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# A landscape imagery framework for sustainable tourism development in traditional villages: systematic literature review

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The pursuit of tourism-driven economic growth often leads to unsustainable practices that threaten the cultural and environmental integrity of traditional villages. Therefore, adopting development approaches that safeguard the heritage of these sites is critical. Landscape imagery has become a crucial tool for assessing and enhancing the visual quality of traditional villages, helping preserve their distinctive character while maintaining their appeal to visitors. Thus, establishing a landscape imagery conceptual framework for sustainable tourism development (STD) is vital for guiding conservation and decision-making. Through a systematic literature review (SLR) of 135 articles using the PRISMA approach, this study identifies 10 core landscape imagery variables that reflect the physical attributes and cultural meanings influencing how residents and tourists perceive traditional village landscapes. These variables are grounded in three theoretical foundations that explain how spatial legibility, cognitive and emotional destination evaluations, and cultural symbolism shape sustainable tourism outcomes. By integrating these theories with the identified variables, the conceptual framework shows that landscape imagery acts as the primary mechanism through which STD is understood, guided, and strengthened. Ultimately, the framework positions landscape imagery as an evaluative lens and a strategic driver that supports environmental protection, cultural continuity, social cohesion, economic vitality, and high visual quality in traditional village tourism.

## KEYWORDS

heritage villages, landscape imagery, rural tourism, sustainable tourism, visual aesthetics

## 1 Introduction

Traditional villages, which can be described as microcosms of cultural heritage, environmental diversity, and socio-economic resilience, face the dual pressures of tourism transformation and rapid urbanisation (Jia et al., 2024). The rapid development of tourism has led to environmental problems that threaten the authenticity and integrity of these sites (Chen et al., 2022). Thus, STD has emerged as a key approach to addressing the environmental, cultural, economic, social, and visual aesthetic issues faced by traditional villages (YiRan et al., 2024).

Researchers emphasise the importance of maintaining a balance among these factors in traditional villages (Rivera et al., 2016). Landscape quality attracts visitors by providing enriching experiences that preserve natural integrity and support sustainable tourism (Shen et al., 2023). Preserving cultural heritage is paramount in ensuring that tourism development respects and promotes the local customs while supporting economic growth (Zhu and Sha, 2024). Community participation is also essential for STD, as it fosters a sense of ownership and ensures that tourism development aligns with local needs (Zou and Xu, 2024). Furthermore, the community's participation enhances the visual aesthetics of traditional villages and their scenic landscapes, fostering emotional connection for tourists and enriching their experience (Mundher et al., 2022b). However, challenges remain, such as the risk of transforming traditional village environments into urban settings or the exploitation of heritage sites for tourism (Yanan et al., 2024). There is also the risk of losing authenticity because of excessive tourism marketing (Meng et al., 2022).

Despite the challenges posed by urbanisation and tourism growth, efforts are underway to assess and improve the visual quality of traditional villages, using techniques such as landscape imagery to ensure sustainable development (Xing and Leng, 2024). STD in traditional villages is closely linked to landscape imagery (Meneghello, 2021), which helps attract visitors and preserve the unique character of these places (Zheng X. et al., 2024). Landscape imagery refers to the mental or visual representations of these spaces, where the landscape is perceived and represented through images (Skowronek et al., 2018). This visual aesthetic appeal enhances the tourist experience by giving visitors a deeper understanding and experience of life in these villages (Tang and Xu, 2023). In addition, advanced landscape imagery techniques can be used to enhance the representation of traditional village landscapes, allowing for a deeper understanding of their spatial and social complexities (Cinnamon, 2024). Landscape imagery is an integral part of tourism, cultural heritage, and sustainable development in traditional villages, providing a rich tapestry of sensory experiences and historical narratives.

The pursuit of economic growth can lead to unsustainable development practices that compromise the environmental integrity of traditional villages, resulting in scenic loss, increased pollution, and the degradation of natural resources (Jia et al., 2024). Furthermore, the increasing commercialisation of tourism may lead to the exploitation of rural areas, resulting in a loss of authenticity and environmental degradation (Crăciun et al., 2022; Nicolopoulos, 2022). Jia et al. (2024), highlight that over 90% of traditional villages have not achieved a balance between conservation and development, leaving them vulnerable to disruption. Current landscape conservation strategies often prioritise economic development over cultural and environmental considerations, leading to unsustainable practices and long-term negative consequences. However, preserving the cultural authenticity, environmental integrity, and socio-cultural vitality of traditional villages is necessary for achieving STD (Kataya, 2021). Therefore, STD in traditional villages requires a balanced framework through the adoption of landscape imagery strategies to ensure the sustainability and authenticity of these places and the long-term protection of their cultural and environmental heritage (Lu and Ahmad, 2023; Maryani and Indrianty, 2024). This can be achieved by addressing the following questions:

- What are the s STD themes in traditional villages?
- What are the landscape imagery themes in traditional villages?

- What is the link between landscape imagery and STD?
- What are the landscape imagery variables for STD?
- What are the landscape imagery theories that support STD?
- What is the conceptual framework of landscape imagery for STD in traditional villages?

## 2 Method

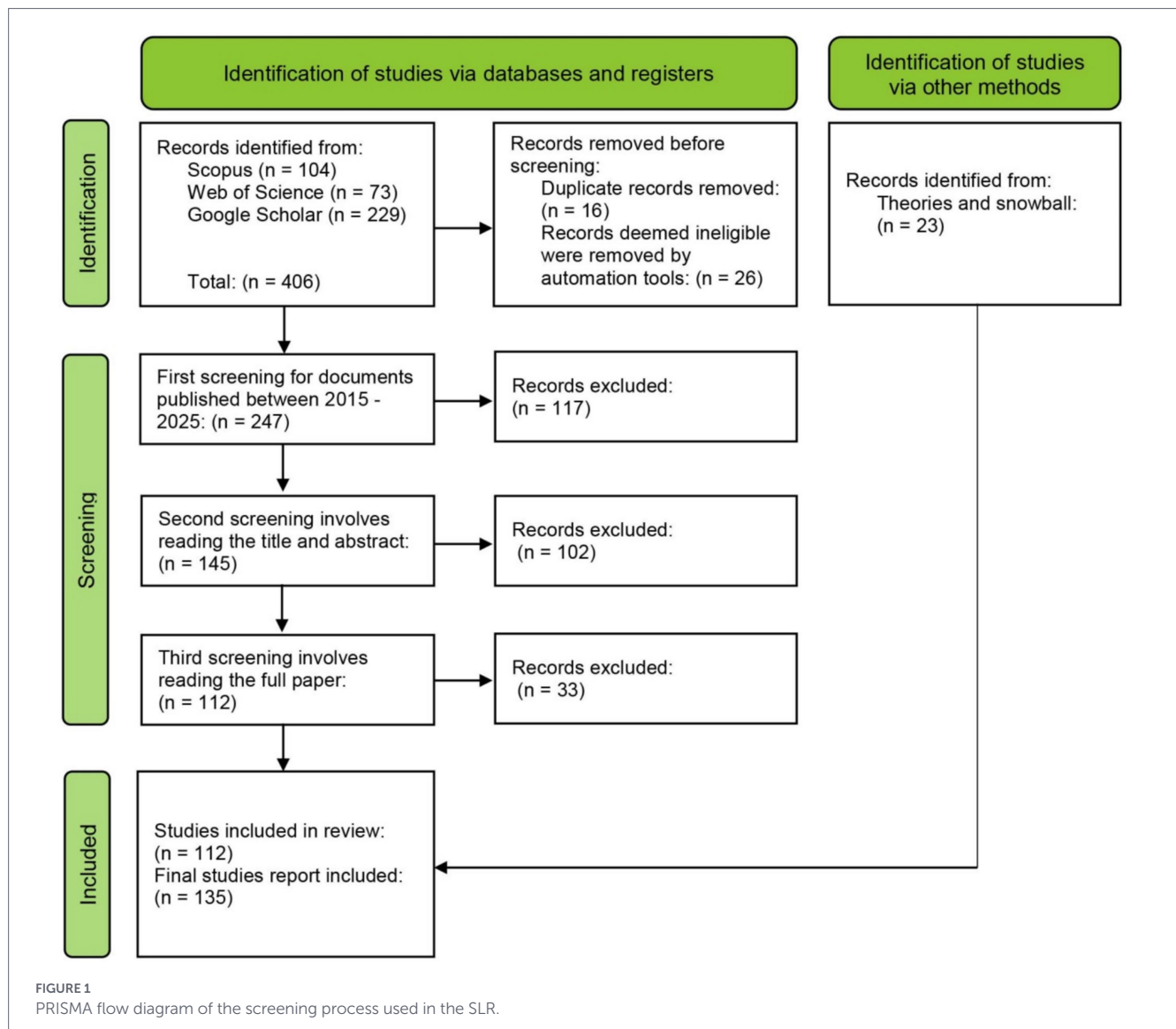
### 2.1 Search strategy

The PRISMA approach was chosen for the present SLR to develop a landscape imagery framework for STD in traditional villages. PRISMA-based studies draw on multiple works and datasets (Li et al., 2024), resulting in high-quality, reproducible quantitative and qualitative reviews. SLR is a rigorous approach that can be used to evaluate all ongoing research in the field of interest (Alam et al., 2025). The SLR approach helps track the scope of the problem systematically by assuming reproducible pathways. Thus, SLR minimises the potential for bias during study search, identification, evaluation, and summarisation (Yanan et al., 2024). Compiling all relevant articles that meet the predefined inclusion criteria is needed for answering the main research question and sub-questions. To achieve this, the PRISMA 2020 guidelines for conducting SLR should be followed, adhering to the PRISMA flow diagram for identified, screened, and included records (Figure 1).

This SLR followed a structured process involving keyword selection, literature screening, and data collection. The scope of this study is grounded in three components: landscape imagery, traditional villages, and sustainable tourism. For each component, commonly used alternative terms and related concepts found in previous literature were identified and combined using Boolean operators to ensure a comprehensive and systematic search across databases. Therefore, the final set of keywords used in the systematic search was ("landscape imagery" OR "landscape iconography" OR "landscape photography" OR "landscape visual") AND ("traditional village" OR "rural village" OR "heritage village") AND ("sustainable tourism" OR "heritage tourism" OR "rural tourism" OR "destination tourism").

### 2.2 Study selection

Scopus, Web of Science, and Google Scholar databases were used for a comprehensive, high-quality, peer-reviewed search. We retrieved 406 papers using the selected keywords. After removing duplicate and ineligible records employing automated tools, 364 records remained. The first screening was limited to documents published between 2015 and 2025. The year 2015 was chosen as the starting point for data collection because it marks the adoption of the SDGs by the United Nations as a universal call to end poverty, protect the planet, and ensure prosperity for all. The screening period extended to 2025, when this research was conducted, resulting in the exclusion of 117 papers. A review of the titles and abstracts of the remaining 247 papers narrowed the selection to 145 papers. Full-text reviews resulted in the final selection of 112 papers. To improve the quality of the research, 23 papers were added by including theories and using



the snowball method (i.e., selecting papers found within the initial selection). Therefore, the final number of selected papers was 135 (Table 1).

### 2.3 Data collection

For data collection, this study included a detailed full-text review of each selected document. The information extracted based on the research questions included the author's name, year of publication, variables, theories, benefits, and challenges. These data were organized in a spreadsheet, using Microsoft Excel and are presented in [Supplementary Table A1](#). During the synthesis process, all extracted information related to landscape imagery and sustainable tourism development was first listed and compared across the included studies. Concepts that were similar or overlapping were then grouped, allowing common themes to emerge across different study contexts and research methods. This step-by-step, systematic approach helped ensure that the final results were based on patterns consistently found in the literature rather than personal interpretation, thereby improving the reliability of the proposed framework.

### 2.4 Quality review

A quality appraisal of the 135 papers included in this systematic literature review was carried out using the CASP qualitative checklist<sup>1</sup> to ensure that the evidence supporting the proposed landscape imagery framework is reliable and methodologically sound. Each study was evaluated using ten criteria, including clarity of research aims, suitability of methodology and research design, sampling and data collection methods, researcher reflexivity, ethical considerations, rigour of data analysis, clarity of findings, and overall research contribution. A simple scoring system was used (Yes = 1, Partly = 0.5, No = 0), with a maximum score of 10, and studies were classified as high quality (80–100%), moderate (60–79%), low (40–59%), or very low (<40%). Most of the studies achieved high-quality scores, usually between 8.5 and 9.5, showing that research in tourism, landscape, and village sustainability is generally well reported and methodologically strong. However, some common weaknesses were found. In particular, researcher reflexivity often received a partial score because tourism

<sup>1</sup> <https://casp-uk.net/casp-tools-checklists/>

TABLE 1 Inclusion and exclusion criteria used in the systematic literature review.

Stage	Inclusion criteria	Exclusion criteria	Records remaining
Initial database search	Papers retrieved from Scopus, Web of Science, and Google Scholar using combined keywords.	Non-retrievable records or clearly irrelevant search returns.	406
Duplicate and automated filtering	Unique records retained after automated duplicate removal.	Duplicate entries and automatically flagged irrelevant records removed.	364
Year filter screening	Publications between 2015_2025 retained.	Papers published before 2015 excluded.	247
Title and abstract screening	Studies relevant to at least one of the three components.	Papers unrelated to tourism, landscape representation, or village contexts.	145
Full-text eligibility review	Peer-reviewed studies directly addressing research themes.	Papers lacking relevance.	112
Snowball and theoretical inclusion	Additional influential papers identified through reference tracking and theoretical relevance.	Papers not meeting thematic or methodological relevance, even if cited.	+23 added
Final data	Studies meeting all inclusion criteria and supporting the study scope.	-	135

studies rarely explain how researchers may influence the research process, and ethical procedures were not always clearly reported unless formal approval or participant consent was explicitly mentioned. Some case studies also provided a limited explanation of how samples were selected, but these issues did not significantly reduce overall study reliability. Bias in the review was minimised by applying the same CASP assessment method consistently to all studies and using clear scoring rules, which helped maintain fair coverage across different research themes and contexts. Overall, the appraisal shows that the studies included in this review provide a strong and dependable foundation for the research findings and are presented in [Supplementary Table A2](#).

## 3 Results

### 3.1 Sustainable tourism development themes in traditional villages

STD is a means for developing and managing tourism in a rural environment with a rich cultural heritage, resulting in economic benefits, social well-being, cultural integrity, environmental safety, and visual aesthetic enhancement, while engaging local communities and providing visitors with enriching experiences (Yanan et al., 2024). STD in traditional villages focuses on balancing the needs of visitors, local communities, and the environment with the protection of cultural heritage (Mei et al., 2024). The primary goal of STD is to revitalise tourism while preserving cultural heritage, social values, and natural landscapes in the long run (Song et al., 2021). This approach supports the revitalisation of rural areas through tourism by focusing on policies that combine cultural heritage preservation with tourism development (Zhuang et al., 2019). This type of tourism integrates cultural heritage preservation, community participation, and economic growth, aiming to improve rural areas while preserving their distinctive cultural and natural characteristics (Zhu and Sha, 2024). Therefore, achieving STD in traditional villages requires the participation of local communities and effective governance to ensure long-term success (Wahyoedi et al., 2024).

The integrated rural tourism model identifies environmental, social, economic, cultural, and visual aesthetic factors as crucial for the sustainable development of cultural landscapes in traditional villages (YiRan et al., 2024). STD in traditional villages reduces environmental harms by implementing eco-friendly measures in accommodations and waste management, which are vital for maintaining ecological balance (Shang et al., 2021; Xiao et al., 2019). STD supports landscape conservation, which, in turn, enhances the overall visitor experience and ensures the preservation of natural resources for future generations (Bao et al., 2022; Gao et al., 2023). Furthermore, STD in traditional villages offers numerous social benefits, such as preserving the local culture, fostering community engagement, and creating opportunities for cultural exchange (Rahmawati et al., 2023). It also strengthens the sense of place and ownership, as residents participate in decision-making processes that affect their environment and livelihoods (Riza Chakim et al., 2023). Moreover, STD offers economic benefits by creating jobs, stimulating local businesses, and contributing to GDP growth (Li et al., 2022). By attracting tourists, STD fosters economic growth, generating increased revenue in villages and stimulating economic activity and investment in the region (Gao and Wu, 2017). The preservation and revitalisation of traditional culture and heritage is another benefit (Lu and Ahmad, 2023). STD supports the revival of local customs and traditions, allowing communities to showcase their unique cultural landscapes, enhancing tourist satisfaction (Stojević, 2019). It also provides aesthetically pleasing and visually attractive environments for visitors, often leading to positive feedback, repeat visits, and longer stays (Lincoln and Madgin, 2018). Landscape design approaches in rural STD emphasise the role of visual aesthetics in enhancing tourists' experiences and emotional connections, boosting their overall satisfaction (Wang et al., 2022). These pillars of sustainable development provide a framework for understanding the sustainability of traditional villages, for which community acceptance and resilience are central (Zheng X. et al., 2024).

Nonetheless, STD in traditional villages faces numerous challenges, including environmental degradation, landscape fragmentation, overcrowding, resource pressure, economic disparity, cultural commodification, unbalanced conservation and development, inconsistent legal and policy frameworks, low community participation, and stakeholder conflicts (Shang et al., 2021; Xiao et al., 2019).

Uncontrolled tourism expansion can harm the ecology of the place through deforestation, pollution, and biodiversity loss (Baloch et al., 2023). Furthermore, the rapid growth of tourism leads to fragmented or disintegrated landscapes, resulting in spatial disturbances and the poor spatial organisation of tourist areas (Teng et al., 2021). The establishment of tourist areas in traditional villages may also lead to overcrowding in some areas, which puts enormous pressure on local resources and infrastructure (Gao et al., 2023). Furthermore, the economic motives driven by tourism can present challenges because unfair treatment and the pursuit of profit and economic gain can undermine STD (Li et al., 2023). Additionally, the economic aspect can erode local customs, as communities alter their practices to accommodate tourists, leading to the commodification of cultural traditions. This commodification can affect the social fabric, creating tension between the need to preserve cultural integrity and the pressure to meet tourists' expectations (Bai and Weng, 2023). This conflict may lead to the destruction of heritage and environmental sites, highlighting the need for a sustainable, scientific system to balance the protection of heritage and the environment with sustainable development (Lu and Ahmad, 2023). One of the main challenges lies in conflicting objectives and inconsistent policies and regulations, which often include vague legal provisions and overlapping responsibilities among different entities, leading to poor coordination and the ineffective implementation of STD strategies (Feng et al., 2019). The situation worsens when community participation is weak, as many local communities lack the knowledge or resources to implement sustainable practices, often resulting in unintended harm (Zhang, 2021). A lack of cooperation among local stakeholders also leads to the misuse of resources, the underutilisation of community potential, and conflicting priorities: residents may focus on community well-being and environmental conservation, while businesses tend to prioritise profit and expansion (Zhang et al., 2020).

### 3.2 Landscape imagery themes in traditional villages

Landscape imagery is the visual representation of the distinctive cultural and historical features of a certain area (Žunić, 2023). In earlier times, landscape imagery referred to painting and traditional art, but with the advent of imagery, its scope expanded to include photography and digital media. Today, landscape imagery involving GIS, remote sensing, and virtual reality influences tourism, heritage preservation, and heritage management (Magige et al., 2020). In other words, landscape imagery has evolved from an art form into a visual representation encompassing cultural, philosophical, and scientific perspectives (Carson, 2016). In the context of a traditional village, landscape imagery includes images of nature, traditional architecture, and cultural practices that form the visual imagery of the place (Cao et al., 2024). This imagery is crucial for preserving the culture and tourism potential of the village (Kang and Liu, 2024).

Landscape imagery influences the formation of a tourist's perception, with architectural, cultural, and environmental elements playing pivotal roles in shaping cognitive and emotional images and promoting STD (Chen et al., 2022). Landscape imagery influences tourists' experiences and identities that shape their travel motivations, intentions, and satisfaction (Zheng S. et al., 2024). Landscape imagery acts as a destination brand by enhancing the unique identity of the site and fostering an emotional connection between visitors and traditional villages (Sandriester and Pizzera, 2024). An emotional analysis of

landscape imagery reveals how these images evoke emotions and experiences, which are crucial for improving tourism services (Liu et al., 2022). This imagery plays a key role in shaping tourists' expectations and desires before and during their visit, as tourists compare actual landscapes to the images they have formed in their minds, influencing their satisfaction, surprise, and loyalty (Žunić, 2023). Moreover, research on social perception underscores how landscape imagery influences public preferences for the landscapes of traditional villages (Kang and Liu, 2024). Therefore, understanding and preserving the landscape imagery of traditional villages can safeguard their cultural heritage and enhance tourist satisfaction while promoting sustainable development (Chen et al., 2022). Collectively, these studies demonstrate that landscape imagery is not only a visual asset but also a cultural and economic resource that supports sustainable development and the preservation of traditional village heritage (Wang et al., 2024).

Nevertheless, landscape imagery in traditional villages presents multiple interlinked challenges: interpretive and analytical complexity, cognitive and disciplinary bias in image selection and interpretation, the erosion of cultural and symbolic depth, and technological and methodological constraints in image capture. Landscape imagery presents a challenge because it is a dynamic system embodying tangible and intangible analytical values shaped by human actions and societal transformations (Ganciu et al., 2024). This complexity is exacerbated by the subjective nature of visual perception, which is influenced by cultural awareness, visual aesthetic values, and the historical context (Bai, 2023). Traditional methods for analysing landscape imagery often fail to achieve their objectives because they rely on subjective interpretations. However, advancements in the visual arts offer more objective frameworks for measuring and analysing landscape imagery, reducing subjectivity, and revealing audience preferences (Gao et al., 2025). The cognitive practices of fieldwork and subjective predispositions in imagery selection may result in bias. The act of 'seeing the landscape' is influenced by the observer's location and fieldwork experience (Couper, 2023). These biases manifest in visual imaging, particularly for landscapes that are not adequately represented (Alkhateeb et al., 2025). The erosion of cultural and symbolic depth in landscape imagery presents a challenge arising from the representation of landscapes through photography and visual media. These media often depict the physical elements that define the identity of a landscape while sometimes overlooking its cultural and symbolic significance for the public (Sun and Khalid, 2025). Furthermore, although landscape imagery captures the environment, it faces technological and methodological limitations that affect its objectivity and effectiveness (Jenkins et al., 2019).

### 3.3 Link between landscape imagery and sustainable tourism development

STD relies heavily on landscape imagery for promoting and developing STD activities. Landscape imagery refers to the visual and symbolic qualities of a traditional village environment, encompassing landscapes, architectural heritage, cultural symbols, and how people perceive and interpret them (Zheng S. et al., 2024). Landscape imagery helps preserve authenticity, engage local communities, and maintain environmental integrity (Qi et al., 2023). Using landscape imagery in the design and management of traditional village landscapes allows engaging local communities in STD (Wang et al., 2024). Furthermore, landscape imagery is a key attraction and promotional tool for tourist

destinations, as it embodies the natural and cultural essence of a place (Mestanza-ramón and Jiménez-Caballero, 2023). Landscape imagery is used in environmental planning to assess and leverage the potential of landscapes in sustainable rural tourism, ensuring that activities are compatible with environmental stability and the character of the place (Belčáková et al., 2023). Integrating landscape imagery into STD strategies also helps preserve the authenticity and cultural heritage of destinations (Scandiffio, 2021). Moreover, cultural and natural landscape imagery promotes STD by maintaining a balance between environmental conservation, cultural authenticity, and economic viability (Pulpón and Ruiz, 2019). Remote sensing images can be used to further illustrate the importance of landscape monitoring in managing the environmental impacts of tourism, ensuring that STD is achieved (Scandiffio, 2021). STD in traditional villages relies on landscape imagery because the visual and cultural qualities of village landscapes attract visitors while supporting heritage preservation, community engagement, and environmentally responsible tourism planning.

Landscape imagery plays a crucial role in sustainable ecotourism by highlighting the natural beauty and cultural significance of traditional villages, where both landscapes and human experiences attract tourists through visual representations (Germaine et al., 2022). Landscape imagery obtained through GIS and remote sensing helps balance environmental conservation with STD (Chen et al., 2017). Similarly, an integrated landscape imagery-based framework guides the sustainability process, ensuring that tourism development aligns with environmental integrity (Shen et al., 2025). Landscape imagery is central to shaping tourist experiences in rural traditional villages, with elements such as vegetation, architectural heritage, and sensory experiences contributing to tourism appeal (Carneiro et al., 2015). Furthermore, landscape imagery fosters a connection between tourists and historical sites, as it encourages pro-tourism behaviours, which are critical for STD (Zhu and Chiou, 2022). Technological advancements are further enhancing rural tourism by improving visitor experiences and promoting sustainability (Wang, 2024). In addition, landscape imagery is used to balance the protection of cultural landscapes with the promotion of community-based tourism, emphasising the importance of local community involvement in preserving the authenticity and integrity of traditional village landscapes (Zhang and Stewart, 2017). Ultimately, the core connection between landscape imagery and STD lies in the role of the former as a vital resource, visual aesthetic context, and interpretive tool for tourism in traditional villages. Thus, landscape imagery is a fundamental element in the planning and management of STD.

### 3.4 Identified landscape imagery variables for sustainable tourism development

Landscape imagery variables support STD by enhancing the attractiveness and distinctiveness of tourist destinations, thereby affecting tourist experiences and local support for tourism initiatives. This study presents numerous visual variables in landscape imagery in traditional villages, and seeks to condense these into 10 main variables: naturalness, diversity, visibility, openness, accessibility, authenticity, sense of place, safety, stewardship, and aesthetics.

- Naturalness

Naturalness, characterised by vegetation and water in landscape imagery, plays a pivotal role in supporting STD (Chaudhary et al.,

2022). Landscapes with high naturalness, such as mountains and forested areas, are best-suited for sustainable tourism, underscoring the importance of natural characteristics in tourism planning and STD (Rajčević et al., 2023). The perception of naturalness is also influenced by visual elements, such as colour saturation, in marketing materials. Lower saturation is associated with a higher perception of naturalness, and vice versa. A higher perception of naturalness enhances tourists' purchasing motivation and supports sustainable tourism practices (Zhang et al., 2024). Naturalness is a key element that influences the visual quality of landscapes, enhances tourist experiences, and supports STD in traditional villages (Kang and Liu, 2024). In summary, naturalness refers to the presence and proportion of perceived natural elements, such as vegetation and water, and the areas covered by these elements without apparent human intervention (Chen et al., 2024).

*Potential indicators:* the percentage of vegetation cover, the clarity of the natural terrain, and the degree of human intervention in the natural landscape.

*Measurement of the variable's value:* the percentage of vegetation cover, the percentage of built-up area, and perceptual evaluations that reflect the naturalness of the landscape to observers are used.

- Diversity

Diversity supports STD by enhancing the attractiveness of tourist destinations through a combination of diverse land uses, plant species, topography, and water features within the landscape (Shen et al., 2025). Landscape features, such as green spaces, colour variations, water features, and architectural structures, influence residents' assessments of visual quality and support STD (Zhang et al., 2024). Diverse landscapes are key resources for ecotourism because they combine elements that enhance STD suitability (Yasin and Woldemariam, 2023). Different landscapes are assessed for their suitability for tourism through the 'diversity' variable, emphasising the role of natural character and visual impression in STD (Rajčević et al., 2023). In traditional village tourism, diverse landscape features, including vegetation and architectural heritage, enhance the visitor experience and support STD by providing a wide range of sensory stimuli (Carneiro et al., 2015). Similarly, landscape diversity shapes tourists' perceptions and improves their overall experience, while maintaining a balance between aesthetic appeal and practical design (Zhou et al., 2023). Nevertheless, increased diversity can lead to complexity and chaos (Mundher et al., 2022a).

*Potential indicators:* the diversity of natural and built elements, ground cover types, colours, textures, and spatial patterns in the landscape.

*Measurement of the variable's value:* quantitative indicators, such as landscape contrast or diversity indices, and perceptual assessments of visual richness, are used.

- Visibility

Visibility supports STD by enhancing the attractiveness and accessibility of tourist destinations (Alsharif et al., 2025). Landscape visibility is fundamental for STD because the sustainable management of these landscapes is essential for preventing degradation and maintaining their appeal (Mestanza-ramón and Jiménez-Caballero, 2023). Visibility is the extent to which key landscape features, including viewpoints and visual pathways, can be seen and understood (Inglis et al., 2022). Visibility often depends on viewpoints and

is essential for understanding how landscapes are perceived and used (Mistick et al., 2023). Visibility is the primary means by which humans interact with their environment; thus, it is an important variable in the study of human–landscape relationships (Wu et al., 2023). The role of landscape visibility, particularly in forested areas, becomes increasingly evident in ecotourism and in supporting STD (Germaine et al., 2022). Landscape visibility in traditional villages is an integral part of STD and requires careful planning and management to preserve the tourist potential of these sites (Xu et al., 2024).

*Potential indicators:* the degree of visibility of landscape features within the observer's field of view.

*Measurement of the variable's value:* GIS-based visibility analysis or visual and perceptual assessments of visual landscape clarity.

- Openness

Openness supports STD by creating memorable experiences for tourists (Mundher et al., 2023a). Openness enhances visual perception, which, in turn, influences spatial perception, contributing to the STD of tourist landscapes (Shao et al., 2024). Openness is the extent to which a landscape provides open spaces, broad vistas, and clear views (Gao et al., 2025). Landscape openness influences people's preferences, with open landscapes being rated as more cohesive and clear than closed ones (Liu and Schroth, 2019). Furthermore, visual openness is crucial in landscape evaluations because it promotes human well-being and environmental sustainability (Gao et al., 2024). Openness is high when a landscape has a wide or panoramic perspective, giving the viewer a sense of spaciousness. Moreover, landscape openness is directly proportional to viewing distance, a critical factor in the availability of open platforms and the attainment of optimal visual preferences (Chen et al., 2023). Overall, openness enhances the visual and emotional appeal of tourist destinations (Zheng S. et al., 2024).

*Potential indicators:* broad vistas, wide or panoramic perspectives, and open platforms.

*Measurement of the variable's value:* field observation or GIS-based openness analysis, supported by perceptual assessments of visual openness.

- Accessibility

Accessibility is a criterion used in landscape imagery for spatial mapping to identify suitable sites for STD (Yasin and Woldemariam, 2023). Accessibility is a key factor in a comprehensive tourism suitability index framework for guiding STD policymakers (Withanage et al., 2024). Accessibility criteria are crucial in identifying potential tourism sites, helping alleviate tourist pressure, and promoting STD in traditional villages (Chaudhary et al., 2022). Accessibility encompasses physical and visual access to different areas of the landscape. Considerations of physical accessibility and inclusive design are included to ensure that visitors can easily access and understand cultural landscapes (Villalobos et al., 2024). Accessible tourism is becoming increasingly important because improved physical access to attractions is linked to higher visitor satisfaction (Dumitrașcu et al., 2023). Overall, the literature demonstrates that accessibility to scenic tourist areas is key in supporting STD.

*Potential indicators:* legibility, physical access, and availability of pathways leading to the site.

*Measurement of the variable's value:* spatial analysis and perceptual ratings of ease of access and connectivity.

- Authenticity

Authenticity influences tourists' behavioural intentions and place-related engagement in cultural landscapes, such as traditional villages and historical areas, and is a key variable for STD (Zhu and Chiou, 2022). Authenticity is the extent to which a landscape retains its historical, cultural, and environmental integrity. Visual quality assessments have revealed that the alignment of visual elements with human aesthetic preferences and physiological responses determines the authenticity of a rural landscape (Zhang et al., 2024). In the context of traditional Chinese villages, the cultural authenticity of landscapes is linked to humanistic concepts such as antiquity, which enhance the competitiveness of the destination (Kang and Liu, 2024). Perceived authenticity influences tourists' perceptions of and satisfaction with the destination's image, enhancing their experiences (Li and Li, 2022). As demonstrated by ecotourism, authenticity enhances the satisfaction of tourists with the landscape and the image of the destination (Yang et al., 2023). Thus, there is an increasing focus on incorporating this variable into STD strategies because authentic experiences promote social acceptance and empower local communities (Poort et al., 2021).

*Potential indicators:* the preservation of traditional architectural styles, the extent of preservation of the historical and cultural heritage, and the materials that reflect the historical character of the village.

*Measurement of the variable's value:* expert evaluations of heritage integrity and participants' perceptions of authenticity and cultural continuity are used.

- Sense of place

The sense of place supports STD by deepening the connection between tourists and destinations. The sense of place in a traditional village enhances support for STD, especially regarding collective benefits (Zhu et al., 2017). The sense of place is the emotional and cultural connection that visitors feel towards the landscape, reflecting its identity and distinctiveness. This is a multidimensional concept, encompassing feelings, beliefs, and behavioural commitments influenced by the tangible and intangible characteristics of the landscape (Ruzhytska et al., 2023). Cultural heritage is an integral part of the sense of place. Authentic local traditions and cultural heritage values are central to the development of rural tourism. Furthermore, the sense of place is a key component of tourism and cultural heritage (Csurgó and Smith, 2022). The sense of place is an important variable in landscape planning and management because it helps identify and preserve the unique features of changing landscapes (Evans et al., 2022). The literature underscores the importance of integrating the sense of place into tourism planning and development to enhance STD that would benefit both local communities and visitors.

*Potential indicators:* emotional attachment, cultural identity, symbolic meaning, and vividness.

*Measurement of the variable's value:* cognitive surveys that assess attachment to place, identity, and belonging are employed.

- Safety

Safety is used to assess landscape fragility and safety for STDs, aiming to minimise environmental impacts while preserving the

quality of tourist attractions (Vyskupová et al., 2021). Safety is the relationship between landscape elements and their perceived or actual physical security and psychological comfort. In rural areas, trees and shrubs enhance feelings of safety and comfort, which are closely linked to positive emotional responses (Ren et al., 2024). Urban trees, when combined with clean neighbourhoods, also provide a sense of comfort and safety, underscoring the importance of well-maintained green spaces (Lis et al., 2024). Furthermore, environmental safety assessments provide valuable insights into balancing STDs with environmental conservation, ensuring that tourism activities do not hinder the area's environmental safety (Wang et al., 2025). The literature highlights that safety is an integral part of STD because it affects tourist experiences and supports the long-term sustainability of tourist destinations.

*Potential indicators:* clear pathways, maintenance of public spaces, and absence of hazards.

*Measurement of the variable's value:* field observations of safety characteristics and participants' perceptions of safety are used.

- Stewardship

Landscape imagery stewardship supports STD by influencing destination management and tourist behaviour and perceptions (Germaine et al., 2022). Environmental stewardship encompasses visual evidence of landscape care and maintenance, contributing to the perception of quality and sustainability (Xu et al., 2024). Landscape stewardship is critical for sustainable environmental management, requiring the engagement of direct users in addressing the challenges posed by environmental and urban change (Rana et al., 2018). Landscape stewardship extends beyond visual aspects to include actions aimed at protecting, maintaining, and sustainably using landscapes (McLeod et al., 2024). Landscape stewardship strategies demonstrate the potential for balancing environmental conservation and tourism development through environmentally sensitive approaches (Shen et al., 2025). The above-mentioned studies demonstrate that landscape imagery, when managed responsibly, can attract tourists and promote STD practices.

*Potential indicators:* the level of landscape maintenance, conservation practices, and awareness of environmental responsibility.

*Measurement of the variable's value:* surveys that measure the participation of residents and stakeholders in environmental conservation activities are used.

- Aesthetics

The aesthetics of heritage sites and traditional villages play a key role in STD. Although inherently subjective, aesthetics enhance the attractiveness of destinations and conservation efforts (Xiong et al., 2023). Aesthetics encompass the beauty of landscapes, including their harmony, composition, and viewer appeal (Mundher et al., 2023b). Landscape aesthetics are often assessed through their visual elements and composition (Jahani et al., 2022). Furthermore, aesthetics are influenced by visual composition, perception, and conditions, which are key factors in the conservation and evaluation of green spaces (Mundher et al., 2022a). Aesthetics highlight the importance of balancing a beautiful landscape with ecological stability, using models to improve landscape networks and achieve STD (Xu and Matsushima, 2023). The aesthetic

assessment of ecological areas links conservation planning with sustainable tourism (Le et al., 2019). The above-mentioned studies show that aesthetic landscaping is an integral part of STD, providing a means to attract tourists while promoting land conservation and balanced use.

*Potential indicators:* visual harmony, the attractiveness of natural and architectural elements, and visual quality.

*Measurement of the variable's value:* visual attractiveness is assessed through expert or participant evaluations applying aesthetic criteria.

### 3.5 Landscape imagery theories supporting sustainable tourism development

Several theories explore the role of landscape imagery in human perception, cultural meaning, and environmental interaction. These include the image of the city theory, which focuses on how people construct mental maps of urban landscapes based on landmarks, routes, and districts; the destination image theory, which explains how visual representations shape tourism perceptions and expectations; and the iconography of landscape theory, which asserts that landscape images are not only representations of nature but also socially constructed visual narratives.

- Image of the City Theory

The 'image of the city', a theory developed by Kevin Lynch in 1960, emphasises the importance of landmarks and how people perceive and navigate their environments (Salam and Nurhasana, 2023). Lynch's theory posits that the city's image develops from five key elements: routes, edges, districts, nodes, and landmarks. These elements help individuals create a mental map of their surroundings (Wessel et al., 2018). This theory provides a method for developing a distinctive image that can be used to build identity and attract tourists (Badami, 2022). Furthermore, it has been applied to the spatial analysis of older towns and villages, considering both physical and spiritual forms. The five elements have been used to describe the identity and aesthetics of a given area (Salam and Nurhasana, 2023). Furthermore, the theory can be applied to understand the intangible aspects of a city's image, such as cultural influences and social interactions, which are essential for building an inclusive identity and promoting a design that supports sustainable tourism (Saudale et al., 2024).

The theory emphasises the role of self-perception and cognitive maps in creating a distinctive image, suggesting that traditional villages are not only physical entities but also places with meaning and identity in the minds of their visitors and inhabitants (Wang et al., 2024). For example, the spatial image of traditional villages is perceived through the lens of tourists, whose cognitive maps highlight the importance of landmarks and pathways in shaping their experiences and understanding of these spaces (Jiang and Sun, 2022). The image of the city theory also posits that stakeholder subjective perceptions of city images are crucial in shaping tourist satisfaction and STD (Ji et al., 2024). Stakeholder involvement in spatial planning is essential for creating liveable places and enhancing satisfaction and STD (Tillie et al., 2018). In ecotourism, the identity and aesthetic image of a place are crucial to attracting and satisfying visitors, highlighting the importance of aligning promotional efforts with the impressions of visitors (Peng et al., 2020).

Overall, the image of the city theory provides a framework for planners and designers to create more navigable, memorable, and meaningful environments, while balancing physical and environmental elements to achieve STD. It emphasises the importance of integrating subjective perceptions with environmental features to enhance stakeholder satisfaction in creating a sustainable living and tourism image.

- Destination Image Theory

The destination image theory was proposed by John R. Gunn in 1972 as a model that distinguishes between images (Huete-Alcocer et al., 2019). This theory consists of three basic dimensions: cognitive, affective, and conative images. The cognitive image refers to knowledge about the destination, the affective image includes the feelings and emotions the destination evokes, and the conative image relates to the behavioural intentions for visiting the destination (Yang et al., 2022). The destination image theory is fundamental to understanding tourists' decision-making processes because it influences their satisfaction, loyalty, and likelihood of repeat visits or recommending the destination to others (Yabo et al., 2024). This theory is influenced by factors such as personal travel experiences and cultural dimensions. Recently, the theory evolved to include the influence of social networks, which are crucial in the digital age, where user-generated content shapes destination perceptions (Huang et al., 2022). The destination image theory provides a comprehensive framework for understanding and influencing tourist behaviour (Trang et al., 2023). This theory not only predicts tourist behaviour but also helps destination management organisations market and manage destinations by aligning the images presented with tourists' perceptions (Huang et al., 2022). The theory posits that the image of the destination influences tourists' intentions to visit, revisit, and recommend it (Yuan and Vui, 2023). The theory clarifies that cultural attributes are central to building a sustainable destination image and enhancing the connection between tourists and destinations (Zhou et al., 2024). Furthermore, the benefits derived from tourism can improve the quality of life of residents (Gautam and Bhalla, 2023). The theory emphasises that the interaction between destination management and tourists is crucial in shaping the destination's image (Zhu et al., 2022). In addition, integrating sustainable practices into a destination's cultural identity can enhance its image and attract tourists who value ecotourism and cultural tourism (Almeida-Santana and Moreno-Gil, 2019). Moreover, this theory provides a comprehensive framework for understanding and promoting the sustainability of destinations to attract a wider audience, supporting STD through the strategic management of destination images (Maldonado-López et al., 2024).

Overall, the destination image theory posits that the mental image tourists hold of a place, shaped by beliefs and feelings, influences their decisions to visit, revisit, and recommend that destination. It also highlights how a sustainable destination image can attract sustainability-conscious tourists and foster behaviours such as loyalty or eco-friendly practices, generating local support for STD initiatives.

- Iconography of Landscape Theory

The iconography of landscape theory was proposed by Denis Cosgrove and Stephen Daniels, who published the book of the same name in 1988. This theory proposes that landscapes should be understood as symbolic images imbued with cultural, historical, and

ideological meanings. It emphasises that landscape imagery is not only a representation of nature, but also a visual narrative grounded in social contexts (Raaphorst et al., 2020). The theory has been used to interpret historical changes in landscapes, highlighting the role of icons in documenting and understanding landscape evolution (Motte and McInnes, 2019). This theory provides a comprehensive framework for analysing and interpreting the visual and cultural dimensions of landscapes across contexts and historical periods. It is thus essential for understanding the cultural and historical significance of landscapes and their aesthetic and symbolic values, which are crucial for sustainable spatial planning and landscape management (Gyurkovich and Pieczara, 2021).

Landscapes serve as a tool for STD by preserving the authenticity and cultural heritage of a place, which are essential for attracting tourists interested in cultural and historical experiences (Fuentes and León, 2017). The iconography of landscape theory emphasises the importance of landscapes in sustainable tourism by highlighting their cultural, symbolic, and economic significance, guiding the sustainable development and marketing of tourist destinations (Terkenli et al., 2021). The visual aesthetics of landscapes thus become a critical attraction for STD because visual appeal can transform them into tourist attractions (Chylińska, 2019). Hence, this theory represents the power of landscape representations by comparing images from similar contexts and describing visual perceptions of landscapes from a critical semiotic perspective (Raaphorst et al., 2017). Ultimately, this theory emphasises the importance of visual and symbolic representations in shaping tourists' perceptions and enhancing STD by improving the image of the destination (Raaphorst et al., 2020).

Overall, the landscape iconography theory posits that landscapes are symbolic cultural images imbued with social, political, and historical meaning. Therefore, by shaping and managing the representation of landscape iconography, destination managers can influence tourist perceptions, reinforce cultural identity, and promote STD.

### 3.6 Proposed conceptual framework

The conceptual framework integrates STD principles into landscape imagery to explain how traditional villages are managed and interpreted in ways that protect their cultural, environmental, and aesthetic integrity. The dimensions of STD (environmental, cultural, economic, social, and visual) provide the contextual basis for assessing the broader sustainability outcomes of tourism activities. The landscape imagery of the village shapes these dimensions, reflecting the interrelationship between tourism development and landscape quality.

Landscape imagery, understood as the visual, spatial, symbolic, and experiential perception of traditional village environments, forms a central focus of this framework. This concept is activated by 10 variables that embody the physical characteristics and cultural meanings inherent in the landscapes of traditional villages. These variables influence the effects of sustainability practices on the perceptions of tourists and residents, highlighting the role of landscape quality in supporting STD outcomes. This framework is theoretically grounded in three scientific theories. The urban image theory enriches spatial cognitive variables, elucidating how visual clarity, readability, and perceptual organisation shape landscape understanding. The destination image theory offers insights into how visitors evaluate the functional, emotional, and psychological attributes of destinations, underlining the role of visual qualities in guiding behavioural intentions. The landscape image theory contributes an

interpretive cultural perspective, portraying landscapes as symbolic texts representing heritage, identity, and collective memory. By combining these theories together shows that landscape imagery influences tourism through three connected aspects: how people understand and navigate a place, how they feel and experience it, and how they connect with its cultural meaning. In simple terms, landscapes that are easy to understand, visually appealing, and culturally meaningful are more likely to support sustainable tourism. From this integration, several practical and testable ideas can be proposed: first, landscapes that are clearer and easier to navigate help visitors feel more comfortable and satisfied; second, destinations that offer both attractive scenery and positive emotional experiences encourage tourists to return; and third, landscapes that reflect local culture and heritage help strengthen community involvement and support long-term tourism sustainability.

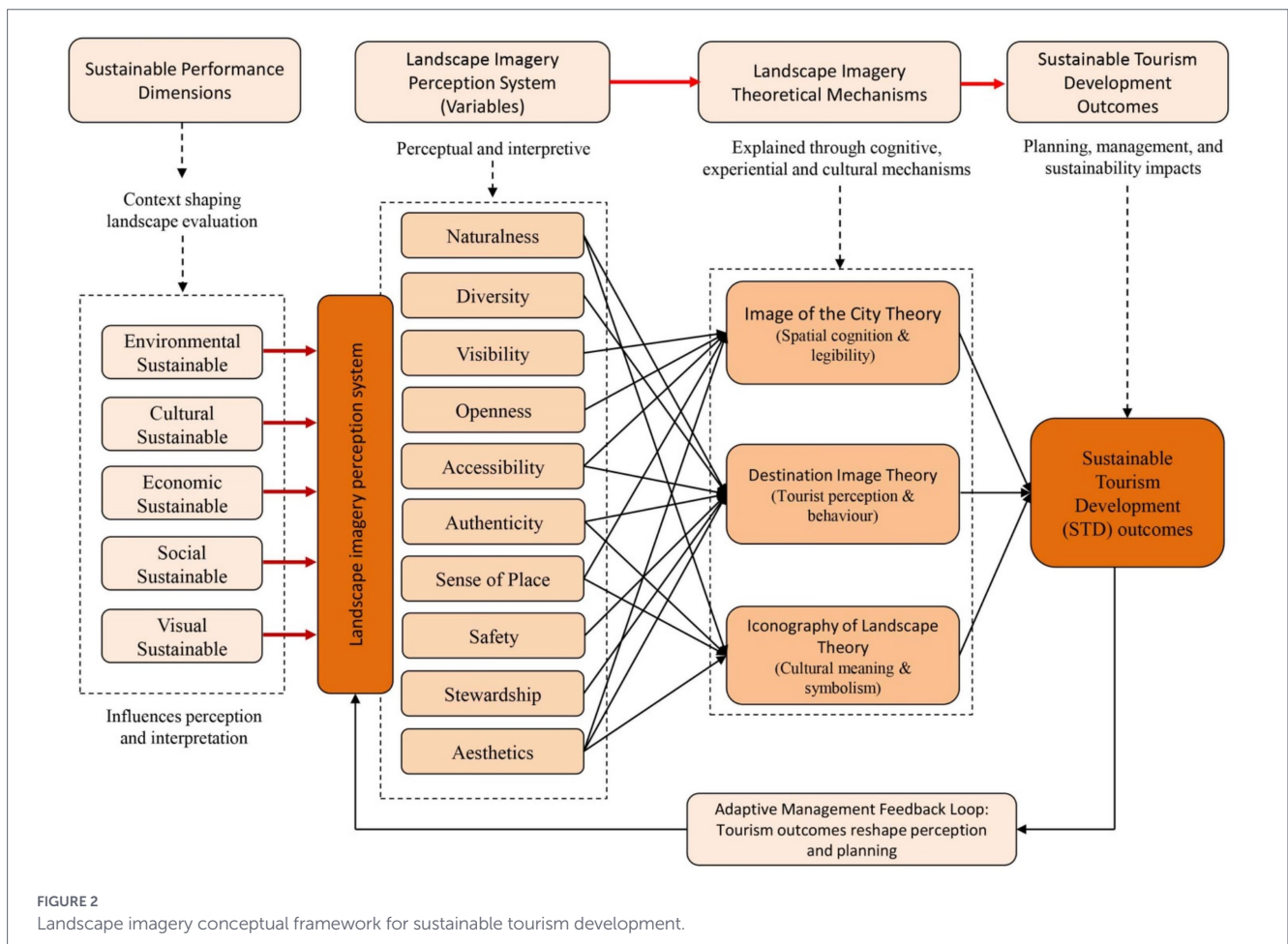
By linking each variable to these theoretical foundations, the framework establishes a coherent structure for analysing how landscape imagery shapes STD dynamics. By combining theories, the proposed framework provides a more comprehensive explanation of how landscape imagery influences STD than any single theory alone, offering a clearer theoretical contribution and practical guidance for tourism and village landscape management. Also, the final component of the model identifies these theoretical and perceptual relationships as key inputs in the STD framework for traditional villages. Thus, landscape imagery can be considered both a diagnostic tool and a strategic mechanism for enhancing sustainability outcomes. The feedback loop embedded in the framework underscores the iterative nature of

sustainable tourism, where landscape images promote positive tourist behaviour and local governance (Figure 2).

### 4 Discussion

STD in traditional villages is based on the integrated pillars of cultural heritage preservation, community participation, economic resilience, environmental protection, and visual aesthetic enhancement, all working together to revitalise rural areas for tourism. These findings are consistent with Yanan et al. (2024). STD balances the needs of residents, visitors, and nature by protecting cultural heritage, promoting local governance, and investing in environmentally friendly practices. It also fosters a sense of belonging by involving stakeholders in decision-making, strengthening social cohesion, and establishing ownership of the cultural landscape. Furthermore, STD supports job creation, encourages small businesses and local investment, while aesthetically improving the landscape to enrich tourist experiences, encourage repeat visits, and foster loyalty. Zheng X. et al. (2024) argued that by integrating good governance and sustainability into all dimensions of development, STD balances long-term tourism growth with heritage preservation, social vitality, the local economy, nature protection, and the visual aesthetics of traditional villages.

Landscape imagery also acts as a vital bridge to STD in traditional villages, framing the visual and symbolic essence of the place to shape tourists' perceptions, preserve its authenticity, and guide planning,



consistent with Qi et al. (2023). Landscape imagery in traditional villages embodies the visual and emotional narratives carried by the landscape, architecture, and cultural practices. Chen et al. (2022) claim that landscape imagery serves as a key driver of sustainable tourism by shaping tourists' cognitive and emotional perceptions, motivating their behaviours, and fostering place identity and emotional connection. Furthermore, it guides heritage conservation and community landscape management based on public preferences and unique visual quality indicators. By engaging stakeholders in the creation and management of landscape imagery, STD strategies align environmental conservation goals with the identities and values of the local population, fostering a sense of ownership and long-term commitment. As a key attraction and marketing tool, landscape imagery embodies the cultural and natural identity of a destination, attracting enthusiastic visitors who appreciate authenticity. Furthermore, landscape imagery allows for monitoring visual quality and environmental safety, ensuring that tourism development aligns with environmental and cultural preservation. Therefore, visual quality, cultural significance, and environmental responsibility can be enhanced using landscape imagery, creating a holistic and sustainable approach to tourism in traditional villages, as emphasised by Scandiffio (2021).

This study identified 10 key landscape imagery variables (naturalness, diversity, visibility, openness, accessibility, authenticity, sense of place, safety, stewardship, and aesthetics) that are fundamental to STD because they embody the physical qualities and symbolic meanings that make village landscapes attractive, meaningful, and emotionally relatable to visitors and residents. These variables are grounded in three theoretical frameworks: the image of the city theory, the destination image theory, and the iconography of landscape theory. The image of the city theory explains how visibility, openness, and accessibility shape mental maps and spatial legibility, as emphasised by Salam and Nurhasana (2023). The destination image theory clarifies how cognitive and affective dimensions of variables like naturalness, diversity, safety, and aesthetics influence tourists' perceptions, behaviour, and loyalty, as argued by Huete-Alcocer et al. (2019). The iconography of landscape theory underpins variables such as authenticity, sense of place, and stewardship by treating landscapes as socially constructed texts that carry cultural, historical, and symbolic significance, as highlighted by Raaphorst et al. (2020). These variables, supported by key theories, help destination managers leverage these meanings to attract tourists, build sustainable brands, and preserve heritage and community identity.

By integrating these theories and variables, the framework illustrates how landscape imagery functions as a core driver of STD, guiding planning decisions, strengthening place identity, and enhancing sustainability outcomes in traditional villages. The final conceptual framework demonstrates how the quality and meaning of landscape imagery shape STD in traditional villages, positioning imagery as an analytical lens and a strategic tool for achieving environmental, cultural, social, economic, and visual sustainability outcomes. The conceptual framework shows that the five STD dimensions operate as the broader context within which traditional villages are evaluated. Meanwhile, landscape imagery acts as the mechanism through which these sustainability dimensions are interpreted and influenced. However, the literature also reveals several tensions and contradictions. For instance, improving visual attractiveness to attract tourists can sometimes lead to commercialisation or modernisation that weakens local cultural identity or damages environmental quality. In some cases, landscapes promoted for tourism may reflect visitors' expectations rather than the values and daily realities of local

communities, creating conflicts between economic goals and cultural preservation. In addition, infrastructure improvements intended to support tourism may conflict with conservation objectives or alter traditional village character. However, this conceptual framework demonstrates that landscape imagery is the central mechanism for understanding, assessing, and promoting STD in traditional villages.

## 5 Limitations and future works

This research has produced valuable findings; however, several limitations should be acknowledged. First, this review comprehensively analysed existing research on landscape imagery for STD in traditional villages within a defined time frame and based on selected keywords. As a result, relevant studies published outside this period or using terminology not captured by the chosen keywords may have been excluded. To achieve a more comprehensive understanding, future studies could expand the search strategy by incorporating a broader range of keywords and additional academic databases to cover a wider body of relevant literature. Second, a more detailed bibliometric analysis could provide further insights into the field. Such an analysis would help identify the most frequently studied aspects of landscape imagery for STD in traditional villages, reveal major research trends, and clarify the geographical distribution of research outputs.

Third, the proposed landscape imagery framework for STD in traditional villages provides a useful structure to support decision-making processes. However, empirical and practical validation is necessary to confirm its effectiveness in real-world contexts. Future research could apply the framework through pilot projects or case studies to evaluate its capacity to support STD in traditional villages. This would allow the research to move beyond theoretical discussion and reach broader practical applications. Addressing these limitations in future work will strengthen the use of landscape imagery as a tool for promoting more sustainable tourism and development in traditional villages.

## 6 Conclusion

The findings of this study demonstrate that sustainable tourist development (STD) in traditional villages depends on an integrated set of cultural, social, economic, environmental, and visual aesthetic dimensions that preserve heritage, strengthen community participation, stimulate local economies, protect natural resources, and enhance visitor experiences. Landscape imagery emerges as a pivotal bridge in this process, capturing the visual, symbolic, and emotional qualities of traditional villages that influence tourists' perceptions, guide planning decisions, and reinforce authenticity. This study identifies 10 essential landscape imagery variables, which encapsulate the physical attributes and cultural meanings that shape how residents and visitors experience village landscapes. These variables are theoretically grounded in the image of the city, destination image, and iconography of landscape theories, which together explain how spatial legibility, cognitive, affective evaluations, and cultural symbolism influence tourist behaviour, community identity, and sustainability trajectories. By integrating these theories with the identified variables, the proposed conceptual framework demonstrates that landscape

imagery functions as the central mechanism through which STD is interpreted, implemented, and enhanced. This framework positions landscape imagery not only as a diagnostic lens for evaluating sustainability but also as a strategic tool for strengthening environmental protection, cultural preservation, social cohesion, economic resilience, and visual quality in traditional village tourism. Ultimately, the framework provides a comprehensive, theoretically grounded structure that guides planners, policymakers, and researchers in using landscape imagery to support resilient traditional villages that preserve their culture while implementing STD.

## Data availability statement

The original contributions presented in the study are included in the article/[Supplementary material](#), further inquiries can be directed to the corresponding author.

## Author contributions

GY: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Writing – original draft. MM: Conceptualization, Project administration, Supervision, Validation, Writing – review & editing. RM: Data curation, Formal analysis, Investigation, Methodology, Resources, Visualization, Writing – original draft.

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## Conflict of interest

The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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## Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/frsus.2026.1761796/full#supplementary-material>

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