Advancing Sustainable Hospitality Education: A Systematic Literature Review

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Abstract

Global challenges such as climate change and social inequality have heightened the emphasis on sustainability across various sectors, with higher education institutions (HEIs) playing a pivotal role in fostering sustainable practices. This systematic literature review assesses the evolution of sustainable hospitality education (SHE) research over the past two decades, highlighting trends and identifying gaps to synthesize the current scholarly discourse. Using a comprehensive search strategy across multiple databases, we identified 39 key articles through a structured screening process. Our findings reveal that SHE is a dynamic and inclusive field, characterized by a diverse array of research methods, educational levels, and sample sizes. The analysis of delivery modes and subject domains underscores the importance of cross-domain issues in SHE research. The review concludes by proposing future directions for SHE, including the development of localized curricula, faculty development programs, and interdisciplinary research initiatives. It also emphasizes the need for longitudinal studies to assess the long-term impact of educational strategies on students' sustainability knowledge and practices. Implementing these recommendations will enable SHE to contribute significantly to the sustainable transformation of the hospitality industry and inspire educational innovation, advancing a greener and more equitable future.

Keywords: sustainable hospitality education, systematic literature review, bibliometric analysis, higher education, sustainability practice

1. Introduction

Faced with the intensification of global challenges such as climate change, resource depletion, and social inequality, the global discussion on sustainability is heating up. Since the early 1970s, sustainability has evolved into an interdisciplinary concept addressing scientific, economic, social, and environmental issues. It promotes a development strategy that comprehensively considers these multi-dimensional challenges (Aber et al., 2009; Hardy, Beeton, & Pearson, 2002). The Brundtland Report further deepened this concept, proposing that sustainable development aims to meet the needs of the present without compromising the ability of future generations to meet their own needs. This report laid a solid foundation for ongoing discussions on sustainability (World Commission on Environment and Development, 1987). As global challenges such as climate change, resource depletion, and social inequality become increasingly severe, the world's attention to sustainability has intensified, seeking cross-sector solutions to promote long-term progress in environmental, economic, and social well-being.

In response to these challenges, there is an urgent need to transform industrial practices towards the three core pillars of economic, social, and environmental sustainability (United Nations, 2022; Albareda-Tiana et al., 2020; Harvey et al., 2022; Zamora-Polo & Sanchez-Martin, 2019). Higher education institutions (HEIs) play a critical role in this transformation due to their ability to transfer knowledge, cultivate sustainable practices, and shape future industry leaders (SDSN, 2017; Aleixo et al., 2018; Findler et al., 2019; Rezapouraghdam & Akhshik, 2021). Sustainable hospitality education (SHE), an integral part of this educational vision, has garnered increasing attention from the academic community. Although its definition in academic literature is still under investigation, its importance is widely acknowledged (Deale & Barber, 2012; Millar & Park, 2013; Deale, 2013; Boley et al., 2014; Liu et al., 2017; Berjozkina & Melanthiou, 2021). Piramanayagam et al. (2023) define SHE as an educational paradigm that equips stakeholders with the knowledge, skills, attitudes, and values necessary to

promote sustainable development. This paradigm underscores the dual importance of promoting education for sustainable development (ESD) and environmental education (EE) within the hotel industry. This discussion not only reflects the academic community's commitment to cultivating future leaders in sustainable development but also highlights the pivotal role of education in addressing global challenges. By deepening the research and understanding of SHE, we can support the sustainable transformation of the hotel industry and inspire innovation in the field of education, collectively advancing a greener, more just, and prosperous future.

Therefore, the core of SHE research is to explore how education can be leveraged as a tool for instilling sustainable values and practices in future hotel professionals. This ensures the long-term prosperity of the industry and contributes to the global sustainable development agenda. It also emphasizes the role of research in bridging current educational practices with future industry needs. In this context, conducting a systematic literature review is crucial for revealing existing research trends, challenges, and future directions in the field of SHE. Such a review provides robust academic support for promoting education and industry practices towards more sustainable goals.

2. Literature Reviews

Previous research on sustainable hospitality education has provided valuable insights. Berjozkina & Melanthiou (2021) reviewed publicly available data related to 11 higher education institutions (HEIs) and 14 tourism-related BA programs, focusing on contributions to education and the current situation in Cyprus. Their analysis provided a detailed examination of the specific context of Cyprus and highlighted the practical implications of tourism education programs in local HEIs. Chen et al. (2022) conducted a systematic literature review of 32 articles from 2000 to 2022, focusing on teaching and learning methods, key points, knowledge, and cognitive skills, and supporting structures in sustainable hospitality education. They employed a rigorous systematic literature review methodology and provided comprehensive coverage of teaching and learning methods. Santos et al. (2023) reviewed 113 articles from 1996 to 2021, identifying trends, influence, authors, research areas, and future research directions. This study's extensive sample size provides a broad overview of the field, and the detailed bibliometric analysis highlights research trends and key contributors. However, the study lacks focus on specific educational practices and outcomes, primarily offering quantitative analysis without deep qualitative insights.

A juxtaposition of these literature reviews (Appendix I), reveals several methodological and scopal gaps, including limited geographical scope and generalizability, small sample sizes, methodological rigidity, insufficient qualitative insights, and a focus on specific aspects. To address these gaps and build on the strengths of previous research, the proposed systematic literature review on sustainable hospitality education will integrate and expand upon these dimensions.

The review will encompass a broader geographical and temporal scope, ensuring greater generalizability and relevance. It will combine systematic literature review and bibliometric analysis to provide both qualitative and quantitative insights, offering a detailed analysis of teaching and learning methods, curriculum design, and practical applications in sustainable hospitality education. This approach will provide a more holistic understanding of sustainable hospitality education by integrating diverse methodologies and expanding the scope. The review will offer actionable insights for educators and policymakers to improve sustainable hospitality education programs, identify gaps, and suggest future research directions to advance the field.

We aimed to answer the following research questions:

Q1: How have development patterns in sustainable hospitality education research evolved over the past two decades?

Q2: Which journals have been the most influential in publishing research on sustainable hospitality education, and what are their characteristics?

Q3: What is the geographic distribution of sustainable hospitality education research, and which countries or regions are leading in this field?

Q4: What are the main thematic areas and subject domains in sustainable hospitality education research, and how have they evolved?

Q5: What research methods are employed in SHE studies, and what are their respective benefits and limitations?

Q6: How does the focus on different educational levels influence the outcomes and effectiveness of SHE programs, and what strategies are used to tailor these initiatives to various educational and professional backgrounds?

Q7: How do variations in sample sizes affect the validity and reliability of findings in SHE research, and what are the implications of different sample sizes for both exploratory and large-scale studies?

Q8: What are the advantages and challenges associated with different research lengths in SHE studies, and how do these durations contribute to the depth and breadth of understanding sustainable practices in hospitality education?

Q9: How do different delivery modes impact the effectiveness and student engagement in SHE, and what best practices can be identified for each mode to enhance sustainability education?

Q10: What are the main subject domains in SHE research, and how do they address cross-domain, commercial, social, and private issues?

3. Methodology

3.1 Data Collection and Filtering

In the pursuit of a rigorous and systematic literature review, our investigation commenced with an exhaustive search of prominent educational databases in July 2024, including Scopus, the Science Citation Index, the Social Science Citation Index, Education Research Complete, Web of Science (WOS), and ScienceDirect (Hwang and Tsai, 2011; Hsu et al., 2012). The search employed a specific query, "Sustainab* AND Hospitality AND Education", targeting keywords within abstracts, which yielded an initial 159 results. The search criteria were then narrowed to include only articles with full texts available in "scholarly (peer-reviewed) journals." Non-English articles were excluded, resulting in a subset of 39 articles. Each abstract was subjected to a thorough review to exclude studies with weak relevance to the research objectives or those that were not empirical. Furthermore, to ensure a focused examination of hospitality education rather than the broader application of sustainability concepts within the hospitality industry, studies not directly related to education were also excluded, reducing the sample to 33 articles. To enhance the comprehensiveness of the literature review, a snowballing technique was utilized, involving the examination of the reference lists of the identified articles for additional relevant works. This approach identified and included an additional 6 articles, culminating in a final sample of 39 papers for the systematic review (see Figure 1 for a visual depiction of the entire filtering process).
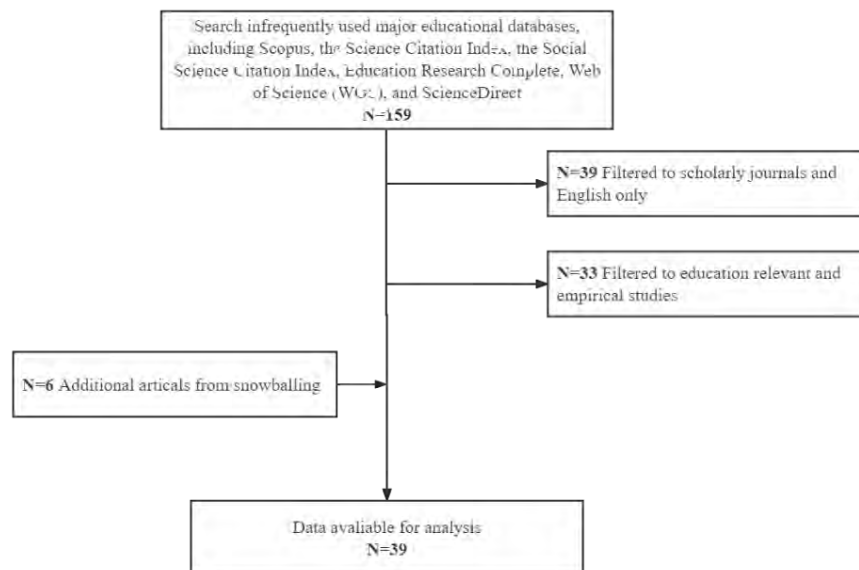
Figure 1. The Data Collection and Filtering Process

3.2 Coding Scheme

This coding system provides a systematic approach to examining the literature on sustainable hospitality education. Following the screening, we reviewed each paper and recorded the following details: authors, public year, journal, level of education, sample, country/region, research methods, study length, sample size, delivery, and subject domain. Any disagreements were discussed in person until the researchers reached a consensus. By

ensuring that every pertinent aspect is consistently and thoroughly analyzed, we aim to gain a deeper understanding of sustainable hospitality education in scientific literature, identifying key trends and insights from the reviewed studies. The categories and codes utilized in this analysis are described in the coding system that follows:

3.2.1 Level of Education Codes

Based on Hwang and Tsai (2011), we categorized participants by their education level:

- Elementary Education (EE): Primary school students.
- Secondary Education (SE): Middle school and high school students.
- Higher Education (HE): College and university students.
- Other (O): Any other education levels not specified above.

3.2.2 Delivery Code

Drawing upon the scholarly work of Zizka, L. (2017), this paper systematically classifies the modalities of sustainability module delivery within the hospitality education sector. For a comprehensive literature review analysis, the following coded categories are proposed:

- Single Course (SC): This classification denotes a focused, independent course that is solely dedicated to the study of sustainability within the hospitality curriculum.
- Embedded Across Curriculum (EAC): This refers to an integrative approach where sustainability education is woven into the fabric of all courses that constitute the hospitality program, transcending the confines of a single course.
- Elective Course (EC): This category signifies an optional course offering that allows students to delve into sustainability topics of their choosing.
- Stand-alone Program (SP): This classification embodies a holistic program centered on sustainability within the hospitality industry, standing apart from other academic programs.
- Integrated Degree (ID): This implies a degree program where sustainability is not a peripheral subject but a fundamental element interlaced throughout the educational curriculum.
- External Delivery (ED): This pertains to the provision of sustainability modules beyond conventional academic frameworks, potentially facilitated through online platforms, seminars, workshops, or other non-traditional educational conduits.
- Other (O): Any other delivery method not specified above.

3.2.3 Subject Domain Codes

Drawing inspiration from the subject domain in hospitality established by Thio (2005), we delineate our subject domain as follows:

- Social Domain (SD): This category pertains to aspects of community involvement, social impact, and corporate social responsibility initiatives within the hospitality sector.
- Private Domain (PD): Encompassing personalized services, client experiences, and private event management, this domain focuses on individual customer interactions.
- Commercial Domain (CD): Covering business operations, marketing strategies, and human resource practices, this domain addresses the profit-driven aspects of the hospitality industry.
- Cross-Domain Issues (CDI): Recognizing the intersectionality of policy compliance, technological integration, and their impact across various domains within the industry.

3.2.4 Research Method Codes

Following the research of Gay et al. (2009), we categorized studies based on their research methods:

- Quantitative (QT): Including subcategories such as Survey Research; Correlational Research; Causal-Comparative Research; Experimental Research; Single-Subject Research.
- Qualitative (QL): Including methodologies like case studies, ethnography, grounded theory, and phenomenology.
- Mixed Methods (MM): Studies employing both quantitative and qualitative methods.

3.3 Bibliometric Analysis

Bibliometric analysis is an important aspect of the study evaluation process, especially in scientific and practical disciplines. It entails a quantitative analysis of textual articles to discover patterns and trends in scholarly communication (Ellegaard & Wallin, 2015, p. 1809). For this study on SHE, bibliometric analysis will be used to carefully assess various parts of the literature, improving our understanding of the discipline and identifying crucial areas for future research. One unique characteristic of this study is the extensive bibliometric analysis used to provide a thorough and multifaceted overview of the area. Its goal is to uncover critical trends, notable authors and institutions, and emerging research fields, all of which will help to enhance sustainable hospitality education.

4. Results

The research questions (RQs) are provided in the order in which the results are displayed. The sequence of RQs mirrors the progression of our findings. In particular, RQs 1-4, delve into the methodological rigor and bibliometric specifics of the evaluated studies. RQs 5-8 broaden the scope to encompass the research design and the broader implications of the studies reviewed. RQs 9-10 synthesize the educational implementation and focus domain from the examined SHE studies. Additionally, the Appendix (Appendix II) has a full coding of the important dimensions in the 39 reviewed SHE empirical investigations.

Q1. Development Patterns Over Time

The overall trend shows a steady increase in the number of publications over the past two decades, indicating growing academic and practical interest in sustainable hospitality education. Recent years have seen a broader range of topics being explored, including detailed analyses of teaching methodologies, curriculum design, and the impact of sustainability practices on hospitality education outcomes. The analysis also suggests a widening geographic distribution of research efforts, with contributions from various countries and institutions, reflecting the global importance of sustainability in hospitality education. The volume and focus of publications in sustainable hospitality education have shown notable trends and milestones over the past two decades, as evidenced by the publication dates of 39 key articles in the field.
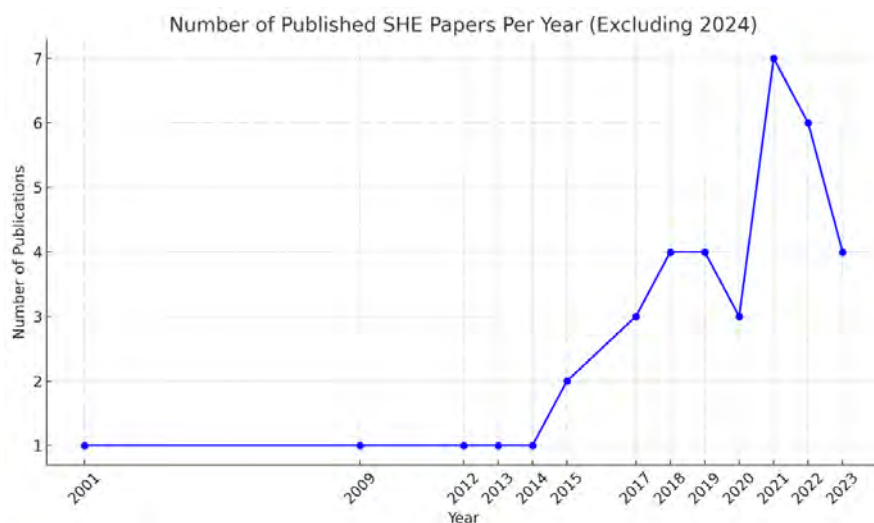
Figure 2. Number of published SHE papers per year

Q2. Journal Identification

A total of 39 journals have contributed to SHE research, amongst which the top 4 are depicted in Table 1. They stand out as top SHE journals due to their interdisciplinary scope, academic rigor, relevance to current issues, global reach, and supportive scholarly communities. These factors collectively contribute to their prominence and effectiveness in publishing research in the field of Sustainable Hospitality Education. *Sustainability* stands out with 8 articles, reflecting its focus on sustainable practices across various disciplines. *Hospitality & Tourism Education* and *Hospitality, Leisure, Sport & Tourism Education* follow, with 6 and 4 articles respectively, highlighting their specialized focus on education within the hospitality sector. *Teaching in Travel & Tourism* contributes 3 articles, emphasizing pedagogical approaches within the tourism industry.

Table 1. Top Contributing Journals in SHE

Journal Name	No. of Articles	JCR	SJR 2023
Sustainability	8	Q 1	0.67
Hospitality & Tourism Education	6	Q 2	0.6
Hospitality, Leisure, Sport & Tourism Education	4	Q 1	1.05
Teaching in Travel & Tourism	3	Q 2	0.46

Note. JCR = Journal Citation Reports; SJR = Scientific Journal Rankings.

Q3. Geographic Distribution

The research shows that sustainable hospitality education (SHE) is a worldwide relevant topic, with major contributions from China, Turkey, and several other countries, as well as six global studies. It is important to clarify that in this study, the terms "country" and "region" relate to the locations where SHE practices are applied, not the authors' home countries or regions. This diversified geographical distribution of research highlights the widespread acknowledgment of the value of sustainability in hospitality education. The top contributing countries/regions are making significant contributions to the discipline through research.
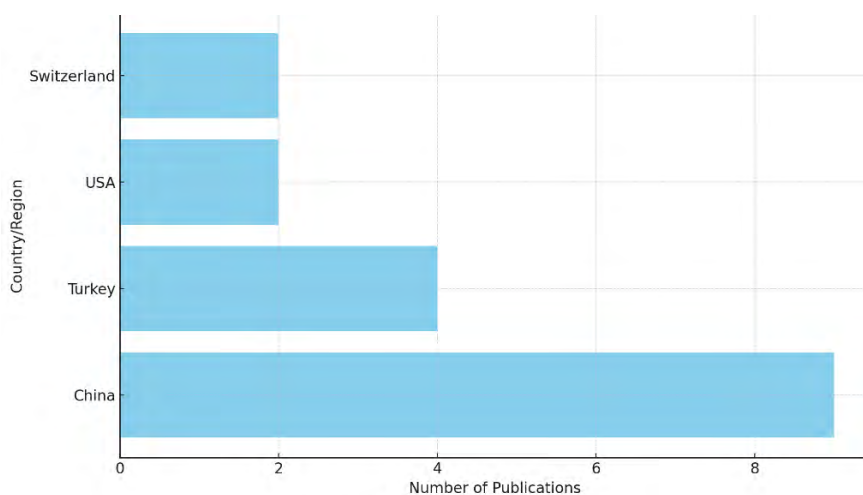

Figure 3. Top Contributing Country/Region in SHE

Q4. Keywords

Upon meticulous examination of the keywords extracted from 39 studies, we have delineated the thematic and emergent trends within the discourse on SHE. The visual representation of these keywords, as depicted in the word cloud (Figure 4), accentuates the most recurrent terms that are intrinsically linked to sustainability and educational practices within the hospitality and tourism sectors. The prominence of each term in the word cloud is directly proportional to its frequency of occurrence in our dataset. The thematic areas within SHE are undergoing a dynamic evolution, with scholarly inquiry progressively embracing an interdisciplinary methodology. This approach amalgamates insights from the realms of education, management, environmental sciences, and a multitude of other disciplines. In the wake of globalization, there is a marked trend of collaborative research endeavors among scholars hailing from diverse geographical regions, united in their pursuit to enhance sustainable practices in hospitality education.

Our analysis indicates that the research is bifurcated between theoretical inquiry and practical application. There is a discernible emphasis on not only the exploration of conceptual frameworks but also the cultivation of students' operational competencies and problem-solving acumen. This dual focus underscores the importance of equipping the next generation with the skills necessary to navigate the complexities of the hospitality industry. Furthermore, with the exponential progression of technological advancements, the seamless integration of modern technology into educational curricula has emerged as a salient research priority. This underscores the need for innovative pedagogical strategies that harness the power of technology to foster a more interactive, efficient, and sustainable learning environment.
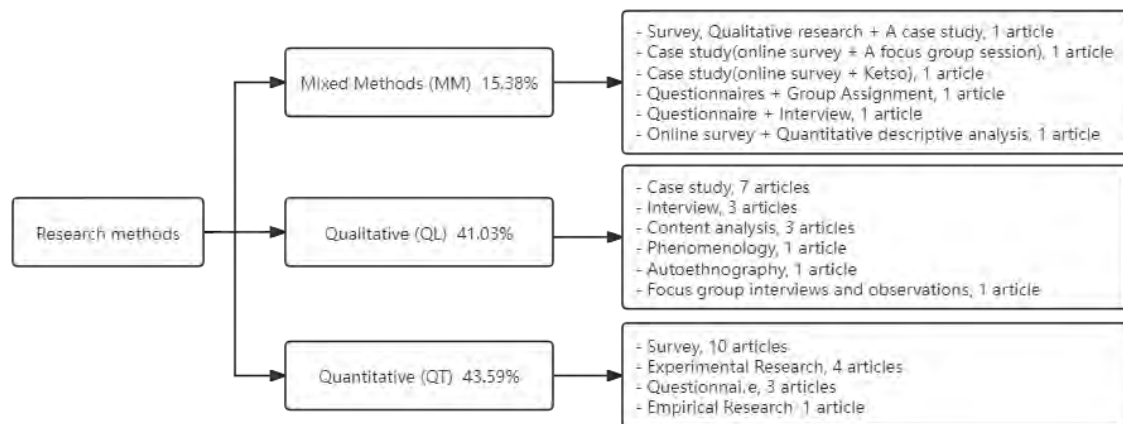
Figure 4. Word Cloud of Keywords in SHE Research

The evolution of SHE research can be categorized into three main phases: Early Focus, Middle Period, and Recent Trends:

Early Focus (2001-2010): Early research primarily concentrated on the fundamental knowledge and teaching methods of hospitality management education, exploring ways to introduce sustainability concepts.

Middle Period (2011-2020): The research focus gradually shifted towards practical application and skills development, highlighting the importance of soft skills and vocational competencies. With the promotion of global sustainable development goals, studies began to focus on Education for Sustainable Development (ESD) and global perspectives.

Recent Trends (2021-Present): Recent research has placed greater emphasis on technological integration and innovative teaching methods to promote sustainable education. Studies on gender equality and diversity in hospitality education have also increased, reflecting growing societal attention to these issues.

Q5. Research Methods

The review of research methods employed in studies on SHE reveals a diverse and comprehensive approach, encompassing mixed methods (MM), qualitative research (QL), and quantitative research (QT). Mixed methods research, which combines qualitative and quantitative techniques, is frequently utilized to provide a holistic understanding of SHE complexities. Examples include questionnaires paired with interviews (Kiryakova-Dineva et al., 2019), qualitative research combined with case studies (Koblianidze & Sachaleli, 2023), and online surveys alongside focus group sessions (Karakiraz et al., 2021). Qualitative research methods, such as interviews (Millar & Park, 2013; Ali et al., 2017), phenomenological approaches (Sezen-gültekin & Argon, 2022), and case studies (Lo, 2022; Zvereva, 2019; Lampoltshammer et al., 2023), are pivotal in exploring and understanding the intricate experiences and perspectives within SHE. These methods offer in-depth descriptions and interpretations, enriching the understanding of complex social and cultural phenomena. Quantitative research methods, including surveys (Zizka, 2017; Mínguez et al., 2021; Akinci et al., 2018), questionnaires (Chawla & Manhas, 2015; Fuchs, 2022; Akinci et al., 2018), and experimental research (Chen et al., 2021; Chou et al., 2019; Zhang et al., 2020), employ statistical, mathematical, or computational techniques to analyze data, emphasizing objectivity and reproducibility. The use of diverse research methods indicates a multidimensional exploration of SHE, with mixed methods providing comprehensive insights, qualitative research offering depth and richness, and quantitative research supplying empirical support. This multidisciplinary and international collaboration trend enhances the global and diverse development of SHE research, suggesting that future studies should continue integrating various methods to advance the field.

Figure 5. Distribution of Research Methods in SHE Research

Q6. Level of Education

The diverse methodological approaches and international reach of SHE research highlight its comprehensive and inclusive nature, engaging a wide spectrum of participants from various educational and professional backgrounds. The emphasis on Higher Education (HE) indicates a strong focus on university-level programs and students, with significant contributions from various countries and regions. The inclusion of Secondary Education (SE) and Other (O) categories highlights the interdisciplinary and inclusive nature of SHE research, involving a wide range of participants from different educational and professional backgrounds.

A majority of the SHE studies focus on Higher Education (HE), primarily involving college and university students. For instance, studies conducted by Akdeniz University (Turkey) and Georgian Technical University (Georgia) reflect significant international engagement, with sample sizes of 524 and 675 students respectively. Other notable studies include a Romanian study with 998 participants and a Chinese study with 646 students. Learners in SHE research span various countries, including India, Thailand, Fiji, the UK, the USA, Sweden, and multiple regions in China, indicating a wide geographical distribution of SHE research. Some studies also involve collaboration between students, educators, and industry professionals. For example, one study included 998 participants, comprising 50 teachers and 948 students, demonstrating the involvement of middle and high school students in SHE research. Additionally, several studies feature participants categorized as Other (O), which include educators, industry professionals, and individuals from non-specified education levels.

Q7. Sample Size

The sample size data have been meticulously organized into quintiles, reflecting the methodological diversity inherent in SHE research. The data were categorized into five groups based on sample size: less than 50, 50-100, 101-150, 151-200, and greater than 200. This stratification elucidates the breadth and depth of scholarly inquiry within the field, as delineated in Figure 6. The group "Greater than 200," comprising 13 studies, dominates the distribution, signifying an emerging preference for expansive research designs that are likely to yield comprehensive insights into sustainable practices within the hospitality industry. The "Less than 50" group includes 12 studies, suggesting a prevalence of exploratory or niche-focused research endeavors typically initiating new lines of investigation or delving into specialized areas of the hospitality sector.

The distribution of sample sizes not only accentuates the eclectic methodologies employed in SHE research but also underscores the field's evolving academic landscape. The juxtaposition of smaller-scale, targeted studies with larger-scale, ambitious projects reflects a field that is both dynamic and responsive to the multifaceted nature of sustainability in hospitality education. In the realm of SHE, 5 sample size analysis takes on a distinct dimension as the units of analysis are not individuals but courses or educational programs. The categorization of these programs based on their scope and prestige provides a nuanced perspective on the research landscape within SHE, showcasing a range from single courses to international cohorts of top programs. This breadth underscores the dynamic and multifaceted nature of SHE, accommodating various scales of educational initiatives and their approaches to sustainability.
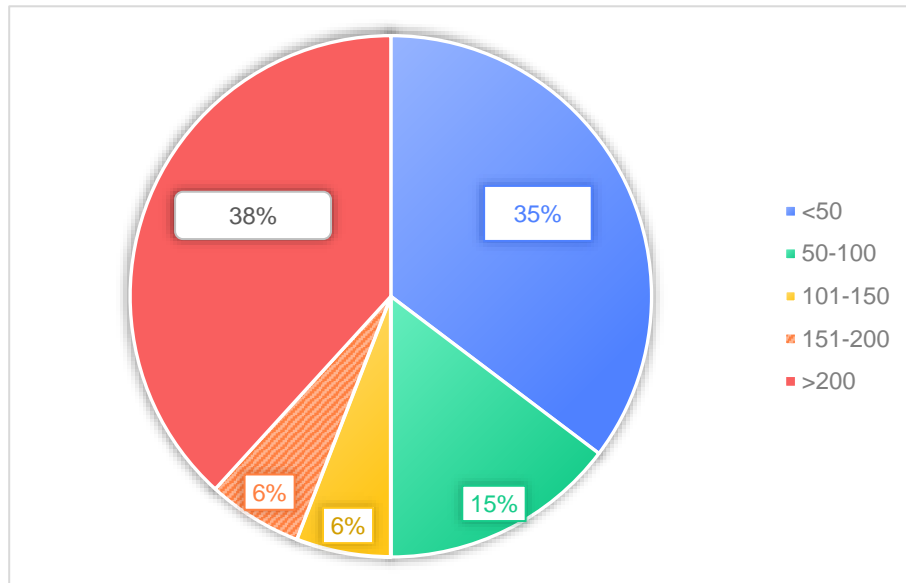
Figure 6. Distribution of Sample Size in SHE Research

Q8. Research Length

The analysis of research lengths in SHE studies demonstrates a strategic selection of methodologies tailored to specific research objectives. Among the 23 reviewed studies, short-term studies (<1 month) constitute 17.4% (4 studies) and are predominantly quantitative, highlighting a preference for controlled research designs that capture immediate data points and trends. Medium-term studies (1–6 months) account for 43.5% (10 studies) and exhibit the highest methodological diversity, incorporating mixed methods, qualitative, and quantitative approaches. This flexibility allows for thorough data collection and preliminary analysis, suitable for comprehensive evaluations. Long-term studies (6–12 months) represent 26.1% (6 studies), balanced among qualitative, mixed methods, and quantitative approaches, enabling more extensive data collection and deeper analysis. Extended studies (>1 year) make up 17.4% (4 studies) and are predominantly qualitative, emphasizing prolonged observation and data gathering to understand sustainable practices in hospitality education over time.

Figure 7. Distribution of Research Length in SHE Research

Q9. Delivery

In the examined research sample, 17 papers explicitly outline the delivery modes for sustainability modules within the field of hospitality education. Based on the designed Delivery Code data provided for SHE research articles, the analysis reveals the distribution of delivery modes. Seven Embedded Across Curriculum (EAC) articles emphasize a transformative approach to hospitality education that prioritizes sustainability. These articles advocate for the integration of creative problem-solving, technological proficiency, interdisciplinary collaboration, and global awareness into the educational framework. Four Stand-alone Program (SP) articles present stand-alone programs that comprehensively address sustainability within hospitality education. Three External Delivery (ED) articles demonstrate the use of external delivery modes, such as online platforms and workshops, to extend sustainability education beyond traditional academic frameworks. There are three Single Course (SC) instances where sustainability is delivered through a focused, single course dedicated to the subject.
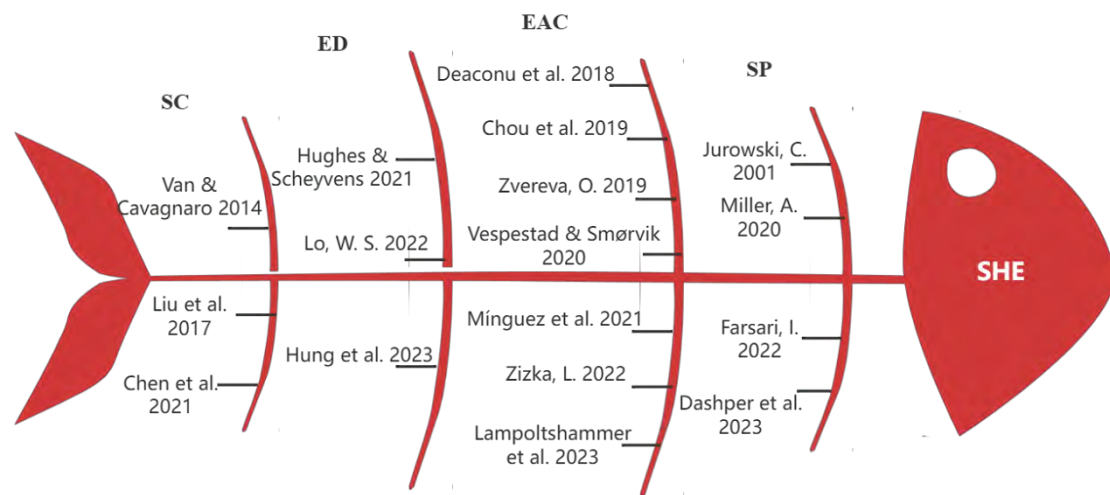

Figure 8. Distribution of Delivery Modes in SHE Research

Q10. Subject Domain

Our comprehensive analysis reveals a pronounced emphasis on Cross-Domain Issues (CDI) within the realm of Sustainable Hospitality Education research. This domain, which delves into the multifaceted nature of policy adherence, technological convergence, and their collective influence across the hospitality sectors, stands out as the most thoroughly explored, featuring a robust corpus of 32 scholarly articles. These contributions underscore the paramount importance of grasping and navigating the intricate dynamics between regulatory structures and technological evolutions within the hospitality industry. Moving to the Commercial Domain (CD), which encapsulates the operational, marketing, and human resource facets of business, this domain emerges as the second most prominent, with a modest yet significant presence of 6 articles. The focus here is on the economically driven dimensions of the hospitality industry, championing the pursuit of efficient management practices and pioneering marketing strategies aimed at bolstering business efficacy. In contrast, the Social Domain is represented by a solitary article, indicating a stark underrepresentation in the current body of literature. This domain, which could potentially explore the societal impacts and community engagement aspects of hospitality education, is conspicuously absent from the broader discourse. Furthermore, the Private Domain is notably absent in the current sample, suggesting a significant gap in the literature concerning the private aspects of hospitality education, such as personal development, individual learning experiences, and the role of private initiatives in shaping the industry.

5. Discussion

5.1 Bibliometric Analysis (RQ 1-4)

The bibliometric analysis of SHE research over the past two decades reveals a clear and sustained increase in the number of publications. This growth trajectory underscores the escalating academic and practical interest in integrating sustainability into hospitality education. The widening geographic distribution of research efforts further indicates the global relevance of SHE. Contributions from diverse countries and institutions reflect the universal importance of sustainability in hospitality education and underscore the collaborative nature of

research in this field.

The geographic analysis reveals a diverse distribution of SHE research, with significant contributions from China, Turkey, and several other countries, as well as six global studies. This distribution illustrates the widespread recognition of the importance of sustainability in hospitality education across different regions. The research is not confined to the authors' home countries but rather focuses on the locations where SHE practices are applied, demonstrating the global applicability and relevance of the findings. The international scope of SHE research highlights the collaborative efforts of scholars worldwide, united in their pursuit of enhancing sustainable practices in hospitality education. This diversity in research origins underscores the universal appeal and necessity of integrating sustainability into hospitality education curricula.

The keyword analysis, depicted in the word cloud, showcases the thematic and emergent trends within SHE research. The most recurrent terms, prominently featured, include "sustainability", "education", "hospitality", "tourism", "management", "curriculum", and "technology". These keywords reflect the central themes and focus areas within the field. The research reveals a dual emphasis on theoretical inquiry and practical application. There is a notable focus on exploring conceptual frameworks alongside the cultivation of operational competencies and problem-solving skills among students. This dual focus underscores the importance of preparing the next generation with the necessary skills to navigate the complexities of the hospitality industry.

In conclusion, the bibliometric analysis of SHE research highlights significant development patterns, influential journals, diverse geographic contributions, and key thematic trends. These insights provide a comprehensive understanding of the evolution and current state of SHE research, offering valuable guidance for future studies and practical applications in sustainable hospitality education.

5.2 Methodology Analysis (RQ 5-8)

The methodological analysis of SHE research highlights a diverse and comprehensive approach, encompassing varied research methods, educational levels, sample sizes, and research lengths. This diversity underscores the field's complexity and the multifaceted nature of sustainability in hospitality education, providing a robust foundation for future research and practical applications.

The methodological landscape in SHE research reflects a multidimensional exploration of the field. Mixed methods offer comprehensive insights, qualitative research provides depth and richness, and quantitative research supplies empirical evidence. This multidisciplinary and international collaboration enhances the global development of SHE research, suggesting that future studies should continue integrating various methods to advance the field.

The focus on different educational levels in SHE research underscores its comprehensive and inclusive nature, engaging participants from diverse educational and professional backgrounds. The emphasis on higher education highlights the importance of integrating sustainability into university curricula to prepare future hospitality professionals. Some studies involve middle and high school students, educators, and industry professionals, indicating a wide range of participants. The broad geographical distribution of SHE research, with participants from countries including India, Thailand, Fiji, the UK, the USA, Sweden, and multiple regions in China, underscores the global relevance and applicability of SHE practices.

The analysis of sample sizes in SHE research reveals methodological diversity, emphasizing the field's evolving academic landscape. The juxtaposition of smaller-scale, targeted studies with larger-scale, ambitious projects reflects a dynamic and responsive field, accommodating various scales of educational initiatives and their approaches to sustainability.

5.3 Educational Implementation and Focus Domain Analysis (RQ 9-10)

The analysis of delivery modes in SHE reveals several important trends and implications for the field. The diversity in delivery modes indicates an evolving and dynamic approach to integrating sustainability into hospitality education, each with its distinct advantages and challenges. The prevalence of the EAC approach underscores its effectiveness in providing holistic and continuous exposure to sustainability principles. By embedding sustainability across various courses, this method ensures that students consistently engage with and apply sustainability concepts throughout their education. This integration promotes a deeper understanding and commitment to sustainability, preparing students to address complex environmental and social challenges in their future careers. However, the success of this approach depends heavily on the faculty's ability to cohesively incorporate sustainability into diverse subjects, which may require significant curricular redesign and faculty training. The stand-alone programs highlight their role in offering concentrated and specialized knowledge. These programs are particularly beneficial for students who seek to gain expertise in sustainability without the

need to overhaul entire curriculums. Stand-alone programs can act as intensive courses that provide detailed, focused education on sustainability topics. Despite their depth, these programs may lack integrative experience, potentially limiting students' ability to see the interconnectedness of sustainability with other aspects of hospitality. The use of external delivery modes demonstrates the potential of online platforms and workshops to extend the reach of sustainability education. These methods offer flexibility and accessibility, making it possible for a broader and more diverse audience to engage with sustainability content. This is particularly important in an increasingly digital and global educational environment. However, the effectiveness of these modes depends on the quality of online content and the ability to engage students remotely, which can vary widely. The single-course delivery reflects an approach that provides a dedicated focus on sustainability within a specific course. This method allows for an in-depth exploration of sustainability issues, and may serve as an important introduction or supplement to broader sustainability education initiatives.

The subject domain analysis reveals a clear focus on Cross-Domain Issues (CDI) within SHE research, which highlights the field's response to the complex and interconnected nature of sustainability challenges. This domain encompasses critical areas such as policy adherence, technological convergence, and interdisciplinary collaboration, all of which are essential for developing comprehensive sustainability strategies in hospitality. The focus on CDI reflects an understanding that addressing sustainability in hospitality requires a broad and integrative approach, considering various regulatory, technological, and operational factors. The extensive exploration of CDI indicates its foundational role in shaping sustainable practices and policies within the industry. Commercial Domain (CD) highlights the importance of operational, marketing, and human resource aspects of sustainability. This focus underscores the need for efficient management practices and innovative strategies to promote sustainability within the commercial operations of hospitality businesses. Addressing sustainability from a commercial perspective ensures that economic viability and environmental responsibility are balanced, which is crucial for the long-term success of sustainability initiatives. The Social Domain, which could explore the societal impacts and community engagement aspects of hospitality education, remains largely unexplored. This gap indicates an opportunity to investigate personal development, individual learning experiences, and the role of private initiatives in promoting sustainability in hospitality education.

6. Conclusions and Limitations

This systematic literature review and bibliometric analysis underscore the increasing importance of Sustainable Hospitality Education (SHE) over recent decades, reflected in the growing volume of global academic contributions. Central themes such as sustainability, education, hospitality, and technology illustrate the dual focus on theoretical exploration and practical application in the field. The diversity of methodological approaches-from mixed methods to qualitative and quantitative research-highlights the complexity of SHE and the critical need for interdisciplinary and international collaboration. Our analysis of educational implementation reveals that different delivery modes-embedded curricula, standalone programs, online platforms, and single-course modules-each present distinct advantages and challenges. To advance SHE, it is essential to tailor curricula to local contexts and continuously train faculty to effectively incorporate sustainable practices. As Dr. Chano et al. (2023) emphasize, teaching strategies must be sensitively integrated, considering the diverse beliefs, societal norms, and resource environments of educators, to ensure their successful application. Interdisciplinary collaboration is also crucial, fostering a comprehensive understanding of sustainability with a strong emphasis on practical, real-world applications, particularly through case studies. Additionally, further exploration of technological advancements in educational modalities is vital, as they offer significant potential to enhance students' understanding of sustainability and their ability to apply environmentally sound practices. Policymakers and educators should actively support initiatives that promote the integration of these technologies.

Despite these insights, the study has limitations. The choice of databases and search terms may have excluded relevant studies, introducing potential bias. The subjective nature of study selection could further contribute to this bias. Moreover, the focus on academic contexts limits coverage of professional training within the hospitality industry. The varying methodologies and sample sizes across the included studies also pose challenges in achieving consistent, generalizable conclusions. To address these gaps, future research should closely examine the intersection of technological advancements and educational practices, assessing their long-term impact on students' understanding of sustainability and their capacity to implement sustainable behaviors. By bridging these gaps, SHE can contribute to developing a resilient, innovation-driven hospitality workforce equipped for a sustainable future.

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Competing interests

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.

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Obtained.

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The Publication Ethics Committee of the Canadian Center of Science and Education.

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The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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No additional data are available.

Open access

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Appendix

Appendix I. A Structured Comparison of Related Literature Reviews

Comparison items	Berjozkina & Melanthiou (2021)	Chen et al. (2022)	Santos et al. (2023)	Piramanayagam et al. (2023)	The Present Review
Covered Period	Before 2021	2000-2022	1996-2021	2009-2022	2001-2024
Methodology	Review of data/evidence	Systematic literature review	Bibliometric data analysis	Systematic literature review bibliometric analysis	Systematic literature review bibliometric analysis
Reviewed Material Types	Publicly available data	Articles	Scientific publication	Articles	Articles
Sample	11 HEI and 14 tourism-related BA programs	32 articles	113 articles	18 articles	39 articles
Analysed Content	- Contribution to education - Current situation in Cyprus	- Teaching and Learning Methods - The Key Point - Knowledge and Cognitive Skills - Supporting	- Trends - Influence - Authors - Research areas - Future research	- Constituents - Topics - Thematic structure	- Bibliometric - Methodology - Educational Implementation and Focus Domain
Research trends	No	No	Yes	No	Yes
Bibliometric Analysis	No	Yes	Yes	Yes	Yes

Appendix II. The Summary Table of Reviewed Studies (Arranged Alphabetically by Author's Last Name)

No.	Authors	Year	Journal	Education	Sample Size	Country/ Region	Study Length	Method
1	Akinci et al.	2018	Sustainability	HE	>200	Turkey	N/A	QT
2	Akinci et al.	2018	Sustainability	HE	>200	Turkey	N/A	QT
3	Ali et al.	2017	Teaching in Travel & Tourism	HE/ O	<50	Globally	N/A	QL
4	Chawla & Manhas	2015	Innovation in Hospitality and Tourism	HE	>200	India	N/A	QT
5	Chawla, G.	2015	In European conference on research methodology for business and management studies	HE	<50	British	N/A	QL
6	Chen et al.	2021	Mathematics	HE	50-100	China	1–6 months	QT
7	Chou et al.	2019	Hospitality, Leisure, Sport & Tourism Education	HE	50-100	China	1–6 months	QT
8	Cynthia et al.	2009	Hospitality & Tourism Education	HE	151-200	Globally	1–6 months	MM
9	Dashper et al.	2023	Sustainable Tourism	HE	<50	UK	N/A	MM
10	Deaconu et al.	2018	Sustainability	SE	>200	Romania	>1 year	QT
11	Deale & Barber	2012	Teaching in Travel & Tourism	HE/O	>200	Globally	N/A	QT
12	Farsari, I.	2022	Journal of Teaching in Travel & Tourism	HE	0	Sweden	N/A	QL
13	Fuchs, K.	2022	Data in Brief	HE	>200	Thailand	1–6 months	QT
14	Hughes & Scheyvens	2021	World Development	HE	50-100	Fiji	1–6 months	QL
15	Hung et al.	2023	Sustainability	HE	50-100	China	>1 year	QL
16	Iriste & Fox	2019	In 14th International Scientific Conference Students on Their Way to Science	HE	<50	Globally	6–12 months	QL
17	Jurowski, C.	2001	Hospitality & Tourism Education	HE	<50	USA	N/A	QL
18	Karakiraz et al.	2021	Sage Open	HE	101-150	Turkey	6–12 months	MM
19	Kiryakova-Dineva et al.	2019	European Journal of Sustainable Development	HE/O	101-150	Bulgaria	6–12 months	MM
20	Koblianidze & Sachaleli	2023	ESI Preprints	HE	0	Georgia	1–6 months	MM
21	Lampoltshammer et al.	2023	Sustainability	HE	0	Austria	N/A	QL
22	Liu et al.	2017	Hospitality, Leisure, Sport & Tourism Education	HE	>200	N/A	1–6 months	MM
23	Liu et al.	2024	Hospitality, Leisure, Sport & Tourism Education	HE	151-200	China	N/A	QT
24	Lo, W. S.	2022	Behavioral Sciences	HE	<50	China	6–12 months	QL
25	Millar, M.,	2013	Hospitality & Tourism	O	<50	USA	1–6 months	QL

No.	Authors	Year	Journal	Education	Sample Size	Country/ Region	Study Length	Method
	& Park		Education					
26	Miller, A.	2020	Heliyon	HE	<50	Cambodian	>1 year	QT
27	Mínguez et al.	2021	Hospitality, Leisure, Sport & Tourism Education	HE	>200	Spain	1–6 months	QT
28	Sezen-gültekin & Argon	2022	Contemporary Educational Research	HE	<50	Turkey	N/A	QL
29	Tavitiyaman & Zhang	2024	Hospitality & Tourism Education	HE	>200	China	6–12 months	QT
30	Van & Cavagnaro	2014	Faculty of Tourism and Hospitality Management	HE	0	South Africa	N/A	QL
31	Vespestad & Smørvik	2020	Journal of Hospitality & Tourism Education	HE	<50	Norway	>1 year	QL
32	Yu et al.	2021	Sustainability	HE	>200	China	1–6 months	QT
33	Zhang & Tavitiyaman	2022	Journal of Hospitality, Leisure, Sport & Tourism Education	HE/O	>200	China	N/A	QT
34	Zhang et al.	2020	Sustainability	HE/O/SE	50-100	Globally	6–12 months	QT
35	Zhou et al.	2021	Sustainability	HE	<50	China	1–6 months	QL
36	Zizka & Varga	2021	Hospitality & Tourism Education	HE	>200	Switzerland	1–6 months	QT
38	Zizka, L.	2022	Hospitality & Tourism Education	HE	>200	Globally	N/A	QL
37	Zizka, L.	2017	Teaching in Travel & Tourism	HE	0	Switzerland	N/A	QT
39	Zvereva, O.	2019	Innovations, Technologies and Research in Education	HE/O	<50	Latvia	1–6 months	QL