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Exploring the relationship between circular tourism and tourist satisfaction: Empirical evidence

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ABSTRACT

This study examines the impact of circular tourism on tourist satisfaction at travel destinations, emphasizing its role in promoting sustainability and enhancing visitor experiences. A survey was conducted with 314 tourists at a selected destination using a random sampling method. The collected data were analyzed using SPSS 26.0 and AMOS 20 to test the relationships among circular tourism, destination image, sustainable tourism, and tourist satisfaction. The results indicate that circular tourism positively influences destination image, sustainable tourism, and tourist satisfaction. Additionally, destination image enhances both sustainable tourism and tourist satisfaction, while sustainable tourism also contributes positively to satisfaction. Furthermore, demographic factors are found to impact these variables, highlighting their role in shaping tourism experiences. Circular tourism plays a crucial role in improving destination image, promoting sustainable tourism practices, and increasing tourist satisfaction. These insights provide valuable guidance for tourism stakeholders in developing sustainable tourism strategies.

Contribution/Originality: This study contributes to the growing body of research on circular tourism by demonstrating its direct and indirect effects on tourist satisfaction. The findings offer practical implications for policymakers and tourism managers seeking to enhance destination competitiveness through sustainable tourism practices.

1. INTRODUCTION

The traditional and linear economic model has revealed various challenges, especially in the context of resource depletion and climate change (Ghisellini & Ulgiati, 2020). Among them, the tourism industry contributes significantly to untreated waste in the environment, which leads to climate change (Ellen MacArthur Foundation, 2023). According to data from the Institute for Tourism Development Research (ITDR), in 2023, the tourism industry in Vietnam released over 300,000 tons of unrecycled plastic waste into the environment (Anh, 2023). Although tourism creates negative impacts on the environment and ecosystems, it also creates job opportunities for more than 40 thousand workers each year (Vietnam National Administration of Tourism, 2020) and makes a substantial contribution to Vietnam's economic growth. In the first five months of 2024, the development of the tourism sector added over one percentage point to Vietnam's GDP (Michael Kokalari, 2024). Circular tourism (CT) is the application of circular economy principles in the tourism industry, in which products and services are recyclable or become

components and inputs for other products and services. The goal is to contribute to the sustainable development of tourism and reduce its impacts on the environment. As a result, a circular economy (CE) is a necessary transition in order to make the tourism field more sustainable and enhance tourist satisfaction (Rudan, Nižić, & Grdić, 2021). The overexploitation of tourism resources has gradually led to the depletion of resources as well as the loss of existing attractiveness due to environmental problems and human activities (Anh, 2023).

Recognizing the crucial role of the circular economy in tourism, we decided to conduct this study for several key reasons. First, the concepts or aspects that define a circular tourism sector remain unclear in the literature (Arzoumanidis, Mancini, Walker, Petti, & Raggi, 2020; Mishulina, 2023). Second, although numerous studies have indicated the relationships between circular tourism and tourists (Robaina, 2022) sustainability (Kaszás, Keller, & Birkner, 2022; Rudan et al., 2021) and destination image (Bosone & Nocca, 2022; Kiaušienė, Hladkova, & Makūnaitė, 2024) these studies are often limited to qualitative approaches or descriptive statistics, lacking empirical evidence to strengthen the validity of the hypotheses. Third, through a comprehensive review, the authors found that there is no benchmarks representing the factor of circular tourism. The absence of essential studies has made applying the circular economy in tourism challenging and fraught with difficulties (Rodríguez, Florido, & Jacob, 2020). Therefore, our research contributes both theoretically and empirically to the field of circular tourism. In detail, the authors propose a unified understanding of circular economy applications in tourism by defining the concept of circular tourism and its aspects. Furthermore, the authors develop a measurement scale for circular tourism factors based on findings from previous studies. Finally, our study is the first to empirically demonstrate the relationship between circular tourism and tourist satisfaction, mediated by sustainable tourism and destination image.

Ninh Binh is a province in northeastern Vietnam with a unique geographical position and a diverse ecosystem that includes coastal areas, plains, and mountains (Thuy, 2023). This diversity provides Ninh Binh with abundant and varied tourism resources (Thuy, 2023). Additionally, the province boasts a rich historical and cultural heritage, serving as Vietnam's capital during the feudal era. Up to November 2024, Ninh Binh welcomed over 7 million domestic and international visitors, a 32.7% increase compared to 2023 (Communist Party of Vietnam Electronic Newspaper, 2024). The reason we chose Ninh Binh province as a case study is due to its relatively successful application of circular economy principles in tourism in Vietnam, which provides statistically meaningful data for assessing the impact of circular tourism on visitors. Since the early 2000s, the province has prioritized sustainable tourism development, shifting from "brown" to "green", and transitioning from manufacturing industries to sustainable tourism development (NinhBinh Newspaper, 2023b). For instance, Plan No. 07/KH-UBND dated 17/07/2009 authorizes a commitment to transforming tourism into a "smoke-free" industry, promoting "greening" in resource exploitation and usage (Thuy, 2023). In the yearly Congress Party, sustainable tourism linked to the circular economy has been a strategic development goal in Ninh Binh, which is one of the four economic pillars (Hung, 2024). Additionally, in 2023, the province ranked among the top 10 most popular tourist destinations in the world, a prestigious award recognizing destinations and accommodations globally (Van, 2023). In the same year, Ninh Binh's provincial Green Index rose by 25, ranking 19th in the country, indicating a significant improvement in the province's tourism environment (NinhBinh Newspaper, 2023a). Furthermore, the provincial government has implemented significant policies to attract sustainable capital investment in tourism (Thuy, 2023). Ninh Binh is also a famous tourist destination, featuring diverse terrains, cultures, and natural conditions (Giang, 2022). In the first six months of 2024, the province's tourism revenue accounted for 5,963.8 billion VND, reaching 72.0% of the target. Additionally, Ninh Binh possesses great potential to promote tourism, but sustainable and circular tourism activities have not yet been fully implemented (Quynh, 2018).

From the problems mentioned above, this study seeks to answer the following research questions (RQs):

Research question 1 (RQ1): How does circular tourism impact tourist satisfaction?

Research question 2 (RQ2): How does circular tourism impact satisfaction through the destination image and sustainable tourism?

This study is divided into seven main sections. Section 1 introduces the research. Section 2 presents the foundational theories related to circular tourism. Section 3 provides a literature review and develops the research hypotheses. Section 4 outlines the research methodology. Section 5 presents the research findings. Section 6 discusses the results and implications. Section 7 presents the conclusion and the limitations of the research.

2. UNDERPINNING THEORY

2.1. The Equity Theory

In this study, the authors mainly use the equity theory, which was built and developed by Oliver and Swan (1989). This theory finds that the satisfaction of customers exists when they receive the output and input rates are the same (Oliver & Swan, 1989). In other words, customers feel satisfied if they perceive that values such as money, time, and benefits meet their expectations (Woodruff, Cadotte, & Jenkins, 1983). This theory has been widely recognized by many scholars and is considered particularly useful for modeling situations in which customer satisfaction is an important factor (Yüksel & Yüksel, 2008). In terms of tourism, equity theory shows that tourists compare their inputs and outputs and feel satisfied when their expected benefits are equal to the time, money, and other costs they have spent. According to this theory, tourists achieve satisfaction through the benefits they gain from purchasing or experiencing tourism services and the effort they invest to obtain these products and services (Yüksel & Yüksel, 2008). This indicates that tourism conditions such as circular tourism, destination image, and sustainable tourism are direct factors impacting tourist satisfaction. Therefore, this theory will support the hypotheses presented below.

2.2. Concept of Circular Tourism

The concept of circular economy (CE) was first introduced by Pearce and Turner (1990), in which the economy is based on the basic principle that "everything is the input of something else." This applies principles of sustainable consumption that differ from a linear economy, in which it is established where inputs come from collection, design, and consumption to produce sustainable value (Manniche, Larsen, Broegaard, & Holland, 2017). The circular economy will replace the traditional economic model by reducing, reusing, recycling, and recovering the production, distribution, and consumption processes, thus applying a circular economy with the goal of achieving sustainable development (Arzoumanidis et al., 2020). In Vietnam, the concept of the circular economic model has been in existence for close to 20 years under various names, such as the VAT model (Garden - Pond - Barn), which has been applied successfully. However, the circular economy was formally acknowledged and solidified with Decision No. 687/QD-TTg, approved by the Prime Minister, on the project for developing a circular economy in Vietnam. This shows that the Party and Government are aware of the huge opportunity for circular economic development in Vietnam.

In terms of the circular tourism concept, Ma, Li, Ai, and Chen (2016) pointed out that circular tourism can be applied to various types of tourism, such as management centers, restaurants, hospitality venues, and shopping areas in general. The authors performed a search through Scopus, Google Scholar, etc., employing the key phrase "circular tourism," which returned a limited number of documents on circular tourism. Each study offered a different concept for this issue (Arzoumanidis et al., 2020). On the one hand, Patti (2017) described circular tourism as the way of traveling that has the least impact on the environment and produces the lowest carbon emissions. On the other hand, Naydenov (2018) proposes an overview; he defines circular tourism as simply having the ultimate goal of developing sustainability and the restoration of nature. Furthermore, circular tourism originates from the term ecotourism from the previous decade, and ecotourism represents similar aspects to circular tourism (Pan et al., 2018). However, circular tourism is not just green tourism; it focuses on limiting the consumption and waste of non-renewable resources. Furthermore, recovering, reusing, redeveloping, and regenerating are key factors in sustainable development and circular tourism (Bosone & Nocca, 2022). In summary, from the various concepts developed in previous studies, we propose the following understanding: circular tourism is the application of circular economy principles to tourism,

including the reuse, reduction, and recycling of products/services with the goal of developing a sustainable tourism industry with low impact on the natural environment.

2.3. Aspects of Circular Tourism

Unlike traditional (linear) tourism, which follows the "take-make-dispose" principle, circular tourism adopts a "take-make-use-recycle" approach (Girard & Nocca, 2017). Implementing circular tourism requires focusing on the role of tourists in maintaining destination sustainability by being aware of their actions (Bosone & Nocca, 2022; Rudan et al., 2021; Sørensen & Bærenholdt, 2020). Actions such as combining walking, cycling, and nature-oriented activities; sharing accommodations; using public transportation; and using sustainable and recyclable products contribute to the development of circular tourism (Sørensen & Bærenholdt, 2020). Moreover, customer awareness of purchasing environmentally friendly products is witnessing an increasing trend (Ageron, Gunasekaran, & Spalanzani, 2012), which is a fundamental aspect of transitioning to circular tourism. Therefore, customer satisfaction will be one of the factors that motivate the company to convert to a circular economy model and produce sustainable products (Wognum, Bremmers, Trienekens, Van Der Vorst, & Bloemhof, 2011). Beyond the role of tourists, the awareness of travel service providers is also crucial (Vargas-Sánchez, 2021). According to the results of Kang, Stein, Heo, and Lee (2012), businesses in the tourism industry can increase customers' awareness of environmental protection and sustainability. Moreover, this study also finds that travelers with a higher concern and awareness about the environment are more willing to pay premiums for green initiatives in hotels. Consequently, service providers play a proactive role in offering eco-friendly services and products such as reusable towels and linens, reducing water usage, using renewable energy, and implementing waste management policies (Robaina, 2022). Another aspect of circular tourism involves having terms clearly defined in law. Collaboration between businesses and legislators is necessary to create supportive policies that maintain and develop the circular economy, such as capital access policies and tax reductions… (Khan, Marrucci, Daddi, & Bellini, 2021). This guidance is essential for orienting businesses and helping them recognize their responsibilities and roles in sustainable activities (Nhu & Huy, 2023).

With the rapid growth of the tourism industry, circular models for tourism buildings and facilities are also critical (Manniche et al., 2017). Tourism infrastructure should be built using reusable and highly recyclable materials. This includes designing spaces that allow flexible use and minimizing waste, and making buildings and products adaptable and easily reusable (Manniche et al., 2017).

From the aspects mentioned above, it is suggested that circular tourism can be assessed based on five aspects: (1) Are tourism products and services designed according to circular economy principles?; (2) Do local authorities implement policies that encourage and maintain circular tourism?; (3) Do tourists play a key role in maintaining or developing circular tourism?; (4) Are businesses and travel service providers proactive in offering circular products and services?; (5) Are the architectural structures at destinations designed to minimize environmental impact?

3. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

3.1. Tourist Satisfaction

The literature review process shows that studies use empirical methods to point out different factors that influence tourist satisfaction at each destination. The characteristics of a destination play an essential role in determining whether visitors feel satisfied. Gender and the seasonal nature of the destination are factors that have been discussed, which have been shown to produce significant differences (Che et al., 2021). Additionally, demographic factors such as age, gender, income, and region also affect tourists' satisfaction levels (Jalilvand, Samiei, Dini, & Manzari, 2012). Destination safety and public security significantly impact satisfaction; it can be said that these are fundamental and critical factors when tourists choose a place to travel (Dinh, Cao, & Lua, 2021; Giao, 2020; Hong, Hong, & Minh, 2022; Trang, 2022; Tuan, 2015). Moreover, the infrastructure at the tourist destination is frequently seen as an important factor, with most studies pointing to a positive relationship between facilities and satisfaction

(Dinh et al., 2021; Tuan, 2015). For example, "night economy" services, a signature tourism service in Hanoi's Old Quarter, have been shown to positively impact customer satisfaction and increase provider profits (Loan et al., 2023). Furthermore, food, entertainment services, service pricing, and tour guides have also been found to correlate positively with tourist satisfaction (Hai & Giang, 2011; Loan et al., 2023).

The author found that factors such as destination safety, local features, infrastructure, products/services, and pricing have been extensively studied and evaluated previously. Therefore, with limited resources and research objectives, this research focuses on exploring and analyzing the influence of circular tourism on tourist satisfaction. Additionally, the authors evaluated how demographic factors affect satisfaction.

3.2. Ccircular Tourism

Developing tourism based on a circular economic principle can be considered a strategic approach to sustainable tourism development in Vietnam. This approach brings multiple benefits not only to businesses and destinations but also to tourists (Nhu & Huy, 2023). Additionally, applying the circular economy in tourism has positive social impacts on local communities through direct or indirect connections with tourists (Richard, Le Ba, Nguyen, & Nguyen, 2022). Tourists also play a central role in promoting the success of CE in tourism, serving as a driving factor for businesses and the government (Bosone & Nocca, 2022). Their research findings indicate that older tourists are willing to spend more on circular services. This highlights a connection between circular tourism and tourists, but this research does not demonstrate its impact on customer satisfaction. Rodríguez et al. (2020) and WTO (1998) found that the existence of CE at destinations plays a vital role in developing sustainable tourism that aims to satisfy tourists, provide suitable accommodations, and protect the environment. However, these studies relied on a literature review approach, and their findings did not emphasize the role of tourist satisfaction but rather focused on the potential for sustainable tourism development through the application of the circular economy. In summary, research on the relationship between circular tourism and customer satisfaction remains limited. First, previous studies often adopted a literature review approach, lacking empirical evidence. Second, field studies have paid little attention to tourists, instead focusing on the impact of circular tourism on the tourism industry as a whole. This highlights the necessity of our study to address these research gaps. Based on these viewpoints, the author proposes the following hypotheses.

H₁: Circular tourism has a positive impact on tourist satisfaction.

It is evident that a destination's image is shaped by how tourists perceive the value they receive, including services, facilities, natural conditions, and more (Aksoy & Kiyci, 2011). Thus, implementing a circular economy in tourism can also improve the image of this destination by making it more attractive to tourists, visitors, talents, and capital (Bosone & Nocca, 2022). Indeed, the application of a circular economy can enhance both tangible and intangible conditions at the destination, thereby positively influencing satisfaction and destination image in the minds of tourists (Kiaušienė et al., 2024). Applying a circular economy in tourism can have various benefits for the destination image. For example, using clean energy sources can create a clean atmosphere and environment. Additionally, infrastructure supports sustainable transportation, which guarantees access to sustainable and circular mobility at tourist destinations (Strippoli, Gallucci, & Ingrao, 2024). These conditions can help improve the destination's image in the mind of the traveler, which enhances their satisfaction. However, the above studies focus on assessing the impact of sustainable vehicles on destination image rather than evaluating the comprehensive effects of circularity. Therefore, the author will continue to examine the relationship between these two factors.

H₂: Circular tourism has a positive impact on destination image.

Currently, tourism must pay attention to shifting tourist demands. We must recognize that social pressures and tourists' needs support sustainable development, and circular tourism is an effective approach to achieving this (Martínez-Cabrera & López-del-Pino, 2021). The principles of sustainability encompass natural, economic, and socio-cultural aspects of tourism development. According to Rudan et al. (2021) and Rudan (2023), they highlighted the link between the application of the circular economy (CE) and sustainable cultural tourism in Croatia. It emphasizes

core values such as the conservation of natural resources and the culture of the destination, ensuring that they remain unchanged under external pressures from tourists, locals, and authorities. Additionally, circular tourism is based on the principles of the circular economy, and tourism types should be developed in line with these principles to achieve long-term sustainability, including the preservation of local culture and heritage (Rudan et al., 2021).

Moreover, Joshi, Sharma, and Kler (2020) conducted a study to identify key circular economy dimensions in the Agri-tourism industry and determine their performance. They identified 11 circular economy dimensions through a systematic literature review, emphasizing the importance of incorporating circular economy principles in the tourism sector. The results of a study also found an important role for the circular economy in tourism. Indeed, circular tourism must adhere to the logical principles of the circular economy and align its business models with the principles of sustainable development (Kaszás et al., 2022). To achieve this, it is necessary to rely on CE principles, including the reuse of heritage, local economies, businesses, taxes, and public expenditure (Girard, 2019). Additionally, circular tourism can help manage resources sustainably, aiming to produce goods and services with minimal environmental impacts (Nedyalkova, 2016). Overall, the literature review suggests that circular tourism and sustainable tourism are essential for the long-term viability of the tourism industry. By incorporating circular economy principles, stakeholders can work towards creating a more sustainable and environmentally friendly tourism sector. However, most studies mentioned above have followed qualitative methods, highlighting the necessity of empirical evidence to fill the research gaps. Based on these viewpoints, the author proposes the following hypotheses.

H_3: *Circular tourism has a positive impact on sustainable tourism.*

3.3. Destination Image

The overall perception of individuals, or the total set of impressions of a destination, can be defined as a destination image (Jalilvand et al., 2012; Phelps, 1986). Numerous studies have confirmed that destination image plays a significant role in the development of tourism and marketing strategies (Grosspietsch, 2006). According to Crompton (1979), destination image comprises the impressions and distinctive elements that remain in tourists' minds. Thus, factors such as service prices, facilities, and tour guides reflect the quality of the destination. Many prior empirical studies have identified a positive relationship between destination image and tourist satisfaction (Le & Du, 2022; Park & Nunkoo, 2013; Thu, Binh, Le Mai, Le Dinh, & Kieu, 2023). A highly rated destination can motivate tourists to return, increasing attractiveness and stimulating tourist spending (Chen & Chen, 2010; Vien, 2020). However, most studies have been conducted in developed countries, where the tourism industry is well-developed and places significant emphasis on environmental issues. In contrast, this relationship may differ in the context of developing countries like Vietnam. Furthermore, the findings of these studies have not been situated within the context of circular and sustainable tourism. This highlights a lack of essential literature in the context of the circular economy. From the above perspective, we propose the hypothesis.

H_4: *Destination image has a positive impact on tourist satisfaction.*

H_5: *Destination image mediates the relationship between circular tourism and tourist satisfaction.*

Moreover, studies have indicated that destination image is connected to sustainable development. This is supported by research from Camprubí and Gassiot-Melian (2023) and Li and Cheng (2022), which suggests that destination branding and unique branding complement each other, aiding tourism sustainability. However, studies focus on conceptual frameworks or theoretical perspectives, with limited empirical validation. Destination image should be built through mass media and social media to improve sustainable tourism by guiding customer behavior and decision-making processes (Hua, Jittithavorn, Lee, & Chen, 2021). Additionally, the image is strengthened through local networks, including residents, local knowledge, and cultural resources, in there, promoting sustainable tourism that emphasizes the role of locals in preserving the traditional culture (Fan, Zhou, & Zhang, 2021). However, research by Hua et al. (2021) and Fan et al. (2021) leaves a gap in understanding how these strategies can be tailored to specific regional or cultural contexts, such as Vietnam or other developing countries. According to Zhou, Siow,

Ariffin, and Aziz (2024), attributes of destination image such as society, economy, and the environment have an impact on sustainable tourism. Sustainable tourism plans require destinations to collaborate with local communities, practitioners, and policymakers as they strike a balance between the requirements of tourism development and conservation (Zhou et al., 2024). But they do not explore the interplay between these factors and how they collectively shape tourist behavior, destination satisfaction, or long-term sustainability. Overall, while sustainable tourism is a central focus, these studies do not delve into the role of the circular economy in shaping destination image. As the circular economy becomes increasingly important for sustainability, the absence of this perspective limits the applicability of their findings in a broader context of sustainable development. Based on these perspectives, we propose the following hypotheses.

H_6: *Destination image has a positive impact on sustainable tourism.*

3.4. Sustainable Tourism

In terms of economic benefits, Streimikiene, Svagzdiene, Jasinskas, and Simanavicius (2021) discussed the significance of sustainable tourism development in enhancing competitiveness, emphasizing the importance of economic, social, and environmental targets in tourism destination territories. In this context, tourism development needs to focus on the role of tourists and viewing them as a crucial link in maintaining this development. However, the evidence remains unclear, as these studies primarily approach sustainable tourism from the perspective of its impact on the economy, society, or the environment of destinations. However, logically, these factors could undoubtedly influence tourist satisfaction. Research by Gursoy, McCleary, and Lepsito (2007) and Naidoo, Ramseook-Munhurrun, and Seegoolam (2011) has recognized the broad and positive relationship between satisfaction and the long-term survival of the tourism industry. Tourist satisfaction will build the long-term viability of tourism and travel companies. Satisfaction partly reflects whether the quality of products and services meets their needs, which is also a factor driving sustainable development (Razović, 2013). Tourist satisfaction and sustainable development have been considered on both sides of the same coin (Asmelash & Kumar, 2019; Bernini, Urbinati, & Vici, 2015). This is a potential factor that supports the development of sustainable tourism (Daud & Rahman, 2011). Based on this perspective, we propose the following hypothesis.

H7: Sustainable tourism has a positive impact on tourist satisfaction.

H8: Sustainable tourism mediates the relationship between circular tourism and tourist satisfaction.

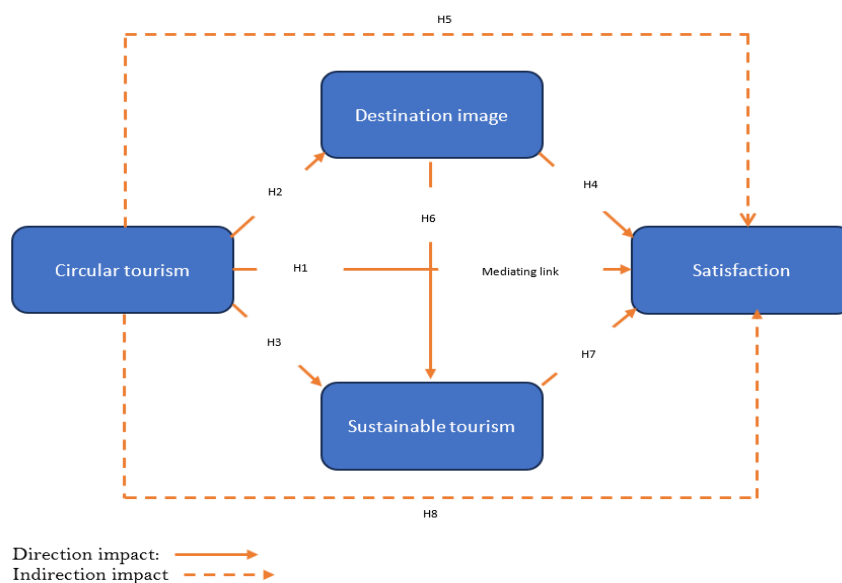The research model (see Figure 1) is presented below.

Figure 1. Research model.

4. METHODOLOGY

4.1. Data Collection and Sampling

To test the research hypotheses, our team collected and analyzed data from tourists visiting Ninh Binh in five popular tourist areas with a high number of visitors: Bai Dinh Pagoda, Trang An Eco-Tourism Complex, Cuc Phuong National Park, Tam Coc – Bich Dong, and Mua Cave. To ensure randomness, we used a data collection method similar to the mall-intercept approach. The data collection process lasted from August 22 to November 15, 2024, which falls within Ninh Binh's peak tourism season, from September to April of the following year (Ninh Binh Newspaper, 2024). Data collection was conducted by team members and trained interviewers. The data collectors stood at public locations and gathered data randomly. When four tourists walked by, the interviewer would invite one of them to participate in the interviews. Tourists were informed and explained about the purpose of the survey and the concept of circular tourism, and all information was kept confidential before the data collection took place. A total of 331 tourists agreed verbally to participate in the survey, and after the first data filtering, 314 questionnaires were considered valid and included in the analysis.

Based on the data provided by the Government (2024) and research by Do, Pham, Duong, and Nguyen (2019), the sample size of this study may be representative of tourists in Ninh Binh. The data showed significant similarity. The gender ratio in the study was 47.77% male and 52.23% female, which is similar to the findings of Do et al. (2019), which reported 45.8% male and 54.2% female. Additionally, the proportion of domestic tourists in the study is 73.89%, compared to 26.11% for international tourists, which closely aligns with the government statistics of 80.11% domestic tourists and 19.89% international tourists. According to the recommendations of Hair, Black, Babin, Anderson, and Tatham (2006), the minimum sample size for the study was 125 samples, based on the formula j x 5 (where j is the number of items). Therefore, the number of samples used in this study was relatively sufficient in terms of quantity. Table 1 presents the descriptive statistics for the research sample.

Table 1. Demographic and traveling characteristics of the sample (N=314).

Types	Frequency	Percent (%)	Compare sample (%) (Do et al., 2019; The Government, 2024)
N=314			
Gender			
Male	150	47.77	45.8
Female	164	52.23	54.2
Regions			
Domestic	232	73.89	80.11
Foreign	82	26.11	19.89
Age			
Under 24	40	12.74	N/A
25–34	58	18.47	
35–44	94	29.94	
45–54	43	13.69	
55 or above	79	25.16	
Distance			
Under 100km	82	26.11	N/A
100-200km	123	39.17	
200-500km	86	27.39	
Above 500km	23	7.32	
Income			
Under 5.000.000 VND	29	9.24	N/A
5.000.001-10.000.000 VND	76	24.20	
10.000.001-20.000.000 VND	138	43.95	
Above 20.000.001 VND	71	22.61	
Previous experience			
First time	182	57.96	N/A
2 times	69	21.94	
3-5 times	37	11.78	
5 or above	26	8.28	

4.2. Questionnaire Design

To ensure reliability, the authors used measurement scales from previous studies. The five items of the factor "Sustainable tourism" were adopted from the study by Scaccia and De Urioste-Stone (2016). The five items of "Destination image" were adopted from the study by Jalilvand et al. (2012). The scale for "Tourist satisfaction" includes three items, which were adopted from Loan et al. (2023). Additionally, the factor "Circular tourism" is introduced for the first time in the model, which includes five items that were developed by the authors based on previous research. Furthermore, to ensure reliability, the scales were reviewed by experts. Items of all scales are presented below (See Appendix 1.)

All items were designed on a 1 to 5 scale (5-point Likert scale), ranging from "strongly disagree" to "strongly agree." In addition, to ensure consistency in the scales, the author translated all the scales from Vietnamese to English and from English to Vietnamese by a translation expert with many years of experience living in both Vietnam and European countries. The collected data were then processed using SPSS and AMOS software.

4.3. Data Analysis

Firstly, internal consistency measures were used to assess the scale's reliability and validity. We use coefficients such as Cronbach's alpha, average variance extracted (AVE), indicator loadings and critical ratios, and inter-factor correlations. Based on the recommendation of Hair et al. (2006), Cronbach's alpha values and CR > 0.75; AVE values > 0.5; The factors loading > 0.7, and discriminant validity < 0.8 are acceptable. Moreover, the maximum shared variance (MVS) is smaller than the AVE; and the square root of AVE is smaller than the inter-construct correlation, that are a good value.

Secondly, the authors use SEM to test the hypothesis. Some of the coefficients were used to evaluate the suitability of the model, including the chi-square statistic, normed chi-square, the root mean square error of approximation (RMSEA), goodness-of-fit index (GFI), and comparative fit index (CFI). According to Hu and Bentler (1999) chi-square/df should be less than 3.0, the TLI greater than 0.8, the RMSEA value smaller than 0.08; and GFI and CFI greater than 0.85 are good-fitting models.

Finally, a one-way ANOVA was conducted to test the impact of individual factors such as age, gender, salary, and distance on various outcomes.

5. RESULTS

5.1. Reliability and Validity

The results in Table 2 show that the Cronbach's alpha coefficients of the 18 items were greater than 0.70. Additionally, the CR values of all the scales were greater than 0.75, ranging from 0.833 to 0.909. The AVE was greater than 0.5, while the MVS was smaller than its values. Finally, factor loads were suitable for values greater than 0.7.

Table 2. Reliability and validity.

Code	Mean	Cronbach's alpha	Factor loadings	CR	AVE	SQRTAVE	MVS
CT	3.99	0.901					
CT1	4.12	0.714	0.773				
CT2	3.96	0.702	0.795				
CT3	3.92	0.709	0.776	0.909	0.670	0.819	0.353
CT4	3.92	0.745	0.79				
CT5	4.03	0.922	0.915				
DI	3.74	0.877					
DI1	4	0.701	0.761				
DI2	3.47	0.676	0.76	0.894	0.634	0.796	0.199
DI3	3.44	0.602	0.739				
DI4	3.94	0.686	0.779				

Code	Mean	Cronbach's alpha	Factor loadings	CR	AVE	SQRTAVE	MVS
DI5	3.85	0.926	0.928				
ST	3.26	0.865					
ST1	3.64	0.606	0.711				
ST2	3.64	0.647	0.715				
ST3	2.85	0.701	0.801	0.833	0.609	0.780	0.243
ST4	2.85	0.634	0.754				
ST5	3.36	0.912	0.921				
TS	3.55	0.889					
TS1	3.56	0.78	0.789				
TS2	3.53	0.76	0.715	0.890	0.730	0.854	0.353
TS3	3.57	0.809	0.798				

Table 3 shows that the correlation of components among "Circular tourism," "Destination image," "Sustainable tourism," and "Tourist satisfaction" is all below 0.85, ranging from 0.290 to 0.594, and the correlation is significant at $p < 0.01$. This also indicates that the maximum shared variance (MSV) is smaller than the average variance extracted (AVE), and the square root of AVE is smaller than the inter-construct correlation, which indicates good discriminant validity.

Table 3. Correlations.

Correlations				
Component	CT	DI	ST	TS
CT	-			
DI	0.290*	-		
ST	0.277*	0.342*	-	
TS	0.594*	0.446*	0.493*	-

Note: CT=Circular tourism; DI=Destination image; ST=Sustainable tourism; TS=Tourist satisfaction; *p < 0.01.

5.2. Structural Equation Model (SEM) Test

In the next step, the structural equation model was tested. The results showed that Chi-square = 293.017; Df = 129; Chi-square/df = 2.291; TLI = 0.951; GFI = 0.912; CFI = 0.959; RMSEA = 0.064 that represented a good model fit. All of the hypotheses showed a positive relationship, which was presented in Figure 2.
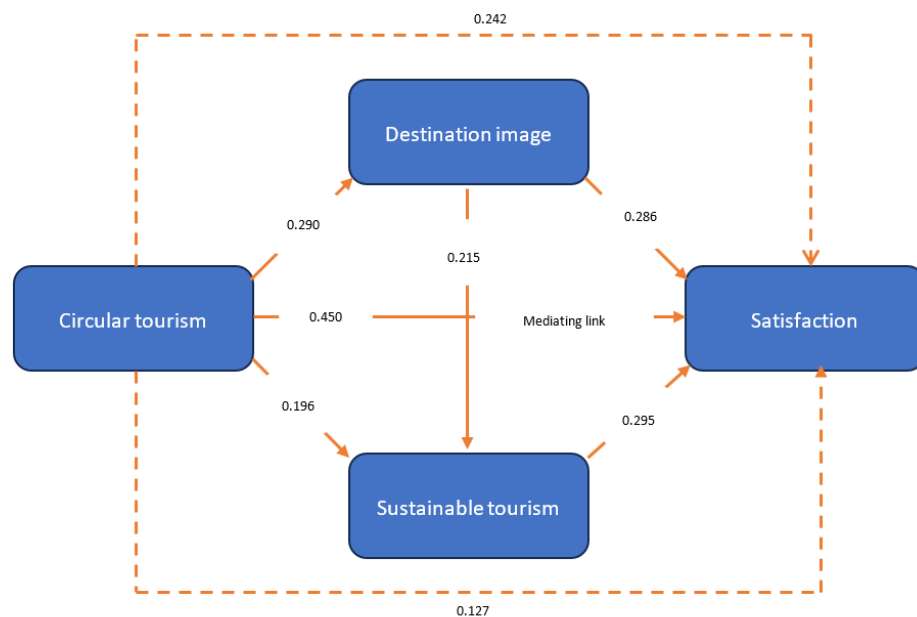

Figure 2. SEM.

Eight hypotheses were tested. As shown in Table 4, the results supported the hypothesized relationships among CT, DI, ST, and ST. Consequently, hypotheses H1, H2, H3, H4, H5, and H6, H7, H8 were supported. Specifically, CT was a significant predictor of TS (H1: b=0.450, sig<0.001); CT has a positive impact on DI (H2: b=0.290, sig<0.001) and ST (H3: b=0.195, sig<0.001). DI has a positive impact on ST and TS, and it mediates the link between CT and TS (H4: b=0.215, sig<0.001; H5: b=0.221, sig<0.001; H6: b=0.160; sig<0.001). Finally, ST was significantly and positively associated with TS, and it mediates the relationship between CT and TS (H7: 0.295; sig<0.001; H8: b=0.185; sig<0.001).

Table 4. Estimate for research model.

Code	Hypotheses	Estimate	Standardized estimate	t-value	S.E	p
H1	CT → TS	0.308	0.450	8.356	0.035	***
H2	CT → DI	0.267	0.290	4.925	0.051	***
H3	CT → ST	0.161	0.195	4.706	0.046	***
H4	DI → TS	0.256	0.286	5.813	0.048	***
H5	CT→ DI → TS	0.221	0.242	5.521	0.032	***
H6	DI → ST	0.160	0.215	6.816	0.037	***
H7	ST → TS	0.244	0.295	7.345	0.042	***
H8	CT→ ST → TS	0.185	0.127	4.572	0.047	***
	Model fit statistic		Chi-square = 293.017 Df = 129 Chi-square/df = 2.291 TLI = 0.951 GFI = 0.912 CFI = 0.959 RMSEA = 0.064			

Note: *** < 0.001 (two-tailed).

Table 5. Effect of demographics on research factors.

Factor	Circular tourism (CT)	Destination image (DI)	Sustainable tourism (ST)	Tourism satisfaction (TS)
Gender	*Sig<0.01*	*Sig<0.01*	*Sig<0.01*	*Sig<0.01*
Male	3.61	3.4	3.02	3.06
Female	4.33	4.05	3.5	4
Age	*Sig<0.01*	*Sig<0.01*	*Sig<0.01*	*Sig<0.01*
Under 24	2.4	3.14	2.79	2.8
25–34	3.5	3.65	3.08	3.29
35–44	4.11	3.81	3.34	3.72
45–54	4.45	3.77	3.44	3.91
55 or above	4.76	4.01	3.47	3.74
Regions	*Sig=0.466*	*Sig=0.936*	*Sig=0.152*	*Sig=0.644*
Domestic	3.26	3.7	3.99	3.57
Foreign	3.3	3.84	4	3.51
Distance	*Sig=0.063*	*Sig=0.003*	*Sig=0.255*	*Sig=0.302*
Under 100km	3.8	3.66	3.32	3.65
100-200km	4	3.73	3.22	3.57
200-500km	4.21	3.86	3.33	3.52
Above 500km	3.75	3.61	3.08	3.28
Income	*Sig<0.01*	*Sig<0.01*	*Sig<0.01*	*Sig<0.01*
Under 5.000.000 VND	3.35	2.83	2.06	2.67
5.000.001-10.000.000 VND	3.59	3.46	2.79	3.36
10.000.001-20.000.000 VND	4.16	3.96	3.31	3.65
Above 20.000.001 VND	4.34	3.99	4.19	3.93
Previous experience	*Sig<0.01*	*Sig<0.01*	*Sig<0.01*	*Sig<0.01*
First time	3.77	3.28	3.06	3.37
2 times	4.29	4.12	3.42	3.77
3-5 times	4.35	4.5	3.73	3.84
5 or above	4.2	4.82	3.63	3.86

5.3. Analysis of Variance

The ANOVA method was tested to analyze how circular tourism, destination image, sustainable tourism, and tourism satisfaction (the dependent variables) are influenced by gender (two levels), age (five levels), regions (two levels), distance (four levels), income (four levels), and experience (four levels), collectively the independent variables. Table 5 shows that gender affects four variables; females have a better experience of circular tourism, destination image, and sustainable tourism, and women have better satisfaction than men. Secondly, age had a significant impact on four variables. In particular, older people are more excited about circular tourism (those above 35 years old have a mean value of more than 4). Third, region and distance had no impact on variables that shared the same mean values. Fourth, tourists with an income over 20 million have a better perception of circular tourism, destination image, and sustainable tourism, and they have higher satisfaction. Finally, previous experience has an impact on all of the variables.

6. DISCUSSION AND IMPLICATION

6.1. Discussion

The research results indicate that circular tourism has a positive impact on tourist satisfaction (H1: b = 0.450, sig < 0.001). This demonstrates that the better the application of the circular economy at a destination, the higher the level of tourist satisfaction. This factor is evaluated for the first time in our study. However, the findings are partially supported by Bosone and Nocca (2022) and Robaina (2022).

This suggests that tourists are increasingly inclined toward environmentally friendly travel, preferring products that protect the environment and participating in activities that enhance sustainable tourism development. The author suggests that this shift in tourist preferences reflects an inevitable trend: as urbanization accelerates, people increasingly seek nature-oriented experiences. These findings also imply that businesses and government organizations must adapt accordingly to meet the growing demand for sustainable options.

Moreover, circular tourism also positively influences tourist satisfaction through the destination image. Indeed, circular tourism has a positive impact on destination image (H2: b = 0.290, sig < 0.001), and destination image positively influences tourist satisfaction (H4: b = 0.215, sig < 0.001). This indicates that destination image plays a significant mediating role in enhancing the relationship between circular tourism and tourist satisfaction. These findings are supported by the studies of Park and Nunkoo (2013) and Che et al. (2021). Furthermore, sustainable tourism also acts as a mediator that strengthens the relationship between circular tourism and tourist satisfaction. This is reflected through the positive relationship between circular tourism and sustainable tourism (H3: b = 0.195, sig < 0.001) and the positive impact of sustainable tourism on tourist satisfaction (H7: b = 0.295, sig < 0.001). These findings are partially supported by the research of Gursoy et al. (2007); Naidoo et al. (2011) and Streimikiene et al. (2021).

This highlights the critical role of circular tourism in promoting sustainability and enhancing destination image, which affects satisfaction. Implementing circular economy practices can be an effective method to help the tourism industry become more sustainable and better aligned with customer demands (Rudan et al., 2021). Furthermore, destination image—a key factor in promoting satisfaction—significantly improves with circular tourism, as it improves a clean and welcoming environment, leaving a positive impression on visitors.

Additionally, the findings suggest that demographic factors also influence these aspects. Female tourists have a better perception than males regarding circular tourism, destination image, and sustainable tourism, and they also report higher satisfaction.

In addition, middle-aged visitors have a better perception of circular tourism, indicating that older visitors tend to prefer circular and sustainable tourism types more than young people. Finally, the study also found that income and experience impact customer satisfaction.

6.2. Implication

To successfully develop circular tourism, the author argues that coordinated policies are essential, with a focus on investment support in the circular tourism sector. These policies should encourage and enable private enterprises to invest in circular tourism. Potential policies may include tax exemptions or reductions, administrative reform, and strategic consulting support to encourage business participation. Furthermore, establishing a clear legal framework is crucial to attracting foreign investment and creating a stable and sustainable investment environment.

An important factor in implementing circular tourism is raising awareness within the community and among businesses. Local governments should focus on educational campaigns to increase awareness of the benefits of circular tourism, which will also contribute to a more sustainable tourism sector. Additionally, local authorities, together with relevant stakeholders, should establish a model of circular economy application model to serve as a basis for evaluating the model's impact on various aspects, such as policy, capital, suppliers, and consumers.

The implementation plan should prioritize building strong partnerships between research institutions, government agencies, businesses, and the local community. The goal is to optimize available resources because circular economy implementation requires collaboration among various stakeholders. This approach also supports the provision of scientific solutions and funding from investment funds.

Both governments and businesses should invest in developing tourism infrastructure, ensuring proper planning to avoid ecological imbalances and environmental pollution. Investment should also target waste collection and recycling facilities. Digitization and the adoption of artificial intelligence (AI) technologies provide effective solutions for managing resources efficiently, enabling faster decision-making based on scientific data, and enhancing the tourist experience at destinations.

Thus, businesses should focus on designing more sustainable products and services. Post-sales services such as repair, maintenance, and product warranties should be emphasized to extend the product lifespan. Additionally, companies should promote their green products and services through targeted communications and consider offering discounts to encourage tourist spending on eco-friendly options.

7. CONCLUSION AND FURTHER RESEARCH

7.1. Conclusion

Green and circular economies are emerging development trends in many countries as environmental degradation increasingly impacts public health and quality of life. With a positive correlation, this study hopes that applying circular economy (CE) principles will drive sustainable growth in the tourism sector. In Vietnam, developing a CE could foster tourism by attracting more domestic and international tourists.

Theoretical contributions, based on the limitations and achievements of previous concepts, the author proposes a new understanding of circular tourism, defining it as the tourism industry's application of core circular economy principles. In addition, through a review of existing research, the author identifies key aspects of circular tourism, including tourism products and services, the role of tourists, the role of the government, and infrastructure. This has led to the development of a suitable scale for evaluating the relationship between circular tourism and satisfaction. The study also reinforces equity theory, indicating that conditions at a destination significantly impact tourist satisfaction.

Empirical contributions, by collecting data from a location that has successfully implemented circular tourism and sustainable development, indicate that the research results are statistically significant. The author introduces a new factor influencing tourist satisfaction, which can be applied to other destinations. The positive relationship between circular tourism and tourist satisfaction demonstrated in this study helps practitioners understand the importance of integrating circular economy principles into tourism, thereby enhancing destination quality and visitor satisfaction.

7.2. Future Research

The study was conducted in Ninh Binh, and data were collected directly from tourists visiting the area. Despite efforts to ensure sample representativeness, limitations may arise due to the specific location and sample size. This issue can be addressed by conducting additional experimental studies in other locations, using larger and more representative sample sizes. Such studies would enhance the generalizability of the findings and provide more comprehensive insights into the application of circular tourism across diverse destinations.

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Appendix 1. Presents items of scales.

Scale	Symbol	Items	Source
Circular tourism	CT1	Tourists can use environmentally friendly tourism products and services which can be reuse/ Have a long life.	Girard and Nocca (2017) and Robaina (2022)
	CT2	Local authorities have measures to encourage circular tourism.	Khan et al. (2021)
	CT3	Tourists are involved in circular tourism activities.	Bosone and Nocca (2022) Rudan et al. (2021) Sørensen and Bærenholdt (2020)
	CT4	Travel businesses proactively provide circular tourism products/Services.	Robaina (2022) Vargas-Sánchez (2021)
	CT5	Buildings are designed to maintain and reduce negative impact on environment.	Manniche et al. (2017)
Destination image	DI1	Ninh Binh is safe and secure.	By Jalilvand et al. (2012)
	DI2	Ninh Binh offers exciting and interesting places to visit.	
	DI3	Ninh Binh has beautiful scenery and natural attractions.	
	DI4	Ninh Binh has a pleasant climate.	
	DI5	As a tourism destination, Ninh Binh offers good value for money.	
Sustainable tourism	ST1	The natural environment in Ninh Binh is being protected now and for the future.	By Scaccia and De Urioste-Stone (2016)
	ST2	Tourism in Ninh Binh is developed in harmony with the natural environment.	
	ST3	Tourism development in Ninh Binh always protects wildlife and natural habitats.	
	ST4	Natural diversity in Ninh Binh is highly appreciated and protected.	
	ST5	Tourism development in Ninh Binh actively promotes environmental ethics.	
Tourism satisfaction	TS1	I had a wonderful and enjoyable experience in Ninh Binh.	By Loan et al. (2023)
	TS2	Travel in Ninh Binh met my expectations.	
	TS3	I was satisfied and decided to choose Ninh Binh as a tourist destination.	