking flows for each option were computed. According to the net outranking flows, the options were ranked in descending order.

2.3.3. Fuzzy Analytical Hierarchy Process (F-AHP)

The Analytic Hierarchy Process (AHP) presents a powerful technique for analyzing and solving complex decision-making problems that involve multiple criteria at multiple levels (Razandi *et al.* 2015). By utilizing both mathematics and psychology, the AHP is able to break down a complex decision-making problem into a number of different hierarchical levels. Pairwise comparisons are used to determine the weights for each criterion and alternative, and the Eigenvector method is used to establish priorities. This structure lets it measure and combine many different factors in a complex decision-making process, which makes it easy to put the parts together into a whole.

Nowadays, the AHP analysis method, along with fuzzy set theory (F- AHP), has been extensively used in the multi-criteria decision-making analysis process. In this research, an F-AHP approach was applied. The procedure for using the F-AHP in this study was structured into four steps as follows: During the first step, a hierarchical structure was set up. This structure included the goal (to identify the main priority factors supporting the development of the ecotourism industry in Prespa Park), the ecotourism aspects (environmental, economic, and sociocultural), and the main priority factors that support the growth of ecotourism.

During the second step, we determined the priorities of the variables at each level by constructing a set of pair-wise comparison matrices of all the variables in relation to each other. The pair-wise comparison illustrates how much variable *A* is more favorable or important than variable *B*. These logical preferences were measured using Saaty's 1–9 scale. So, during this second step, first an AHP questionnaire was composed and distributed by email to the Delphi experts for assessment. Each expert offered a possible value for each assessed issue based on Saaty's 1–9 scale, where score 1 indicates equal importance and score 9 reflects the extreme importance of one factor compared to another (Saaty 1980). Next, the triangular fuzzy numbers were used to express the experts' fuzzy opinions. Hence, a fuzzy positive reciprocal matrix was established. Further, a set of fuzzy pair-wise comparisons at each level in the hierarchy were set up. Lastly, a final comparison matrix was established.

During the third step, the consistency test was conducted. This was checked by calculating the consistency ratio (*CR*). As Scholl *et al.* (2005) highlight, *CR* specifies the degree of consistency or inconsistency. According to Saaty (2008), consistency can be satisfied if *CR* is less than 0.1; otherwise, the pair-wise comparison matrices must be repeated.

During the fourth step, the weight determination was realized. To do that, first, using a triangular membership function and geometric means (Efe 2016), the fuzzy weights of criteria at various stages of the fuzzy matrix were yielded. Next, using the modal value dominancy method (Krejčí *et al.* 2017), all weights obtained by fuzzy geometric means were defuzzified, and then, using the arithmetic mean procedure proposed by Chang and Lee (1995), they were normalized. Lastly, the overall normalized weight values of the hierarchy were calculated.

3. Results and Discussion

3.1. Assessing and Prioritizing Different Options for Tourism Development with PROMETHEE II in Prespa Park

Assessing and prioritizing different options for tourism development is a useful way to increase efficiency in decision-making. As a result, in this study, an MCDA procedure was designed with the goal of carrying out this prioritizing task. To address this problem, we used the PROMETHEE II method coupled with a fuzzy Delphi survey. In the selection and evaluation process, the following three sequential phases were conducted: The

tourism development options and associated criteria were identified during the first phase. To assemble a comprehensive list of options and criteria for identifying the best option for ecotourism development, first there were organized consultations with local stakeholders and authorities. Then, a one-day workshop was organized and attended by about 30 participants who had a good knowledge of the problems under investigation, including ecotourism experts, economists, academicians, and representatives from tourism, agriculture, and protected area management authorities who work directly or indirectly on the study area.

Upon arrival at the workshop, participants were given background information on the study (including goals and objectives), a summary of the survey results, and how the research and workshop relate to this process. The findings from consultations with stakeholders and authorities were also presented in order to get some feedback and ratification of this part of the research. A series of short presentations and panel discussions were used to brief participants on the key principles of the participatory MCA analysis, the possible tourism development options, and their features in Prespa Park. The participants were asked to assess the criteria for analyzing the tourism development options against a preliminary list developed by a panel of experts. The meeting was characterized by intense debate among the participants.

At the end of the workshop, the following five tourism development options were identified: (O1) the status quo, or tourism as usual; (O2) agritourism; (O3) ecotourism; (O4) cultural tourism; and (O5) rural tourism. Option O1, "tourism as usual," represents the current scenario for the tourism industry in the region, leaving the system on its own without any type of intervention. Then, a preliminary list of 15 criteria was made (see the section on collecting data in this paper for more information).

According to Macharis *et al. (*2004), PROMETHEE is based on the assumption that the decision maker or stakeholder is able to weigh the criteria appropriately when the number of criteria is not too large. As a result, a filtration procedure was required before the developed criteria could be used in the PROMETHEE II method. This was released through the Fuzzy Delphi survey. So, a questionnaire with 15 items was prepared and then distributed by email to the Delphi experts for assessment. Their assessment was based on a range of 0–10, with 10 signifying the most important and 0 the least important. In this study, the procedure described in sub-section 2.3.1 was implemented using the statistical Expert Choice Software (2002).

Table 1. Results of fuzzy Delphi method for Prespa Park

Evaluation criteria	Oi			Ci			Mi*	Zi**	Gi
	O^i_L	O^i_M	O^i_U	C^i_L	C^i_M	C^i_U			
Employment opportunities	8	9.6	10	4	7.2	9	3.2	1	8.4
Touristic itinerary design	9	9.7	10	6	6.9	8	2.8	−1	8.3
Agricultural resources	8	9.5	10	5	6.1	7	3.4	−1	**7.6**
Biodiversity/ native biota	7	9.2	10	3	6.1	7	3.1	0	**7.7**
Cultural events and festivals	9	9.8	10	5	6.9	8	2.9	−1	8.3
Water quality and lakes health	9	9.7	10	5	6.6	8	3.1	−1	8.2
Local product diversity and quality	7	9.1	10	3	6.2	8	2.9	1	**7.5**
Aesthetics/scenic views	9	9.8	10	3	6.3	9	3.5	0	8.1
Spacious guestrooms	9	9.7	10	5	6.3	8	3.4	−1	8.0
Socio-cultural and historic heritage	9	9.9	10	5	6.8	8	3.1	−1	8.4
Participation of residents	9	9.6	10	3	6.3	7	3.3	−2	8.0
Convenience of connected traffic	8	9.4	10	5	6.1	7	3.3	−1	**7.7**
Marketing promotion	7	8.9	10	2	5.4	7	3.5	0	**7.2**
The integrity of the farm facilities	8	9.4	10	5	6.9	8	2.5	0	8.1
Staff service quality and attitude	8	9.6	10	5	6.7	8	2.9	0	8.2
Threshold value (Gi)	8.0								

*$M_i = O^i_M - C^i_M$; **$Z_i = C^i_U - O^i_L$

Source: The author's collected and elaborated survey data for 2017-2018

The threshold value of this study was 8.0. Based on this calculated threshold value, five evaluation criteria (40 percent of the total) with a Gi value (in bold) less than 8.0 were deleted at the end of the fuzzy Delphi survey, leaving ten. These remaining ten criteria provided the basis for the development of the third phase of analysis. The results obtained are shown in Table 1.

Then, during the third phase, the PROMETHEE II procedure was applied to establish weights, compare among them five different tourism development options, and identify the best option based on the aggregation of the criteria. Mareschal (2012) made the software PROMETHEE Version 1.3, which was used to carry out the steps in section 2.3.2.

The results (Table 2) indicated a top ranking for the ecotourism (O3) option, and the other options are ranked in descending order as follows: O2 (agritourism), O4 (cultural tourism), O5 (rural tourism), and lastly, O1 (tourism as usual).

Table 2. PROMETHEE flows and ranking

Outranking flows	Options				
	O1	O2	O3	O4	O5
Φ^+	0.2845	0.3541	0.3572	0.3018	0.2943
Φ^-	0.1764	0.1782	0.1443	0.1893	0.1981
Φ	0.1081	0.1759	0.2129	0.1125	0.1062
Ranking	5	2	1	3	4

Source: The author's collected and elaborated survey data for 2017-2018

The participatory multi-criteria evaluation approach of tourism options in Prespa Park described above highlighted the fact that maintaining the current regime of tourism management was not an appropriate option. The process supports a change to alternative tourism, one component of which is ecotourism.

3.2. Identifying Main Priority Factors Supporting Ecotourism Industry in Prespa Park

The development of sustainable ecotourism is influenced by many factors, which need to be identified. In this second part of the research, the Fuzzy Analytic Hierarchy Process method, coupled with a Fuzzy Delphi survey, was used to identify the priority factors supporting future ecotourism industry development in Prespa Park. The procedure was employed in two phases of analysis.

The objective of Phase I was to establish an initial hierarchical structure representing a consensus of experts' opinions. This initial hierarchical structure (of two levels) was constructed based on the research aim: to identify the main priority factors supporting the development of the ecotourism industry in Prespa Park. On the first level, there were three pillars (parts) of sustainable ecotourism: environmental, economic, and sociocultural. On the second level, there were priority factors that help ecotourism grow. The priority factors were developed through a literature review, consultations with stakeholders and experts, and a second one-day workshop. At the end of the workshop, a preliminary list of 26 priority factors was approved.

In order to achieve consistency among the levels and to make reasonable and effective pairwise comparisons, Saaty (2008) suggested that the number of elements in each level or sub-level should be fewer than seven. So, before the developed priority factors were entered into the second level, they needed a filtration procedure. This was released through the Fuzzy Delphi survey. The same procedure and software used in the previous section for the fuzzy Delphi survey, were also used in this paper section.

Finally, based on the calculated threshold value of 7.5, at the end of the fuzzy Delphi survey, 11 factors (42.3% of the total) were deleted and 15 remained (Table 3). These remaining factors made up the second level of the hierarchical structure of potential priority factors in the ecotourism industry. This provided the basis for the development of the second phase of analysis.

The purpose of Phase II of the analysis was to screen for the 15 priority factors using the Fuzzy Analytic Hierarchy Process. This offered the opportunity to arrive at an objective set of main priority factors. So, at first, based on the list of 15 priority factors, an AHP questionnaire was composed and distributed by email to the Delphi experts for assessment. Each expert offered a possible value for each assessed issue based on Saaty's 1–9 scale. Then, the pair-wise comparison of priority factors was carried out, and a comparison matrix was also prepared. Next, through the fuzzy analytical hierarchy process, the relative weights of the related main ecotourism aspects (pillars) were estimated. Expert Choice Software (2002) was used for analyzing the consistency test and calculating the weighting.

The weighting accuracy was checked by calculating the consistency ratio (*CR*) at their respective levels and in the entire hierarchy (Table 3). The results indicated that the CR values were all < 0.1, and this meets an acceptable deviation scope as recommended by Saaty (1980). This result indicated that previous and subsequent judgments of experts at all levels were consistent. The overall consistency ratio (CR) of the hierarchical

framework was 0.065. Since this value is below 0.1, the inter-level relationships within the hierarchical structure were appropriate, and the consistency of the entire hierarchy was satisfactory.

Finally, using the F-AHP method coupled with the F-DM, the normalized weights of the analyzed priority factors were calculated. Based on the normalized weights, the ranking of priority factors in Prespa Park in descending order, was carried out. The larger the value of the normalized weights, the better the priority factor. Table 3 summarizes the results.

Table 3. Weight analysis of main priority factors in ecotourism industry of Prespa Park

1st level		2nd level		
Ecotourism aspect (pillar)	Normalized weight	Priority factors supporting ecotourism development	Normalized weight	Rank
Environmental	0.323	Conservation of biodiversity, ecosystems, and landscapes	0.107	1
		Encouraging ecologically sustainable practices	0.052	10
		Improving cooperation between ecotourism and nature resources management	0.065	7
		Developing environmentally friendly infrastructure, activities, products and services	0.084	5
		Raising awareness of environmental protection	0.038	14
Economic	0.436	Generating revenue to fund natural resources conservation and management	0.089	4
		Improving job opportunities for local communities	0.078	6
		Production and consumption of locally grown seasonal and organic foods, and local goods, and services	0.101	2
		Stimulating enterprises that are less harmful to the environment	0.048	11
		Promoting of local image and attracting investment	0.041	13
Sociocultural	0.241	Improving social welfare and material, and spiritual life of local people	0.061	9
		Building up local people's confidence, self-esteem, pride, and dignity	0.044	12
		Protecting and developing the heritage values, local culture, customs, and practices	0.098	3
		Participation of local stakeholders in decision-making and involvement in ecotourism industry	0.063	8
		Ensuring local social order and security	0.031	15
Consistency ratio (CR) = 0.065 < 0.1				

Source: The author's collected and elaborated survey data for 2017-2018

In 1961, Daniel had the idea that most industries normally have three to six critical factors that decide their success or failure. According to Daniel's (1961) point of view, this study identified in descendent order the following six main priority factors (with the weighted values given in brackets): "Conservation of biodiversity, ecosystems, and landscapes" (0.107), "Production and consumption of locally grown seasonal and organic foods, and local goods and services" (0.101); "Protecting and developing the heritage values, local culture, customs, and practices" (0.098); "Generating revenue to fund natural resource conservation and management" (0.089), "Developing environmentally friendly infrastructure, activities, products, and services" (0.084); and "Improving job opportunities for local communities" (0.078).

These main priority factors represent sustainable ways of conserving and protecting the natural environment and cultural heritage, while at the same time stimulating economic development and the social well-being of the local communities. With the right management and combined with the active involvement of all local communities, there are reasons why ecotourism can be developed in Prespa Park.

This section of the paper showed that using the fuzzy analytical hierarchy process, coupled with the fuzzy Delphi survey, in the concrete conditions of Prespa Park was an effective way for developing and then, identifying the main environmental, economic, and sociocultural priority factors supporting the development of the ecotourism industry, which can be used in the future as strategies for ecotourism development and management in the study and similar other areas.

Conclusions

The research was carried out in two parts. In the first part, the PROMETHEE II outranking method coupled with a fuzzy Delphi survey was used to rank options (types of tourism) for tourism development in Prespa Park. To do that, a finite set of possible options and a set of evaluation criteria, were needed, which were identified through consultations with local stakeholders and authorities, a panel of experts, and a one-day workshop. For the developed criteria, a filtration procedure was needed, which was realized by the fuzzy Delphi method. Finally, the PROMETHEE II software was applied to establish the net outranking flows and compare the tourism options between them. The result showed that ecotourism was the best option, followed by agritourism, cultural tourism, rural tourism, and lastly, tourism as usual.

This study was also specifically aimed at examining the priority factors that enable ecotourism development in Prespa Park. For this reason, in the second part of the research, a hierarchical structure of two levels was first constructed. In the 1st level, three aspects (pillars) of sustainable ecotourism were included, and in the 2nd level, priority factors supporting ecotourism development were included. The ecotourism aspects and priority factors were selected through a literature review, consultations with stakeholders and experts, and a second one-day workshop. Then, using the fuzzy Delphi survey, a filtration procedure for priority factors was employed. Using the F-AHP method coupled with the F-DM, the normalized weights of the analyzed ecotourism aspects and priority factors were calculated. Finally, based on Daniel's (1961) point of view and the values of normalized weights, six main priority factors were identified. The findings revealed that two of them were related to the environment, three to the economy, and one to the sociocultural aspect. They demonstrated how the outcomes of ecotourism are linked to the economic, environmental, and sociocultural pillars that drive sustainable development.

This study provides a promising framework for handling the complex ecotourism decision-making problem. In view of the fact that the ecotourism industry is still in its infancy in Prespa Park, the results obtained can enable decision makers and planners to develop integrated policies, measures, and strategies on where to concentrate efforts for ecotourism development in the area over the short and/or long term and help the administrators and authorities of ecotourism enterprises attract tourists and create profitability.

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Declaration of Competing Interest

The author declares that she have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Declaration of Use of Generative AI and AI-Assisted Technologies

The author declares that she has not used generative AI and AI-assisted technologies during the preparation of this work.

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Environmental Management and Power Generation in Czech Republic

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Abstract: **Purpose:** This article emphasizes the urgent claim for a sustainable approach embedded in the efforts of economic theory for spurring long run growth. The recent approach in the field of economic modelling and climate change estimates the impacts of unfettered economic activity on the atmosphere and on the climate. In such terms, this article presents the most relevant findings linking sustainability and economic growth in order to encompass the current situation of the Czech power generation sector.
Methodology: A descriptive narrative intended to unfold the main theoretical developments of economic theory and climate change based on the contribution of the 2018 Nobel Prize Nordhaus and the main results of the climate change modelling. There, the emphasis marks the interaction between technological change and the preservation of natural resources, encompassed in an international effort for engaging the main contaminant countries in an effort of abatement. This theoretical bedrock provides us with the set of criteria to assess the method and the technology for generating power in the Czech Republic in a sustainable way.
Findings: The blatant threat coming from global warming and climate change requires the involvement of the most contaminant countries. The article demonstrates that a game based on non-cooperative rules is not an incentive for complying the environmental goals. With no effective sanctions for the contaminant countries there is no incentive to comply with the rules. From the point of the economic theory, the first step for punishing the carbon emissions and contamination is the assignment of an economic value to the emissions, and to the extent that it makes up a negative externality, the contaminant agent must pay a cost due to an unsustainable production process and technology.
Originality: The new sectorial and macroeconomic approaches involve the participation of private sector, the government and supranational spheres for ruling and implementing sustainable production practices and goals. Europe has been an example of concern for the definition of ambitious environmental goals, and the Czech Republic echoes the collective guidelines intended to make the economy more environmentally friendly.

Keywords: energy; strategic management; sustainability; Czech Republic.

JEL Classification: Q42; Q51; Q01; R11.

Introduction

Humanity has arrived to a non-return point in terms of the climatic threaten, due to accumulative processes of carbon emissions and consumer patterns and production intensive in a such carbon emission, which have demonstrated to be deadly disrupting for the life. These long-lasting practices provoke global externalities which induces strong damages to humans a life all round the world.

In all corners of the world, proliferates severe effects: high temperature, precipitation patterns, storm abundance and frequency, snowpacks, river runoff, water scarcity, surface warming of the land and oceans, and ice sheets. Glaciers quickly have been disappearing evaporating pure water supplies. The rising temperature of the oceans and tropical storms become more severe.

The increase in the ocean level threatens the existence of several geographical spots. Keeping the same situation within 50 years, or according the Nordhaus (2018b) definition, replicating more the Business as Usual Trajectory (BUT), Maldives will disappear beneath the ocean, Manhattan could be under water, and the Bangladesh territory will be submerged, driving to internal migrations whose final effect is to plummet even more

the current subsistence level of income (Stiglitz 2006) and Nordhaus (2018a). Precisely, is spite of the worldwide harmful effects, the low-income countries become the most vulnerable to its effects, despite contributing least to climate change.

This unsustainable development concentrated green-houses gases at the atmosphere. This long-lasting process is the consequence of liberation of carbon dioxide (CO2) through the intensive use of fossil (or carbon-based) fuels namely: coal, oil, and natural gas. The human activities account for most of the emissions, considering that the source of 65% of the gases is the use of energy; the remainder arises from waste, agriculture, and land use (Arrow 2006).

The process has expanded uncontrolled with the human intervention and the economic activity. Rigorous models and analysis estimates that in 1750 the CO2 concentrations in the atmosphere were 280 parts per million (ppm), evolving dramatically until 2018 accounting for more than 413 ppm of CO2. Under the same scenario of business-as-usual trajectory, the projections forecast a range of concentration spanning 700–900 ppm by 2100, if no efforts are made in terms of curbing the fossil fuel use. In such time horizon, it looms an increase in the average global warming reaching 3 - 5°C in 2100 (Nordhaus 2018a). The most plausible computation predicts concentrations of 550 ppm, driving a rise in temperature of at least 2°C.

The catastrophic impact hits the economic activity as agriculture, tourism, forestry and the models' outcomes impart about the effect on GDP. Howard and Sterner (2017) estimate models intended to gauge the potential damage of global warming, and account for a wide range of possible affectations. An increase in the global surface temperature by 3°C, conveys a disparate range of potential damage tantamount to 1.9% to 17.3% of GDP.

Despite the development of a myriad of models, the environmental future scenarios end up being full of uncertainty (Shelling 2007). The current dimension of the damage already caused is so large that all models focused on the economic or the climatic forecast are mostly unpredictable, and accordingly, the ranges of uncertainty for future emissions, concentrations, temperature, and damages broaden slackly.

The forecasts generally depend on the current base lines, and the results impart that even under the most optimistic assumptions, the global temperature increases markedly, and in any case, the results accounts for substantial damages (Nordhaus 2018). On the other hand, Lemoine and Rudik (2017) apply a set of recursive models at analysing sources of uncertainty, in the context of the Nordhaus integrated assessment models, intended to quantify the complete effects of climate change.

Facing a such challenge, this article analyses the plausibility of the approaches suggesting the measurement of the environmental costs. Likewise, this article discusses the urgency of implementing an international cooperative approach, intended to gather the international will to reduce the emissions, in the context of international agreements designed to be complied by country members. After this introduction, next part points out the justification for making up an international effective common task for reducing the emissions. Last part of this article describes the degree of sustainability in the production of energy in the Czech Republic.

1. Research Background

During decades, the international community have unfolded several efforts for curbing the carbon emissions through the activation of international framework convention. Kyoto (1997) and Paris (2018) are palmary examples of institutional intends to attain and international consensus of de-carbonization, although the results have been scarce. The global goal is to get an international commitment regarding the abatement (the reduction of emissions). The Kyoto Protocol in 1997 was the first convention intended to achieve an agreement for reducing the emission of green-house gases. However, the United States refused to join early, and there was absence of developing countries. Neatly, the protocol became a failure. The American government brandishing the interest of national companies to use a cheap fuel without environmental tax, but while they harness the economic expansion, the world has to undergo the global warming. Actually, in the international realm, there was no mechanism to stimulate the compliance with the climate goals. The environmental international conventions have to face the challenge of free riders (Nordhaus 2018a).

The failure of the international consensus become glaring under the international governance, but the frustration is based on the absence of any law in force by which the international community can summon the more responsible contaminant countries. The inaction and ineffectiveness of international efforts for taming the most contaminant countries stems from the free riding, expecting the outcomes of active policies implemented by other counterparts, but keeping the individual business as usual trajectory. Besides, in general the national environmental policies tend to be more effective than the commitments of the international consensus (Nordhaus 2018a). At this point, the optimal environmental consensus must be derived from cooperative games with

common engagements. The agreements derived from non-cooperative games turn out to be cheated because the members are unable to appropriate the full benefits of the game. To the extent that the individual efforts become as spillovers to others members, there is no incentive to participate in cooperative games, and even less to comply the engagements.

In such terms the dominant strategy is the free riding because there is no incentive to participate in a cooperative game. As long as the free rider gets the same result when complying, or when cheating the engagements, he can enjoy the positive externality with no cost. The free riding conveys failure for the global goals because the few compliant countries has limited capacity to achieve ambitious objectives. This is the glaring reason explaining the scarce results in the current international policy environment (Nordhaus 2018a).

The most harmful effect of the inaction in the main contaminants countries will impact the developing world. In spite of their marginal blame for contamination, poor countries are mostly unprepared and vulnerable to the catastrophes derived from the global warming and the contamination. The threaten externalities will take the form of rain-fed agriculture, seasonal snow packs, coastal communities impacted by sea-level rise, river runoffs, forest erosion and fires, and natural ecosystems. As a matter of fact, when the countries did not yield any economic advantage to make the necessary emissions reductions, withdraw quickly. However, the solution of non-cooperative games, in which predominate the nationalist interests and make countries more closed, leads to outcomes where nations are worse off (Nordhaus 2018a).

Here appears the necessity to foster an economic approach to valuate externalities not priced. In such terms, the costs or benefits spreads outside the market, and there is no economic valuation, to the extent that market prices fails to capture such externalities (Nordhaus 2018a). In fact, the excessive consumption of intensive in emission fuels, accounts for the insufficient social cost ascribed to the prices of fuels. As Tol (2009) asserts, it is not possible have cheap energy without carbon dioxide emissions, and the cheap contaminant energy delays the transition to cleaner sources.

Some methodologies have been proposed to gauge for each country the degree of transition away from carbon-intensive energy practices. The Idiosyncratic path of each country is connected with the industrial evolution and the energy sources used (Ye et al. 2024). In Nordhaus (2015) appears a coordinated approach designed to overcome the environmental free riding. The argument asserts that it finds that in absence of sanctions against non-participants, there are no optimal results, other than goals engaged with minimal abatement. However, other mechanism is proposed brandishing small trade penalties on non-participants, as a mechanism for inducing the achievement of more ambitious goals.

Stiglitz (2006) also Howard and Sterner (2017) refer to the Social Cost of Carbon (SCC) as modelling methodology composed by various steps in order to translate a marginal unit of CO2 emissions into a measurement of economic damage. More formally, SCC gauges the economic cost derived from an additional ton of carbon dioxide emissions or its equivalent. According a more sophisticated concept, it can be defined as the change in the discounted value of economic welfare per an additional unit of CO2 - equivalent emissions (Nordhaus 2017). Stiglitz (2006) proposes the levy of environmental tax on emissions as an economic character intended to make pay for the social cost incurred by the responsible of the emissions, bringing up the microeconomic concept of marginal cost. Pricing the emissions offsets the underpricing of the negative externality of pollution. When increasing the prices, a limit is established on the amount of allowable emissions or by levying a tax on carbon emissions (the “carbon tax”) (Nordhaus 2018a).

The carbon tax, should be an effective measure for inducing radical changes in the human behavior. This burden must be sufficiently high, that necessary raises the fossil fuel and other prices leading the industries and consumers to substitute away from technologies intensive in emissions (Nordhaus 1992). In such terms, the policy measures based of the fair pricing of contaminant technologies, should be so deterring as to provoke a change in the consumption patterns. This alteration in the human behavior in response to climate change must respond to the policy’ s incentives, whose effects, in turn, must be embedded in the models of prediction (Tol 2009).

Other direct levies can be imposed. In an empirical work for Ecuador, Terneus Paéz *et al.* (2022) demonstrated that when levying a tax on engine displacement of vehicles, the final effect deters the acquisition of large vehicles, conveying a drop in the fuel consumptions and a lower emission of greenhouse gases. The economic theory trumpets the principle of “there is no free lunch”. Each producer must to pay by the factor he demands, optimally at the market price. This is possible because the production factors are prices, and there is a social valuation for it. This solution must start by pricing the cost in which incur the industries for contamination. It involves the assessment of the magnitude of the social cost of emissions. Otherwise, the contaminant companies would be receiving a subsidy. The subsidy is defined in terms of a firm who is unable to pay the full cost of

production, including the environmental damages. Not paying by emissions is tantamount to don't pay other production factor (Stiglitz 2006). The pricing policy has to be deterring, as it must make expensive the generation of CO2 and other greenhouse gases.

The valuation of environmental effects is based on a cost-benefit analysis, intended to gauge the balancing costs-benefits, with the exception that some impacts are hard to measure. This methodology is a plausible strategy to develop climate policy which includes obviously the abatement costs (Stiglitz 2006). It poses the principle of uniformity of price whose implementation involves the equalization of carbon prices according the sector and country (Nordhaus 2018a). The economic valuation of the carbon emissions can provide several aspects for making appear as costly the carbon production. It makes up an indicator for the consumers about the content of produced carbon of each good and service, giving rise to rationalize the consumption of more contaminant goods. On the other hand, the producers can detect how highly expensive the production be, inducing them to adopt clean technologies. Finally, the social valuation of contamination can spur the innovations process for producing low-carbon new products (Nordhaus 2018a). In such process of valuation, the market signals will make their work. It is the market mechanism through affordable taxes, valuation of subsidies and rationing, the force in charge of transmitting the information about the necessity of cleaner production. It is the price system the mechanism in charge of signaling how deadly costly can be production based on fossil fuels and in carbon emissions (Schelling 2007). Other recent approaches, are developing risk modeling taking in consideration the climate change and biodiversity, a task on charge of central banks and financial supervisors who joined the group of stakeholders interested in quantitative measurement of environmental issues (Hugues 2024).

Regarding the necessary scientific task intended to wrap up the set of innovations which make cleaner the production, Shelling (2007) points that the market mechanism perhaps does not suffice for provide powerful incentives. Other sources must emerge to the extent that R & D activity must be financed. Governments must come up for funding the innovative environmental activities whose yields are not sufficient for remunerating a such investment. Other sustainable procedure for reducing the role of fossil sources is the full exploitation of biofuel, mainly supplied by developing countries. However, the collateral damage is made by the diversion from staple food crops, to biofuel production with the subsequent effect on food prices (Nakamya 2022). In the context of smart cities, other innovations have been proposed as home energy management incentivizing the use of renewable energy sources mainly solar panels and energy storage units. This technology conveys several advantages as more stable prices, more flexible sources for the households (Ghanavati *et al.* 2024). Other participative initiatives to decarbonize the manufacturing production entail shared infrastructures, the creation of local zero-carbon hubs, the application of innovations into abatement technologies and the local participation in designing energy plans (Rattle *et al.* 2024).

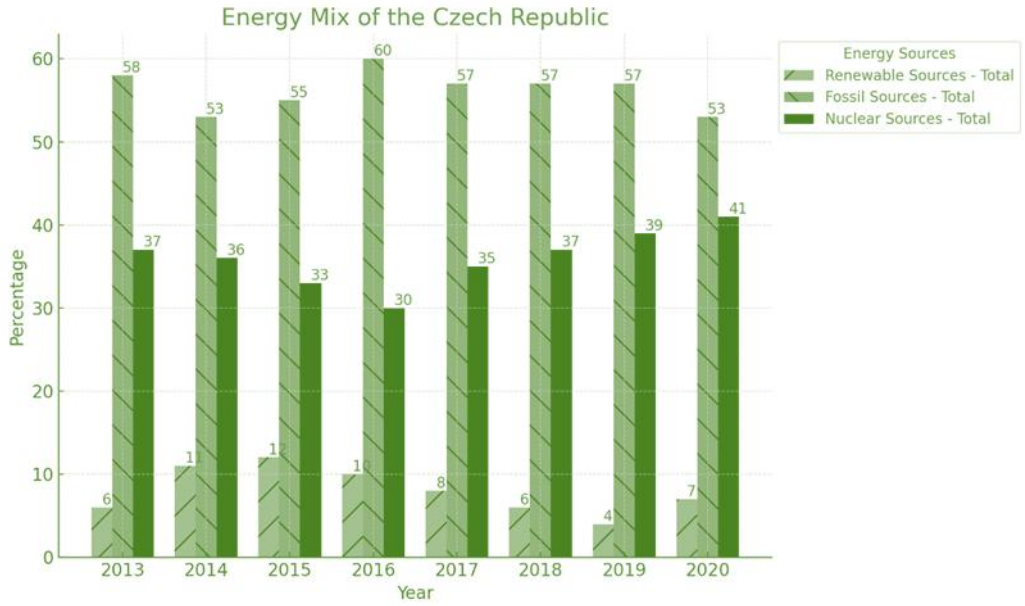
2. Sustainability in the Energy Generation in Czech Republic

After the previous overview dealing with the international consensus on environmental issues, we proceed to describe the main traits dealing with the energy sector in the Czech Republic, a discussion fully encompassed in the European context, marked by the compliance with the Green Deal. Accordingly, the Czech Republic is obliged to implement policies related to energy efficiency in particular, which is why the Czech transmission system is interconnected with all neighboring states (Ministry of Trade and Industry 2021).

The development of the Czech energy sector has gone through an incredible transformation. At the end of the 19th century, coal was an important energy, raw material, in the 20th century, oil, natural gas and hydropower, and since the middle of the 20th century, nuclear energy has taken its place of importance. In the 21st century, the following resources are used: oil, coal, natural gas, combustible waste, nuclear energy, hydropower and other resources (Matyášek *et al.* 2009).

Alongside this descriptive overview, this analysis separates energy sources into primary and secondary sources. It includes primary resources freely accessible into nature without recourse to human intervention for their transformation. The main trait of secondary resources is that they are reused as a result of energy and technology processes. The diversity of resources in the Czech Republic is quit disparate. Resources used in the Czech Republic are black and brown coal, natural gas, oil incl. petroleum products, nuclear fuel, electricity, renewable energy sources and other fuels.

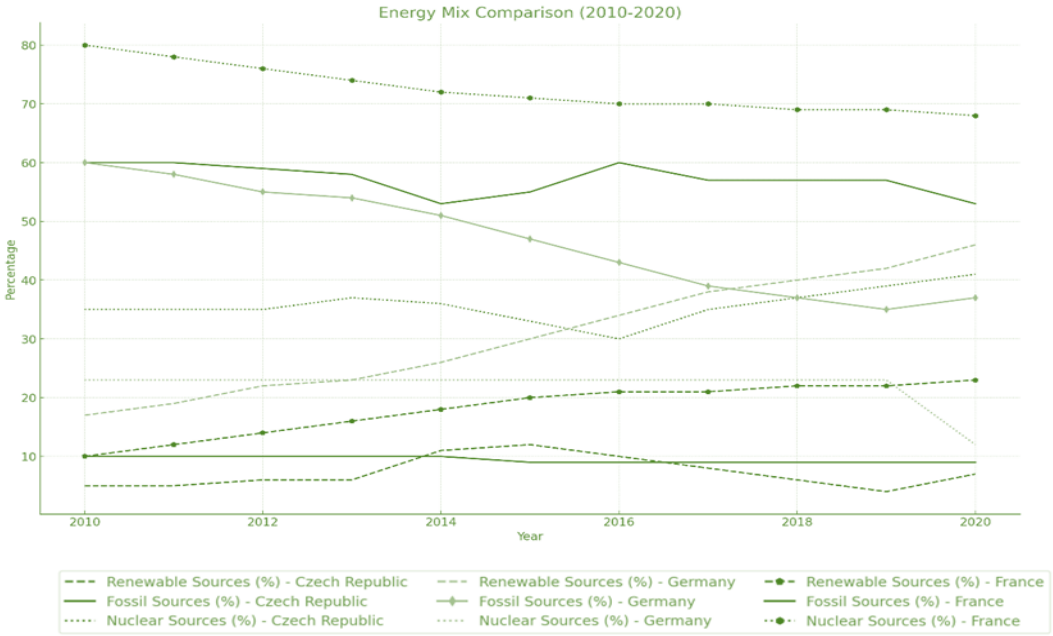
Graph 1. Energy mix in the Czech Republic



Source: Own elaboration according to the Ministry of Trade and Industry, 2021.

The ratio of the consumed energy is shown in graph no. 1, where the percentage of energy production in the area of fossil energy, renewable sources and the core is shown. Almost 50% of the consumption of primary energy sources in the Czech Republic is covered by domestic sources. The import dependence of the Czech Republic accounts for almost 50% of total, being one of the smallest in the entire EU (Ministry of Trade and Industry 2021).

Graph 2. Energy mix comparison of the Czech Republic, Germany and France in the last decade



Source: Own elaboration according to the International Energy Agency (2023), Eurostat (2023), World Bank (2023), Energetický regulační úřad (ERÚ 2023), Federal Ministry for Economic Affairs and Energy (2023), Ministry for the Ecological Transition (France 2023) and BP (2023).

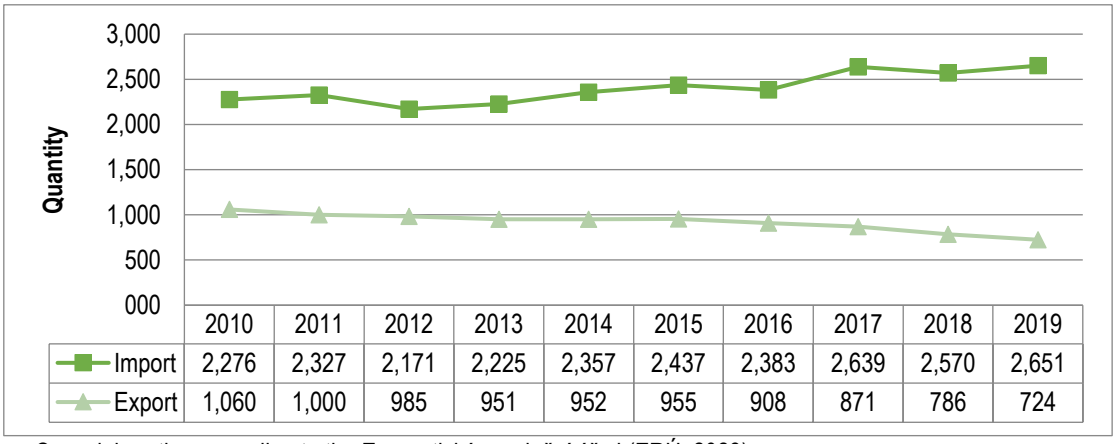
Czech Republic maintains a balanced energy mix with a significant share of nuclear energy, modest increases in renewables, and a gradual decrease in fossil fuels.

On the other hand, Germany demonstrates a strong shift towards renewable energy, significant reductions in fossil fuel dependency, and a clear move away from nuclear energy. France continues to rely heavily on nuclear energy, with gradual increases in renewables and minimal dependence on fossil fuels. This comparison

highlights the different strategies and progress made by these countries in transitioning to more sustainable energy systems. While Germany and France have made substantial strides in increasing renewable energy, the Czech Republic continues to rely heavily on nuclear power as a key component of its energy strategy. Since the Czech Republic does not have significant deposits of gas, oil and other energy sources, it is necessary to transfer these raw materials from countries to deposits that are richer and for the most part from not quite politically and militarily stable areas. That is why the development of nuclear energy in the Czech Republic helps to fulfil the energy and raw material security, which is caused by easier transportation and storage of nuclear fuel.

Graph 3 shows the balance of foreign energy trade in the Czech Republic, where we can observe a slight increase in imported energy commodities, and, on the contrary, a slight decrease in exported commodities.

Graph 3. Energy foreign trade in the Czech Republic



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Import	2,276	2,327	2,171	2,225	2,357	2,437	2,383	2,639	2,570	2,651
Export	1,060	1,000	985	951	952	955	908	871	786	724

Source: Own elaboration according to the Energetický regulační úřad (ERÚ, 2023).

The transport and storage of the various raw materials is linked to the safety requirements of each type of energy. Coal demands an enormous volume and, consequently, the problem of storage for future consumption is increasing. Oil is transported by pipelines and natural gas from gas pipelines, both of which are stored in special storage tanks. From the point of view of transportation and storage, nuclear energy has on the simplest way of transporting and storing nuclear fuel even for several years ahead (Ministry of Trade and Industry, 2021).

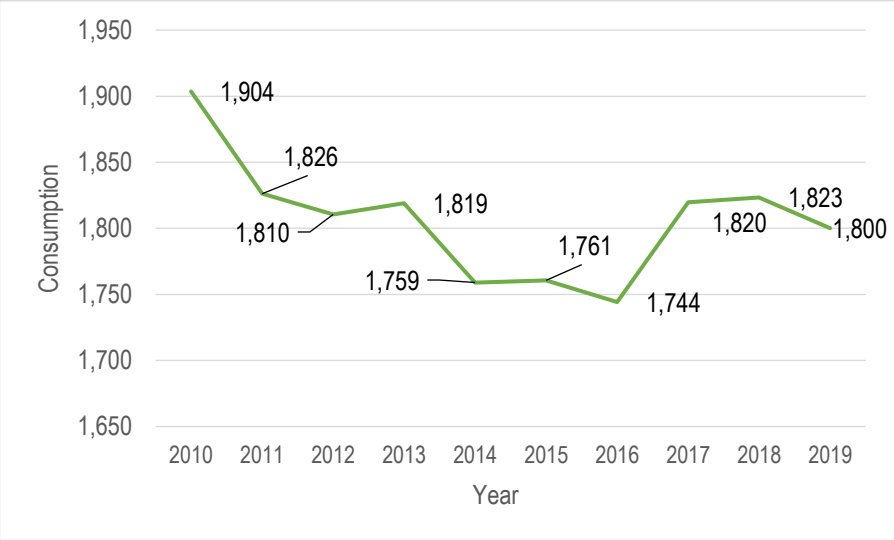
Currently, the issues of impact on the environment are widely discussed, when it is necessary to keep in mind the health of the population and the environment of the Czech Republic as a whole. In this sense, by reducing the impacts of energy and industrial production, the Czech Republic has made a lot of progress.

Among the key factors affecting the quality of the environment for residents are local airborne dust emissions, SO2 and NOx emissions. These emissions burden on the health of the inhabitants to a decisive extent, caused mainly by inefficient combustion of solid fuels, including biomass, and transport. On the contrary, CO2 emission is not a key indicator, but it is an obligation of the EU and subsequently also of the Czech Republic.

Gross household consumption shown in graph 4, accounts for a secular significant decrease, but describing a short-term increase in energy consumption in households. The decrease in energy is associated with better insulation of households and the replacement of energy equipment with newer, less energy-intensive equipment, thereby reducing the energy needed to produce heat.

Alongside this descriptive overview, this analysis separates energy sources into primary and secondary sources. It includes primary resources freely accessible into nature without recourse to human intervention for their transformation. The main trait of secondary resources is that they are reused as a result of energy and technology processes. The diversity of resources in the Czech Republic is quit disparate. Resources used in the Czech Republic are black and brown coal, natural gas, oil incl. petroleum products, nuclear fuel, electricity, renewable energy sources and other fuels.

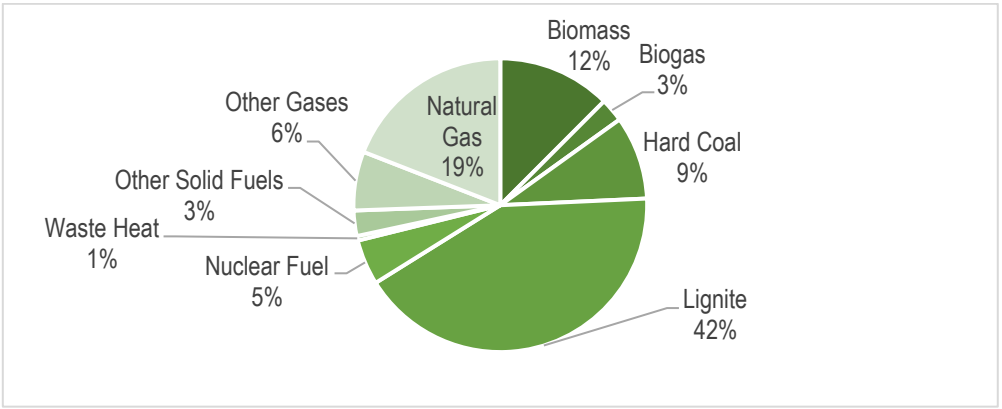
Graph 4. Gross household consumption in the Czech Republic



Source: Own elaboration according to the Energetický regulační úřad (ERÚ, 2023).

The total share of generation from large and medium-sized sources, amounts to almost 70% of the total gross heat production. The advantage of this production is the high level of fuel energy utilization, when 12-13% of gross electricity production is produced at the same time. The share of heat production from domestic fuels is around 60% and around heat supply it is more than 80%. Brown and black coal, natural gas, but also biomass is mostly used as fuel in heating plants to produce heat shown in graph 5 (Energy Regulatory Office 2021).

Graph 5. Energy source for production of heat in the Czech Republic, 2020



Source: Own elaboration according to the Energetický regulační úřad (ERÚ, 2023).

In the area of renewable sources, the Czech Republic aimed to achieve a share of gross final consumption around heat production of 13% for 2020 and a share of 22% of gross final consumption for 2030. The target for 2020 was exceeded (Energy Regulatory Office 2021).

2.1 Fossil Resources

Oil as an energy commodity is most used in the Czech Republic in the field of transport. This commodity is almost no longer used to produce heat in the form of heating oil. As part of the tightening emission limits, there is an effort to reduce its consumption, but in the field of transport, oil will still be the dominant raw material for many years to come. Mining within the Czech Republic covers less than 3% of the total annual consumption, which makes the Czech Republic completely dependent on imports of this commodity, especially from the Russian Federation. Czech refining companies have been privatized, which means that trade within this resource is fully controlled by the market and not by the state. Through legislation in the field of oil economy, the state only influences the amount and structure of emergency stocks of oil and oil products, which now prescribes a stock for 90 days. The state owns the company MERO ČR, a.s., which operates the Družba Ingolstadt-Kralupy-Litvínov oil pipelines in the territory of the Czech Republic, the central refuelling station and the storage of emergency oil reserves of the Czech Republic near Kralupy nad Vltavou. And the second state-owned company is ČEPRO, a.s.,

which owns and operates a domestic pipeline system connecting the company's warehouses and centres with refineries in Litvínov, Kralupy nad Vltavou and Slovakia, but also owns and operates significant fuel storage capacities. Coal sources make up the main share of primary sources, which are widely used in the production of heat through district heating and individual heating.

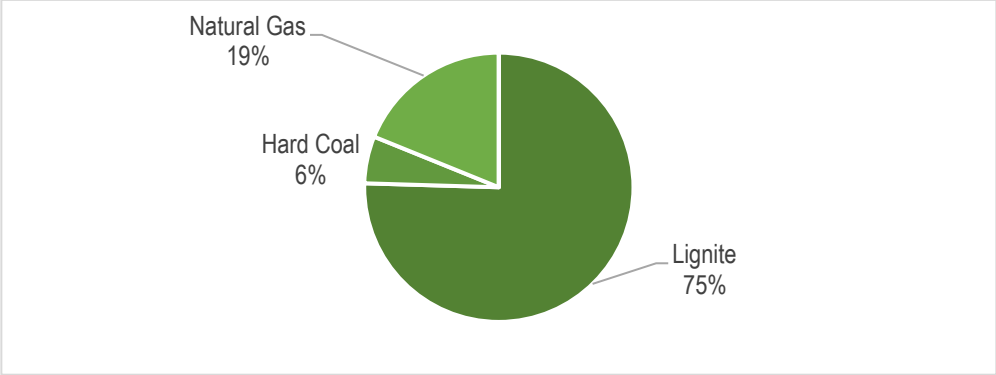
Even though coal resources are approaching the limit of their economic and physical lifetime, ecological aspects, this raw material is not completely replaceable. As part of the implemented measures and alternative methods used for heat production, the consumption of black and brown coal is expected to decrease. These measures lead to the most efficient and ecological way of consuming the remaining supply of coal raw material.

Natural gas is one of the important energy sources of the Czech Republic, but domestic consumption is almost entirely dependent on imports. The largest supplier of this commodity is the Russian Federation, followed by Norway. Recently, it has also been widely acquired by trading on markets within the EU. This resource is used for district and individual heating, but also for electricity generation. The ecological and technical properties of gas point to the appropriate use of the resource to produce electricity and heat, as well as the provision of supporting services in the electric power industry.

An equally important sector of natural gas use is in the field of transport, where it will serve to replace part of liquid fuels, and therefore its increased consumption is expected in the years to come. Natural gas consumption in 2020 increased by 1.87% compared to the previous year.

Graph 6 shows the percentage of energy from fossil sources of the total energy produced in 2020 in the Czech Republic. At first glance, it is obvious that brown coal with 40% is the most represented commodity, followed by natural gas, then black coal and a negligible part is made up of oil and oil products, secondary sources and others, when these commodities are at the 0% limit.

Graph 6. Energy source from fossil resources in the Czech Republic, 2020



Source: Own elaboration according to the Energetický regulační úřad (ERÚ, 2023).

2.2 Nuclear Fuel

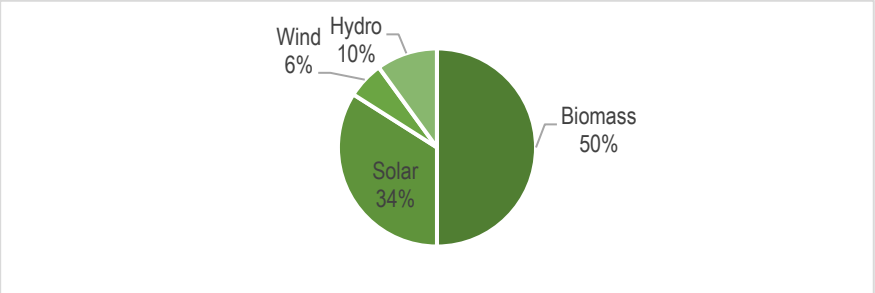
Nuclear fuel is the second largest energy resource in the Czech Republic. Nuclear sources use highly advanced technologies and are particularly used in power generation. Electricity production from this source accounted for 40.75% of the total electricity produced in 2020. The properties of the nuclear power source are particularly long service life, high utilization factor, reliability, but also cheap and predictable operation. The advantage of this resource is the high concentration of fuel, enabling the creation of strategic reserves for several years of operation. Currently, the Czech Republic has nuclear power in the Temelín and Dukovany power plants. The construction of a power plant based on the use of a nuclear source is very demanding in terms of technology, design, and personnel. An essential part is nuclear supervision overseeing nuclear safety focused on the risks of high concentration of energy in the nuclear source and the risk of radiation.

2.3 Renewable Energy

Non-fossil natural, renewable resources include the energy of water, wind, sunlight, solid biomass and biogas, environmental, energy used by heat pumps, geothermal energy and the energy of liquid biofuels (ČEZ 2021). At 2020, the share of renewable sources in domestic gross electricity consumption reached 6.75% (OTE 2021), but the commitment of the Czech Republic for gross final consumption of energy from renewable sources by 2020 was set at 13% (Ministry of Trade and Industry 2021).

In 2020, biomass had the largest share in energy production with a share of 3.4% of the total production, see graph 7, followed by solar energy with a ratio of 2.27%, followed by water and wind energy.

Graph 7. Energy source from renewable resources in the Czech republic, 2020



Source: Own elaboration according to the Energetický regulační úřad (ERÚ, 2023).

Among the renewable energy sources, biomass is the only and available systemic renewable energy source for the needs of the heating industry in the Czech Republic. Other energies classified as renewable sources are limited for heating purposes for technical and social-environmental reasons. The pro-growth biomass support measure produces greenhouse gas savings with the lowest cost per ton of CO2 saved. However, some sources also point to other types of emissions arising from the burning of biomass, which show higher values than from the burning of natural gas and coal. Therefore, it is necessary for the development of biomass burning to ensure technologies leading to the minimization of the emission load. The water resources used in the Czech Republic are currently almost exhausted, and their share in the national energy mix was 0.65% of the total production in 2020, and it is assumed that this share will not continue to increase. The advantage of pumped-storage power plants in the Czech Republic is their flexibility when they cover the fluctuations of intermittent sources.

Wind and solar energy have relatively limited possibilities of use in the Czech Republic regarding geographical and climatic conditions. Areas suitable for using wind to produce energy are in most cases in mountain natural protected areas. Solar energy used for energy production has seen rapid growth, but it is running into the limits of agricultural land protection.

The latest preliminary analyses speak of geothermal energy as an important commodity associated with high costs for the time being. The unproven potential of this commodity is in the field of heating, air conditioning and electricity generation.

The unused potential of a substitute for coal in terms of the production of electricity and heat is the energy use of waste, the energy use of which brings a non-negligible effect and at the same time solves the problem of removing the unused component of waste. Regarding the nuclear energy, it is considered as a non-renewable source with a sustainable process during the operation phase. On the other hand, this kind of energy gives rise to some concerns about the disposition of the waste, but it occurs at the end of the process of generation (Pienkowski 2024).

According to the previous overview, the main concern in the Czech Energy policy is to ensure a stable and fluent system of supply, able to guarantee the national self-sufficiency. Despite the lack of natural resources for generating certain kind of energy, the national system has arranged a matrix of supply based on imported energy whose tensions became a concern after the Russia-Ukraine conflict. The Czech Republic mainly depends on the fossil fuel for transport, and on the nuclear sources for residential and industrial purposes. On the other hand, renewable energy can increase its share in the national energy matrix.

In any case, the energy mix must be sufficiently flexible for incorporating the renewables, because the market conditions become challenging. When the system is strongly reliant on fossil-fuel to ensure the stability of the electric grid, the European Union (EU) ask for a systematic transition away from fossil-based fuels. So, when the grid becomes flexible, the planning of a medium- and long-term storage, it is possible to in insert the contribution of other sources as wind and solar energy (Sankaran 2023).

The diversification of the energy sources involves important changes in national regulations and markets. The goals of the diversification efforts must be based on the reliability of the electricity supply, the matching with consumer demand, the affordability in term of prices of end-users, and the fostering of economic development. The more decisive share of Renewable Energy Sources conveys several advantages, namely: the promotion of the renewable energy integration, the implementation of new technologies, the consumer participation, and the strengthening of the system resilience (Jingi *et al.* 2022).

3. Discussion and Conclusion

The harmful effects of global warming will hit badly poor countries for several reasons. This group of countries are lay in tropical zones closer to the Equator; accordingly, the countries are hotter, and higher temperatures will have a straightforward effect on agriculture. Furthermore, they are particularly weak to adapt to climate change due to the lack of resources and the institutional underdevelopment (Tol 2016).

There is a tendency for the current generation to ride free by pushing the costs of dealing with climate change onto future generations. Generational free riding occurs because most of the benefits of costly emissions reductions today would accrue many decades in the future. There are some explanations for the inaction or the climatic negationist. Nordhaus (2018b) defines the Business as Usual Trajectory (BUT) the reproduction of the actual inaction, in a set of countries engaged with minimal policies for reducing the emissions.

One of them is related with the intergenerational lack of solidarity, intended to transfer to future generations the cost of dealing with the climate change. It is quoted as “Generational free riding” (Nordhaus 2018a). However, if the time elapses more and more, the environmental damage becomes irreversible.

In this economic logic the cost should be so prohibitive that the force the implementation a cleaner technology. It could be a compensation to the current subsidies currently received. The subsidy is the tax not applied to contaminant production (Stiglitz 2007). The economic approach intended to price in market conditions the consequences of contamination looms as an effective strategy for mitigating the damages, and to force the producers to implement clean technologies. In a such context, policies raising the price of CO2 and other greenhouse gas emissions must be urgently implemented effectively for stopping emissions and promoting low-carbon technologies.

Penalty on carbon emissions becomes a convincing argument to migrate towards cleaner technologies and is the unique strategy for a quick transition to a low-carbon economy. The implementation of economical low-carbon technologies will reduce the cost of getting the goals.

The international community must promote a cooperative game, in which countries afford proportionally the share of costs, but can receive in return the benefits of a more sustainable environment. The comprehensive actions must be global to be effective and must convey a cooperative game with explicit commitments and proportional benefits for all. The isolated national actions normally have scarce results. In such terms a cooperative game the coalition of nations can gather nations engage with environmental goals, having the capacity to penalize the free riders.

The Czech Republic energetic stance is encompassed in the European engagement of reducing the carbon emissions, dealing with a small contaminant country with scarcity of oil, and with a supply of power based on nuclear plants. The search of green alternative sources faces strong geographical constraints given the relatively small territory and the lack of access to the sea.

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Credit Authorship Contribution Statement

Gabriela Antošová: Conceptualization, Investigation, Methodology, Project administration, Software, Formal analysis, Writing - original draft, Supervision, Data curation, Validation, Writing - review and editing, Visualization.

Declaration of Competing Interest

The author declares that she has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Declaration of Use of Generative AI and AI-Assisted Technologies

This text was prepared based on an extensive review of scholarly sources (with the aid of the scite.ai tool for searching relevant literature) and contains structured information that has been processed and organized using AI-assisted tools (chatgpt.com). AI was primarily used as a means for efficient analysis and organization of available data, while all content was carefully reviewed, edited, and expanded by the author. The final literature review is therefore the result of expert work combined with modern technologies, enabling a faster and more systematic approach to processing information.

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Recreational and Preservation Value of Charaideo Maidams of Assam, India

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Abstract: Historical monuments serve as profound connections to the past, embodying cultural, architectural, and societal significance. Historical tourism has played a very important role in generating income and employment in North-East India, especially Assam, as the region is blessed with distinct natural and archaeological resources that attract a huge number of domestic as well as foreign tourists every year. These sites possess both use and non-use economic values, similar to environmental resources, and are valued not only for their direct recreational and educational benefits but also for their option, bequest, and vicarious values. The challenge in determining their true value stems from their non-market nature, where conventional economic mechanisms fall short. This study examines how socio-economic and demographic factors influence visitation to historical sites, using regression analysis, and the recreational benefits enjoyed by visitors at a historical heritage site are estimated employing both revealed and stated willingness to pay (WTP), specifically through the Travel Cost Method (TCM) and the Contingent Valuation Method (CVM). The analysis shows that the distance travelled and the costs they incur have a significantly negative impact on how often they visit a site, while higher income and education levels positively influence visit frequency. The estimated recreational benefits, based on both revealed and stated WTP for the site's preservation and enhancement, suggest that increasing recreation charges through policy changes could be justified.

Keywords: non-market valuation; cultural heritage tourism; travel cost method; contingent valuation method; recreation benefit; willingness to pay.

JEL Classification: Q01; Z32; Q20; Q51; Q26; Q31; R11.

Introduction

Historical monuments are vital links to the past, representing cultural, architectural, and societal significance. These structures not only preserve the heritage and traditions of bygone eras but also serve as valuable repositories of knowledge, offering insights into ancient craftsmanship, beliefs, and lifestyles. The monetary worth of historical, cultural heritage and archaeological sites, similar to environmental resources, is reflected in individual's willingness to pay (WTP) for their recreational or educational experiences. This intrinsic value aligns with the concept of cultural ecosystem services, emphasizing the contribution of these sites to cultural identity and experiences. As pointed out by Xiang and Clarke (2003), the value of historical sites is evident in people's willingness to allocate financial resources for guided tours, educational trip, and other recreational activities linked to these sites, illustrating the intangible yet substantial worth attributed to preserve and experience historical heritage (Garrod *et al.* 1996, Grosclaude & Soguel, 1994).

Historical resources are unique and irretrievable, and their economic worth includes use value, option or choice value, and existence value. This option value acts as a safeguard against uncertainties concerning these resources' future availability. It comprises of three dimensions: the value of preserving the monument for an individual's future use, termed ***future use value*** - the ***bequest value***, ensuring its availability for future

generations; and the ***vicarious value***, securing accessibility for others. The comprehensive economic worth of a natural resource or an environmental asset is the culmination of its actual use value, option value, and existence value combined (Banerjee, 2003). These attributes align with the notion of irreversibility in environmental economics, where once altered or destroyed, these resources cannot be restored to their original state (Solow, 1993). Given that market mechanisms often fail to capture the full recreational value of such non-market goods, understanding the diverse motivations of visitors and their socio-economic factors is crucial. Furthermore, the social, economic and demographic attributes of visitors significantly influence their desire to visit a historical site, thus impacting its perceived value (Carrus *et al.* 2015).

This study aims to investigate the effect of different socio- economic and demographic factors on the visit frequency to the chosen site, estimate the visit demand function, WTP derived from the projected visit demand function, and finally evaluate of the recreational benefits derived by the visitors and tourists. It's important to acknowledge that some visitors may have additional motives beyond recreation, introducing the challenge of valuing multiple attributes or goods obtained from the site. This inherent issue in evaluating historical resources is addressed thoughtfully in this study to isolate and minimize the error of estimation, focusing specifically on the recreation value.

The novelty of this study lies in the estimation of existence value along with the valuation of recreation and cultural importance of the first UNESCO cultural heritage of the region, the ***Charaideo Maidams***, which are often referred to as the ***"Pyramids of Assam".*** Visitors' willingness to pay for the preservation of the sites over and above the current recreation/cultural benefit obtained by ZTCM is estimated by prudent application of CVM and appropriate econometric technique.

The Study Area

The rapid expansion and significant contribution of the tourism sector towards income and employment generation in India, particularly in the northeastern region, is well-recognized. In India, the tourism sector has made significant strides over the years. As per the Travel and Tourism Development Index (TTDI), 2024, report by the World Economic Forum (WEF), India ranks 39th out of 119 countries. This represents a significant improvement from its 54th place ranking in the 2021 index.

Assam, in North-East India, is rich in historical and natural attractions. One of its most notable sites is the ***Charaideo Maidams***, often referred to as the ***"Pyramids of Assam"***. These royal burial mounds of the Ahom dynasty, nestled in the picturesque landscape, are a testament to the region's rich cultural heritage. Despite their significance, tourism in Assam contributes only a small portion to the state's net domestic product. Assam witnessed 98.12 lakh domestic and 18,946 overseas visitors in 2023. This represents a significant rise over the 17.02 lakh domestic and 1,231 foreign visitors in 2022 (India Tourism Statistics, 2023). The Charaideo Maidams, housing of about 42 tombs of kings and queens atop a hill, mirrors the grandeur of the Egyptian pyramids and showcases the exemplary craftsmanship of medieval Assamese masons. It was decleared as a World Cultural Heritage Site by UNESCO in July 2024. North East India's Charaideo Maidam is the 43rd World Heritage Site and the first cultural heritage site from this region.

There is a pressing need for a comprehensive study to assess the recreational benefit along with the preservation worth associated with this site. This is to understand people's WTP for the gratification and conservation of these resources. Such an assessment would greatly assist planners and policymakers in making informed decisions to ensure the sustainable conservation of this historically significant site.

The next section provides a brief review of the relevant studies. Sections 3 and 4 include objectives of the study, and data and methodology followed in the analysis. Section 5 deals with observation and discussion. It is followed by concluding remarks on the whole study.

1. Research Background

Studies on the valuation of recreation benefits attained from natural and semi-natural tourist sites have evolved significantly since the mid-20th century, employing methods such as the Travel Cost Method (TCM) and Contingent Valuation Method (CVM). These approaches have become increasingly popular due to their ability to estimate the monetary value of natural and cultural resources, tourism resources and conservation efforts, despite encountering limitations (Santagata & Signorello, 2000; Freeman, 2003). These studies demonstrated the economic impact of conservation and provided a foundation for refining these methodologies to reduce estimation errors and improve accuracy (Knetsch & Davis, 1965; Navrud & Mungatana, 1994).

Empirical research on the benefits linked to cultural heritage assets began in the 1980s, with studies focusing on theatres, historical sites, and museums (Pearce & Ozdemiroglu, 2002; Noonan, 2003). Subsequent

research expanded to include a wide range of cultural and historical assets, employing various valuation techniques to measure both tangible and intangible benefits. For example, Montenegro *et al.* (2009) explored the evaluation of historical heritage sites in Valdivia, Chile, using regression analysis and TCM, while Voltaire *et al.* (2017) employed Zonal Travel Cost Method (ZTCM) to Mont-Saint-Michel to assess the economic worth of cultural world heritage sites. These studies highlight the complex interplay between economic valuation and cultural preservation, emphasizing the need for nuanced approaches in assessing historical sites.

In India, valuation studies have focused on both natural and cultural sites to help conservation and tourism management. Research by Hadker *et al.* (1997) and Chopra (1998) utilized CVM and TCM to estimate the monetary worth of parks and reserves, revealing substantial willingness to pay of public for conservation. Recent studies have explored the economic worth of heritage sites and their post-lockdown recovery, employing a combination of valuation methods to assess visitor satisfaction and willingness to pay. These studies contribute valuable insights into the economic importance of cultural and natural sites in India, guiding policy decisions and conservation strategies (Dutta *et al.* 2007; Islam, 2021; Bizuneh, 2021; Baitalik & Bhattacharjee, 2023). Baitalik & Bhattacharjee (2023) estimated WTP for the improvement of heritage temples in Bishnupur area of West Bengal by using CVM. Overall, these studies collectively enrich the understanding of diverse valuation methodologies, challenges, and applications in the context of resource conservation and recreation values. Gómez-Zapata, Herrero-Prieto and Arboleda-Cardona (2024) used choice experiment methodology to obtain the value allocated to different attributes like natural landscape, elements of tangible historical heritage and intangible technological knowledge by various groups of visitors, according to their origin or type of stay. Several other studies help in decision-making in cultural and tourism policies that directly impact local development (McLennan *et al.* 2012; Schuhmann *et al.* 2023; Wright & Eppink, 2016). Zhao *et al.* (2024) employs a multi-value interpretation framework to the utility of reuse of heritage sites in the urban Xi'an of China. Utilizing a comparative case study method, they specifically examine the burgeoning phenomenon of heritage parks. The findings show how the reuse of heritage intertwines with urbanization processes, by considering the environmental, economic, social, and cultural values.

2. Objectives of the Study

In this study, the initial focus lies on examining the impact of different socio- economic and demographic aspects on the visit frequency to the chosen site. Subsequently, the study delves into the estimation of visit demand function (VDF) or trip generation function (TGF). Following this, the visitors' maximum WTP is derived from the estimated VDF, representing the consumer surplus (CS) that signifies the recreational benefits derived by the visitors and tourists. Finally, the revised recreation benefit is calculated based on contingent valuation method to unearth the preservation or existence value of the site.

3. Materials and Methods

Both primary and secondary data were utilized for the analysis. Secondary data included information on the population of various regions from which tourists visited the selected site, per capita NSDP, level of education, holidays and festivals, as well as data on domestic and international tourist arrivals. These data were gathered from various secondary sources such as reports from the Ministry of Tourism, Government of India, Basic Statistics of the North-Eastern Region and different states of India, Census of India, and the Archaeological Survey of India.

Primary data were gathered through a survey method involving direct interviews using structured questionnaires. A total of 300 tourists, including 45 international visitors, were surveyed during 2021-22. It was observed that the majority of both domestic and foreign tourists visited the site during the peak tourist season, from October to April, due to favorable weather conditions and official holidays in their regions of origin. The sample respondents were selected through simple random sampling. Information was collected on their socio-economic and demographic profiles, frequency of site visits, purpose of travel (whether solely for recreation or combined with other activities), mode of transportation, travel expenditures, accommodation and food costs, loss of working days and their monetary value (opportunity cost), local transportation and other expenses such as parking and entry fees, as well as their willingness to pay additional fees for the maintenance and enhancement of the site.

4. Research Methodology

Using individual travel cost technique, the regression of the frequency of visits onto the key explanatory factors is applied to analyse the effects of different socio-economic features on the visit frequency by the surveyed tourists.

Since semi-log model provides better results (Bann, 1998), it is considered for the chosen site. The equation can be written as:

$$V_i = \alpha_o + \alpha_1 \ln TC_i + \alpha_2 \ln Y_i + \alpha_3 \ln DT_i + \alpha_4 \ln (A_i - \mu)^2 + \alpha_5 EQ_i + \alpha_6 E_i + \alpha_7 \ln FS_i + \alpha_8 DG_i + \alpha_9 DM_i + e_i \ldots \ldots \quad (1)$$

Here, V_i = number of times i^{th} individual visited the site (if multiple visits are observed in plenty).
TC_i = total cost for one round–trip to the site for i^{th} individual
Y_i = total monthly household income of i^{th} respondent (INR/month)
DT_i = one-way distance covered by i^{th} respondent to visit the site
A_i = age in years of i^{th} individual, and μ = average age in years of the surveyed respondents,
EQ_i = educational level of i^{th} respondent
E_i = nature of employment of i^{th} respondent (E_i = 1 for public sector employee, 0 otherwise)
FS_i = family size of i^{th} respondent,
DG_i = gender of respondent; (DG_i = 1 if male, 0 otherwise)
DM_i = marital status of respondent; (DM_i =1 if married, 0 otherwise)

With the typical features of classical linear regression, e_i is the random disturbance term. The logarithmic value of the visit rate is not considered here as for many of the tourists this was their first visit to the site. Since the number of visits is limited, count data modelling would be appropriate. Hence Poisson regression method is applied here.

Reviewing the existing literature on the valuation of historical sites, it is found that valuation studies are mostly conducted by one or a combination of TCM and CVM, depending on the specific objective of the particular study. Since the present study attempts to obtain the recreational value of a UNESCO-recognized cultural-historical heritage site in the North-Eastern Region, TCM (looking at the suitability of Individual and Zonal travel costs) has been used to assess the 'demand curve' for the monument. Also, CVM has been applied to examine WTP for the preservation and up-gradation of recreational facilities and other infrastructure associated with the site. This method attempts to measure the worth of a non-marketed good holistically. CVM would utilize the contingent valuation questions either of dichotomous choices, open-ended referendum, iterative bidding, and payment cards, each of which has some merits and demerits.

To mitigate various biases, such as starting point bias, dichotomous choice bias, part-whole bias, or embedding effects, iterative bidding was employed during the survey through direct interviews of the respondents. The process began with a significantly high bid (more than double the current fee), and respondents were asked if they would be willing to pay this amount. If they agreed, the bid was progressively increased until they declined to pay the proposed amount. Conversely, if they initially refused to pay the quoted amount, the bid was gradually reduced until they agreed to the proposed sum.

After completion of the primary data collection, the tabulation was made through the organized distribution of surveyed tourists based on their originating place/zone. Additionally, the socio-economic and demographic characteristics of the tourists were categorized by zone and presented in tabular form. The surveyed tourists came from the major twenty-five states and union territories of India, which were grouped into seven zones based on their central distance from the site. Foreign tourists, who came from various countries of diverse distances were consolidated into Zone 8.

Subsequently, the effect of various parameters on the number of visits made by the surveyed tourists was investigated using regression analysis. Specifically, individual TCM was utilized for this purpose. For those visitors whose primary purpose was recreational, total expenses encompassing travel and other expenditures were taken into account. While, if the tour is completed jointly with any business-related activity (for making profits) or joining conferences sponsored by other organizations, just local travel expenses as well as opportunity cost associated with additional time spent is considered. Very few tourists were found to visit in packaged tours, their primary motive was to visit nearby Kaziranga National Park and the chosen site *i.e.* the Charaideo Maidams and hence the travel expenses to visit Charaideo Maidams and the relevant expenditure on accommodation, meals, and opportunity costs incurred were accounted for at this particular site.

To estimate the demand curve of the visitors, Clawson's ZTCM was applied. Most visitors from zones other than Zones 1 and 3 visited the site only once, resulting in minimal variation in individual visit frequency. The process involved the following steps:

(i). Classification of sampled visitors by their zone of origin (political boundary/state-based).
(ii). Calculation of number of visitors from each zone and their proportion of the total sample.
(iii). Estimation of annual visits per zone by multiplying relative share and total annual visits.
(iv). Computation of the average visit rate by dividing the annual visits by the zonal population.

(v). Estimation of demand function, average consumer surplus, and total recreational benefit.

The area under the estimated demand curve, when compared to the average expenditure per visit, provides an estimate of the recreational value a tourist derives from visiting the site. This value can be extrapolated to estimate the total recreational benefits for the visiting population. The following structural equations in implicit form are used for this estimation:

$$V_i = f(ATC, Y, ADT, E, EQ, A, Error) \ldots \ldots \quad (2)$$

$$ATC = g(ADT, Y, V_i, Error) \ldots \ldots \quad (3)$$

where, V_i = visit rate, ATC = average total cost for a round–trip to the site/tourist, Y = per capita State Domestic Product (PCSDP), ADT = average distance from the zone to the site, E = employment type (E = 1 for public sector employee, 0 otherwise), EQ = educational qualification of the respondent (Illiterate = 0, Literate but Less than Secondary = 1, Secondary but less than HS = 2, HS but less than Graduate = 3, Graduate but less than Master = 4, Master and above = 5), A = age of surveyed tourist, Error = random disturbance term with characteristics of classical regression.

The system of simultaneous equations, represented by equations 1 and 2, addresses the endogeneity of both ATC and V_i, which are interrelated. Notably, the inverse demand function, represented by the second equation, is over-identified. Additionally, V_i in this second equation is correlated with other exogenous explanatory variables, leading to issues of multicollinearity. While factors such as infrastructure (transport and communication networks), purpose of visit, and availability of information also influence tourists' decisions, these variables were not included as explanatory factors due to insufficient usable data. Their effects, therefore, are assumed to be captured by the error term.

To obtain consistent and reliable estimates, the two-stage least squares (2SLS) method was employed. In explaining individual travel costs, all the variables in the first equation, as derived from survey data, were included. However, in the estimation of the demand function using zonal travel costs, only three observed explanatory variables—distance, literacy rate, and per capita NSDP—were incorporated, with the visit rate being regressed on these available variables. The predicted visit rate was then substituted for the actual rate and used to estimate both the demand curve and consumer surplus.

Unlike the approach taken by Gillig *et al.* (2003), this study estimates the visit demand function separately using both revealed willingness to pay (WTP) from travel cost data and stated WTP from contingent valuation data. This dual estimation allows for the identification of visitors' maximum WTP for the preservation and enhancement of the scenic beauty of the UNESCO cultural heritage site in North-East India.

5. Research Results

The assessment of recreational benefits of the site was done based on data collected from a survey of 240 tourists. It was found that most of the tourists visited the site either with family members or in groups of friends or colleagues, with significant variation in the size of the groups. To standardize data collection, only one senior member (or leader) from each group was interviewed. Consequently, although there were 240 respondents, the total number of tourists represented in the sample was 1074, which included both domestic and international visitors. For the purpose of analysis, only the socio-economic characteristics of the individual respondents were considered, as each respondent was deemed to represent their group in all relevant aspects.

5.1 Socio-Economic and Demographic Characteristics of the Surveyed Tourists

The socio-economic and demographic features of the surveyed tourists are considered to be important for any recreational valuation study. Since the present study attempted to calculate the visitation rate and examined the factors influencing it, it was felt pertinent to observe the socio-economic profile of the tourists surveyed. The study of the socio-demographic and economic profile of the visitors includes information on age, gender, marital status, educational attainment, household size, nature of employment, monthly household income, distance of travel of an individual to reach a particular site and the availability of recreational activities in that concerned site.

5.2 Distribution of the Surveyed Tourists According to their Zone of Origin

Distribution of respondents based on the distance travelled by them is shown in the Table 1. It indicates that of the 300 respondents among the total 1074 tourists included in the sample, 31.67 percent were from zone-1, 7.33 percent were from other states of NER excluding Assam and Sikkim (zone-2), and only 3 percent and 3.67 percent were from zone-7 and 6 respectively. Largest number of respondents were from zone 1 and the second largest (19.67 percent) from zone 3 *i.e.*, West Bengal, Orissa and Bihar that was followed by zone-5 *i.e.* the

states of Chandigarh, Delhi, Haryana, Punjab, and Rajasthan sharing 10.67 percent of the sample. 9 percent of the respondents were from zone-4 that comprises of Chhattisgarh, Madhya Pradesh, and Uttar Pradesh. Lastly, 15 percent were foreign tourists (zone-8).

Table 1. Distribution of the Surveyed Tourists According to their Zone of Origin

Zone	States Included in the Zone	Distance of the Zone from Sivasagar (Km)	Number of Respondents	Total Number of Sample Tourists
			Charaideo Maidams	
Zone-1	Assam	Less than 500	95 (31.67)	301 (28.03)
Zone-2	Arunachal Pradesh, Manipur, Tripura, Meghalaya, Mizoram, Nagaland	501-1000	22 (7.33)	110 (10.24)
Zone-3	Eastern Region: Bihar, Orissa, Sikkim, West Bengal	1001-1500	59 (19.67)	167 (15.55)
Zone-4	Central Region: Chhattisgarh, Madhya Pradesh, Uttar Pradesh	1501-2000	27 (9)	133 (12.38)
Zone-5	Northern Region: Chandigarh, Delhi, Haryana, Punjab, Rajasthan	2001-2500	32 (10.67)	154 (14.34)
Zone-6	Western Region: Gujarat, Maharashtra	2501-3000	11 (3.67)	55 (5.12)
Zone-7	Southern Region: Andhra Pradesh, Karnataka, Kerala, Tamil Nadu	3001-3500	9 (3)	43 (4)
Zone-8	Foreign Countries	3501-15000	45 (15)	111 (10.34)
Total			300	1074

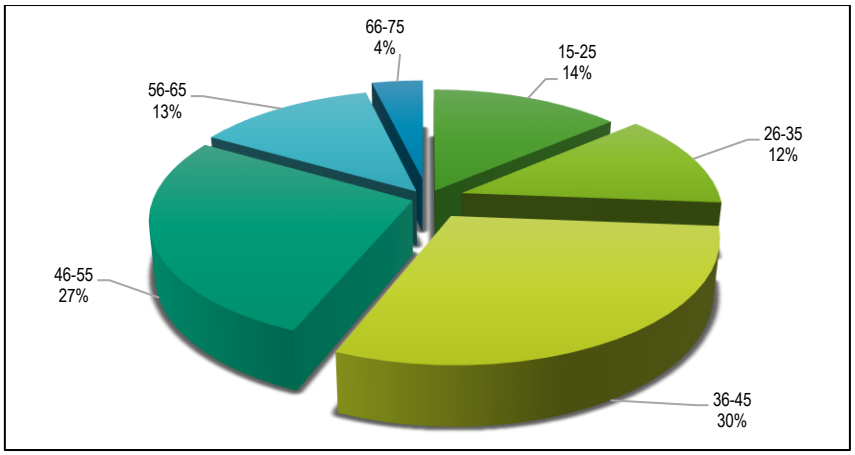
Source: Field Survey by the researcher during 2021-22.
Note: Figures in the parentheses represent percentage to total.

It is noticed that the percentage of the surveyed tourists varies inversely with the zonal distance. Table-1 also indicated the distribution of the 1074 surveyed tourists, a part of which (300) was included in the sample respondent for the collection of relevant information. The distribution shows almost a similar pattern of distribution as observed in case of the respondents across the zones. Largest percentage of sample tourists was from zone-1 and 3 and then declined in order of the distance.

5.3 Age-Distribution of Surveyed Tourists

The distribution of the respondents according to their age group is shown in Figure 1. It shows that 30 percent of the surveyed tourists were in the age group of 36-45 years, which was followed by 27.08 percent respondents from age group 46-55 years. Age groups 26-35 and 56-65 years shares 12.5 and 12.92 percent respectively of the sample respondents; while age group 66-75 constitutes of very small 3.75 percent. Age-group 15-25 constitutes 13.75 percent they were mostly from zones 1, 2 and 3.

Figure 1. Age-Distribution of Surveyed Tourists



Source: Field Survey by the researcher during 2021-22.

5.4 Distribution of Tourists According to their Gender

Distribution of respondents according to their gender (Table 2) indicated that 132 individuals (43.75 percent of the samples) were female and 168 respondents *i.e.* 56.25 percent were male. Here the distribution is found to be marginally in favour of male.

Table 2. Distribution of the Surveyed Tourists According to their Gender

Zone	Female	Male	Total
Zone-1	44 (46.67)	51 (53.33)	95
Zone-2	9 (40.91)	13 (59.09)	22
Zone-3	27 (45.24)	32 (54.76)	59
Zone-4	10 (37.04)	17 (62.96)	27
Zone-5	15 (46.88)	17 (53.13)	32
Zone-6	4 (36.36)	7 (63.64)	11
Zone-7	4 (44.44)	5 (55.56)	9
Zone-8	19 (43.24)	26 (56.76)	45
Total	132 (43.75)	168 (56.25)	300

Source: Field Survey by the researcher during 2021-22.
Note: Figures in the parentheses represent percentage to total.

5.5 Distribution of Surveyed Tourists according to Their Marital Status

The distribution of respondents according to their marital status reflects that, 59.17 percent of the sample visitors were married, and the 40.83 percent were unmarried (Table 3).

Table 3. Distribution of the Surveyed Tourists According to their Marital Status

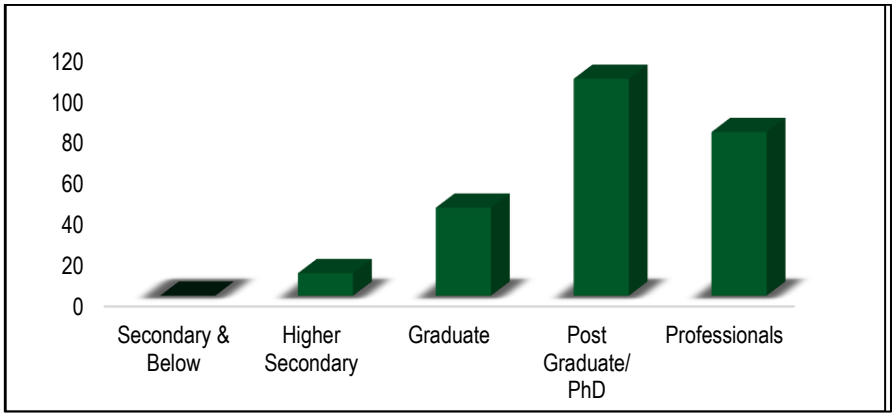
Zone	Married	Unmarried	Total
Zone-1	35 (36.67)	60 (63.33)	95
Zone-2	12 (54.55)	10 (45.45)	22
Zone-3	48 (80.95)	11 (19.05)	59
Zone-4	19 (70.38)	8 (29.63)	27
Zone-5	19 (59.38)	13 (40.63)	32
Zone-6	8 (72.73)	3 (27.27)	11
Zone-7	7 (77.78)	2 (22.22)	9
Zone-8	24 (53.33)	21 (46.67)	45
Total	142 (59.17)	98 (40.83)	300

Source: Field Survey by the researcher during 2021-22.
Note: Figures in the parentheses represent percentage to total.

5.6 Distribution of Surveyed Tourists according to their Educational Qualification

The distribution of respondents according to their level of education has been displayed in Figure 2. Only 4.58 percent had the lowest educational qualification of Higher Secondary level and 17.92 percent were Graduates. The largest 44.17 percent had Post Graduate or Doctoral degrees. The second largest 33.33 percent have professional qualification.

Figure 2. Distribution of the Surveyed Tourists According to their Educational Qualification

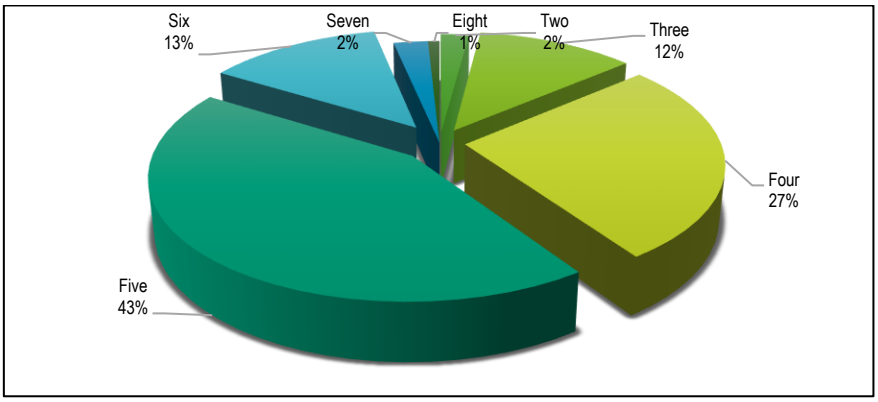


Source: Field Survey by the researcher during 2021-22.

5.7. Distribution of the Surveyed Tourists According to their Family Size

Distribution of sample tourists according to their family size is shown in Figure 3. Only 2 percent of the sample respondents reported to have the smallest family size of 2, while 12 percent have family size of 3 and 27 percent of them have family size of 4. The biggest group constituting 43 percent of the sample have family size of 5 members. 13 percent reported to have family size of 6 members, and 2 percent had family size of 7 members.

Figure 3. Distribution of the Surveyed Tourists According to their Family Size

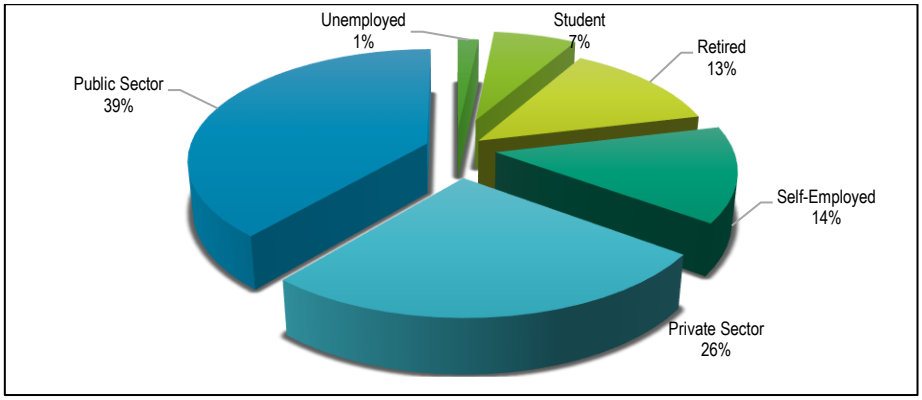


Source: Field Survey by the researcher during 2021-22.

5.8 Distribution of Surveyed Tourists according to their Nature of Employment

Figure 4 displays that, of 300 respondents, only 1.67 percent was unemployed and 6.67 percent were students, while 12.92 percent were retired individuals. Maximum 38.75 percent of the sample respondents were public sector employees and 26.25 percent were private sector employees and 13.75 percent were self-employed visitors. The employment-wise distribution pattern is almost identical for all the zones under study.

Figure 4. Distribution of the Surveyed Tourists According to their Employment



Source: Field Survey by the researcher during 2021-22.

5.9 Distribution of Surveyed Tourists According to Their Total Monthly Family Income

Zone-wise distribution of the 300 as per the total monthly family income is shown in table 4. The table reveals that 20.33 percent of respondents belong to the income range of INR 60001 to 70000, which was followed by 18.33 percent of the responds having monthly income more than INR 90000 where most of tourists are from zone-8 *i.e.* foreign tourists. The intra- zonal distribution however reflects that percentage of respondents in the higher monthly family income was positively associated with the distance of the specific zone. More percentage of respondents in the low level of income from the neighbouring zones was in parity with the level of expenditure required and the distance of the zone and hence the result.

Table 4. Distribution of Surveyed Tourists According to their Total Monthly Family Income

Zone	Up to 20000	20001-30000	30001-40000	40001-50000	50001-60000	60001-70000	70001-80000	80001-90000	Over 90000	Total
Zone-1	2	10	24	18	20	6	7	5	2	95
Zone-2	0	0	3	11	5	2	1	0	0	22
Zone-3	0	0	0	8	14	22	5	7	3	59
Zone-4	0	0	0	2	8	7	6	3	1	27
Zone-5	0	0	0	0	0	18	12	1	1	32
Zone-6	0	0	0	0	0	5	2	2	2	11
Zone-7	0	0	0	0	0	1	3	4	1	9
Zone-8	0	0	0	0	0	0	0	0	45	45
Total	2 (0.83)	10 (3.33)	28 (9.17)	39 (12.92)	47 (15.67)	61 (20.33)	36 (12)	22 (7.33)	55 (18.33)	300 (100)

Source: Field Survey by the researcher during 2021-22.
Note: Figures in the parentheses represent percentage to total.

6. Impacts of Socio-Economic Factors on the Visit Frequency of the Tourists

The frequency of visits to tourist sites is expected to be influenced by a range of factors, including disposable income, leisure time, and demographic features such as age, gender, marital status, and household size. High disposable income and ample leisure time generally increase the likelihood of frequent visits to recreational sites. Geographical aspects, such as the distance to the site and the quality of tourism infrastructure also impact travel decisions. Increased travel distance in general reduces frequency of visit due to higher travel expenses, time requirements, and opportunity costs (often assessed by using a minimum daily wage set by the Government of India) as a proxy for lost income during travel.

Distance covered by tourists to reach a spot plays a crucial role in determining how often they visit that particular destination. Taking other factors constant, there is an expected inverse relationship between the distance covered from the origin of tourists to the spot and their number of visits.

Educational level and income significantly influence visit frequency. The educational level of tourists is a key component that is likely to positively influence individuals' earning proficiencies. An upper educational qualification is also correlated with increased awareness, curiosity, and a desire to learn more about archaeological heritage sites, especially among those involved in history, architectural intelligence, archaeological preservation, photography, and historical enthusiasts. Thus, educational level of visitors is deemed to have a significant positive impact on the visit rate to a certain location. Similarly, a higher income level amplifies an individual's ability to spend, providing a feeling of financial stability. Consequently, it is expected to have a notable positive impact on the visit frequency of the tourists.

Additionally, government employees in India benefit from travel incentives such as Leave Travel Concessions (LTC) and greater job security, making them more likely to travel compared to self-employed individuals and private sector workers who face higher opportunity costs. Therefore, employment type is expected to influence travel decisions, with public sector employees likely to travel more for recreation. To account for this, a dummy variable (DE) is introduced in regression analysis, taking a value of 1 for public sector job holders and 0 for others. Age also impacts travel behavior, with individuals between 36 and 55 typically engaging more in travel due to stable finances and better health, whereas younger and older individuals may travel less frequently due to financial and health constraints (Uprety & Sharma, 2012). Consequently, when plotting the number of visits by

tourists against their age, it is likely to observe a trend resembling an inverted U-shaped curve. It follows that the absolute difference in tourists' ages from the mean age is expected to negatively impact their visit frequency.

The travel preferences of individuals are also influenced by gender. In many regions, women are often restrained to domestic responsibilities, with limited influence on decision-making regarding travel. Additionally, many women tend to avoid jobs that require extensive travel. Thus, the demographic of tourists is expected to exhibit a bias towards males. To assess this, a dummy or binary variable, DG, is introduced, that takes value 1 for male respondents and 0 for others. Marital status is another crucial factor affecting travel plans. Generally, young couples are observed to travel more frequently than single individuals. Similarly, older individuals typically tend not to travel solo, with the majority of travelers being senior married couples, as indicated by survey results. To evaluate the impact of gender on the frequency of visit, another dummy variable, DM, is introduced, that takes value 1 for married respondents and 0 for others.

The two-way correlation among the relevant explanatory variables is presented in the Table-5 for all the sample tourists (N = 300). The result displays that there exists a statistically significant positive correlation between a visitor's total monthly family income from all sources, distance covered, and the travel cost incurred by the tourist. Consequently, a segment of the effects of distance covered is already taken into account by the travel costs.

Table 5. Two-Way Correlation among the relevant Explanatory Variables for *Charaideo Maidams*

Charaideo Maidams N=240	Gender	MarStat	Edu	Age	Dist.(km)	FSize	TC (INR)	Income	Employment
Gender	1								
MarStat	-.117	1							
Education	.309**	.083	1						
Age	.159*	-.265**	-.115	1					
Distance (km)	.079	.219**	.182**	-.042	1				
Family Size	.070	.250**	.205**	-.067	-.272**	1			
TC (INR)	.156*	.234**	.271**	.005	.939**	-.218**	1		
Monthly Income	.142*	.275**	.256**	-.019	.796**	-.178**	.862**	1	
Employment	-.092	.208**	.125	-.374**	-.139*	.191**	-.198**	-.118	1
No of Visits	.164*	.121	-.007	.113	-.394**	.321**	-.321**	-.105	.076

Note: Correlation is significant at the 1% (**) and 5% (*) level of significance (2-tailed).

Moreover, the strong correlations between monthly income and both education and travel expenses emphasize the importance of income in shaping tourists' spending habits. Additionally, the correlations involving distance travelled and travel cost highlight that longer distances are linked to higher travel expenditure. These findings provide a foundation for informed decision-making in the tourism industry, enabling stakeholders to tailor their strategies and services to the distinct characteristics and preferences of diverse tourist groups.

Table 6. Estimated Results of Poisson Regression (Individual Travel Cost)

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test	
			Lower	Upper	Wald Chi-Square	Sig.
(Intercept)	.309	.2873	-.255	.872	1.154	.283
Ln Family Size	-.157	.0518	-.258	-.055	9.141	.002
Ln Cost of Single Journey	-.051	.0265	-.103	.001	3.667	.055
Ln Family Income	.107	.0306	.047	.167	12.195	.000
Ln Distance	-.235	.0227	-.279	-.190	106.946	.000
Ln Age	.263	.0605	.144	.381	18.837	.000
Education	-.005	.0159	-.036	.026	.087	.768
Employment	-.004	.0081	-.020	.012	.204	.652
[Gender=0]	.048	.0233	.003	.094	4.289	.038
[Marital_Stat=0]	.009	.0290	-.048	.066	.099	.753
Dependent Variable: Number of Visit.						

The regression results show that in all the cases, frequency of visits is positively related to the visitor's per capita family income and negatively affected by the distance travelled to reach the site from the tourist's area of origin and the per person travel expenses for a single round-trip to the site (Table 6). Moreover, significant positive correlation has been observed between a tourist's travel distance and the expenses incurred, indicating that a portion of the impact of travel distance is already reflected in travel expenditures.

6.1 Estimation of Visit Demand Function, Consumer Surplus and Recreation Benefit

The ZTCM is employed to estimate the Trip Generation Function (TGF) or the visit demand function (VDF). The TGF is derived by the optimization of the visitors' utility function given their budgetary constraints, aligning with neoclassical analysis as elucidated by Nillesen (2002) and Khan (2003). Treating a visitor as a metaphorical consumer, who allocates her/his income between the utilization of a market good (Q_M) and a public good (V), in this case, visiting tourist destinations. The visitor seeks to maximise utility within the constraints of their budget, expressed mathematically as follows:

Maximize: $U(Q_M, V)$… … … … (4)

Subject to: $Y = P_X Q_M + P_o V$ … … (5)

Here, U represents consumer's utility, Q_M stands for market good, V denotes frequency of visits to a recreational site, P_x indicates cost of the market good (Q_M), and P_o refers to the amount of money paid for visiting the sites. Y is used as the visitor's money income (Khan, 2003). Solving this formulation yields the Marshallian VDF as $V = g(P_x, P_o, Y)$. The demand function implies that consumer's demand to visit a tourist site is influenced by the price of a visit, associated expenditures, household income, and other socio-economic factors (not explicitly mentioned here). V is only a function of P_o for given P_x and Y. Due to each site's unique ability to satisfy various visitor demands, the cost of visiting a substitute site is not taken into account in this approach.

Zonal TCM has been applied for estimating CS and the recreational use value of the Charaideo Maidams (CMs). First, with the help of travel cost data the Trip Generation Function (TGF) or visit demand function (VDF) has been estimated. The TGF/VDF is estimated by using Clawson's ZTCM. First of all, the 'zonal' visit rate for the tourists from different zones has been estimated and this value has been used to estimate the visit demand function.

Here surveyed tourists are grouped into domestic and foreign categories. The domestic tourists are visitors from different states of India visiting the chosen sites mainly for recreation purpose. The visitors from foreign countries usually visit other sites of India together with the selected sites. Thus, for them travel expenditure form their previous point to the study site and returning point in India has been considered for the analysis.

As the area under derived demand curve in respect of the average expenditure per single visit offers an assessment of the recreational value for an average tourist upon visiting the particular site, it is extrapolated to the pertinent visiting population for estimating the overall recreation benefit generated by the site in a specific year.

To ensure consistent estimations, 2-stage least square (2SLS) regression method has been employed. While in individual travel cost method, all variables from equation (3) are considered, in case of estimation of the demand function by zonal travel cost method, only six observed explanatory variables were considered, viz. average total cost, PCSDP (proxy for income), distance travelled, employment, educational qualification and age of the tourist. Regression of the number of visits on the logarithmic values of these explanatory variables was conducted to avoid inconsistency. Subsequently, the actual visit rate was replaced with the anticipated visit rate in order to estimate the demand curve and consumers' recreation benefit.

6.2 Estimation of Trip Generation Function (TGF), Consumer Surplus and Recreational Value for Charaideo Maidams (CMs)

The TGF for CMs is estimated in the second stage takes the following form:

For all tourists,

$$\text{Ln WTP} = 12.794 - .568\, LnVR_{hat}{}^{*} \ldots \ldots \ldots \quad (6)$$

R^2 = .881, F = 1492.091

Mean LnVR_hat = 8.01, Consumer Surplus (CS) = 19.32

Equations 6 shows that there exists an inverse relationship or a negative correlation between the travel costs and visit rate in case of all the visitors (domestic and international), and thus reflects the law of demand.

Table 7. Result of Regression of LnVisit Rate on Explanatory Variables

Variables	B	Std. Error	t-value	p-value
(Constant)	17.731	1.020	17.391	.000
LNATC	-1.065	.067	-15.968	.000**
LnPCNSDP	.054	.076	.708	.480
LnADT	-.532	.051	-10.466	.000**
LnEmp	.295	.085	3.466	.001**
LnEdu	.339	.137	2.484	.014**
LnAge	.291	.106	2.760	.006**
Zone 5, N = 300, R^2 = .900, Adj R^2 = .897, F = 294.330 (.000)				

Source: Calculation based on sample survey in CMs during 2021-22.
Note: **, * significant at the 1% and 5% level of significance respectively.

The estimated consumer surplus per 100000 visitors of all tourist categories in case of CMs is INR 19.32 lakh, while the overall value is INR 8.88 lakh. This surplus directs the sum that visitors are willing to contribute beyond the actual expenses to enjoy the recreational benefits by visiting these historical monuments. The total recreational value for all tourists is calculated to be INR 1.61 crore.

Table 8. Estimation of Consumer Surplus in CMs

Tourist Site	Tourist Type	Choke Price (INR) (1)	CS (per 100000 population) (INR) (2)	CS per person (INR) (3)	Total Visitor in 2021- 22 (4)	CS for Visitors of 2021-22 (INR) [(3)*(4)]
CMs	*All Tourists*	360051	1932000	19.32	45975	888237

Table 9. Annual Recreational Value of CMs

Tourist Site	Tourist Type	CS per person (INR) (1)	Total ATC per Person (INR) (2)	Total Visitor in 2021-22 (3)	Total Recreational Value (INR) [{(1)+(2)}x(3)]
CMs	*All Tourists*	19.32	35023.31	45975	161108491

6.3 Willingness to Pay (WTP) based on CVM

The CVM utilizes various question formats including dichotomous choices, open-ended queries, iterative bidding and payment card formats, and each has its own advantages and drawbacks. There are also several variations in their application. To assess WTP for the *preservation and conservation* of the selected monument, the dichotomous choice form of CVM is utilized. According to the findings, 96.07 percent of the respondents expresses a desire to contribute financially for the preservation and better management of the sites.

6.4 Estimation of Visit Demand Function (VDF) based on WTP Examined by CVM and Applying 2SLS Method

Taking into account the additional WTP exhibited by the visitors beyond their current expenditure in terms of increased entrance fees, parking fees, and entertainment taxes, a distinct regression equation has been formulated for the site, resulting in the following revised demand function:

Ln WTP = 12.797* – .568 LnVR_hat*
(0.118) (0.015)
[R(bar)2 =0.883, F = 1521.34, n = 203]
Mean LnVR_hat = 8.012, Consumer Surplus (CS) = 18.23

The values within brackets denote the standard errors of the respective coefficient, and an asterisk (*) signifies that the coefficient is significant at the 1 percent level of significance by the two-tailed test.

The revised consumer surpluses estimated is INR 8.89 lakh respectively. Therefore, there is a slight increment of consumer surplus by INR 919.5. This indicates that the visitors/tourists are willing to contribute more for Charaideo Maidams. However, in the case of Charaideo Maidams, a large number of visitors are local day visitors and students, and most of them are reluctant to pay more and many cannot afford. On an average, the

responses of all the visitors showed that they are willing to contribute more by INR 235.51 for the site, along with the existing entry fee.

Table 10. Estimation of Revised Consumer Surplus

Tourist Type	Choke Price (INR) (1)	CS (per 100000 (Popu) (INR) (2)	CS per person (INR) (3)	Total Visitor in 2021- 22 (4)	CS for the Visitors of 2021-22 (INR) [(3)*(4)]
All Tourists	861132.43	1934000	19.34	45975	889156.5

Source: Researcher's calculation on the basis of field survey 2021-22.

Estimated consumer surplus for foreign tourists is INR 361.46, where there is a negligible increment of consumer surplus by INR .66 only. However, the WTP for the site is much higher in the case of foreign visitors and their WTP is also much higher than an average domestic tourist. This can be primarily attributed to their significantly higher monthly incomes. On an average, responses of the foreign tourists showed that they are willing to contribute more by INR 631.96 for the site with the existing entry fee of INR 250/person.

Using total number of visitors, total consumer surplus or recreation benefit generated during 2021-22 is estimated, which is presented in Tables 11 and 12.

Table 11. Annual Revised Recreational Value for the year 2021-22

Tourist Type	*CS per person (INR) (1)*	*Total ATC per Person (INR)*	*Total ATC+WTP per Person (INR) (2)*	*Total Visitor in 2021- 22 (3)*	*Total Recreational Value (INR) [{(1) +(2)}x(3)]*
All Tourists	19.34	35023.31	35258.82	45975	162102425

Table 12. Approximated Total Recreational Gain in the year 2021-22

Tourist Site	Estimated Surplus Generated (Crore INR)	Surplus as per WTP (Crore INR)	Expressed Variation (Crore INR)
CMs	1.61	1.62	0.01

Table 12 reveals that the overall annual recreation benefit derived by all the tourists was about INR 1.61 crore, which could be increased to INR 1.62 crore, if the WTP of the visitors for the purpose were considered *i.e.*, by about INR 0.01 crore. Furthermore, the development of tourism in these sites yields numerous additional benefits in diverse forms. As a result, the genuine benefits derived from the site extend well beyond the currently estimated recreational advantages. If the resources allocated for tourism purposes are appropriately managed, there exists significant potential to augment these benefits, thereby enhancing the well-being of the individuals connected with it.

7. Discussions

India stands out as one of the world's most enchanting countries, renowned for its vibrant culture and rich heritage. The historical monuments of India, characterized by splendid architecture and a profound legacy, are a testament to its cultural richness. With the magnificent beauty of North-East India and the government's dedicated efforts in preserving heritage sites, tourism has experienced a significant growth, attracting travellers from across the globe. Sivasagar, a prominent historical city in North-East India showcases remarkable architectural, archaeological, and engineering marvels. These are evident in the numerous temples, palaces, stone bridges, tanks, and pyramid-shaped Maidams, the first UNESCO heritage site that grace the region.

The present study has been undertaken primarily to estimate the recreation values of Charaideo Maidams, a UNESCO recognized cultural heritage site in North-East India, in order to know the emphasis given by the visitors and that would be reflected through their willingness to pay. It provides some important guidelines for the preservation of unique and untarnished beauty of these areas, and for the sustainable growth of tourism there. As usual, majority of the visitors in the chosen site were domestic tourists. The findings highlight that the monthly income of tourists strongly favour the frequency of visit, while longer travel distance and higher expenses adversely affect the visit rate. ZTCM, the study establishes demand functions and calculates consumer surpluses or recreation benefit for domestic and foreign tourists. However, it is imperative to note that the study focuses solely on recreational values, overlooking the broader "Total Economic Value" encompassing non-use values as well. In conclusion, it can be rightly said that, since this study captures only the recreational values of the selected site, the actual total economic value of the site is much higher. Therefore, proper policies need to be implemented

in order to have sustainable development of such sites, which will also have significant positive economic impacts on the economy of the local community.

Using the estimated number of visitors, total consumer surplus or recreation benefit generated in that particular year is estimated for the site, to be around INR 1.61 Crore, which could further be increased to INR 1.62 Crore, if the WTP of the visitors for the purpose of preservation were considered *i.e.*, an increase of about INR .01 Crore. Thus, it can be argued that as there are other social and economic benefits (through employment and income generating tourist activities); the actual benefit is much more than the estimated recreational values of the site and that provides an important policy implication.

Conclusions and Further Research

This study examines the impacts of various factors on the visiting decisions of the potential tourists to the historical cultural sites of Charaideo Maidams in Assam, India. After that ZTCM has been employed to estimate the visit demand function and based on that the consumer surplus (use value) of the site. Also, preservation benefit is computed by finding out the willingness to pay over and above the average payment calculated from visit demand function under ZTCM by applying CVM. The outcome of the present study is in line with findings of Pearce & Ozdemiroglu (2002), Noonan (2003), Montenegro *et al.* (2009), Voltaire *et al.* (2017), Islam (2021), Baitalik & Bhattacharjee (2023) on the historical, cultural and recreation value of heritage sites in different places. However, each of them used either TCM or CVM to estimate the WTP of the visitors as a valuation of recreation or historical benefit. There are significant variations in valuation obtained by CVM (holistic approach and hypothetical market) and TCM (related market approach) and WTP for preservation to capture option values was not addressed earlier. The present study captured visitors' WTP for the sustainable management of UNESCO heritage site Charaideo Maidam in Assam by combining CVM with Zonal TCM that has important policy implication.

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Credit Authorship Contribution Statement

Utpal Kumar De: Understanding the problem, revision of draft, verification of analysis and finalization.
Bidyajyoti Borah – Conceived the problem, data mining, analysis, drafting.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Declaration of Use of Generative AI and AI-Assisted Technologies

This is to declare that we have not used generative AI and AI-assisted technologies during the preparation of this work.

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"Ecotourism" and "Sustainability": A Bibliometrics Analysis using Biblioshiny and VOS viewer

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Abstract: This study presents a bibliometric analysis of research on sustainability in ecotourism, highlighting global trends, key themes, and emerging areas. Using databases like Scopus 1993–2024 till the date 10th December. Publications were analyzed to identify influential authors, institutions, and journals. The findings reveal a growing interest in sustainable practices, and biodiversity conservation within ecotourism. This Study uses Bibliometrics analysis (Biblioshiny), and VOS viewer software to identify the main developments. To achieve this goal in the "Scopus" database "Ecotourism Sustainability" keyword searched. Overall, 2849 articles were discovered. After applying the filter to the English language only 2741 articles were left. Again, we use a filter to get access to articles only and are left with 2275 articles. Although we need the articles of the journals only and get 2261 articles. After that, we narrowed our research to 2 subject areas social science and business, management and accounting we got 1752 articles. out of these 12 articles are in press so after excluding these articles we finalize our research to 1740 articles. The findings highlight annual publication trends, most relevant journals, top Nations, Journals and co-citation, co-occurrence and thematic analysis. The findings show that the most relevant journal is

"Sustainability (Switzerland)", Australia is the leading country and "Sustainability" is the most cited keyword. The results show the growing interest of researchers in the emerging field of ecotourism and sustainability and more attention is needed to enhance theoretical and empirical exploration of a domain in future.

Keywords: ecotourism; sustainability; Biblioshiny; VOS viewer.

JEL Classification: Q01; Q56; Z32; I23.

Introduction

Travelling to relatively pristine or unpolluted places with the explicit intention of exploring, gratitude, and enjoying the natural landscape, its fauna and flora, and any related cultural expressions found there was the original definition of "ecotourism" (Lascurain, 1987). The "International Union for Conservation of Nature" (IUCN) first gives the idea of ecotourism in year 1983 (Indwar & Muthukumar, 2023). "Ecotourism is a type of travel that prioritises protecting the environment and paying special attention to the experience of a natural area" (Zhang *et al.* 2021). However, ecotourism is a conservation tool that aims to "Improve the quality of life in desert, wetland, marine, and forest ecosystems" while also slowing the decline of biodiversity (Samal & Dash, 2022). The development of eco-friendly infrastructure and practices, as well as the prudent use of natural resources, are encouraged by ecotourism. It promotes social well-being, environmental stewardship, economic growth, educational enrichment, sustainable development and cultural preservation. which benefits both human and natural communities (Fu & Zhao, 2024). From these efforts, ecotourism has developed and embraced various concepts of tourism in related to nature, sustainable tourism, adventure tourism, rural tourism, green tourism, responsible tourism and wilderness tourism (Nordin & Jamal, 2020). The term sustainability (German: Nachhaltigkeit) was first introduced in Europe (1713) in the book Sylviculture Oeconomica, written by German scientist and forester Hans Carl von Carlowitz (Heinberg & Lerch, 2010). A major theme in the last 20 years has been the concern for "sustainability," as it relates to development, societies, livelihoods, and a variety of other social, economic, and ecological activities (Sneddon, 2000). The term "sustainability" is being used more and more to describe particular socio-ecological processes, such as urbanisation, ecosystem management, and agricultural practices, as well as to clarify the notion in ways like contrasting "strong" and "weak" sustainability (Jamieson, 1998). Sustainability is very important factor to take into account when developing ecotourism. The management approach of fulfilling financial obligations without compromising an equivalent or better standard of living for future generations is known as sustainability (Vincent & Thompson, 2002). In the tourism business, eco-tourism is thought to be the sector with a rapid rate of growth. Eco-tourism is more than just a catchphrase promoting leisure and vacation that values the environment. Ecotourism's primary objective is to preserve the diversity of natural and cultural ecosystems that exist worldwide. In the regions where it works, it respects and preserves the native customs while offering visitors entertainment and lodging that is as less intrusive or damaging to the environment as feasible (Nag, 2018).

This research aimed to investigate the publications of the study of "ecotourism" and "Sustainability" within the Scopus database with bibliometric analysis. This way, the trends of Ecotourism and Sustainability studies can be derived and recommendations made for future studies. Based on that objective, Our study aims to answer the following research questions:

RQ1. Which countries are the most productive, and what are the yearly trends in publications, citations, and author profiles?

RQ2. Which are the top ten cited articles in the field of Ecotourism and Sustainability?

RQ3. What are the key themes and topic trends explored by the researcher in the specific field?

1. Review of Literature

1.1 Ecotourism and Sustainability

The society of Ecotourism defines term as "responsible travel to natural areas, which conserves the environment and sustains the well-being of the local people". Ecotourism has been one of the most extensively studied ideas in the larger tourism industry within the last 20 years (Weaver, 2008). Sustainability, as defined by the dictionary, is the ability of a certain action or activity to be sustained (Santillo, 2007). Sustainability is becoming more and more seen as a desirable objective of environmental management and development (Brown *et al.* 1987). Many studies have been done in the field of Ecotourism linked with sustainability. Dinç *et al.* (2023) analyse the developments, and patterns of ecotourism research during the past 20 years, emphasising partnerships, co-citations and new research areas. Hasana *et al.* (2022) By using bibliometric analysis the study conducts a quantitative study of ecotourism in protected areas. Research publications published between 2002 and 2020 were analysed using the well-known bibliometric program VOSviewer. Le and Nguyen (2023) this paper, by using

VOSviewer software to perform bibliometric analysis of ecotourism literature published in between 2002-2022. According to this study, data-driven decision-making, stakeholder involvement, and climate adaption in researchers worldwide are becoming interested in the planning and administration of ecotourism. This is ecotourism, as a tourism sector that stresses conservation of the environment, respect for culture, and sustainable development, which has rapidly gained prominence since its concept in the 1980s. The area has been well-researched and increasing attention is placed on the capability of this area to be useful in meeting SDGs. According to recent studies (Jones *et al.* 2023), it is found that ecotourism can successfully be implemented through balancing environmental, social, and economic factors for minimum ecological footprints while having the benefits accruing to the local communities. One such significant analysis was conducted by Smith and Lee (2022) on research trends. Patel (2024) did an impressive job summarizing ecotourism's current trends and impacts. Utilizing tools such as Biblioshiny and VOSviewer, these studies map the geographical distribution of the research, key authors, and the thematic clusters surrounding the concepts of sustainability and ecotourism. Findings from such studies indicate increased community-based ecotourism, where the local communities are empowered to take part in and benefit from tourism activities (Williams & Thompson, 2023). Gokkaya *et al.* (2017) & Shasha *et al.* (2020) have also studied ecotourism using bibliometric analysis. Liu and Li (2020) have analysed research trends throughout the domain of ecotourism, which has lately become an area of significant focus both for policymakers and researchers as a key step towards sustainable tourism. A bibliometric study was performed based on 2531 ecotourism-related papers published between 1990-2016 extracted from the SSCI, “Science Citation Index” (SCI), “Index to Scientific & Technical Proceedings” (ISTP), and “Arts & Humanities Citation Index” (A&HCI). Honey (2008) said, “Ecotourism and sustainability are intricately connected, with ecotourism often seen as a tool for achieving sustainable development by balancing environmental conservation, cultural preservation, and economic benefits for local communities”. More recently, a notable trend that has been emerging from bibliometric studies is the growing application of technology in ecotourism research. For instance, technologies such as GIS and remote sensing are being used to monitor environmental impacts, optimize sustainable practices, and enhance the visitor experience (Brown & Taylor, 2023). Another emerging theme is the role of ecotourism in climate change mitigation and adaptation, particularly in vulnerable ecosystems (Garcia *et al.* 2024). The ecotourism sector has recently begun to embrace a more inclusive, socially sustainable form of tourism with a focus on equity, inclusion, and capacity building in host communities (Rodrigues & Carter, 2024). It reflects the changing understanding of the concept of sustainability, from purely environmental concerns, to challenging researchers to think about how ecotourism can bring positive long-term changes to local cultures and economies. Recent bibliometric analyses (Chen *et al.* 2023) suggest that the country’s most active in the field of ecotourism research are typically those with great biodiversity and rich cultural heritage, like Brazil, Costa Rica, and Kenya. These regions remain at the forefront of scientific research and practical ecotourism activities.

Keyword Identification: To find relevant articles, the initial search was conducted using the Boolean string that included ecotourism sustainability in their “title”, “abstract”, or “keywords”: - “Ecotourism” and “Sustainability” in the Scopus database. These keywords can be used as a search item in the title section to find particular papers that meet the study's objectives.

2. Methodology

Bibliometric Analysis: According to (Cooper, 2015), Bibliometric methods calculate the impact or influence of a chosen research article on subsequent studies. Bibliometrics refers to "Component fields related to the study of the dynamics of disciplines as reflected in the production of their literature"(Hood & Wilson, 2001). The use of statistical and mathematical metrics to assess and contrast the advancements in science and methodology across all fields of study is known as bibliometrics. The bibliometric analysis includes an interaction analysis between the researchers and the subjects which they are willing to study in addition to the performance analysis of contributions on certain topics (Donthu *et al.* 2021). The quantitative evaluation of academic output is the typical use of bibliometrics, which is also beginning to be applied to practice-based research. The two primary processes in bibliometrics are science mapping and performance analysis (Noyons *et al.* 1999). Evaluation of groupings of scientific actors (nations, institutions, departments, and researchers) and the effects of their work are the goals of performance analysis (Noyons *et al.* 1999). Science mapping aims to illustrate scientific research's dynamic and structural elements (Borner *et al.* 2003). We use a VOSviewer tool that allows users to create and view bibliometric maps. For instance, VOSviewer can be used to create maps of authors or journals using co-citation information or to create maps of keywords using co-occurrence information. Maps created with any appropriate mapping approach can be shown in VOSviewer (Van Eck & Waltman, 2009). Additionally, we have used the R program, which is open-source software that facilitates data analysis for academics utilising

Biblioshiny systems i.e designed by (Aria & Cuccurullo, 2017). The data exported from scientific databases is combined using an R language algorithm to create a flow ft that can be uploaded to a web platform for information processing. Multiple analysis and the creation of visual maps are the reasons why this methodology performs better. Additionally, it provides a global perspective of scientific production that uses static graphics and prevents user participation (Pessin *et al.* 2022).

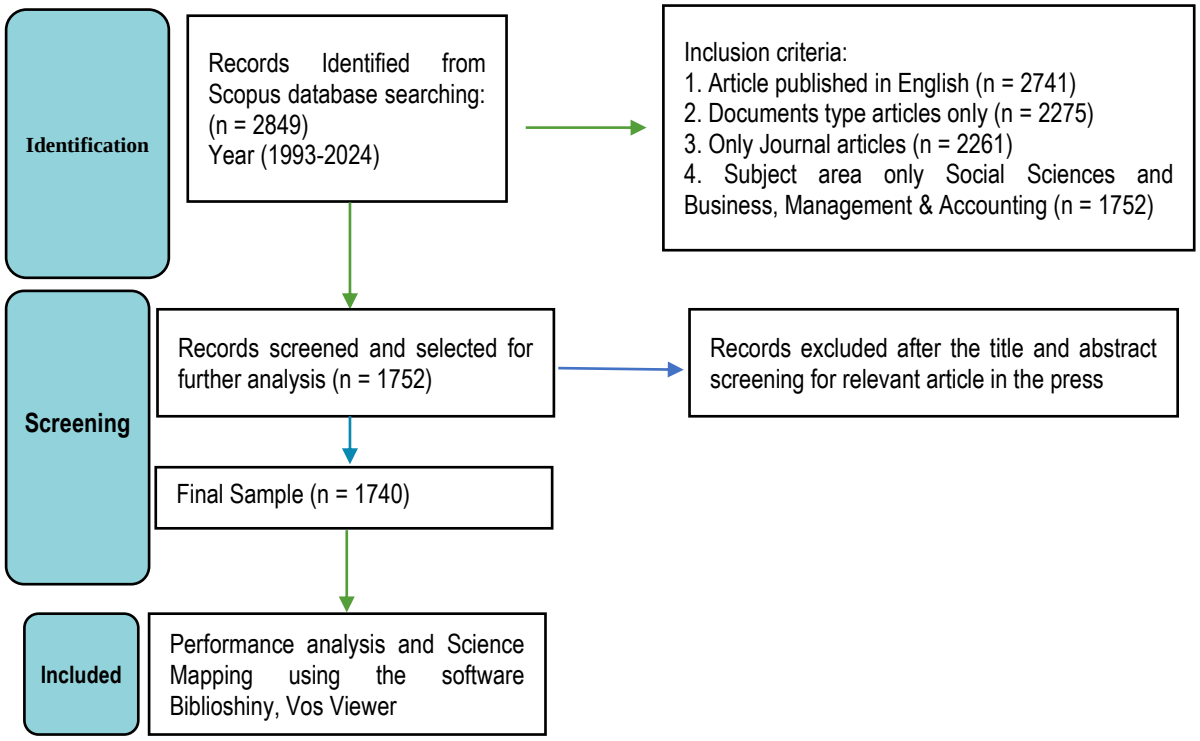
Initial research: As shown in figure 1, the search results contain 2849 articles. After applying the filter, limiting to our research articles in the English language is 2741. Again, we narrowed our research to document-type articles only in the English language is 2275. After finalizing this we have left with the journal articles which are in English language are 2261. After choosing the 2 subject areas only 1752 articles were left out of which 12 articles were in the press, we excluded these articles. The final articles we had left were from 1740.

Inclusion and Exclusion: After limiting our research, as displayed in figure 1, 1740 articles remain. These articles are lifted from different subject areas. For our study, we chose 2 subject areas: 1. Social Sciences and 2. Business, Management, and Accounting. This includes only research articles, no book chapters, and no conference papers. The 1740 articles were published between 1993 and 2024.

3. Results and Discussion

Systematic reviews should provide enough information about their procedures and findings to enable consumers to judge the reliability and relevance of the review's conclusions. To make it easier to report systematic reviews clearly and comprehensively, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement was created (Page *et al.* 2021).

Figure 1. Prisma framework



Source: Authors compiled from Scopus Database

3.1 Performance Analyses

Performance analysis examines how research participants contribute to a certain sector (Cobo *et al.* 2011). Since it is quite a common practice for reviews to explain the performance of different research elements, then most reviews, even in those theses that do not participate in scientific mapping, will present some form of performance analysis (e.g., authors, institutions, nations, and journals). Measures used in performance analysis include metrics linked to publications, metrics related to citations, and metrics related to both publications and citations (Donthu *et al.* 2021).

Table 1 was extracted using Biblioshiny software. Table 1 provides a descriptive summary of the Scopus file we obtained for our research investigation on December 10, 2024, after applying different filters. The first work to

include these keywords was published in 1993, according to the period of our analysis, which runs from 1993 to the end of 2024. Our Scopus collection has a total of 266 sources (Journals) and 1740 documents (articles). Our study's yearly growth rate is larger than 10, which indicates that keyword research is ongoing. The percentage of international co-authors is 28.79.

Table 1. Descriptive Data Statistics

Timespan	1993-2024
"Sources (Journals, Books, etc)"	266
"Documents(articles)"	1740
"Annual Growth Rate %"	18.34
"Document Average Age"	6.23
"Average citations per doc"	33.38
"International co-authorships %"	28.79

Source: Extracted from RStudio using Scopus database

3.2 Citation Analyses

With the Scopus database, Table 2 shows the top 10 most referenced publications by authors. (Sims, 2009) has the most citations with 880, and its average citation count is 55.00. All the Top 10 publications had more than 300 citations in the second-place paper (Hassan, 2000), with 589 citations and an average citation rate of 23.56. (Juvan & Dolnicar, 2014)

It is in the third position with 503 total citations with 45.73 per year. Additionally, the final seven articles each have more than 300 total citations (Gössling & Peeters, 2015, Nicholas *et al.* 2009, Han, 2021, Reynolds & Braithwaite, 2001, Ballantyne *et al.* 2010, Lee & Jan, 2018, Jamal & Stronza, 2009). Given the field's explosive expansion, we predict that citations will soon rise. Since the study's inception, many scholars have made significant advances in Ecotourism research. In our database, we located 4555 writers who contributed to works between 1993 and 2024. To locate the authors' table with the most relevant information, we created a ranking list of the top 10 authors with the most citations. According to Table 2, the paper with the maximum number of citations is "Food, place, and Authenticity: Local Food and the Sustainable Tourism Experience" (Sims, 2009).

Table 2. Top 10 most referenced publications by authors

Year	Author	Title	Source	Total Citation	Citation per year
2009	Sims, R (Sims, 2009)	"Food, Place and Authenticity: local food and the Sustainable tourism experience"	"Journal of Sustainable Tourism"	880	55.00
2000	Hassan, S.S (Hassan, 2000)	"Determinants of Market Competitiveness in an Environmentally Sustainable Tourism Industry"	"Journal of Travel Research"	589	23.56
2014	Juvan, E., Dolnicar, S. (Juvan & Dolnicar, 2014)	"The Attitude–Behaviour gap in Sustainable Tourism"	"Annals of Tourism Research"	503	45.73
2015	Gössling, S., Peeters, P. (Gössling & Peeters, 2015)	"Assessing Tourism's Global Environmental Impact 1900–2050"	"Journal of Sustainable Tourism"	412	41.20
2009	Nicholas, L. N., Thapa, B., Ko, Y. J (Nicholas *et al.* 2009)	"Residents' Perspectives of a World heritage site: The Pitons Management Area, St. Lucia"	"Annals of Tourism Research"	401	25.06
2021	Han, Heesup. (Han, 2021)	"Consumer Behaviour and Environmental Sustainability in Tourism and Hospitality: a review of theories, concepts, and latest research"	"Journal of Sustainable Tourism"	395	98.75
2001	Reynolds, C, Paul.,	"Towards a conceptual	"Tourism Management"	380	15.83

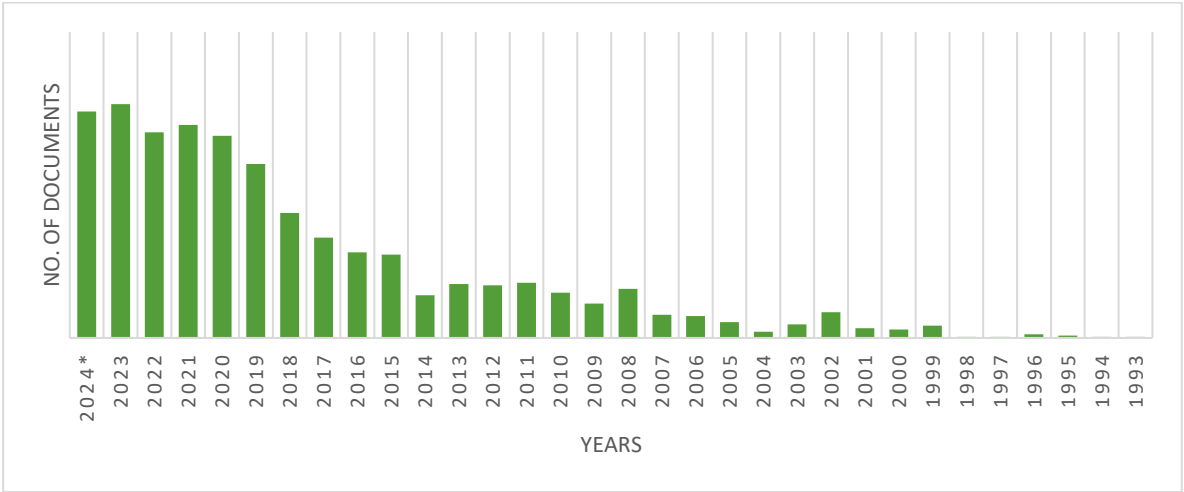
Year	Author	Title	Source	Total Citation	Citation per year
	Braithwaite, Dick. (Reynolds & Braithwaite, 2001)	framework for Wildlife Tourism"			
2010	Ballantyne, Roy., Packer, Jan., Falk, John. (Ballantyne *et al.* 2010)	"Visitors' learning for Environmental Sustainability: Testing short- and long-term impacts of Wildlife Tourism experiences using structural equation modelling"	"Tourism Management"	376	26.86
2018	Lee, Hung, Tsung., Jan, Hauh, Fen. (Lee & Jan, 2018)	"Can Community-Based Tourism contribute to Sustainable development? Evidence from residents' Perceptions of the Sustainability"	"Tourism Management"	352	58.67
2009	Jamal, T., Stronza, Amanda. (Jamal & Stronza, 2009)	"Collaboration theory and Tourism practice in protected areas: Stakeholders, Structuring and Sustainability"	"Journal of Sustainable Tourism"	350	21.88

Source: Data extracted from Scopus database

3.3 Number of documents published

Figure 2 shows the status of Ecotourism and Sustainability research publications between 1993 and December 10, 2024. The first paper on this topic was the unrecognized threat to tourism. Can tourism survive 'sustainability'? (McKercher, 1993) study, which examined ecologically sustainable development in the tourism field. After completing the analysis pattern, we have concluded the number of documents published throughout the years. In 1993 and 1994, there was only 1 publication in these years. Approximately 20-21 papers averagely published between 2000 to 2010. From 2014 to 2024, the research on ecotourism and sustainability has increased. In 2014 35 documents were published. And, in 2015 the number of documents published was 68. In 2016 the number increased to 70. In 2017 the number increased to 82, In 2018 the published documents were 102. In 2019 the numbers were 142, In 2020 (165), 2021 (174), 2022 (168) and last year the numbers are in most published 191. Current year till December 185 documents have been published.

Figure 2: Show the publication trend. Figures were extracted using Biblioshiny.



Source: Data extracted from Scopus database

3.4 Most Relevant Affiliations. Top 10 University

Table 3. Publication trend university-wise

Affiliation	Articles
GRIFFITH UNIVERSITY	52
UNIVERSITY OF SURREY	42
THE UNIVERSITY OF QUEENSLAND	31
JAMES COOK UNIVERSITY	27
KYUNG HEE UNIVERSITY	27
UNIVERSITY OF NOVI SAD	27
UNIVERSITY OF OTAGO	27
UNIVERSITY OF QUEENSLAND	27
MURDOCH UNIVERSITY	24
UNIVERSITY OF WATERLOO	24

Source: Data extracted from Scopus database

Table 3 shows the most relevant affiliations, the top 10 associated with which have the most published documents. Griffith University (Australia) has the greatest number of articles published in the field studied. After that, the University of Surrey (United Kingdom) has 42, and the University of Queensland (Australia) has 31.

3.4 Document by Country

In Table 4 shows the various countries' contributions to the global publication. The number of publications per nation, only the top 15 most productive countries in terms of Ecotourism and sustainability were taken into account in this analysis. Only publications authored in English (2741), as per the Scopus database, were looked at for the study. With 219 publications published in this field and a total of 8579 citations, the United States, one of the world's top industrialised nations, took first place. Australia came in second with 215 papers and 9529 citations, followed by the United Kingdom with 153 articles and 7484 citations. This data demonstrates that the US, UK, and Australia are heavily involved in culture heritage tourism research, as the rest of the countries maintained their positions in the top 15 out of 113 countries. This data demonstrates how actively engaged in research on Ecotourism and sustainability are the US, UK, and Australia.

Table 4. Publication by countries.

Ranking	Countries	Documents	Citations
1	United States of America	219	8579
2	Australia	215	9529
3	United Kingdom	153	7484
4	Spain	133	3374
5	China	131	3154
6	Italy	116	2809
7	Indonesia	111	751
8	Canada	87	3918
9	South Africa	81	2379
10	Malaysia	77	1943
11	India	57	1219
12	Portugal	57	1337
13	New Zealand	55	2671
14	Turkey	50	1421
15	Taiwan	49	1896

Source: Data extracted from Scopus database

3.5 Most Relevant Journal Sources

We have the top 10 journals relevant to “ecotourism” and “sustainability” as shown in Table 5. The leading journal with the top articles published is “SUSTAINABILITY (SWITZERLAND), which has 434 articles. The number second position is the “JOURNAL OF SUSTAINABLE TOURISM” with 333 articles published. The “JOURNAL OF ECOTOURISM” has 64 articles that have been published. “GEOJOURNAL OF TOURISM AND GEOSITES” has 54 articles published. “CURRENT ISSUES IN TOURISM” has 53 number of articles published. The remaining 5 i.e. “TOURISM MANAGEMENT”, “ENVIRONMENT, DEVELOPMENT AND SUSTAINABILITY”, “TOURISM GEOGRAPHIES”, “ASIA PACIFIC JOURNAL OF TOURISM RESEARCH”, “INTERNATIONAL JOURNAL OF SUSTAINABLE DEVELOPMENT” have less than 50 articles published but more than 28.

Table 5. Top 10 Journals

Sources	Articles
SUSTAINABILITY (SWITZERLAND)	434
JOURNAL OF SUSTAINABLE TOURISM	333
JOURNAL OF ECOTOURISM	64
GEOJOURNAL OF TOURISM AND GEOSITES	54
CURRENT ISSUES IN TOURISM	53
TOURISM MANAGEMENT	45
ENVIRONMENT, DEVELOPMENT AND SUSTAINABILITY	35
TOURISM GEOGRAPHIES	32
ASIA PACIFIC JOURNAL OF TOURISM RESEARCH	29
INTERNATIONAL JOURNAL OF SUSTAINABLE DEVELOPMENT AND PLANNING	29

Source: Extracted from RStudio using Scopus database

3.6 Most Cited Countries. Top 10 Countries

The research impact of different nations is shown in Table 6 as Total Citations (TC) and Average Article Citations (AAC). Total Citations, which show the overall impact of each nation's research output, show the total number of times research articles from that nation have been cited. Australia, for instance, has the largest research footprint, with 7,229 citations. Conversely, average article citations show the calibre and applicability of the articles by calculating the average number of citations per article. Although its TC is smaller than that of larger nations like the USA or China, New Zealand has the highest AAC of 58.70, indicating that its articles have a significant impact on an individual basis. This information sheds light on the volume and calibre of research contributions made in these countries.

Table. 6 Top 10 Cited Countries

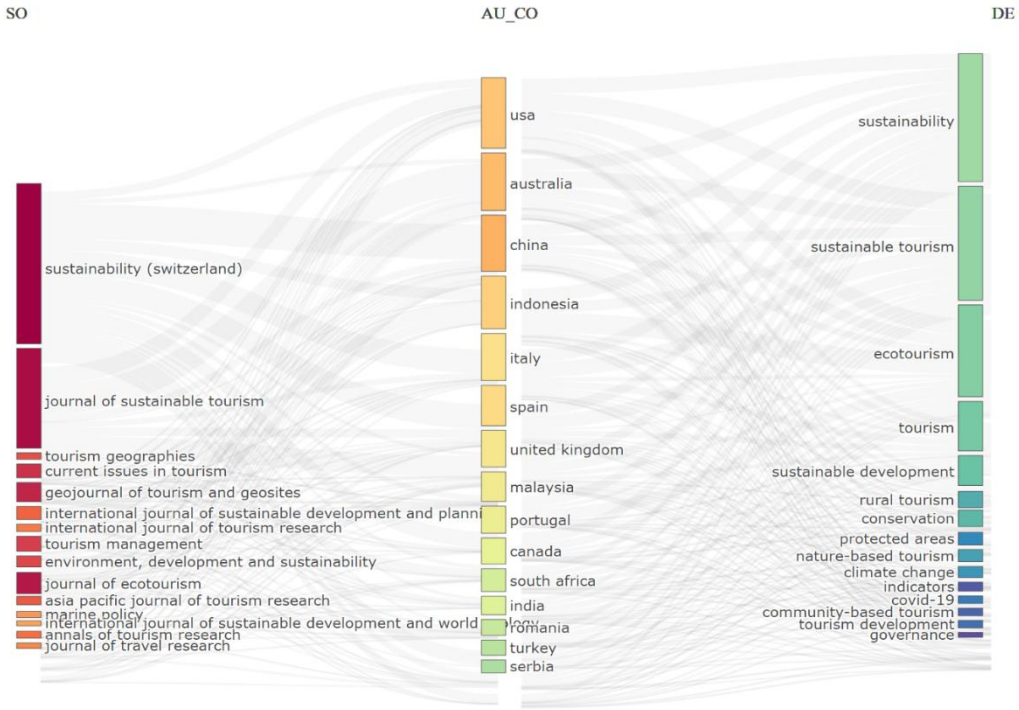
Country	TC	AAC
AUSTRALIA	7229	52.40
UNITED KINGDOM	5931	67.40
USA	4570	36.30
CHINA	3484	26.80
CANADA	2863	55.10
SPAIN	2504	28.80
ITALY	2325	26.40
NEW ZEALAND	1585	58.70
MALAYSIA	1499	34.90
SWEDEN	1045	52.20

TC: Total Citation**, AAC:** Average Article Citations
Source: Data extracted from Scopus database

3.7 Three Field Plot

Three-field plots, or Sankey diagrams, show the interconnections of different attributes of the research database. Sankey diagrams describe the weighted features and help visualize the different systems and their conversations (Guleria & Chakma, 2022). The sum of influx weights at each node equals the sum of the weighted value of, outgoing faxes. In this study, a three-field plot is obtained via the Biblioshiny R-programming package, rectangular diagrams present the essential elements with different colours. Number of communications between multiple components in three-field plots. It directly depends upon the height of the rectangle. By analysing the relationship between these three units it can be observed that the major area of interest in this field is Sustainability, Sustainable Tourism and Ecotourism. The plot can reveal the dispersion of scientific articles within a particular discipline categorizing areas of focus and interdisciplinary exploration along with the identification of the most productive countries and journals within a specific field as showcased in the figure. The figure shows that the Sustainability(journal) is at the top of the most-performing journal list accompanied by the Journal of Sustainable Tourism and Tourism geographies, with the top three countries U.S.A, Australia and China. The most relevant and frequently occurring keywords are Sustainability, Sustainable Tourism and Ecotourism.

Figure 3. Three field plots, Relationship between Sources(left), Countries (Middle), and Keywords (Right) for Ecotourism and Sustainability

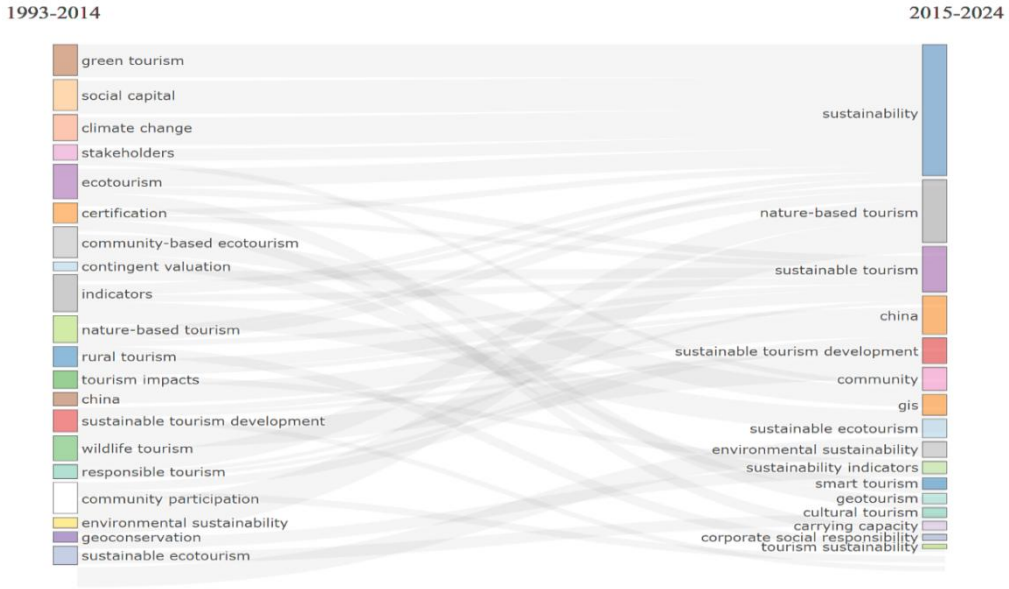


Source: Extracted from RStudio using Scopus database

4. Thematic Evolution of Ecotourism and Sustainability

We have observed a sharp rise in publication between 2015-2024. The study looked at 1st phase 1993-2014 and 2nd 2015-2024 as shown in Figure 4. The algorithm used for these progressions is a walk trap and some criteria set for it, such as minimum cluster frequency of 5 number of words and number of labels for each cluster is 3 and the parameters for a number of words is 100. The thematic map separates the subjects into four quadrants according to their centrality and density value along two axes, taking into account the number of publications, citations, and the extent of overlap with other topics. Centrality measures a theme's importance concerning other themes on the map, whereas density measures the expansion of the internal connections inside a cluster that a theme is used to signify. The cluster label chosen by the Biblioshiny program reflects the most widely used phrases. Cluster centrality and density determine the cluster's location, while the cluster's size indicates the frequency of usage of the phrases it contains (Cobo *et al.* 2011). The interface generated the first theme evolution map based on the Sankey diagram. Sankey diagrams have long been used to illustrate the flow of material or energy across various network operations. They provide a flow numerical data example. Their evolution and interrelation (Riehmann *et al.* 2005).

Figure 4. Thematic Evolution

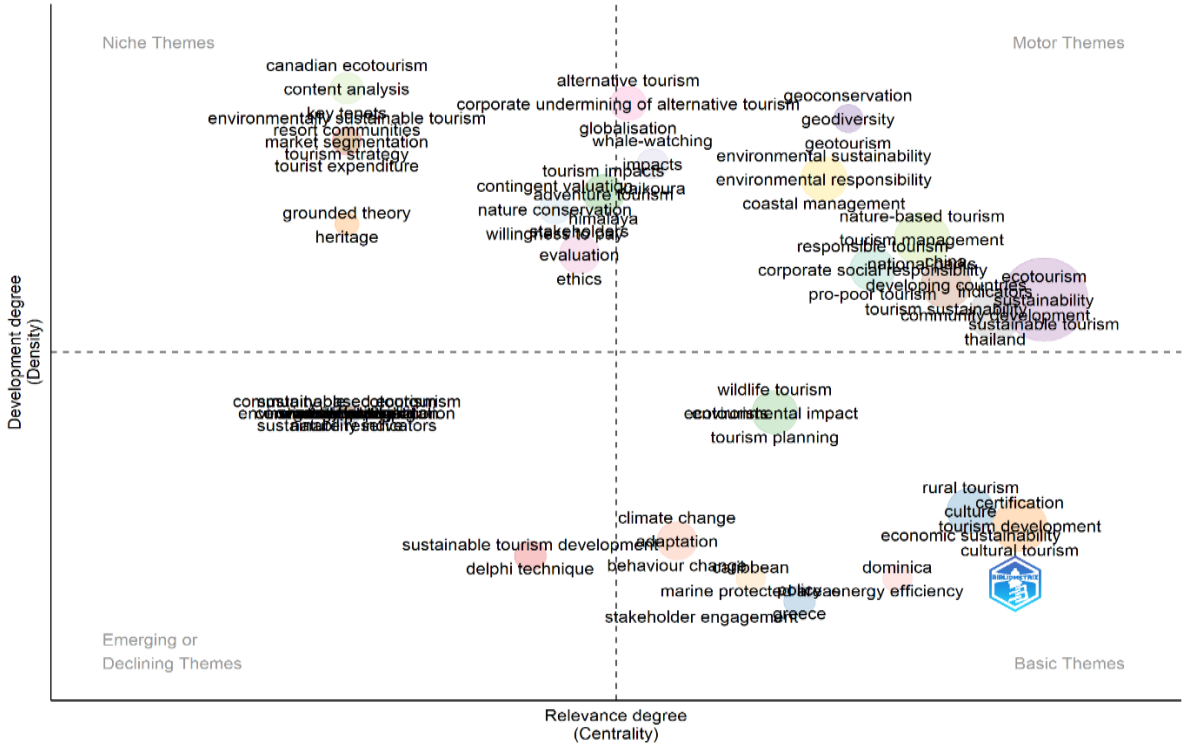


Source: Extracted from RStudio using Scopus database

4.1 Thematic Map between 1993-2014. Map Generated by Biblioshiny

As shown in Figure 4. Between 1993 and 2014, the main focus of Sustainability research was on developing topics and underlying concepts. Important subjects that focused on environmental preservation and community engagement were green tourism, ecotourism, and community-based ecotourism. A desire to comprehend the social and cooperative aspects of sustainable tourism is reflected in terms like social capital, climate change, and stakeholders. Additional focal areas that were aimed at assessing and encouraging responsible tourism practices included certification, contingent valuation, and indicators. All things considered, this era established the foundation for the study of Sustainability, emphasising fundamental ideas, environmental issues, and the part played by communities and stakeholders in the growth of the industry.

Figure 5. Thematic Evolution 1993-2014



Source: Extracted from RStudio using Scopus database

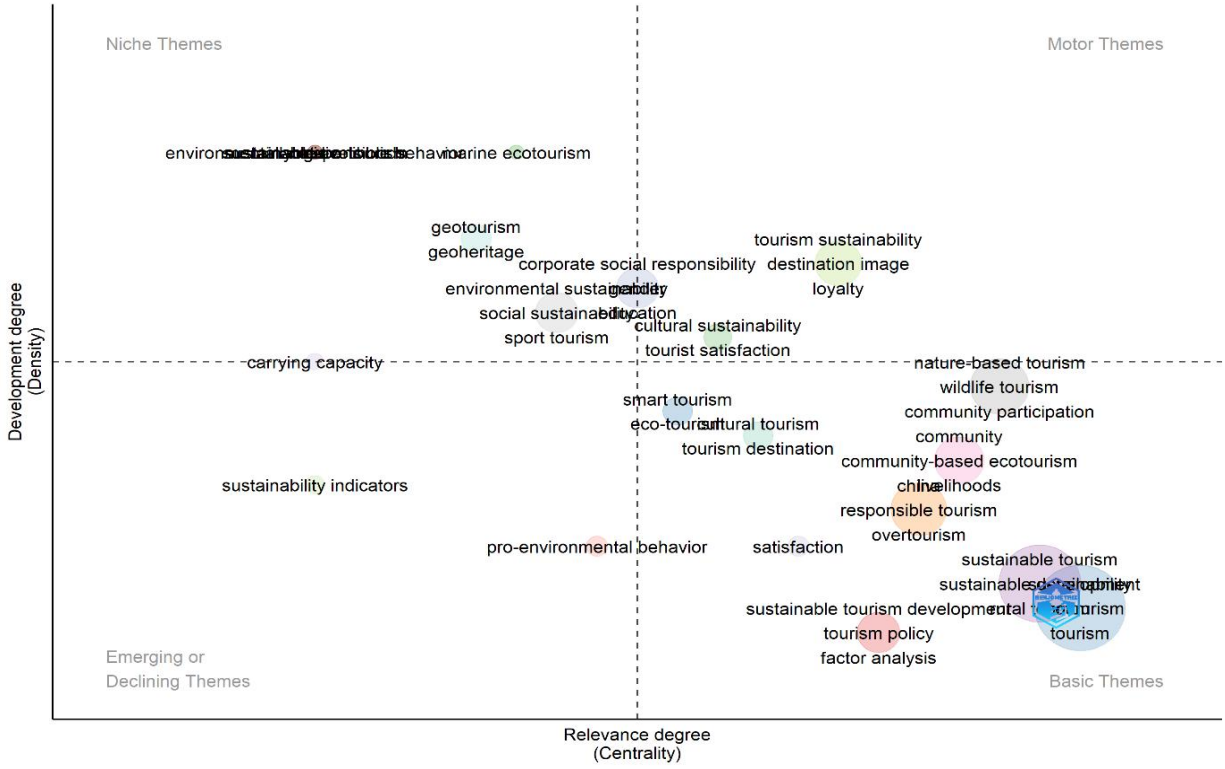
The bottom left quadrant (emerging theme) represents a theme that is not fully developed and has low density and centrality. These subjects are of less importance and present opportunities for future research. The bottom right quadrant (fundamental theme) indicates that fundamental, transversal, and underlying themes have relevance probability with minimal network development. In the future, greater attention must be paid to topics. The upper left quadrant (niche themes) represents well-developed, highly specialised, dense, and peripheral themes. The upper right quadrant (motor themes) indicates highly developed, dense, and central themes. It is highly pertinent and helps to advance the research (Bagdi *et al.* 2023).

Figure 5 displays the thematic map for period 1, from 1993 to 2014, the start of this domain. The terms "wildlife tourism," "rural tourism," and "climate change" are placed in this quadrant which are the main keywords, respectively, and are located in the lower-right quadrant of the map to represent a fundamental theme that is considered to be significant and has not yet been developed for the research field due to its high centrality and low density. The themes that appear in the upper-right quadrant are believed to be key motor themes that have been thoroughly explored and have a high degree of centralization and density. Geoconservation is the focus of the first cluster in this quadrant. Between the basic theme and the motor theme, a large cluster is formed that includes the keywords "Ecotourism, Sustainability, Sustainable tourism, Tourism, sustainable development, conservation", and "nature-based tourism," indicating that more research has been done on the larger cluster of Ecotourism and, Sustainability. Last but not least, the issues in the top-left quadrant are highly specialised, have low centrality, and are thought to be of modest importance in this discipline. They also have a high density of research. The keywords in this quadrant are categorised into three clusters: "Canadian ecotourism" in the first cluster. In the second cluster and "Resort Communities, Tourism Strategy" and "Grounded Theory and Heritage" in the third cluster. The themes that appear in the lower-left quadrant are waning or emerging themes with low centrality and density, which are considered to be underdeveloped with minor importance in single clusters. One cluster is formed near emerging/declining themes and the basic theme, which consists of 2 clusters "community-based ecotourism" and "Sustainable tourism development"

4.2 Thematic Map between 2015-2024. Map Generated by Biblioshiny

The study of sustainable tourism underwent a substantial expansion and diversification between 2015 and 2024 as displayed in Figure 4. A greater focus on combining the environmental, social, and economic facets of tourism is reflected in key themes including sustainability, sustainable tourism development, and nature-based tourism.

Figure 6. Thematic Evolution 2015-2024



Source: Extracted from RStudio using Scopus database

A growing dependence on technology and data for sustainable planning and monitoring is indicated by emerging subjects such as GIS (Geographic Information Systems), smart tourism, and sustainability indicators. The growing significance of community and business involvement in accomplishing sustainable tourism goals is highlighted by themes including community participation, corporate social responsibility, and environmental sustainability. All things considered, the emphasis has moved to more sophisticated, multidisciplinary, and application-driven methods of tackling the difficulties associated with sustainable tourism in the contemporary day.

The thematic map for period 2 (2015-2024) is shown in Figure 6. During this time, motor themes that appear in the upper-right quadrants have a high centrality and density, making them interesting study topics. Figure 6 demonstrates how fundamental motifs from period 1 exist in the second period's motor theme, which has two clusters, the first cluster is made up of "tourism sustainability, destination image and loyalty" and the second cluster is "cultural sustainability and tourist satisfaction". The niche-related terms in the upper left quadrant. There are four clusters in this quadrant, with the first cluster consisting of the keywords "environment responsible behaviour", the second one has the keywords "marine ecotourism", the third cluster has "Geotourism and Geoheritage", the fourth one has the keywords "environment sustainability, social sustainability, sports tourism and ecotourism sustainability". Sustainability indicators and pro-environmental behaviour, located in the bottom left quadrant and have low relevance and development, are thus viewed as developing or fading issues. Finally, nine clusters of novel keywords in fundamental topics are revealed. Sustainability, ecotourism, tourism, conservation, climate change and protected areas are the keywords in the first cluster. Sustainability is the term in the second cluster. In the second cluster, "sustainable tourism, sustainable development, rural tourism, culture heritage, tourism management, indigenous tourism," in the third, "nature-based tourism, wildlife tourism, community participation, local community, community empowerment, community involvement" in the fourth cluster. In the fifth cluster "community, livelihood, agritourism, national park, swot participation" are the keywords. "China, responsible tourism, overtourism, urban tourism, destination management, local food" are keywords. "Sustainable tourism development, tourism policy and factor analysis" are the keywords in the sixth cluster. "Smart tourism and ecotourism" are in the seventh cluster. "Cultural tourism and tourism destination" are in the eighth cluster, and in the last cluster the keyword is "satisfaction".

4.3 Science Mapping

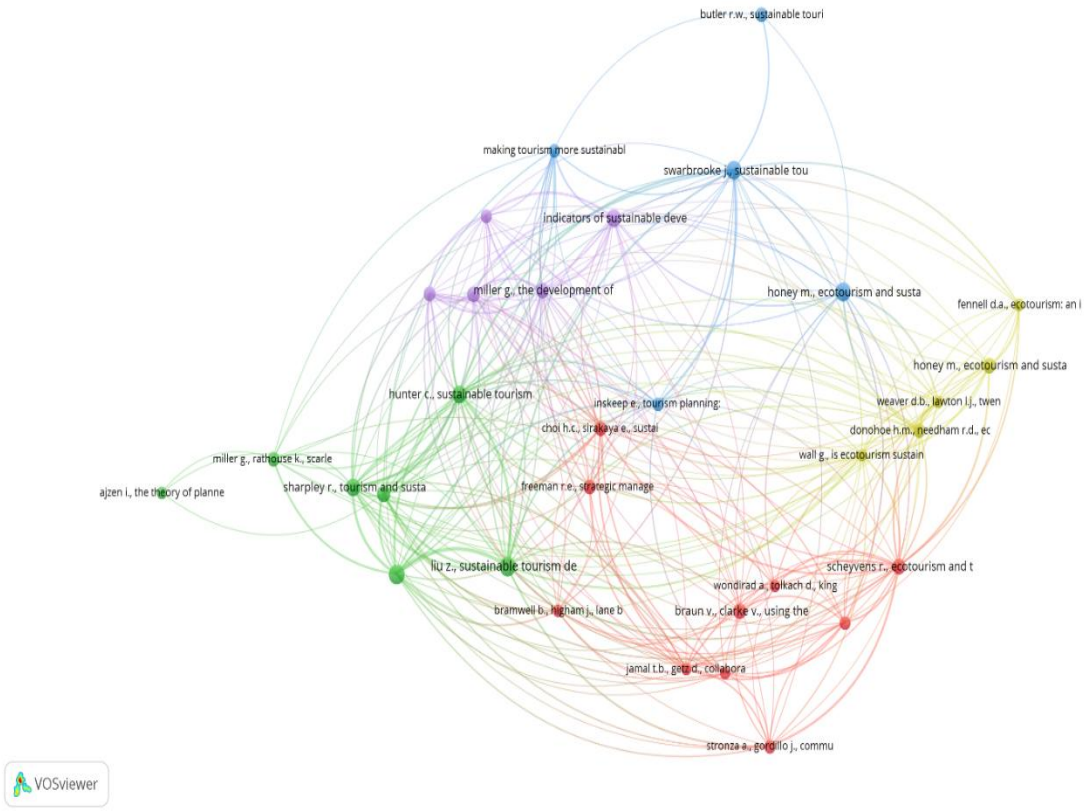
At the outset of the study, when several bibliometric data are presented to support scientific writing, the application of science mapping and bibliometric methodologies has been cemented as standard procedures. Since science mapping and bibliometrics procedures are made up of methodical processes based on various software, they are used to create a scientific drawing of the themes addressed with sophisticated talks. This method requires management. It is important to note that not all tools offer free access (Aria & Cuccurullo, 2017). As the name implies, science mapping aims to provide a summary of the "state-of-the-art" scientific understanding in each field of study. Stated differently, it encompasses the examination of numerical indications and interactions found within the scientific data corpus (Donthu *et al.* 2021). When paired with network analysis, it is crucial for demonstrating the intellectual and bibliometric structure of the topic of research (Moosa & Shareefa, 2020).

4.4 Reference Co-Citation Figure Extracted from Vos-Viewer

This research starts by looking at the sources cited together in the figure. The study clusters illustrate the connections between several publications, Ecotourism and Sustainability research topics.

In figure 7, Out of 95840 cited references, it satisfies only 32 threshold references. Minimum number of citations of cited references are 20. With a minimum cluster size of 5, 5 clusters are made using Vos viewer. In cluster 1st there is a cluster of 10 items, in cluster 2nd there is a cluster of 7 items, in cluster 3rd there is a cluster of 5 items, in cluster 4th there is a cluster of 5 items, in cluster 5th there is a cluster of 5 items. Cluster 1st is in red, cluster 2nd is in green colour, cluster 3rd is in blue, cluster 4th is in yellow, and cluster 5th is in purple. The total linkages are 281, and total link strength is 617. The results are depicted in the figure (Liu, 2003) which is green in colour and has the most cited reference with 46 the total link strength is 79 and the links are 21. (Hunter, 1997) which is green in colour second in number with cited references 36, and has 24 links with a total link strength is 73. (Buckley, 2012) is in third in number green in colour has cited references are 43, 24 links and total link strength is 71. The fourth number is (Sharpley, 2000) has cited references are 35, has 25 links and a total link strength is 61. (Scheyvens, 1999) which is red in colour ranked fifth and has cited references are 28, 23 links and a total link strength is 60.

Figure 7. Reference co-citation Figure Extracted from Vos-Viewer



Source: Extracted from Vos-Viewer

4.5 Journal Co-Citation Figure Extracted from Vos-Viewer

After examining the co-citation references, the study focuses on the journal co-citations link in figure 8. We observed the threshold of 283 categories in 4 clusters out of 34521 sources and the minimum number of citations is 30. Cluster 1(Red) 83 items, Cluster 2 (Green) 58 items, Cluster 3 (Blue) 49 items and Cluster 4 (yellow) 10 items are four cluster colours and number of items in it. The counting method is full counting. From a total link strength of 620122, links are 11479 in 4 clusters and the total items are 200.

Figure 8. Journal co-citation Figure Extracted from Vos-Viewer

Source: Extracted from Vos-Viewer

The top 5 journals in this field of study are the Journal of Sustainable Tourism with total link strength of 120125 with 150 links and the most number of citations 4097 is of cluster 1, Tourism Management is in number 2 and has

98600 total link strength with 172 links and 3184 citations in this journal is of cluster 1, annals of tourism research (a journal) it has 2728 citations and 80796 total link strength with 151 links is of cluster 1, sustainability journal has 61892 total link strength with 199 links and 2386 number of citations is of cluster 2 and tour. manag is in 5th position with 44648 total ink strength with 104 links and 1370 citations of cluster 2.

4.6 Most Cited Keywords

Using the Biblioshiny tool, we were able to identify the most popular author keywords used worldwide in Ecotourism and Sustainability studies, as shown in the Table 7. We obtained the 50 most often referenced terms in this field. The table displays the ten most common keywords related to research. The preceding observation indicates that more work is being done in the areas of Sustainability, Sustainable tourism, and Ecotourism is the rank among the top 10 terms in this category due to the fact that the majority of its writers are also employed in these disciplines.

Table 7. Most cited keywords

Terms	Frequency
Sustainability	421
sustainable tourism	383
Ecotourism	285
Tourism	164
sustainable development	97
Conservation	49
rural tourism	43
nature-based tourism	41
climate change	39
protected areas	32

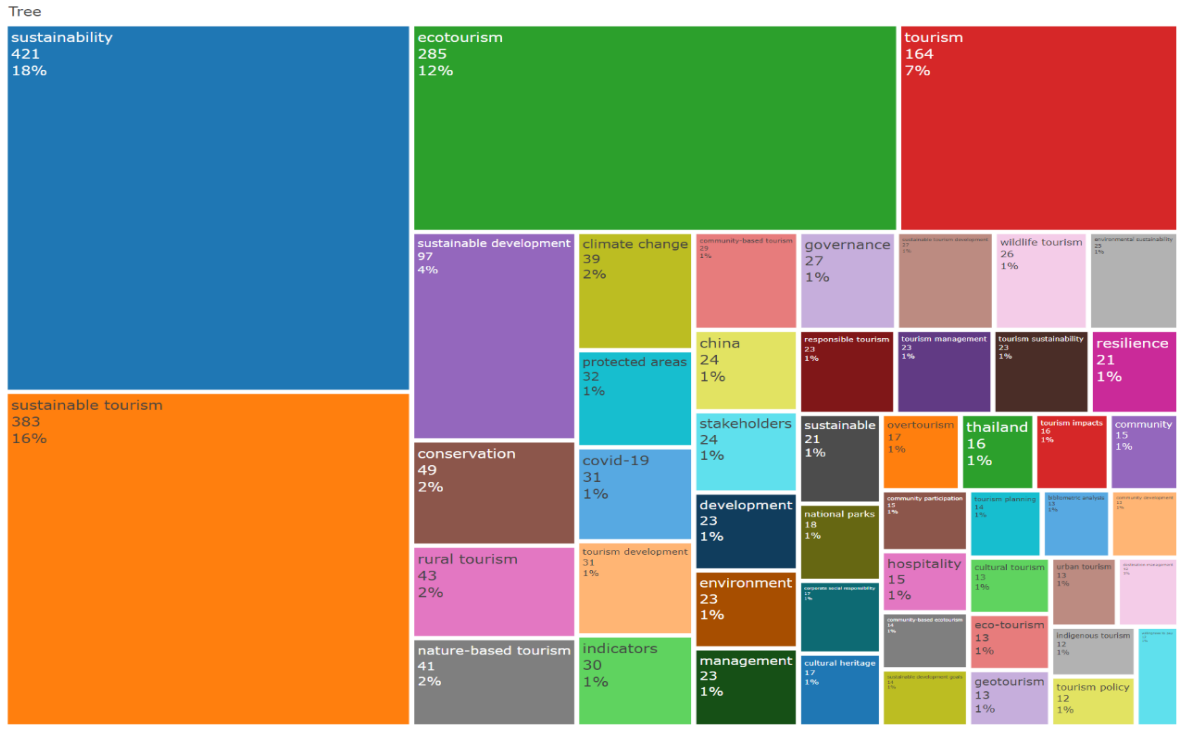
Source: Extracted from Biblioshiny

Most cited keywords figure obtained by using Biblioshiny software.

4.7 Treemap of Most Cited Keywords

Word Tree Map shows words that frequently occur in boxes that resemble map regions; the more words that appear, the larger the square area (Assalafiyah *et al.* 2020).

Figure 9. Tree map extracted using Biblioshiny



Source: Tree map extracted using Biblioshiny

Treemap showed in the Figure 9, the frequency with which the words are used in the above database of 1740 articles that we have taken. After applying a filter from Biblioshiny software by choosing the Field – Authors keywords and Number of words are 50 through this extraction the top three Keywords with are highest number occurrences are “Sustainability,” “Sustainable Tourism,” and “Ecotourism.”

Conclusion

The current study enhances our understanding of the current status of sustainability and ecotourism research. It covered the entire era of publishing in this field and allowed for a comprehensive examination over 31 years, from 1993 to December 2024. Much study is required to capitalise on this growing demand and provide the greatest services to tourists. We require a scientific understanding of cultural heritage tourism to provide tourists with flawless service. As a result, this study provides a comprehensive bibliometric analysis of sustainability and ecotourism, assesses the various issues examined, and identifies important theoretical and practical ramifications for both the travel industry and the academic community.

Finding publications from 1993 to the present by using the Scopus database is the study's primary contribution. However, after 2008, when the topic caught the interest of academics, the output of scholarly articles on it has become much more relevant. The number of publications increased from 40 in 2008 to 68 in 2015. We discovered a definite upward trend in the quantity of papers starting in 2015.

The development of major research topics in sustainable tourism from 1993–2014 to 2015–2024 is depicted in this Sankey diagram. Themes including "green tourism," "ecotourism," and "community-based ecotourism" were prevalent during the previous time frame (1993–2014). In addition to new topics like "environmental sustainability," "GIS," and "corporate social responsibility," there has been a discernible movement over time towards more expansive and integrated ideas like "sustainability," "sustainable tourism," and "sustainable tourism development." A growing focus on global sustainability issues, technological integration, and holistic approaches to tourist development is reflected in the diagram, which shows how core concepts from the earlier era affected more recent, complex conversations.

More researchers turned their attention to ecotourism and sustainability in 2008. In all, 1740 papers met the requirements for our 2024 study, including those published in English, that only journal articles were considered, and that focused on the social sciences as well as business, management, and accounting. Ecotourism and Sustainability research have not gotten the same amount of attention globally. Even though papers on the subject have been written in other countries, the Australia leads the field with 7229 citations and 52.4 average article citations, followed by the US, UK, China, and Canada. We discovered three papers having over 500 Scopus citations out of a total of 1988 citations from the leading publications. There were 4580 writers who produced publications regarding Sustainability and ecotourism study (1993-2024). According to Scopus, the papers (Sims, 2009) had an average citation rate of 55.56% each year.

Importance of the Study

The bibliometric analysis of "Ecotourism" and "Sustainability" with the help of tools such as Biblioshiny and VOSviewer is critical to understanding the academic and practical discourse around these interrelated concepts. This study identifies the trends in research, influential authors, and significant publications, providing a comprehensive overview of the field's evolution. It points out the geographic and thematic distribution of research, revealing gaps and opportunities for future studies. Through this study, stakeholder prioritisation is facilitated by the sustainable practices and policy development supported through collaborative examination of collaborations, co-citations, and keyword dynamics. Finally, it serves as a vital resource for academics, policymakers, and practitioners working towards promoting ecotourism as a sustainable development tool.

Limitations and Future Research

There are a number of restrictions on bibliometric analysis in the context of sustainability and ecotourism. First of all, it is frequently limited by the scope and accessibility of indexed databases, which may result in the exclusion of pertinent research published in regional or non-English publications. It is also difficult to document new themes and changing definitions of sustainability because ecotourism research is dynamic and multidisciplinary. A mixed-methods strategy that combines bibliometrics and content analysis to better understand theme patterns and knowledge gaps could be used in future studies to overcome these constraints. The comprehensiveness of analysis could also be improved by expanding databases to include non-traditional publication sources and a variety of geographic regions. Furthermore, cutting-edge methods like network dynamics and machine learning

may reveal a more profound understanding of the changing connections between sustainability and ecotourism. The present study exclusively employed VOS viewer and Biblioshiny software. However, it is noteworthy that other analytical tools, including Gephi, Cite Space II, and Bibexcel can be used in future research.

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Credit Authorship Contribution Statement

Amrik Singh contributed significantly to this research through Conceptualization, Methodology, Investigation, Formal Analysis, Supervision, and Writing – Review & Editing. Their expertise and guidance played a crucial role in shaping the study's direction, ensuring methodological rigour, and refining the final manuscript.
Nihal Kapoor: Communicator, Idea Generator, Conceptualization, Investigation with co-author, Methodology, and Help in Writing – Original Draft, Data Curation.
Abhishek Kumar: Validation, Visualization and Project Administration and helps in finding the software packages and installation of the needed software.
Rajan Sharma: Help in finding keywords and help in Drawing a PRISMA diagram (Inclusion and Exclusion criteria).
Manoj Kumar: Helps in Investigation and Vos-viewer interpretation of the data analysis stage.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Declaration of Use of Generative AI and AI-Assisted Technologies

The authors declare that they have not used generative AI and AI-assisted technologies during the preparation of this work.

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Corporate Social Responsibility: Historical Overview and Conceptual Framework

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Abstract: The emergence of unprecedented socio-environmental challenges has highlighted the need for a profound transformation of traditional business models. Corporate Social Responsibility (CSR) has emerged as an essential framework for addressing these challenges, by integrating ethical, social and environmental considerations into business practices. This article explores the evolution and significance of CSR, examining its historical roots, theoretical and conceptual foundations. The study begins by tracing the origins of CSR, exploring its ethical and religious foundations within the broader context of "Business and Society". It then analyzes the historical development of CSR, highlighting the various conceptual approaches that have shaped its understanding over time. Finally, the article examines the key stages in the evolution of CSR, synthesizing its various definitions into an overarching framework for sustainable business practices.

Keywords: Social Responsibility; conceptual analysis; CSR origins; modern concepts; globalizing strategic CSR.

JEL Classification: Q01; Q50; Q56.

Introduction

The origins of CSR go back a long way, rooted in ancestral notions of charity and social assistance. Entities such as asylums, hospices and orphanages, present in ancient Roman laws, bear witness to this (Chaffee 2017). This concept of social enterprises was then taken up by English law in the Middle Ages, notably within university, municipal and religious institutions. During the 16th and 17th centuries, under the impetus of the English Crown, guilds gained in importance, perceived as tools for social development. With the expansion of the British Empire, this conception spread to the American colonies, where corporations played a definite social role (Chaffee 2017).

The 18th and 19th centuries were marked by the influence of Christian religious philosophy and a more sustainable social approach. This approach, in response to growing social inequalities, led to social reforms and the rise of Victorian philanthropy. The latter tackled problems such as poverty, ignorance, child labor and women's work (Carroll 2008; Harrison 1966). A notable example from this era is the founding of the Young Men's Christian Association (YMCA) in London in 1844. Driven by Christian values, the YMCA aimed to apply them to the business world, a notion that quickly spread to the United States (Heald 1970).

At the end of the 19th and beginning of the 20th century, social protection schemes developed, adopting a paternalistic approach aimed at protecting and supporting employees. According to Heald (1970), there are compelling illustrations of the social sensitivity of entrepreneurs. These include Macy's in the USA, which in 1875 granted funds to an orphanage and, in 1887, included its charitable donations in its accounting records under miscellaneous expenses. Similarly, the Pullman Palace Car Company founded a model industrial community in 1893, aimed at improving the quality of life of its employees (Carroll 2008; Heald 1970).

The increasing urbanization and industrialization of this period created new challenges for the labor market. Farmers and small businesses struggled to adapt to the new economy, unions were formed to defend workers' rights, and a middle class worried about the erosion of family values (Heald 1970). In response to these upheavals, business leaders created organizations to promote values and improve working conditions. The Civic Federation of Chicago is a case in point, illustrating the fusion of religious values and economic goals in the service of the common good (Heald 1970).

The 1920s and 1930s marked a turning point in the perception of the role of business. Managers became aware of the need to balance the pursuit of profit with the satisfaction of the needs of their customers, employees and the community (Carroll 2008). This awareness paved the way for a broader debate on the social responsibilities of business, as exemplified by the work of Barnard (1938) and Clark (1939).

Exploring the origins of CSR highlights a rich and complex historical journey. From the earliest forms of social assistance to modern concepts of corporate responsibility, this path bears witness to the constantly evolving relationship between business and society.

1. 1950s and 1960s: The Beginnings of the Modern CSR Era

The post-war years and the 1950s marked a period of adaptation and change in attitudes towards CSR (Carroll, 2008). While corporate actions remained broadly restricted to philanthropy, there was a considerable shift in perception. Bowen (1953) is a prime example. For him, the concentration of power in the hands of large corporations and the tangible impact of their actions on society meant that decision-making processes had to be modified to include a social dimension.

Based on this observation, Bowen (1953) proposes a set of principles to guide companies in the exercise of their social responsibilities. He highlights the influence of the decisions and actions of corporate executives (“businessmen” in the original text) on stakeholders, employees and customers, directly impacting society's quality of life (Bowen, 1953). He thus defines the social responsibility of business leaders as “the obligations of businessmen to pursue policies, make decisions or follow courses of action that are desirable in terms of our society's goals and values” (Bowen, 1953).

Carroll (2008) souligne le caractère avant-gardiste de l'approche de Bowen (1953), qui visait à améliorer la réponse des entreprises à leur impact social et à contribuer à la définition de la RSE. La pertinence de ses travaux réside également dans le fait qu'il s'agit du premier ouvrage universitaire spécifiquement consacré à la doctrine de la RSE, faisant de Bowen le "père de la responsabilité sociale des entreprises" (Carroll, 1999).

In the wake of Bowen's pioneering work, several authors have examined corporate behavior and its interaction with the social context of their time. Manne (1956), in his book “Corporation Giving in a Free Society”, published in 1956, points to the failure of the large corporations of the time to assume their responsibilities in the face of galloping inflation. In a similar vein, Selekman (1959) explores the evolution of corporate moral responsibility in response to societal expectations of work in his book “A moral philosophy for management”, published in 1959. These early explorations of CSR as a defining concept, combined with the social context of the time, led to a growing interest on the part of researchers in identifying the nature and scope of CSR (Carroll, 2008).

It's easy to see how interest in CSR in the 1960s was influenced by the growing awareness of societal issues and social movements of the time. However, it is important to point out that the effect of this growing interest was perhaps most visible in the USA, the UK and other developed countries.

These years were marked by a series of social and environmental upheavals that contributed to the emergence of the CSR concept. Among the main concerns of the time were rapid population growth, pollution and resource depletion (Du Pisani, 2006). These concerns gave rise to social movements in favor of environmental protection, human rights and labor rights (Carroll, 1999).

The decade was also marked by a growing culture of protest, notably around civil rights and opposition to the Vietnam War. In the United States, protests evolved from sit-ins and organized student strikes to more radical forms of activism. These movements often challenged the role of corporations, seen as an integral part of the system the protesters sought to overthrow (Waterhouse, 2017). The businesses targeted were mainly banks, financial institutions and large corporations. Among the most striking examples were the protests against Dow Chemical, manufacturer of the napalm used during the Vietnam War (Waterhouse, 2017).

These social and environmental movements put increasing pressure on companies to assume greater responsibility for their societal and environmental impacts. This awareness formed the basis for the development of CSR in the decades that followed, and gave rise to major contributions to CSR theory, constituting the foundations of a broader vision of corporate engagement beyond mere profit maximization.

Keith Davis (1960) was a pioneer in this field, arguing that companies have an obligation to society in terms of both economic and human values. He suggested that social responsibility could be linked to a company's economic returns, stressing the importance of balancing profitability with societal impact. Davis also put forward the idea that "the social responsibilities of businessmen must be proportional to their social power", underlining the need for powerful companies to assume responsibilities commensurate with their influence.

Frederick (1960), meanwhile, analyzed the evolution of corporate power over the course of the 20th century, arguing for a new theory of corporate responsibility based on five key principles:

- Have a clear value principle, in this case responsible economic production and distribution.
- Be based on the latest concepts of management and administration.
- Recognize the historical and cultural traditions that underpin today's social context.
- Understand that a business leader's behavior must be influenced by his or her role in society and its social context.
- Recognize that responsible corporate behavior is not automatic, but the result of deliberate, conscious effort.

McGuire (1963) broadened the perspective by examining changes in business institutions and their impact on corporate responsibility. He observed an increase in corporate size and complexity, changes in public policy and regulations, and transformations in social and economic conditions. In the face of these developments, McGuire argued that corporate responsibility went beyond legal and economic obligations, encompassing areas such as politics, the social well-being of communities and employee welfare.

Finally, Walton (1967) analyzed the ideological changes of the 1950s and 1960s, highlighting the growing recognition of the potential role of business in improving social and economic conditions. He proposed a definition of social responsibility that emphasized the interdependence between business and society, stressing the need for mutually beneficial collaboration.

These major contributions in the 1960s laid the foundations for a deeper understanding of corporate social responsibility, paving the way for further developments and a more holistic view of the role of business in society.

While some academics broadened the scope of CSR, others, like Milton Friedman, winner of the 1976 Nobel Prize in Economics, adopted a restrictive vision. For Friedman (1962), in a free capitalist system, the role of business should be limited to maximizing profits. This position was reaffirmed in his article "The Social Responsibility of Business is to Increase its Profits" (Friedman 1970), in which he saw CSR activities as an inappropriate use of corporate resources, diverting funds unfairly to the general interest.

Although the social context of the 1960s influenced the academic approach to CSR, its practical implementation remained essentially philanthropic (Carroll 2008). However, the end of the decade saw increasing pressure on companies to align themselves with the social expectations of the time, expressed notably in environmental and anti-war protests and campaigns (Waterhouse 2017).

2. The 1970s: CSR and Management

The late '60s and early '70s saw a turbulent social and political climate, marked by growing anti-war sentiment, rising insecurity within society and a growing distrust of business (Waterhouse 2017). This particular context has contributed to the emergence of a strong environmental movement, questioning the ability of corporations to meet the public's needs and aspirations for environmental protection.

A major event was the Santa Barbara oil spill in 1969[1], which triggered a wave of mass protests in the USA and Eastern Europe. This ecological disaster symbolized the dangers of industrial pollution and galvanized public opinion around the need for urgent action to protect the environment, hence the organization of the first Earth Day in 1970[2].

The first Earth Day mobilized 20 million people in the United States, demanding a clean, sustainable environment and fighting industrial pollution. This citizens' movement had a major political impact, contributing to the creation of the Environmental Protection Agency (EPA)[3]on the same year. The creation of the EPA marked a turning point in environmental regulation in the United States, establishing a new legal framework and imposing new responsibilities on companies in terms of environmental protection.

It's important to note that this context of mistrust in business was also part of a period of economic crisis in the United States, marked by high inflation, low growth and an energy crisis (Waterhouse, 2017). Faced with these multiple challenges, the social movements of the 1960s and early 1970s prompted the federal government to take major steps in social and environmental regulation. In addition to the creation of the EPA, other federal agencies were created, such as the Consumer Product Safety Commission (CPSC)[4],the Equal Employment Opportunity Commission (EEOC)[5]and the Occupational Safety and Health Administration (OSHA)[6], all aimed at formalizing and reinforcing corporate responsibilities with respect to the social and environmental concerns of the day (Carroll 2015).

In the early 1970s, two major contributions to the CSR debate emerged from the United States, from the Committee for Economic Development. (CED)[7]. The first, “A New Rationale for Corporate Social Policy”, examined the legitimacy of corporate involvement in social issues (Baumol 1970). The second, “Social Responsibilities of Business Corporations”, explored the new expectations society was placing on the corporate sector (CED, 1971).

These publications played a crucial role in the evolution of CSR discourse by recognizing that companies operate with public consent and have a fundamental duty to respond constructively to societal needs (CED 1971, p. 11). As Carroll (1999) and Lee (2008) point out, this work reflected a new rationale for corporate roles and responsibilities.

CED (1971) also highlighted the substantial evolution of the social contract between business and society, asserting that: “Business is being asked to assume broader responsibilities to society than ever

[1]On January 28, 1969, a Union Oil drilling platform in the Santa Barbara Channel off the coast of California suffered a major accident. A crude oil blowout occurred following the rupture of an underwater well, resulting in the massive release of oil into the ocean and having a devastating impact on the region's flora and fauna.

[2]The first Earth Day was celebrated on April 22, 1970 in the United States. This landmark event was initiated in response to a growing awareness of environmental problems and the damaging effects of ecological disasters, such as the Santa Barbara oil spill in 1969. The idea for Earth Day was proposed by Senator Gaylord Nelson, a Democrat from Wisconsin, inspired by the student movement against the Vietnam War. Mathieu Gobeil on Radio Canada.

[3]The United States Environmental Protection Agency (EPA) is an independent agency of the U.S. government, although its activities are overseen by the Committee on Science, Space and Technology of the U.S. House of Representatives. It was founded on the initiative of President Nixon on July 9, 1970, and officially created by Presidential decree on December 2, 1970, shortly after Earth Day, with the mission of studying and protecting the environment and the health of American citizens. The journal of regulation.

[4]The United States Consumer Product Safety Commission (CPSC) is an independent U.S. government agency created in 1972 by the Consumer Product Safety Act to protect people from “unreasonable risks of injury from consumer products”. Official CPSC website.

[5]The Equal Employment Opportunity Commission (EEOC) is a U.S. federal agency created to enforce laws against discrimination in the workplace. It was established by the Civil Rights Act of 1964, signed by President Lyndon B. Johnson.

[6]The Occupational Safety and Health Administration (OSHA) is a U.S. federal agency responsible for regulating and enforcing occupational safety and health standards. It was founded with the passage of the Occupational Safety and Health Act, signed by President Richard Nixon on December 29, 1970.

[7]The Committee for Economic Development (CED) is a non-partisan policy research organization based in the United States. Founded in 1942, CED's mission is to provide thoughtful, research-based policy solutions to promote economic growth and stability.

before, and to serve a wider range of human values. Indeed, companies are being asked to contribute more to the quality of American life than simply providing quantities of goods and services. To the extent that business exists to serve society, its future will depend on how well it responds to changing public expectations" (Committee for Economic Development, 1971).

In 1972, the Club of Rome, a group of international researchers, published the report "The Limits to Growth", which questioned the viability of continued growth and its environmental impact, raising international awareness of the challenges of population growth and resource depletion, and highlighting the need for responsible business practices and new regulatory frameworks.

The 1970s also saw the birth of pioneering CSR companies. Whether in response to new societal expectations, a changing regulatory framework or a pioneering strategy, these companies illustrate the growing formalization and integration of CSR policies in response to the social and public issues of the day. This period marked the entry into what Carroll (2015) calls the era of "corporate social responsibility management". The growing popularization of the term CSR led to its use in a multitude of contexts, sometimes diluting its meaning and giving it varied individual interpretations (Sethi 1975, Votaw 1973).

For example, for Preston and Post (1975), corporations have a public responsibility that is limited by clear boundaries, expressing that everything outside is not an obligation for the corporation. In fact, they stated that companies are not responsible for improving social conditions or solving social problems, and asserted that a company's responsibility extends only to the direct consequences of its decisions and the activities in which it engages (Preston and Post 1975).

This restrictive view contrasts with the perspective of Sethi (1975), for whom CSR implies adherence to societal norms, values and expectations. According to Sethi, corporate responsibility is normative in nature, requiring companies to align their behavior with prevailing societal principles. This normative approach to CSR emphasizes the obligation of companies to contribute positively to society by going beyond minimum legal requirements and engaging in actions that benefit all stakeholders.

The 1970s saw a proliferating and unregulated use of the term "corporate social responsibility" (CSR), leading to confusion as to its precise definition. It was against this backdrop that, in 1979, Archie B. Carroll proposed what is considered the first unified definition of CSR, defining it as "society's economic, legal, ethical and discretionary expectations of organizations at a given point in time" (Carroll, 1979).

Carroll's (1979) approach was part of the debate on corporate behavior at the time, largely influenced by the social movements of the 1960s and new regulations in the USA. However, its relevance lay in the fact that it drew on the work of other researchers, including CED, to propose a clear and concise conceptualization applicable to all contexts, which contrasted with previous definitions of CSR that lacked coherence (Davis, 1973; Frederick, 1960; M. Friedman, 1962; McGuire, 1963; Walton, 1967).

Another major contribution of Carroll's conception of CSR lies in the fact that it does not consider economic and social objectives as mutually exclusive entities, but rather as inseparable elements of an overall framework of societal responsibility (Lee, 2008). Indeed, Carroll asserted that companies that maximize short-term profits while neglecting their societal obligations risk jeopardizing their long-term success through brand image degradation, stakeholder abandonment and potential sanctions.

The 1970s saw a significant evolution in the understanding of CSR, largely influenced by the intensification of social movements and the adoption of new legislation. In the academic world, this evolution was reflected in the publication of works proposing conceptual frameworks to help companies meet their new responsibilities. These frameworks took account of the fact that the scope of CSR had broadened beyond the traditional economic and financial aspects, to include environmental, product safety and labor rights dimensions (Carroll, 2008).

The following decade saw a shift in the focus of the CSR debate. The focus shifted to the practical issues of implementing CSR principles within companies. Researchers and practitioners turned their attention to issues such as integrating CSR into strategic decision-making processes, communicating CSR initiatives to stakeholders and measuring the impact of these initiatives.

3. The 1980s: Implementing CSR

The 1980s saw a major shift in policy direction, mainly under the influence of the presidencies of Reagan in the USA and Thatcher in the UK. These governments favored a liberal approach, aiming to reduce business regulation and stimulate economic growth (Feldstein, 2013; Wankel, 2008). For them, market freedom with less state intervention was crucial to economic prosperity (Pillay, 2015).

In the face of this retreat of the state from regulating corporate behavior, societal expectations of business have not disappeared. Business leaders have had to face up to the demands of various interest groups, such as shareholders, employees and consumers (Carroll, 2008; Wankel, 2008). This context has encouraged the emergence of business ethics and the study of CSR as a tool for managing stakeholder relations (Carroll, 2008; Wankel, 2008). The term "stakeholder" has become commonplace to designate the various actors affected by a company's activities.

Alongside CSR, other concepts have been explored by researchers, such as corporate social performance, corporate social responsiveness and stakeholder theory and management (Carroll, 2008).

In 1980, Thomas M. Jones pioneered the conceptualization of CSR as a decision-making process influencing organizational behaviour. This major contribution paved the way for a new field of reflection on CSR, shifting the focus from the abstract concept to its concrete operationalization. This is reflected in the development of frameworks, models and methods for assessing CSR from an operational point of view. Notable contributions include Tuzzolino and Armandi's (1981) hierarchical framework of needs based on five criteria: profitability, organizational security, affiliation and industrial context, market position and competitiveness, and self-fulfilment. Also Strand's (1983) systemic model linking organization, social responsibility, responsiveness and response identified the internal and external effects of corporate behaviour. Cochran and Wood (1984) also analyzed the relationship between CSR and financial performance, using the combined list of Moskowitz[8] , and Wartick and Cochran's (1985) reformulation of Carroll's (1979) conceptualization of CSR into a framework integrating principles, processes and social policies.

To fully grasp the rise of the operational approach to CSR during these years, it is essential to consider the societal context of the time. This period was marked by the emergence of growing societal concerns, as evidenced by several notable events:

- 1981: Creation of the European Commission's Directorate-General for the Environment.
- 1983: Creation of the World Commission on Environment and Development, chaired by Norwegian Prime Minister Gro Harlem Brundtland.
- 1986: Chernobyl nuclear disaster.
- 1987: Publication of the report "Our Common Future" by the Brundtland Commission, defining the concept of sustainable development.
- 1987: Adoption of the Montreal Protocol by the United Nations.
- 1988: Creation of the Intergovernmental Panel on Climate Change (IPCC).

Although these events are not directly linked to CSR, they do reflect a growing awareness of environmental and sustainable development issues within the international community, indirectly influencing expectations of business. Carroll (2008) identifies the most relevant societal concerns for corporate behavior during the 1980s as: "environmental pollution, employment discrimination, consumer abuse, employee health and safety, quality of work life, the deterioration of urban life and the questionable/abusive practices of multinational corporations". This favorable context has enabled researchers to explore new themes. The concepts of business ethics and stakeholder management thus emerged in the corporate vocabulary of the 1980s, as part of a broader discourse on corporate responsibility at the time.

4. The 1990s: The Globalization of CSR

During the 1990s, major international events influenced the international perspective on social responsibility and the approach to sustainable development. The most important of these were: the creation of the European Environment Agency (1990), the United Nations Summit on Environment and Development held in Rio de Janeiro, which led to the Rio Declaration on Environment and Development, the adoption of Agenda 21 and the United Nations Framework Convention on Climate Change (UNFCCC) (1992), and the adoption of the Kyoto Protocol (1997). The creation of these bodies and the adoption of international agreements represented notable efforts to set higher standards for climate-related issues and, indirectly, corporate behavior (Union of Concerned Scientists 2017).

Indeed, the 90s saw an intensified interest in CSR on the international scene. This phenomenon can be explained by the conjunction of two major factors: the rise of sustainable development on an international scale and the accelerated process of globalization. As Carroll (2015) points out, globalization in the 1990s

[8]The Moskowitz List is a reputation index developed in the early 1970s by Milton Moskowitz to assess the social performance of a number of companies.

led to a significant expansion in the activities of multinationals. The latter found themselves confronted with heterogeneous foreign business environments, some of which presented failing regulatory frameworks. This unprecedented context created new business opportunities, but also heightened global competition for access to new markets. Moreover, the growing visibility of multinationals on an international scale increased the risk of damage to their reputations. Finally, they have had to deal with sometimes contradictory pressures, demands and expectations from home and host countries (Carroll, 2015).

Many multinationals have discerned that adopting socially responsible practices could be a viable strategy for navigating the challenges and opportunities inherent in globalization (Carroll 2015). As a result, the formalization of CSR has intensified. An emblematic example of this institutionalization is the founding, in 1992, of the "Business for Social Responsibility (BSR)" association, made up of 51 companies. This organization set itself the mission of becoming a "force for positive social change in order to preserve and restore natural resources, guarantee human dignity and equity, and operate transparently" (Business for Social Responsibility 2018). The European Commission (EC) also played a crucial role in promoting CSR as early as 1995, when it encouraged 20 business leaders to sign the European Business Declaration against Social Exclusion, in response to the EC's call to combat social exclusion and unemployment (Les Echos Apr. 19, 1995). A year later, this initiative led to the creation of the European Business Network for Social Cohesion, later renamed CSR Europe, which aimed to federate business leaders to strengthen the integration of CSR within their organizations.

Although the institutionalization of CSR intensified in the 1990s, the concept itself has not evolved significantly (Carroll 1999). However, three major contributions to CSR deserve particular attention.

Donna J. Wood (1991), motivated by the need to systematically integrate conceptual aspects into a unified theory, built on the models of Carroll (1979) and Wartick and Cochran (1985) to develop a model of Corporate Social Performance (CSP). She defined three dimensions of CSP: firstly, the principles of corporate social responsibility, which include legitimacy, public accountability and managerial discretion. Secondly, it identified corporate social responsiveness processes, such as environmental assessment, stakeholder management and issues management. Thirdly, it specified the outcomes of corporate behavior in terms of social impacts, social programs and social policies. As a result, Wood's (1991) model was more comprehensive and integrated than those of Carroll (1979) and Wartick and Cochran (1985). Its relevance lay in contextualizing aspects of CSR within the interaction between business and society, with an explicit focus on corporate results and performance (Carroll 1999).

In 1991, Carroll introduced the "Pyramid of Corporate Social Responsibility", aimed at providing a pragmatic approach to CSR for executives balancing their commitments to shareholders with their obligations to a wider set of stakeholders, in response to new regulations and government agencies in the USA.

Economic and legal responsibilities are fundamental and essential pillars for any company. In economic terms, corporate responsibility aligns with the traditional view of the company's role, namely to maximize profit for its shareholders. Carroll argued that the company itself acts as an economic unit within society. At the same time, legal responsibility imposes an obligation on companies to comply with laws and regulations set down by governments or competent authorities.

Beyond legal requirements, companies also have a responsibility to act ethically and responsibly. This means respecting human rights, promoting diversity and inclusion, and protecting the environment. This is the highest level of CSR, and refers to a company's actions that go beyond its economic, legal and ethical obligations. This may include charitable donations, employee volunteering, or community development initiatives.

The third notable 1990s contribution to the concept was made by Burke and Logsdon (1996), who set out to find evidence of the link between CSR and positive corporate financial performance. They identified five key dimensions of strategic CSR, which they considered crucial to achieving corporate objectives and creating value. Firstly, centrality, which assesses the degree of proximity or congruence of CSR with the company's mission and objectives. Secondly, specificity, which measures the ability of CSR to bring distinctive advantages to the company. Third, proactivity, defined as the ability to anticipate and develop policies in response to emerging social trends. Fourth, voluntarism, described as discretionary decision-making uninfluenced by external compliance requirements. Finally, visibility and transparency, which refers to the importance of CSR in terms of recognition and relevance to internal and external stakeholders. These dimensions are considered fundamental to the effective integration of CSR into a company's overall strategy.

A significant contribution to the debate on corporate behaviour was introduced by the concept of the "Triple Bottom Line", first formulated by Elkington in 1994, as a sustainability framework balancing the social, environmental and economic impact of business. Elkington (1998) later clarified that achieving outstanding performance in these three dimensions (social, environmental and economic) relies on building effective and sustainable partnerships between the private and public sectors, as well as with stakeholders. This triple bottom line concept gained popularity in the late 1990s as a practical approach to sustainability.

At the same time, the globalization process of the 1990s extended the global reach of multinationals and accelerated the development of capitalism, prompting companies to focus more on their competitiveness, reputation, global visibility and expanding their stakeholder network (Carroll 2015). This has led to the emergence of alternative themes such as stakeholder theory (Donaldson and Preston 1995; Freeman 1984), corporate social performance (Swanson 1995) and corporate citizenship (Carroll 1999). Although these new themes are generally consistent with, and build on, existing definitions and understandings of CSR (Carroll 1999), they have created uncertainty as to the precise definition of CSR. As a result, the concept found itself with "blurred boundaries and questionable legitimacy" (Lantos 2001). Thus, by the end of the 1990s, there was no universally accepted definition of CSR (Lantos 2001), despite a social and institutional impetus to promote corporate citizenship (Carroll 1999).

5. Since the 2000s: Evolution of the CSR Concept According to Its Strategic Approaches

The early 2000s saw the emergence of several high-profile issues, including global warming, environmental degradation and energy security concerns. These challenges brought the controversy surrounding corporate social and environmental responsibility to the forefront, prompting a re-examination and revision of the conceptual and methodological approaches traditionally employed.

This reflection has paved the way for new avenues of research, requiring the development of more sophisticated conceptual and methodological approaches to analyzing and understanding corporate responsibility in a world marked by the complexity and interdependence of issues. This research aims to shed light on managerial practices that enable companies to reconcile economic performance, social responsibility and environmental preservation, while contributing to equitable and inclusive sustainable development.

Table 1. Evolution of the definition of CSR since the 2000s

Authors	Proposed definition
Craig Smith 2001	CSR refers to a company's obligations towards its stakeholders, the people affected by the company's policies and practices. These obligations go beyond legal requirements and the company's duties to its shareholders. Their fulfillment aims to minimize any harm and maximize the company's long-term beneficial impact on society.
Lantos 2001	CSR implies an obligation, arising from the implicit "social contract" between companies and society, to meet the latter's long-term needs and wishes, optimizing the positive effects and minimizing the negative effects of their actions.
Freeman 2005 and A.L. Friedman & Miles 2002	Have brought a new perspective to stakeholder theory, reinforcing the belief that companies should be managed in the interests of a wider set of stakeholders. Freeman (2005) argues that companies have a responsibility to suppliers, consumers, employees, shareholders and the local community, and should therefore be managed accordingly, while A.L. Friedman and Miles (2002) attest that the relationship between companies and their stakeholders is dynamic and has different levels of influence.
Marrewijk 2003	CSR is a concept that encompasses voluntary corporate activities aimed at integrating social and environmental concerns into business operations and interactions with stakeholders. This definition of corporate sustainability includes five key aspects: taking into account the expectations of different stakeholders, promoting social aspects, implementing initiatives to reduce environmental impact, ensuring economic viability and adopting a voluntary approach.
Werther & Chandler 2005	The relevance of their work lies in transforming CSR from a minimal commitment into a strategic necessity. Furthermore, they assert that effective integration of strategic CSR must result from a genuine commitment to change and self-analysis, and must take a top-down approach throughout the company's activities if it is to translate into sustainable competitive advantage.
Porter & Kramer 2006	propose an alternative definition of CSR, calling it Shared Value Creation (SVC). Instead of focusing on the social and environmental obligations of companies, SVC

Authors	Proposed definition
	emphasizes identifying and exploiting the links between social needs and a company's economic activities. For them, CSV is not about philanthropy or traditional CSR, but rather a smart business strategy that can lead to sustainable competitive advantage.
Husted & Allen 2007	Reinforcing the notion of value creation through strategic CSR, they drew on four of the five dimensions of strategic CSR established by Burke and Logsdon (1996) to provide their own definition, namely the company's ability to give coherent direction to a portfolio of resources and assets (centrality), to anticipate competitors (proactivity), to create a reputational advantage (visibility), to ensure that the added value created returns to the company (appropriability), they excluded the concept of voluntarism proposed by Burke and Logsdon (1996) from their definition of strategic CSR, but stressed its relevance as a key dimension of CSR for value creation.
Heslin & Ochoa 2008	Attest that the strategic approach to CSR is guided by seven common principles: cultivating the necessary talent, developing new markets, protecting the well-being of workers, reducing the environmental footprint, leveraging by-products, engaging customers and greening the supply chain. The relevance of these principles stems from the conviction that companies can improve their business opportunities while bringing benefits to the social context in which they operate.
ISO26000 standard 2010	CSR is "the responsibility of an organization for the impact of its decisions and activities on society and the environment, through transparent and ethical behavior that contributes to sustainable development, including the health and well-being of society. This behavior must also take into account the expectations of stakeholders and comply with applicable laws. In addition, it must be compatible with international standards, integrated throughout the organization and implemented in its relationships".
European Commission 2011	CSR is "*the responsibility of companies for the effects they have on society*", in fact, within the framework of internationally recognized principles and guidelines, including the OECD guidelines, the Global Impact principles and the principles of ISO 26000.
Porte & Kramer 2011	They developed the concept of shared value creation as a necessary step in a company's evolution, and defined it as follows: "Creating shared value focuses on identifying and expanding the links between societal and economic progress, and is the company's main objective. The first step in achieving this is to identify societal needs and the advantages or disadvantages that the company embodies through its products.
Leila Trapp 2012	She considers the creation of shared value to be the third generation of CSR, which she explains as the moment when companies reflect their concerns about social and global issues in their activities, even if some of these concerns are not directly linked to their core business.
Chandler & Werther 2013	Affirm that strategic CSR (SCSR) has the potential to generate sustainable value, and that the first step in doing so is to identify the social problems for which the company can create a market-based solution in an effective and socially responsible way. They define it as the incorporation of a holistic CSR perspective into the company's strategic planning and core operations, so that it is managed in the interests of a wide range of stakeholders to achieve maximum economic and social value over the medium to long term.
Carroll 2015	Examined the concepts of stakeholder engagement and management, business ethics, corporate citizenship and sustainability, and shared value creation, and concluded that they are all interdependent and overlapping. He also stressed that all these concepts have been incorporated into CSR, which is why he defines it as the reference point and center piece of the socially responsible business movement.
O. Benaicha 2017	Defines CSR, based on the definition by Gond and Igalens 2008, as: "The principles of social responsibility, the processes of integrated and ethical management of CSR, and the results of this management as deployed in the interactions between the company and its stakeholders, and in its contribution to the well-being of society and to sustainable development".
Chandler 2022	Presents a slightly modified definition that reflects its new perspective on value generation, in effect the incorporation of a holistic CSR perspective into the company's strategic planning and core operations so that it is managed in the interests of a wide range of stakeholders in order to optimize value over the medium and long term.

Source: compiled by authors

In this sense, the EC (2001) considers CSR to be a topic of great importance, insofar as it offers a favorable contribution to the goals established at the European Summit in Lisbon in March 2000. It defined CSR as the responsibility of companies for the effects they have on society, "the voluntary integration of social and environmental concerns into business activities and stakeholder relations. Being socially responsible means not only complying fully with applicable legal obligations, but also going beyond them and investing "more" in human capital, the environment and stakeholder relations" Green Book on Corporate Social Responsibility 2001.

Since that time, attention to CSR and the issues it raises has grown considerably, and the debate on sustainable development has intensified. This has helped to stimulate the adoption of CSR practices within companies worldwide. And beyond the institutional and public influence in the implementation of CSR, the 2000s were marked by relevant contributions to the concept in academic literature, which we will try to illustrate in the Table 1.

Conclusion

While the linear presentation of this paper suggests a gradual clarification of the concept of CSR, an in-depth analysis of the literature reveals a persistent lack of consensus on both its definition and its operationalization. Indeed, since the early 2000s, a new conception of CSR has crystallized, revisiting previous approaches and proposing an innovative framework. This new perspective places the company's societal role and its contribution to collective well-being at the heart of reflection and research. It is thus in line with global concerns for sustainable development and "sustainability", giving full meaning to the definition of CSR as a corporate contribution to sustainable development. This concept integrates social and environmental issues at the very heart of a company's activity, creating value for itself, its stakeholders and society as a whole, while respecting ethical principles (Business Ethics).

With this in mind, this paper proposes to adopt the definition presented by Chandler (2022), which encompasses the various conceptualizations given to CSR and is in line with the current global economic trend, namely that it is the incorporation of a holistic CSR perspective into the strategic planning and core operations of the company so that it is managed in the interests of a wide range of stakeholders in order to optimize and create value in the medium and long term. In short, CSR is an intrinsically subjective notion, as it is perceived differently by each individual, each with his or her own conception of the role that business should play within society. This diversity of perspectives gives rise to a variety of interpretations of how social responsibility should manifest itself.

Credit Authorship Contribution Statement

Lamia EL BADRI: Conceptualization, Investigation, Methodology, Project administration, Formal analysis, Writing – original draft, Supervision, Validation, Writing – review and editing, Visualization, Funding acquisition.
Mohammed Rachid AASRI: Conceptualization, Investigation, Methodology, Project administration, Formal analysis, Writing – original draft, Supervision, Validation, Writing – review and editing, Visualization, Funding acquisition.
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Anouar FAITEH: Conceptualization, Investigation, Methodology, Project administration, Formal analysis, Writing – original draft, Supervision, Validation, Writing – review and editing, Visualization, Funding acquisition.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Declaration of Use of Generative AI and AI-Assisted Technologies

The authors declare that they have not used generative AI and AI-assisted technologies during the preparation of this work.

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Implementation of Sensory Marketing in Korean Concept Hotels

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Abstract: The hospitality industry continues to innovate and renew itself to build a personal and profound brand for hotel guests. The hospitality industry in Indonesia, in particular, continues to grow with various concepts applied to create a different experience. Indonesia is currently heavily influenced by Korean culture, particularly the K-pop phenomenon. Korean dramas, food, fashion, and cosmetics are increasingly popular among young people and are spreading rapidly in Indonesia. So, the influence of Korean culture is also emerging in the hospitality industry. One of the hotels that adopt Korean culture is Tama Boutique Hotel Bandung.

This study aims to apply sensory marketing in a Korean concept hotel, a case study of Tama Boutique Hotel Bandung. The method used is the Netnography method. To collect data through reviews from Travelokal, Google.com, and Agoda.com to get answers to the application of sensory marketing in the Korean concept Tama Boutique hotel. In this study, researchers also interviewed informants who had stayed at the Tama Boutique Hotel. I will also conduct direct observations of the Korean concept of the Tama Boutique Hotel in Bandung. The results obtained that the application of sensory marketing on the sense of "sight" at Tama Boutique Hotel with a Korean concept in building a new brand reached 65% seen from the design, lighting, and ornaments that are typical of Korea then the application of sensory marketing on the sense of "hearing" in building a new brand reached 20.5%. The sense of "smell" in building a new brand reached 22.5% because the elements of "hearing" and "smell" have not been applied optimally. Furthermore, according to theory, the application of sensory marketing on the sense of "Taste" in building a brand has reached 31%. In comparison, the sense of "Touch" in creating a new brand reached 12.5% because its application is still minimal.

Keywords: sensory marketing; korean concept hotel.

JEL Classification: Z32; Z33; M39; R11.

Introduction

The hospitality industry continues to innovate and renew itself to build a personal and profound brand for hotel guests. The hospitality industry in Indonesia, in particular, continues to grow with various concepts applied to create a different experience. Indonesia is currently heavily influenced by Korean culture, particularly the K-pop phenomenon. Korean dramas, food, fashion, and cosmetics are increasingly popular among young people and are spreading rapidly in Indonesia. So, the influence of Korean culture is also emerging in the hospitality industry. One of the hotels that adopt Korean culture is Tama Boutique Hotel Bandung.

The influence of Korean culture in Indonesia is enormous, so the hotel industry that applies the Korean hotel concept needs to pay attention to sensory marketing, which aims to build the hotel's brand identity. Sensory marketing utilizes the five senses to influence perception, memory, and learning processes to manipulate consumer motivation, desires, and behavior. The goal is to create a sensory experience that strengthens the relationship with the user through a process involving the rational and emotional parts of the brain, although

varying degrees. As part of this process, the subconscious component facilitates automatic decision-making and behavior based on lessons learned through past experiences (Manzano, Serra, & Gavilan, 2019).

According to Krishna (2012), sensory marketing involves the consumer's senses and influences consumer behavior. Meanwhile, according to Jang & Lee (2015), sensory marketing is a marketing strategy that stimulates consumer emotions instead of rational judgment by appealing to the five human senses: sight, hearing, smell, touch, and taste. According to Hulten (2020), sensory marketing is an integrative marketing approach and model that explains how companies can apply the five senses in business practices. Especially when it comes to how brands, objects, products, places, and service environments are multi-sensory brand experiences. According to the definition given by the American Marketing Association, sensory marketing "is a marketing technique that aims to seduce consumers by using the senses to influence consumer feelings and behaviour". Sensory refers to what people feel, see, hear, smell, and taste when exposed to external stimuli from a particular environment and their visual, auditory, and tactile perceptions of those experiences (Zuckerman, M., 2014).

Human senses have long been neglected in marketing, although we know their importance. The five human senses are essential to the individual experience in purchasing and consumption. Through these senses, each individual becomes aware of and perceives companies, products, and brands. Therefore, further knowledge of the human senses can make corporate marketing more successful and individual marketing of sensory experiences more personalized (Hultén et al., 2009).

Hotels have developed and sold differentiated services and products by mobilizing sensory marketing strategies to stimulate the five senses. Consumers are no longer satisfied with the previous general marketing advice that sensory marketing elements should be issued only on special occasions. In response, corporate management has approached consumers with different types of marketing, including marketing of color, fragrance, sound, and even healing. In the hospitality industry, such marketing strategies are due to the increasing number of hotels, and almost everyone needs to develop and maintain a competitive advantage by providing differentiated services (Kim et al., 2020).

The sense of smell is closely related to our emotional life, and aromas can significantly affect our emotions. A human can remember more than 10,000 scents, and the perception of a scent experienced previously is enough for us to associate it with precious memories. Scents can contribute to sensory experiences that create lasting memory images in customers' minds, increase awareness, and create an image of a brand both temporarily and long-term (Hultén et al., 2009).

Visualization as a visual sensory strategy means creating brand awareness and building a product or brand image that sharpens the customer's sensory experience. The image that a company wants to convey about itself then contributes to its identity and forms the basis of the image that customers have of it (Hultén et al., 2009).

Taste is one of our most distinct emotional senses. This fact is often expressed through sweet, sour, and taste concepts. Taste experiences of various kinds can contribute to creating the image of a product or brand. The concept of "taste" is often more related to the overall sensory experience of the customer than just what is put in the mouth (Hultén et al., 2009).

The sense of touch is the sense of touch with which we make physical contact with the world around us and can investigate three-dimensional objects. The sense of touch also contributes to building a sense of shape that tells us whether an object is sharp, rigid, or round. Unique tactile experiences have a great potential to create an identity and image around a product in terms of tactile marketing. The urge to touch can make customers willing to interact with products they would not usually know. This increases the chances of impulse or unplanned purchases (Hultén et al., 2009).

This study focuses on implementing sensory marketing in Korean-concept hotels and a case study of Tama Boutique Hotel Bandung with a Korean concept. This study will analyze how the application of sensory marketing from the senses of sight, hearing, smell, taste, and touch in building a brand in Tama Boutique Hotel Bandung with a Korean concept.

1. Research Background

Sensory marketing, first proposed by Schmitt (1999), is a marketing strategy that stimulates consumers' emotions instead of rational judgment by appealing to the five human senses: sight, smell, sound, taste, and touch. According to Jang & Lee (2015), the application mechanism of sensory marketing creates stimuli based on external environmental factors that can appeal to consumers' senses. These external ecological factors influence consumers' emotions and product or brand evaluations; Therefore, these factors may ultimately influence customer purchasing intentions and behavior. According to Jang & Lee (2015), external environmental stimuli

affect the five human senses. Humans are most influenced by "sight"; the first impression conveyed through sight helps consumers form product and brand images. "Sight" is the most practical sense for communicating marketing messages to customers. Since "smell" is connected to breathing, it is the only sense that cannot be ignored. "Smelling" most directly and quickly affects memory. Voices vary according to pitch, tempo, and intonation. "Sound" has a long-term effect on memory, and much information is absorbed through sound. "Taste" differentiates between sweet, salty, sour, bitter, and savory. When humans consume food, the five senses operate in harmony, as food is related to taste, smell, texture, appearance, and sound of chewing. Lastly, "Touch" is a sensory factor felt by the skin. When touch occurs when a person comes into contact with something or someone, it leads to a connection between the two, changing human emotions and significantly affecting communication.

Meanwhile, according to Hulten (2020), sensory marketing is an integrative marketing approach and model that explains how companies can apply the five senses in business practices. Especially when it comes to how individuals might perceive and experience brands, objects, products, places, and service environments as multi-sensory brand experiences. Sensory marketing, as a marketing-oriented experience, is an innovative solution that allows consumers to experience products and services (Shabgou & Daryani, 2014). The color and shape of a product or atmosphere that emits odors, efficient songs, and freedom to touch and taste delicious food products with different effects motivate consumer behavior (Shabgou & Daryani, 2014). According to Kotler Armstrong (2018), vision is associated with color, brightness, arrangement, and design; hearing is associated with sound and loudness; smell is associated with artificial or natural fragrances; touch is associated with softness, smoothness, and temperature.

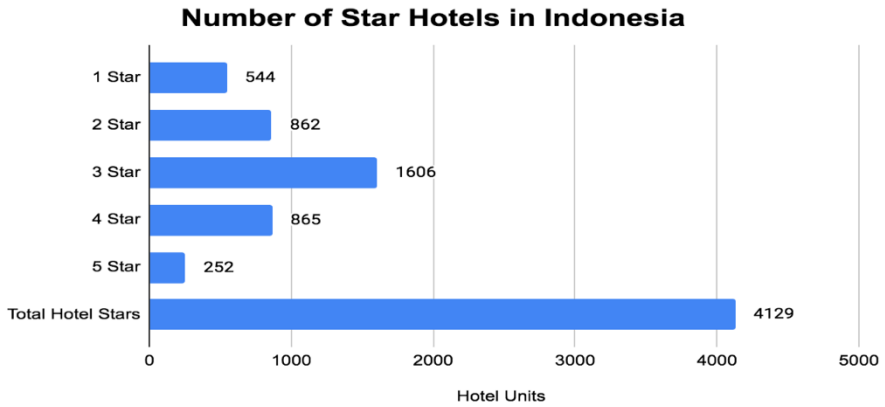
2. Method also Called Materials and Methods or Experimental Methods

This study uses the Netnography method. The Netnography method is a qualitative study that uses the Internet to collect and analyze data on social and cultural phenomena in online communities. This method adapts ethnography, which is traditionally conducted face-to-face in a physical environment. This method was developed in 1995 by Robert Kozeinets, a Northwestern University, United States professor. Netnography is different from ethnography because, when collecting research data, there is no direct face-to-face meeting with participants via the Internet. Researchers can use various applications on the Internet to collect as much data as possible. This study will collect data by looking at reviews from Travelokal, Google.com, and agoda.com to get answers to the application of sensory marketing at the Tama Boutique Hotel with a Korean concept. In this study, researchers also interviewed informants who had stayed at the Tama Boutique Hotel. I will also conduct direct observations at the Tama Boutique Hotel using a Korean concept.

3. Case Studies

Based on the Central Statistics Agency (BPS) reported that there are 4,129-star hotels in Indonesia in 2023. The number has increased by 25 units compared to 2022. In 2023, three-star hotels dominate with 1,606 units or 38.89% of the total national star hotels. There are 865 four-star hotels in Indonesia, and two-star hotels nationally reach 862 units. Furthermore, there are 554 one-star hotels. The number of Five-star hotels is the lowest, at 254 units nationally.

Figure 1. Number of Star Hotels in Indonesia



Source: https://databoks.katadata.co.id/properti/statistik/60db570e8eaf1a2/jumlah-hotel-bintang-di-indonesia-2023-mayoritas-bintang-tiga

Based on the data above, the most dominant three-star hotels in Indonesia means that competition is getting tighter between three-star hotels in Indonesia. To survive and compete, it is necessary to build a brand identity according to each hotel's concept to attract guests. One way to build a brand is by using sensory marketing. Sensory marketing involves the five human senses (sight, hearing, smell, touch, and taste) to create a memorable experience and build an emotional connection with consumers. The goal is to influence the perception of consumer attitudes and behavior towards the brand.

One of the three-star hotels in Indonesia is Tama Boutique Hotel Bandung. Tama Boutique Hotel builds its brand identity with a Korean concept. Indonesia is currently heavily influenced by Korean culture, particularly the K-pop phenomenon. Korean dramas, food, fashion, and cosmetics are increasingly popular among young people and are spreading rapidly in Indonesia. So, the influence of Korean culture also appears in the hotel industry. Tama Boutique Hotel strives to compete and survive by adhering to the Korean concept of attracting guests.

4. Research Results

The results of the implementation of sensory marketing at the Korean-concept Tama Boutique Hotel in building a brand are not yet optimal, as seen in the Table 1.

Table 1. The results of implementing sensory marketing at the Korean-concept Tama Boutique Hotel

Sensory Marketing	Building Brands in Sensory Marketing	Sensory Marketing Implementation of Korean Concept Tama Boutique Hotel in Bandung
Sensory Marketing on the Sense of “Taste”	31%	31 %
Sensory Marketing on the Sense of “Vision”	80%	65%
Sensory Marketing on the Sense of “Hearing”	41%	20,5%
Sensory Marketing on the Sense of “Smell”	45%	22,5%
Sensory Marketing on the Sense of “Touch”	25%	12,5%

Source: Research Result

5. Discussions

A. Sensory Marketing on the Sense of “Vision”

Vision is the dominant sensory system, and the most potent sense used in marketing. More than 80% of commercial communication and shopping is done through the sense of sight. Logos, colors, packaging, and product design are visual stimuli that can be part of any brand strategy.

Figure 1. Korean Concept Hotel at Tama Boutique Hotel

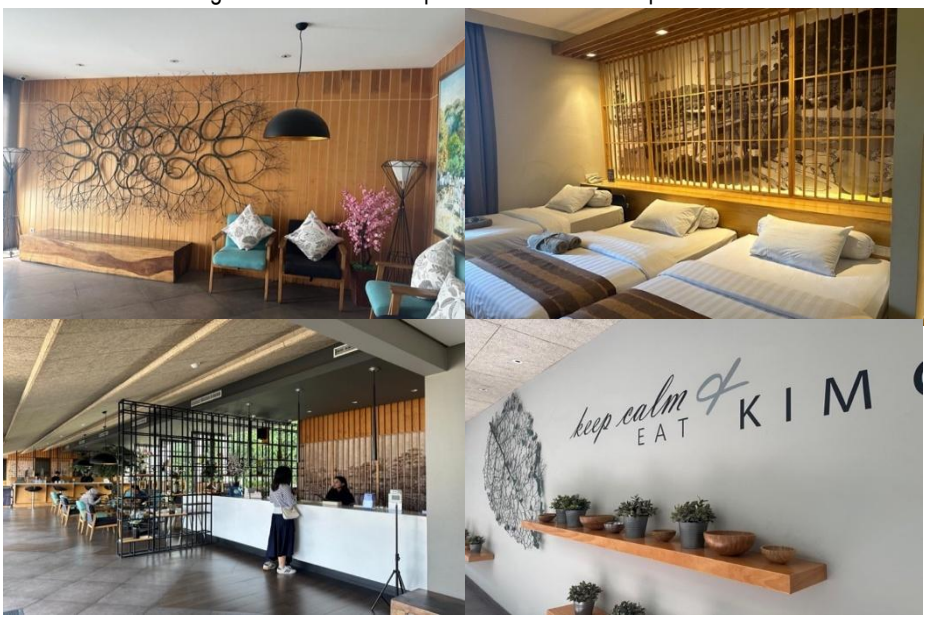


Photo Source: Personal Document

Colors produce different reactions (biological, psychological, and attracting attention to an object) in people and have a specific mental impact on customers. Significant factors such as logos, packaging, colors, designs, and attractive shapes can be strategic approaches to strengthen and create the desired image of a product in the minds of consumers (Shabgou, M. & Daryani, S. 2014). Vision is the dominant sensory system and, therefore, the most potent sense used by sales. It is also important to note that customers, despite not having access to other data, either overall or negative, are tormented by visual stimuli. Also, because they attract them, they show emotional responses. Vision is the most reliable and necessary sense for many humans and rarely drives the primary impression. For this reason, inventive administrators have long worked to create images, messages, and calls to action that are both appealing and easy to understand (Singh et al., 2020).

Based on the review results on traveloka from several guests who have stayed at Tama Boutique Hotel with a Korean concept, seen from Sensorik Marketing "Vision":

"Korean-style hotel, Good facilities. Good, spacious, and comfortable rooms. The food is also Korean-style and delicious because the hotel has a Korean restaurant. Next time, I will come back here."

"Although it is in a not-too-big building, the aesthetic design and comfort are not in doubt. Clean bed sheets. Complete amenities and additional requests are served if they do not match the number of guests who made the reservation. You can borrow prayer equipment. Breakfast is an order type, not a buffet. The choice is quite limited but enough. Pleasant experience."

"The vibes of the Korean hotel are felt; the playlist is only romantic Korean songs, the food, and the interior exterior too. It's a shame there is only one elevator, so we use the stairs if there is a problem."

"Satisfied staying here. The room is beautiful and clean, and it has Korean-style kiyowok. The breakfast is also delicious."

"A Korean nuance hotel, which is very comfortable, not noisy, and very peaceful. Clean rooms and Korean nuance interior design, bathroom shower, and sufficient toilet amenities, equipped with a refrigerator and standard minibar. Helpful and friendly hotel staff. According to the request, the breakfast provided already has a menu at the beginning, Korean food style. Very suitable for those who want to staycation or holiday to Bandung, staying at this hotel at an affordable price but can make you feel at home and linger in Bandung."

Based on the review results on Agoda from several guests who have stayed at Tama Boutique Hotel with a Korean concept seen from Sensorik Marketing "Vision":

"Satisfied staying at Tama Boutique Hotel with a Style concept; the room is quite large, as well as the bed even though it is a twin - clean & comfortable. The breakfast is also different from hotels in general".

Korean-themed hotel, clean rooms, and a cozy atmosphere.

"So, the story is that I accidentally found this thematic hotel on Agoda. I was immediately interested because it was Instagrammable and had good ratings; the price was also okay. It turned out to be cute; the room was big and clean, the service was friendly, and it was not too crowded. The interior is Korean style with wooden doors and ornaments; even the hotel sandals have rattan motifs".

Based on the results of interviews with several guests who have stayed at Tama Boutique Hotel with a Korean concept, seen from the Sensory Marketing "Vision":

"Sensory marketing "vision" is not yet optimal because the interior appearance does not show the uniqueness of Korean excellence, like the Korean Palace. The interior shown is still standard. The employee's clothing does not reflect traditional Korean clothing."

"Sensory marketing "vision" is seen in the bathroom, which is designed with stones that reflect Korean characteristics and already reflect Korean characteristics.

It is concluded that Tama Boutique Hotel, with a Korean concept of applying sensory marketing to the sense of "Sight," reaches 65%, which means that Tama Boutique Hotel, in building a new brand, reaches 65% while according to the theory of the sense of "sight" in building a brand reaches 80% - judging from the interior design in the lobby, rooms & restaurants using Korean style with white nuances combined with brown from wooden ornaments. The lighting in the hotel is quite bright, and the layout is aesthetic so that the Korean concept can be felt. Then, the hotel decoration has ginseng roots, a characteristic of Korea. Likewise, the bathroom is

designed with rocks, a characteristic of Korea. However, sensory marketing has not been fully implemented in the Sense of "Sight" at Tama Boutique Hotel; it still needs to add ornaments & designs that are more characteristic of Korean culture so that the Korean nuance can be felt as a whole. It is also necessary to add the appearance of staff wearing Korean clothing to make the nuance more pronounced.

B. Sensory Marketing on the Sense of "Hearing"

Sound has long been recognized as an essential driver of positive effects on consumer mood, preferences, and behavior. The share of hearing in building a brand is 41%. Sound can be used as an efficient tool to communicate with consumers' subconscious needs. This study shows that store music can effectively increase sales and influence purchase intentions (Shabgou, M. & Daryani, S. 2014). The human ear can diagnose a minimum of sixteen to 28,000 cycles per second. Most companies know that sound is considered a strategy to elevate the overall identity and image. If sound is implemented consciously, companies have a good chance of making sound to differentiate the whole. The influence of sound on our judgments and comments regarding the products and improvements we are likely to buy, if truth be told, is the influence of sound on purchasing behavior and habits (Singh et al., 2020).

Based on the review results on Google.com from several guests who have stayed at the Korean-concept Tama Boutique Hotel, seen from the Sensory Marketing "Hearing":

"The room is clean, neat, and tidy and certainly not noisy even though the location is in the middle of the city. The sound of vehicles is not heard".

"This hotel has spacious, clean, cool, fragrant rooms. Strategic location, close to everywhere, and in an environment that is not noisy".

"One of the hotels with affordable prices is strategically located close to the food center. The room is clean, neat & tidy and certainly not noisy even though the location is in the middle of the city. The sound of vehicles is not heard at all".

Based on the results of interviews with several guests who have stayed at Tama Boutique Hotel with a Korean concept, seen from the Sensory Marketing "Hearing":

"Music can only be heard at the entrance on the 1st floor, while the lobby and corridors do not hear any music. As for the voices of the hotel employees, they are enough to be heard well and do not use typical Korean language when greeting or greeting."

It is concluded that Tama Boutique Hotel with a Korean concept in applying sensory marketing to the sense of "Hearing" reaches 20.5%, which means that Tama Boutique Hotel in building a new brand reaches 20.5% while according to the theory of the sense of "hearing" in building a brand reaches 41%. This is because not all sensory marketing of the Sense of "Hearing" is applied in the Tama Boutique Hotel, such as Korean-style music. Music is only heard in the lobby area; even then, the music is not always played.

Sound, mainly music, is one of the most effective ways to evoke emotions and memories in hotel guests who stay. Sound is also the most effective way to motivate guests to book hotel rooms.

The music applied in the hotel will be different in each room; for example, the lobby must be based on the overall hotel concept because the lobby is the first meeting place for hotel guests with the hotel. While in the restaurant, the music should be slower.

C. Sensory Marketing on the Sense of "Smell"

The sense of smell involves 45% of brand communication. The sense of smell is very close to consumer emotions and behavior and significantly influences consumer behavior. In the long term, smell causes more fragrant memories, and aromatic objects are much more attractive than non-aromatic ones. In a shopping center, they concluded that smell directly affects buyers' impressions and influences consumer behavior (Shabgou, M. & Daryani, S. 2014). The smell is the second most widely used sense, behind the sight, because everyone has a unique and individual experience with smell and associates it with personal experiences (Sendra et al., 2017). According to Singh et al. (2020), the sense of smell involves forty-five complete communications. It is very on the threshold of our emotions and behavior and positively influences consumer behavior. In addition, smell dramatically influences the perception of quality and product regulation.

Based on the review results on Agoda from several guests who have stayed at the Korean-concept Tama Boutique hotel, seen from the Sensory Marketing "Smell":

"For the room, please add a fragrance to make it smell good."

Based on the review results on Traveloka from several guests who have stayed at Tama Boutique Hotel with a Korean concept, seen from the Sensory Marketing "Smell":

"This hotel is excellent. Maybe a suggestion is to add air fresheners in the bathroom and room area to make it fresher."

Based on the results of interviews with several guests who have stayed at Tama Boutique Hotel with a Korean concept, seen from Sensory Marketing "Smell":

"The aroma in the lobby & rooms is still standard like hotels in general; it does not have Korean characteristics."

"The aroma of the food can already increase appetite."

It is concluded that Tama Boutique Hotel with a Korean concept in applying sensory marketing to the sense of "Smell" reaches 22.5%, which means that Tama Boutique Hotel in building a new brand reaches 22.5% while according to the theory of the sense of "Smell" in building a brand reaches 45%. This means that Tama Boutique Hotel still does not have an aroma that characterizes Korea both in the lobby area and the rooms. The aroma of the food is appropriate so that it can arouse appetite. Aroma is a means of communication used by the human body. When the aroma is pleasant, it can automatically improve a person's mood.

D. Sensory Marketing on the Sense of "Taste"

The flavor associated with brand building has a share of 31%. In a situation where there is intense competition among food product marketers, intuitively good taste expressions effectively influence consumer behavior (Shabgou, M. & Daryani, S., 2014).

Figure 1. Food Menu at Tama Boutique Hotel

Photo Source: Personal Document

The relevance of food taste in purchasing decisions is limited. This is an opportunity, and taste can represent an excellent potential for creative marketing campaigns (Sendra et al., 2017). The flavor associated with the complete building has dozens of parts in cases of intense competition among food merchandise marketers and poor treatment. Intuitive expressions of fine style are efficient blessings to influence consumer behavior (Singh et al., 2020).

Based on the review results on Agoda from several guests who have stayed at the Tama Boutique Hotel with a Korean concept:

"There are also several options for breakfast because it is a set menu, and the food is delicious. Yesterday, I was four people who tried different menus. Korean sets 1,2,3 were all delicious. The American breakfast is also delicious; you can eat it in the lounge or deliver it to your room. I highly recommend Tama Boutique Hotel, a hotel that has an interesting theme and is very comfortable".

"The Korean breakfast menu is also highly recommended."

"Breakfast can also be delivered to your room, and because it is a la carte, we can choose the breakfast menu. Overall, we are satisfied staying at Tama Hotel. Thanks all"

"Complete breakfast, suitable for children aged 18 months. So I don't need to buy lunch for my little one. Delicious & complete breakfast. Rice, meat, vegetables, seaweed soup, delicious and soft tofu, fruit jelly suitable for little ones".

"Excellent service, friendly staff, strategic location, perfect interior design, clean. Most importantly the breakfast is delicious, especially for Korean food".

"The lobby is located on the upper floor so that it maintains guest privacy, a choice of Korean breakfast menus that are rarely found in other hotels, a large bed (rarely found in other hotels) & comfortable."

"The breakfast menu is also Korean-style and very delicious. Downstairs, there is a Korean restaurant called Bornga."

"Spacious room, large twin bed, delicious food, especially for Korean lovers; you are spoiled here."

"Delicious Korean style breakfast, clean and large room."

Based on the review results on Google.Com from several guests who have stayed at the Tama Boutique hotel with a Korean concept:

"The breakfast is cool, unlike the usual hotel; here, several breakfast packages can be delivered and eaten in the room, making it more practical and comfortable."

"Breakfast a la carte, wow delicious (Korean style)….aah everything is excellent. Want to come here again".

"The food is also delicious; there are many choices from Korean to Indonesian, and big portions are also satisfying."

"I appreciate breakfast the most (breakfast choices, not buffet), but everything is perfectly served, my son said. I got jelly dessert. If the taste of each tongue, I happened to order Korean food, and I don't understand the definition of delicious, but the ingredients used are guaranteed fresh. Five of us; we ordered food for four people, and the food was enough for five".

"Get a breakfast set menu that can be chosen; there is a Western, Asian, or fusion menu. It can be eaten on the rooftop or in the room, too.

"What I like the most is that the breakfast is Korean food, and it can be delivered to the room for those who are lazy. I recommend it for those who want to stay in Bandung.

Based on the results of interviews with several guests who have stayed at the Korean-concept Tama Boutique hotel:

"The taste of the food served already has a distinctive Korean character."

It is concluded that the Tama Boutique Hotel, a Korean concept hotel implementing sensory marketing on the sense of "Taste," has reached 31%, meaning it has built a 31% brand according to theory. The sense of taste or taste is a sensory system that allows humans to taste food and drinks. In addition to functioning as a taste bud, the tongue has other functions, such as helping to communicate, chew, and swallow food.

E. Sensory Marketing on the Sense of "Touch"

Touch is the body's largest sensory organ and is a symbol of physical contact through the skin. The sense of touch associated with brand building has a share of 25%. Material, temperature, weight, and shape positively impact the tactile experience, increase the positive impact on the tactile experience, and increase customer loyalty. Visual and auditory sensory cues affect customer attention and positively correlate purchasing behavior with product touching. Sensory stimulation makes consumers closer to the product and more likely to touch it (Shabgou, M. & Daryani, S., 2014). Consumers love to touch products and want to test products by consumers themselves. The clever use of tactile cues can challenge many companies (Sendra et al., 2017). Touch is the body's largest sensory organ and a picture of physical contact through the skin. A little sense is related to the entire building, which has twenty-five parts. By touching the merchandise, the client's behavior and appearance perspective are ultimately affected (Singh et al., 2020).

Based on the review results on Agoda from several guests who have stayed at the Korean-concept Tama Boutique hotel:

"The cleanliness of the room is lacking; suggestions for replacing the sheets and pillow bolsters with new ones, the bedcover has holes, and the sheets have stains in several places. Even if we complain, room service comes quickly, and the sheets are immediately replaced".

"When I was there yesterday, the pillowcases and sheets had a few stains. Maybe if the hotel took the time to be more thorough, there should be a program to remove the stains. Likewise, one of the towels I got was torn at the edges. A towel for a foot mat would be better. However, I give a thumbs up to how the hotel responded to my complaint; less than 5 minutes after I called the front desk, a replacement towel came immediately".

"The room is clean and tidy, and facilities and service are good, minus the new towels smell."

Based on the review results on Google.Com from several guests who have stayed at the Korean-concept Tama Boutique hotel:

"Nice Hotel. Every time I go to Bandung, I have stayed here several times. The service is the best… Very friendly, the AC is cold. The room is also big and clean, highly recommended".

"Very recommended hotel. Comfortable room and bed, cold AC, good toilet".

"Friendly staff, clean room, cold AC, there is a bolster, really love it."

"Clean room, cold AC, waiting for hot water is extended.

Based on the results of interviews with several guests who have stayed at the Korean-concept Tama Boutique hotel:

"The materials used, such as bed sheets and towels, are standard hotel standards in general, so there is no difference. The room temperature functions well so that guests feel comfortable."

It is concluded that the Korean concept of Tama Boutique Hotel in implementing sensory marketing on "Touch" has only reached 12.5%, which means that Tama Boutique Hotel in building a new brand has only reached 12.5%. In contrast, according to the sensory theory, "Touch" in building a brand reaches 25%. Using standard bed sheets and towel materials so that the application of sensory marketing on "Touch" is not optimal. Meanwhile, the room temperature is the temperature needed by hotel guests. The sense of touch or touch functions to feel pressure, temperature, pain, and vibration.

Conclusions and Further Research

It can be concluded that Sensory Marketing at Tama Boutique Hotel in building a brand identity as a Korean concept hotel has not been fully fulfilled; only sensory marketing on the Sense of "taste" is implemented comprehensively, which is 31% according to theory. Meanwhile, sensory marketing on the Senses of Sight, Hearing, Smell, and Touch has not been fulfilled. Therefore, Tama Boutique Hotel needs to act quickly to improve and fulfill all elements of sensory marketing, including the senses of sight, hearing, smell, and touch.

The new thing about this study is the discovery of sensory marketing that is different from hotels in general. Usually, hotels have relatively the same sensory marketing; this study focuses on Korean concept hotels that are applied in Indonesia so that different sensory experiences are found from the aspects of the senses of sight, smell, sound, taste, and touch for hotel guests. So, this study is essential for the hotel industry, especially for Indonesia's most dominant three-star hotels. To build a brand, it is necessary to create different sensory marketing strategies to attract the interest of hotel guests.

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Credit Authorship Contribution Statement

Yustisia Pasfatima Mbulu: Conceptualization, Investigation, Formal analysis, Writing – original draft, Supervision,
Validation, Writing – review and editing.
Devi Roza K. Kausar: Conceptualization, Investigation, Methodology, Supervision

Declaration of Competing Interest

The author honestly declares that there is no conflict of interest regarding the publication of this paper.

Declaration of Use of Generative AI and AI-Assisted Technologies

While preparing this work, the author used Google Translate and Grammarly checkers. The author reviews and edits the content as necessary and is solely responsible for the publication's content.

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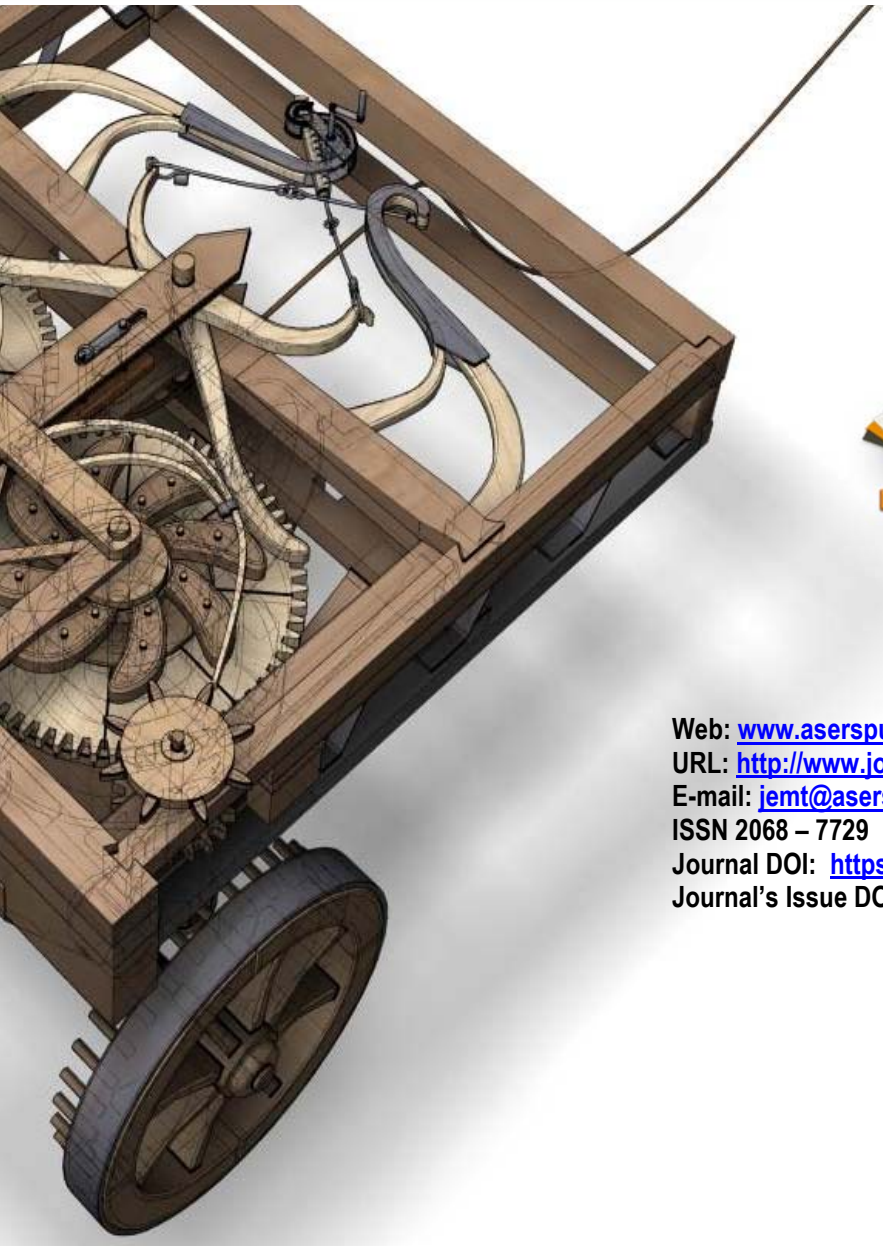

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