

external memory

by Perpustakaan Referensi

Submission date: 06-May-2025 11:50AM (UTC+0700)

Submission ID: 2257851829

File name: cek_plagiat.pdf (220.66K)

Word count: 5817

Character count: 35971

Revealing The Mediating Role of Internal and External Vivid Memories: From Sustainable Tourism Attributes to Tourist Loyalty

ABSTRACT

The concept of tourism experience has evolved to emphasize memorable, where the focus is not only on satisfaction but also on creating unforgettable moments. Moreover, in the digital era, technology has significantly assisted biological memory and enhanced lasting memories of tourism experiences. Despite this, limited research has explored how sustainable tourism attributes can enhance memorable experiences and how technology aids tourist memory. Therefore, this research examines how sustainable tourism attributes can foster tourist loyalty through internal and external vivid memory. Sustainable tourism is measured through three multidimensional aspects: environmental, socio-cultural, and economic attributes, which contributes to the tourist experiences. A survey of 432 foreign tourists in four Indonesian cities, Yogyakarta, Manado, Badung Bali, and Surabaya, was conducted to collect data, and it was analyzed using PLS-SEM (Partial Least Squares Structural Equation Modeling). The findings indicate that each sustainable attribute contributes significantly to the external vivid memory. However, environmental attributes do not significantly affect internal vivid memory. Furthermore, the results reveal that neither internal nor external vivid memory serves as a mediating variable between environmental attributes and tourist loyalty. Conversely, it functions as a partial mediator in the relationship between socio-cultural attributes and loyalty. It is also noteworthy that vivid memory acts as a full mediator in the relationship between economic attributes and tourist loyalty. Moreover, the result shows that remembering through digital technology is more impactful to loyalty than biological memory. This study provides new perspectives on the role of technology and biological memory in enhancing tourist loyalty.

Keywords: Sustainable Tourism, Tourism Experience, Vivid Memory, Tourist Loyalty.

1. Introduction

Tourism has evolved to focus on memorable experiences, which can increase the value of tourism services [1], [2], [3]. This shift has occurred due to changes in tourist behaviour, as they are no longer satisfied with ordinary tourist attractions. Instead, they are looking for destinations that will offer a unique and authentic experience [1], [4], [5], [6]. Positive tourist experiences significantly influence their perceptions and memories of tourist visits [7], [8], [9], [10]. The more detailed a person's memory of an event is, the less likely it is to be forgotten. The term vivid memory describes autobiographical memories linked to sensory experiences from previous events [11]. The findings of previous studies indicate that tourists perceive the value of their experiences and retain memories, which are perceived as extraordinary, authentic, and unique [12], [13], [14]. The value derived from this experience enhances the vividness of visitors' and tourists' memories, which in turn fosters loyalty behaviours such as recommending the experience to others and intending to revisit the destination [12], [13], [14].

Previous studies have primarily focused on vivid memory as biological memory, which refers to natural memory stored in the human brain [12], [13], [14], [15]. However, with the advancement of digital technology, memory is no longer solely reliant on biological processes but also supported by external tools outside the human body [16], [17], [18]. The storage of memories involving external media, such as smartphones and social media, is called cognitive augmentation [16]. Therefore, this study expands the vivid memory dimensions to include internal or natural and external or digital technology that helps enhance memory retention.

In addition, the tourism industry has evolved concerning sustainability [19], [20], [21]. The concept of sustainability in the tourism industry highlights the significance of implementing responsible tourism practices with the dual objective of preserving natural and cultural resources while simultaneously generating economic benefits [22], [23]. It is argued that a tourism industry that is able to prioritize environmentally friendly programs, economic growth, and the preservation of the culture of its local population will be able to provide tourists with a positive experience [24]. Previous studies have generally employed a three-dimensional conceptualization of

sustainability, including environmental, socio-cultural, and economic dimensions [24], [25], [26]. The environmental aspect of sustainable development encompasses conserving renewable and non-renewable natural resources. The socio-cultural dimension pertains to the protection of socio-cultural resources. The economic dimension prioritizes the fulfilment of society's economic needs and the enhancement of its living standards.

Sustainable tourism, in the previous studies, has only been examined from the perspective of local residents [27], [28] and tourism-related businesses perspective [21], [29], [30]. In addition, research on sustainable tourism that examines tourist behaviour is mostly concerned with the assessment of pre-visit attitudes or behaviours [31], [32], and focuses only on environmental aspects [33], [34], [35], [36]. There is a gap in the literature that examines the concept of sustainable tourism thoroughly, considering the economic, sociocultural, and environmental aspects [37] and evaluating its added value from the perspective of tourists [26].

In response to the growing interest in sustainable and memorable tourism, this study aims to explain its application in the context of destination attributes. Therefore, this study explores the impact of sustainable tourism attributes on tourists' internal and external vivid memories and loyalty. This research makes a valuable contribution to tourism studies, offering new insights into how sustainability attributes and external memory aids influence tourists' loyalty.

2. Literature Review

2.1 *Cognitive Augmenting Theory*

Digital technologies can significantly enhance human memory by providing tools that help reconstruct past events with greater clarity and detail [16], [17], [38]. External storage of personal memories, e.g. photos, videos, and diaries, falls under the concept of cognitive augmenting, where external media are a means of expanding biological memory capabilities rather than replacing them [16]. This is because human memories are prone to bias, distortion, and fading over time. In contrast, external media that digitally store memory traces are reliable due to their

accuracy, completeness/detail, and objectivity [17]. As such, one of the important benefits of using digital memory aids is reducing the cognitive load [16]. This may reduce the concern of forgetting important information where the data has been stored externally. This externalization of memory allows a person to focus on other cognitive activities, thus increasing overall cognitive efficiency and potentially improving quality of life in work, health, and education [17].

2.2 Sustainable Tourism

The main idea of sustainable tourism is to promote the integration of economic, social, and environmental considerations into the management of tourism-related activities. The underlying premise was that such an approach could ensure the fulfilment of these diverse needs of stakeholders by incorporating cultural elements, ecological processes, and biodiversity, thereby facilitating the advancement of society [39]. From tourists' perspective, sustainable tourism is seen as an ongoing process that considers the needs of tourists in the present and future generations [40]

The notion of sustainable tourism is inherently multifaceted, necessitating the utilization of more than one dimension to assess its various dimensions accurately. The environment, for instance, is not sufficient to evaluate the concept [33], [34], [41], [42]. Therefore, it is necessary to employ multidimensional measurements to gain a more comprehensive understanding [25], [26]. A previous study delineated the four dimensions of sustainable tourism, namely environmental, social, cultural, and economic [43]. However, most prior studies have classified the dimensions of sustainable tourism into three primary categories, integrating social and cultural aspects into a unified framework. This approach aligns with the triple bottom-line theory [24], [26], [39], [44]. In other studies, social and economic factors are examined in conjunction with other elements, such as culture and the environment. [45].

2.3 Economic Attributes, Vivid Memory, and Tourist Loyalty

The economic growth of a destination can be observed in several ways, including an increase in business and employment opportunities, the development of local

facilities and infrastructure, an improvement in the living standards of the population, and an expansion in the number of local products and services [45]. Prior research indicates that elements of a city's economy, such as public infrastructure, accessibility, tourism facilities, and the cost of goods and services, can also impact tourists' travel experiences [26], [31]. The condition of a tourist destination concerning this aspect can subsequently impact a person's travel experience, whereby tourists will have a positive experience if the destination has well-maintained infrastructure and a wide range of appealing facilities [24]. Nevertheless, should tourists perceive the area as lacking adequate facilities and infrastructure, they may experience a sense of disappointment [26].

The quality of accommodations in a destination has been demonstrated as an economic factor that can significantly influence travelers' overall experiences and satisfaction [8]. Moreover, local souvenirs that possess the tourist destination's distinctive attributes can facilitate a more detailed recollection of the tourist experience [46], [47]. Furthermore, tourists' evaluations of the sufficiency of infrastructure, the availability of cost-effective tour packages, the quality of cuisine and accommodation, and the efficiency of transportation facilities can also foster their intention to revisit the destination [48]. The evidence presented in previous research studies indicates that repeat tourists desire the availability of well-maintained infrastructure that facilitates convenient access during their journeys [49]. Furthermore, the availability of shopping facilities, such as malls and entertainment venues, contributes to the overall tourist experience and impacts future tourist behavior [50], [51]. Purchasing souvenirs or other items associated with a destination is an essential component of the tourism experience, serving as a defining aspect of many travelers' journeys. Consequently, the authenticity of local souvenirs and the allure of tourist attractions in a given destination play a significant role in influencing subsequent visits and recommendations for other tourist attractions [49].

Prior research indicates that maintaining public facilities can positively influence the tourist experience, leading to more positive memories and an increased likelihood of revisiting or recommending the destination [52]. Such positive experiences can result in vivid memories, which are critical to a traveler's overall satisfaction and their

intention to revisit or recommend the destination to others [2], [7]. Shopping malls represent another significant factor influencing tourists' memories and subsequent behavior. The diversity and distinctiveness of souvenirs, the ambiance of the shopping environment, and the quality of service in these shopping centers can collectively create memorable shopping experiences that are often disseminated through word-of-mouth or social media [53]. Based on the previously stated evidence, the following hypotheses are developed:

H1. Economic attributes of a destination positively influence tourist loyalty.

H4a. Economic attributes of a destination positively influence internal vivid memory.

H4b. Economic attributes of a destination positively influence external vivid memory.

2.4 Environmental Attributes, Vivid Memory, and Tourist Loyalty

In examining the environmental attributes, scholars have focused their attention on the environment, atmosphere and natural attractions. [45]. Pollution and congestion are examples of environmental issues identified as causes of concern for tourists, with the potential to impact their experiences negatively [31], [54]. Furthermore, preserving a natural environment can be a competitive advantage for a tourist destination. Due to its authenticity and inherent natural potential, a destination can also offer a distinctive experience for tourists, particularly those with an affinity for nature [26], [54]. The preservation and beneficial nature of a locale can also foster local support for the tourism industry, which may subsequently enhance the environmental reputation of a city [24]. Accordingly, tourists are more likely to have a favorable experience while traveling and leave the destination with positive sentiments if the natural environment is perceived as well-maintained [24], [55], [56].

It has been demonstrated that the environmental attributes of a tourist destination are also a significant factor influencing tourists' behavioral intentions. Tourists' perceptions of sustainable management practices in a destination are a significant predictor of their intention to revisit and recommend the destination to others [25]. Engaging with a stunning and genuine natural setting has the potential to stimulate the five senses, thus enhancing the depth and meaningfulness of the tourist experience [54]. Tourism destinations that demonstrate effective maintenance and cleanliness of their natural environment are more likely to elicit a positive response

from tourists, including a greater propensity to revisit and recommend the destination [24], [26], [45] and even willing to pay more [31].

The natural resources and environments that tourists encounter, including wildlife, weather conditions, and natural scenery, are elements that are inherently difficult to control and not created by humans. Consequently, tourists' positive judgments about these elements can directly affect their memory [57]. Travellers who appreciate the inherent natural authenticity of tourist attractions may feel that they seem to leave their daily routines and enter a different world temporarily. This experience can lead to a profound appreciation of the beauty and satisfaction of that offer. As a result, these experiences can be genuinely memorable [58]. Furthermore, natural stimuli that engage the senses, including the sound of the sea, the scent of nature, and visual details of natural beauty, leave a lasting impression on memories and are vital for the formation of future recollections [59]. Additionally, tourists who participate in nature conservation initiatives, such as observing turtle nesting and other conservation activities, may develop a unique and profound connection to the destination [60]. In conclusion, the following hypotheses are formulated:

H2. Environmental ²attributes of a destination positively influence tourist loyalty.

H5a. Environmental ²attributes of a destination positively influence internal vivid memory.

H5b. Environmental ²attributes of a destination positively influence external vivid memory.

2.5 Socio-cultural Attributes, Vivid Memory, and Tourist Loyalty

The cultural assets of a destination, including ancestral and historical heritage, can be presented in various formats, such as tourist attractions, festivals, arts, and traditions. These assets can create a distinctive impression for tourists, shaping their perceptions and experiences within a destination [41]. In addition to the favorable consequences, tourism can also result in unfavorable outcomes, such as the erosion of community identity [45]. Consequently, it is essential to safeguard a destination's cultural heritage to preserve the local community's identity while attracting tourists. Tourists are more likely to have a memorable experience if they are allowed to learn about and participate in the local culture when they visit a tourist destination [24].

Conversely, social issues such as elevated crime rates, vandalism, substance abuse, and communities with high rates of alcohol dependency can harm tourists, potentially influencing their overall impression of the destination [31]. Consequently, the tourist experience may also be affected by the social conditions of the tourist destination. A positive travel experience is enhanced when tourists perceive the area as safe and the locals as friendly and helpful [24]. Conversely, if tourists perceive the area to be unsafe or incompatible with the local society, their experience is likely to be negative.

The socio-cultural attributes of tourist destinations also have a significant impact on tourists' behavioral intentions. Prior research indicates that local culture directly influences tourists' intentions to revisit a destination by providing authentic local experiences [30], [61]. Furthermore, social aspects, such as interaction and communication with local residents, can facilitate an understanding of tourists' needs, thereby increasing the likelihood of tourists intending to revisit, sharing their experiences, and recommending the tourist destination [30], [61].

The local culture allows tourists to gain a unique and authentic experience that is unlikely to be encountered elsewhere [10]. Such experiences encompass local traditions, culinary practices, festivals, and interactions with the local population. Collectively, they enhance the traveler experience and foster the formation of unforgettable memories [45]. Travelers who strongly recollect the cultural festival memory are more likely to consider returning to the destination to relive the experience or to recommend it to others [60]. Moreover, interactions with tourism service providers, such as tour guides, service staff, or local communities, have been shown to create more memorable experiences and ultimately influence future behavior [57].

Cultural symbols and attractions experienced while traveling serve as a catalyst for the formation of profound cultural insights and comprehension, which are then stored in tourist memories.[62]. The distinctive and genuine aspects of local culture can serve as the defining characteristics of a region and can be utilized as a promotional instrument for its traditional culture, thereby fostering positive memories among tourists [47], [63]. Accordingly, the following hypotheses are formulated:

²
H3. Socio-cultural attributes of a destination positively influence tourist loyalty.

²
H6a. Socio-cultural attributes of a destination positively influence internal vivid memory.

²
H6b. Socio-cultural attributes of a destination positively influence external vivid memory.

³ **2.6 Vivid Memory and Loyalty**

Vivid memory is a component of autobiographical memory, encompassing recollections of past personal experiences [11]. Vivid memory demonstrates the richness and complexity of the human memory process. Vivid memories are thus an important factor in fostering customer loyalty, as the locations and environments that elicit these memories will be strongly associated with feelings such as happiness, excitement, positive meaning, participation, and refreshment [64].

The degree of visual imagery and emotional reaction is a significant predictor of memory recall [11], [65]. Individuals who experience high levels of visual imagery and emotional reaction are more likely to remember the details of an event, access the memory, and have a vivid recollection of it. This vivid memory is considered an important factor in the recall process [46], [66], indicating that memories stored with high visual imagery and emotional intensity can be long-lasting and accurate [12]. Additionally, vivid memories are an essential cognitive process, stored in long-term memory and reappearing when recalling memorable personal events [64], [65], [67]. Vividness is an important construct in the pre-purchase evaluation of products [15] and determines post-experience behaviour [13], [14], [64]. Travelers who recall a greater number of sensory experiences from previous travel encounters are more likely to return to the destination and engage in similar activities [59]. Therefore, the following hypotheses are formulated:

H7. Internal vivid memory positively influences tourist loyalty.

H8. External vivid memory positively influences tourist loyalty.

2.7 Mediating Role of Vivid Memory

Vivid memory serves as a mediator in the relationship between economic attributes and tourists' loyalty. Fair pricing and the availability of high-quality local products have

contributed significantly to creating memorable experiences that enhance tourists' intentions to revisit and recommend a destination [13]. Positive experiences with local products, particularly in terms of price and quality, also increase the clarity of recalled memories and strengthen tourists' desire to return and share their experiences with others [53], [65].

In addition to economic aspects, environmental attributes such as natural beauty also contribute to vivid memory formation. The natural beauty of a tourism destination creates memorable experiences [57], [60], [68]. The uniqueness appeal of an environment improves a tourist's ability to recall that place, which can shape their future decisions and actions [13], [54].

Moreover, vivid memory has been identified as a strong predictor of future repeat behavior [65]. Previous studies revealed that memories related to the social aspect exert the strongest influence on tourist loyalty [13]. Social interactions and a sense of togetherness often generate more intense emotional responses and lead to deeper memory encoding [69]. Social experiences, such as engaging with local residents or participating in cultural events, enhance the vividness of recalled memories, thereby fostering tourist loyalty [46], [63], [70].

In the context of the digital era, vivid memory is no longer confined to internal cognitive processes. Tourists increasingly rely on external memory, such as photographs, digital videos, and social media posts, to record their experiences [16], [18], [71]. These external representations act as visual and emotional cues that reinforce internal memories and can trigger emotional responses upon recall [71]. The accessibility and shareability of these digital memories further influence tourists' intention to revisit and recommend destinations, especially when such content is validated or shared within their social networks [72]. As such, external memory plays a complementary and amplifying role in the formation of vivid memory [16], [17], and by extension, tourist loyalty [59], [73].

Therefore, the following hypotheses are formulated:

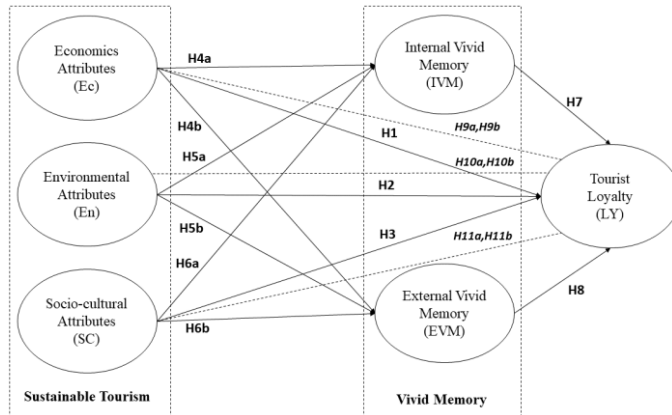
H9a-H9b. Internal vivid memory (H9a) and external vivid memory (H9b) mediate the relationship between economic attributes and tourist loyalty.

H10a-H10b. Internal vivid memory (H10a) and external vivid memory (H10b) mediate the relationship between environmental attributes and tourist loyalty.

H11a-H11b. Internal vivid memory (H11a) and external vivid memory (H11b) mediate the relationship between socio-cultural attributes and tourist loyalty.

Figure 1 below illustrates this study's research model and hypothesis.

Fig 1. Research Model



3. Methodology

The data collection method employed is a field study through a survey, which utilizes a questionnaire. The questionnaires were distributed to foreign tourists visiting four areas that serve as tourist destinations: Likupang/Manado, Badung Bali, Magelang/Jogjakarta, and Surabaya. The questionnaire was available in both English and Chinese. Each variable indicator is measured using a 7-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree".

In terms of research ethics, the respondent was first asked about their willingness to participate in the study, with explicit written consent obtained. The subsequent

questions in the questionnaire were designed to correspond with the variables being investigated. Additionally, respondents were asked to consent to the release of their contact information should they wish to participate further in the study. The consent statement included a direct query regarding their agreement to participate. The study protocol was approved by the Institute of Research and Community Outreach at Petra Christian University. All respondents voluntarily agreed to participate and were informed of their right to withdraw at any point without facing any consequences.

This study defines sustainable tourism as tourists' positive perception of a destination's natural, cultural, and economic aspects. Environmental attributes are described through eight indicators that have been adapted from previous research [24], [26], [31], [45]. The socio-cultural attributes are translated into six indicators, which have been adapted from previous research [24], [31], [45], [70]. The economic attributes are reflected in eight indicators adapted from previous research [24], [31], [45]. Vivid memory can be divided into internal and external, which is defined as the clarity and detail of memories that are particularly vivid and closely match the tourist experience. Internal vivid memory indicators are derived from previous research to measure this construct [12], [13], [66]. External vivid memory is measured by four indicators (Soares et al., 2023; Kirjakovski, 2023; Stone & Zwolinski, 2022; Hutmacher et al., 2023; Wang et al., 2017). Moreover, five indicators used to measure loyalty are adapted from previous research [24], [59], [75]. Data processing and analysis used Smart Partial Least Square (SmartPLS).

A total of 432 foreign tourists participated in the research. The respondents in this research were found to be a demographic balance between male (48.96%) and female (50.36%) respondents. The age distribution shows that the majority of respondents were aged between 22 and 40 years (74.01%). Regarding geographical origin, most came from Europe (53.83%) and Asia (34.11%). Regarding occupation, most respondents identified as employees (40.84%).

4. Result and Analysis

4.1 Measurement Model

The research model has been evaluated with reflective measurement through external model testing. At this stage, the internal consistency of the constructs is assessed through Cronbach's alpha test, with a minimum acceptable limit of 0.6, and composite reliability, which ideally ranges from 0.6 to 0.9. In addition, convergent validity is examined through the average variance extracted (AVE), which should be greater than 0.50, as suggested by [NO_PRINTED_FORM] [76]. At this stage, the AVE value still did not meet the requirements, so eight indicators had to be discarded, including one indicator related to the economy, three indicators related to the environment, two indicators related to social and cultural attributes, one indicator related to internal vivid memory, and one indicator related to loyalty. After removing these indicators, the convergent validity requirement was met. In addition, discriminant validity was evaluated using the Fornell-Larcker test and the HTMT ratio, where the HTMT value must be less than 0.90. [76]. The test results show that the research model meets the requirements of discriminant validity. The results of the tests for each construct are presented in Table 1 below.

Table 1. Reliability and Validity

Item	Loading Factor	Cronbach Alpha	Composite Reliability	AVE
Economy Aspect (Ec)		0.799	0.857	0.501
Good public transportation system	0.798			
Good public physical infrastructure	0.701			
Diverse locally-owned business	0.654			
Various places to go out and have fun	0.640			
Widely available public facilities	0.719			
High-quality of local souvenirs and crafts	0.723			
Environmental Aspect (En)		0.763	0.838	0.510
Interesting natural attractions	0.742			
The level of pollution is acceptable	0.629			
Concerned preservation of natural areas	0.687			
Pleasant weather and climate	0.708			
Restful and relaxing atmosphere	0.793			
Social cultural Aspect (SC)		0.708	0.819	0.532
Fascinating cultural attractions	0.769			
Aesthetic local arts and crafts	0.725			
Authentic cultural heritage and traditions	0.687			
Interaction between residents and visitors	0.734			

Internal Vivid Memory (IVM)		0.686	0.809	0.514
Recall what I saw	0.711			
Recall what I heard	0.718			
Remember my emotions	0.690			
Remember the ambiance	0.749			
External Vivid Memory (EVM)		0.700	0.817	0.529
Remembered through photos on the phone	0.638			
Visualized through travel notes on gadgets	0.695			
Described through social media of others	0.741			
Described through my social media posts	0.823			
Loyalty (LY)		0.679	0.803	0.511
Revisit the destination	0.535			
Recommend to others	0.812			
Say positive things	0.763			
Share positive experience on social media	0.718			

4.2 Structural Model

The results of the structural model test on international tourists demonstrate that not all the proposed hypotheses are accepted. ¹ The results are presented in Table 2 below.

Table 2. Path Analysis Result

Path		Original Sample	T statistics	P values	Hypotheses Result
H1	Ec -> LY	-0.002	0.035	0.486	Rejected
H2	En -> LY	0.261	4.646	0.000	Accepted
H3	SC -> LY	0.218	3.322	0.001	Accepted
H4a	Ec -> IVM	0.167	2.191	0.014	Accepted
H4b	Ec -> EVM	0.229	2.776	0.003	Accepted
H5a	En -> IVM	0.055	0.780	0.218	Rejected
H5b	En -> EVM	0.150	2.345	0.010	Accepted
H6a	SC -> IVM	0.369	5.088	0.000	Accepted
H6b	SC -> EVM	0.251	2.513	0.006	Accepted
H7	IVM -> LY	0.162	3.113	0.001	Accepted
H8	EVM -> LY	0.249	3.956	0.000	Accepted

Note(s): t-statistic value at 5%

Table 2 demonstrates that two hypotheses are rejected: economic attributes do not affect loyalty (H1), and environmental attributes do not affect internal vivid memory (H5a). However, the results indicate that environmental and socio-cultural attributes directly affect loyalty (H1 and H2), while economic attributes influence vivid memory (H4a and H4b). Socio-cultural attributes affect vivid memory (H6a and H6b), while environmental attributes only impact external vivid memory (H5b). In addition, both internal and external vivid memory influence tourist's loyalty (H7 and H8). However, external vivid memory has a higher impact on loyalty compared to internal vivid memory.

4.3 Mediation Analysis

A mediation analysis was conducted to examine the mediating roles of internal vivid memory (IVM) and external vivid memory (EVM) in the relationship between destination attributes and tourist loyalty (LY). The destination attributes included economic attributes (Ec), environmental attributes (En), and sociocultural attributes (Sc). Table 3 summarizes the mediation results.

Table III. Mediation Test

Path	Original Sample	T statistics	P values		Conclusion	Hypotheses Result
			Indirect	Direct		
H9a Ec -> IVM -> LY	0.027	1.717	0.043	0.486	Full Mediation	Accepted
H9b Ec -> EVM -> LY	0.057	2.188	0.014	0.486	Full Mediation	Accepted
H10a En -> IVM -> LY	0.009	0.675	0.250	0.000	No Mediation	Rejected
H10b En -> EVM -> LY	0.037	1.900	0.029	0.000	No Mediation	Rejected
H11a SC -> IVM -> LY	0.060	2.750	0.003	0.001	Partial Mediation	Accepted
H11b SC -> EVM -> LY	0.062	2.176	0.015	0.001	Partial Mediation	Accepted

Note(s): t-statistic value at 5%

The results show that internal vivid memory (H9a) and external vivid memory (H9b) fully mediated the relationship between economic attributes and tourist loyalty, indicating that tourists' memories effectively transmit the influence of economic aspects into loyalty. In the case of environmental attributes, no significant mediation was found through either internal vivid memory (H10a) or external vivid memory

(H10b), suggesting that environmental attributes do not influence tourist loyalty through memory-based mechanisms. Meanwhile, sociocultural attributes showed partial mediation through both internal vivid memory (H11a) and external vivid memory (H11b), indicating that sociocultural attributes influence tourist loyalty both directly and indirectly.

5. Discussion

The findings of this study suggest that the attributes associated with sustainable tourism enhance tourist loyalty, particularly those related to environmental and socio-cultural aspects. While economic attributes do not directly impact loyalty, they appear to enhance the vividness of tourists' internal and external memories. This implies that the perception of infrastructure, public facilities, and transportation is seen as a standard and fundamental aspect of travel, which may not strongly motivate foreign tourists to revisit, recommend, and share their experiences related to these aspects. Tourists will only revisit, recommend, and disseminate information about infrastructure, facilities, and shopping centres if they are unique and extraordinary. This is consistent with prior research highlighting examples of destinations with distinctive shopping malls [50], [53], which serve as a competitive advantage.

Environmental attributes do not significantly impact the clarity of biological memories, but they influence memories requiring technological assistance. This might be explained by the complexity and intensity of sensory inherent in natural attributes, which are not artificially constructed [77]. Consequently, the sensory details of such experiences are more effectively encoded and retained with the assistance of photos, videos, digital records, or social media platforms. This concept is known as externalizing memory [16], [17], [38].

The sociocultural attributes of sustainability tourism have been identified as the most influential factors in creating vivid internal and external memories. Interestingly, this attribute only influences biological memory more strongly than technology-assisted memory. This finding is consistent with the results of previous studies, indicating that culture has the potential to enhance tourists' memories of destinations through new

cultural learning [62], as well as nostalgic experiences and authenticity [47]. In this context, memorable tourism is synonymous with elements perceived as novel and high levels of interaction [57].

According to the mediation analysis results, vivid memory plays a key role in mediating the relationship between destination attributes and tourist loyalty, particularly for economic attributes like infrastructure, public facilities, and shopping centers. These economic factors need to be vividly remembered in order to create lasting impressions that influence loyalty. To be memorable, transportation systems, infrastructure, and public facilities must offer more than basic functionality, they should feature unique and authentic characteristics that enhance the overall travel experience and leave a lasting impression on tourists [2], [7], [53], [66]. On the other hand, sociocultural attributes also mediate loyalty through memory, but they also have a direct effect, showing that cultural experiences impact loyalty both through vivid recollections and immediate engagement. This highlights the importance of cultural authenticity, as deeply rooted and unique cultural elements leave a distinct impression on tourists [10], [55]. Such authentic cultural experiences not only enrich their visit but also create meaningful memories that contribute to a stronger attachment, which triggers loyalty to the destination [30], [78], [79]. Environmental attributes, however, showed only a direct effect on loyalty, without needing to be vividly remembered. This may be because natural landscapes or ecological features, while beautiful, may not evoke strong memories like cultural or economic experiences. Instead, their direct impact on loyalty could come from their ability to offer relaxation, peace, or a sense of escape [80], [81], which can foster attachment to the destination even without vivid memories.

Moreover, the findings indicate that memory facilitated by technology has a greater impact on loyalty than natural memory. This suggests that the perception of destination attributes in a tourist destination is not retained in tourists' biological memory but rather facilitated by social media, photographs, and other forms of technology. Several studies have previously emphasized the importance of technology, proposing directions for future research to consider technology in tourism study and practice [82], [83].

5.1 Theoretical Implication

This study represents a further development of the concept of the tourism experience in the digital era. Vivid memory can be considered an essential cognitive process, as these memories are stored in long-term memory and reappear when recalling memorable personal events [64], [65], [67]. A comprehensive grasp of the concept of vivid memory can prove invaluable in creating models for memorable experiences [66], [67]. The degree of vividness, therefore, represents a crucial element in assessing traveller loyalty. Hence, this research expands the concept of memorable experiences by examining the externalization of memory, which is a potential solution to enhance tourists' recollections of their experiences. Finally, it provides tourists with remarkable experiences that lead to their intention to revisit, recommend, and share them with others [54].

5.2 Managerial Implication

The results of this study indicate that the attractiveness of tourism in the eyes of international tourists lies primarily in the social and cultural aspects of a destination. Therefore, it is important to properly maintain the authenticity of local culture and behaviour. This includes efforts to preserve traditions, local values, and social interactions that are unique to the destination. In addition, destination managers and governments should proactively emphasize this socio-cultural content in destination promotion strategies. This can be done by developing promotional materials that highlight the uniqueness of local culture and sustainable practices that support cultural preservation.

The findings of this study indicate that destination attributes related to a beautiful and well-maintained natural environment will increase tourists' desire to recommend and share their experiences. This underscores the importance of providing internet and digital infrastructure to facilitate information sharing. Destination managers must also prioritize the maintenance of the natural environment through the development of regulations and educational initiatives at tourist attractions.

In addition, destination managers and tourism business providers should consider enhancing the availability of technology that allows tourists to capture photos and

videos and access social media. In this way, the multisensory of natural elements can be better remembered and internalized, boosting tourist loyalty. Additionally, destination managers can create experiences that are not only memorable during the visit but also encourage tourists to share and recommend them, which can help promote the destination organically.

6. Conclusion and Recommendations

In conclusion, the findings provide valuable insights regarding the relationships between sustainability tourism attributes, vivid memory and tourist loyalty. Economic attributes were found to have no direct impact on loyalty or internal vivid memory. However, environmental and socio-cultural attributes play significant roles in shaping both loyalty and internal memory clarity. Moreover, environmental attributes influence external memory but not internal memory. Specifically, socio-cultural attributes have the highest impact on vivid memory, while environmental attributes influence loyalty most. Furthermore, the mediation analysis underscores the pivotal role of vivid memory in shaping tourist loyalty, particularly concerning economic and sociocultural destination attributes. Infrastructure, public facilities, and shopping centers must be offered beyond their functionality to be vividly remembered and influence long-term loyalty. In addition, sociocultural attributes rely on memory and exert a direct influence, highlighting the effect of culturally rich encounters on tourists' emotional connections to a destination. In contrast, environmental attributes directly affect loyalty without requiring vivid memory, suggesting that their impact lies more in the emotional states they induce rather than in strong cognitive impressions. Furthermore, the findings reveal that technology-enhanced memory (through photographs, social media, and digital notes) has a greater influence on loyalty than natural memory alone. This emphasizes the growing importance of digital tools in complementing tourist experiences, and the need for further exploration of technology's role in tourist behavior and destination branding.

7. Limitation and Future Direction

In addition to offering new insights into the role of technology in vivid memory and its

impact on enhancing international visitor loyalty, this study has several limitations that must be acknowledged. This study is limited to four cities in Indonesia, while other regions or countries have different unique characteristics and economic dynamics. Therefore, future research is recommended to conduct studies in other locations for a more comprehensive comparison. Moreover, the research model can be developed by incorporating intangible aspects of the destination, such as reputation and branding. Additionally, examining the characteristics of different tourist segments could further enrich this study and provide a deeper understanding of how various factors influence tourists' memorable experience and their loyalty.

external memory

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