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EVALUATING PARTICIPATORY PLANNING: COMMUNITY ENGAGEMENT, INCLUSIVE DECISION-MAKING, AND SOCIAL COHESION IN URBAN PLANNING – THE PENANG MODEL

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Abstract

Urban planning in Penang is shaped by diverse socio-cultural dynamics that pose challenges to effective community engagement. Existing literature on participatory planning often lacks a nuanced understanding of how such engagement processes influence planning policies and outcomes. This study investigates the impact of participatory planning on community engagement in Penang, with a focus on decision-making processes, inclusivity, and social cohesion. The objective is to identify the factors influencing the effectiveness of participatory strategies and evaluate their role in promoting sustainable urban development. A mixed-methods approach was adopted, combining quantitative data from surveys and questionnaires distributed to fifty (50) community members and stakeholders, with qualitative insights from in-depth interviews with ten (10) participants. This methodology enabled a comprehensive analysis of how participatory planning affects engagement, decision-making, and cohesion. Findings reveal that 66% of respondents held a positive view of participatory planning, rating its benefits as high or very high. Social cohesion levels varied, with 36% reporting strong cohesion, 44% moderate, and 20% weak. Decision-making was perceived as moderately inclusive, with an average score of 3.0, and 60% of respondents reported active involvement in urban development decisions. Qualitative results underscored the importance of individual empowerment, continuous professional development, and environmental education in fostering effective engagement. Stakeholders emphasized the need for transparent communication and inclusive decision-making processes. The study highlights that successful participatory planning requires stakeholder alignment, ongoing training, early integration of sustainability principles, and tailored strategies that address diverse community needs. Future research should explore innovative tools and approaches—especially technology-driven solutions—to reduce socio-economic disparities and ensure equitable distribution of development benefits.

***Keywords**:* Participatory planning, community engagement, inclusive decision-making, urban development, Penang, sustainability, social cohesion

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INTRODUCTION

Urban planning is essential for sustainable development, enhancing social, economic, and environmental welfare. Effective urban planning relies on the participation of local communities in the decision-making process, known as participatory planning. This approach ensures urban development is inclusive, fair, and responsive to community needs, especially in diverse and rapidly urbanising areas like Penang, Malaysia. Participatory planning fosters community involvement, inclusive decision-making, and social cohesion, contributing to the long-term success of urban initiatives (Deep, 2023). Despite its advantages, implementing participatory planning faces several challenges, particularly in navigating the complex social, cultural, and political landscapes of Penang. The current literature on participatory planning lacks a comprehensive understanding of these dynamics and their impact on planning effectiveness. This study aims to address this gap by examining the effects of participatory planning on community involvement, inclusivity, decision-making, and social cohesion in Penang (Mubita et al., 2017). The study uses a mixed-methods approach, combining quantitative surveys and questionnaires with qualitative interviews. This combination allows for a detailed understanding of community engagement in urban planning. Initial findings indicate that participatory planning leads to more inclusive decision-making and improved social harmony. The study aims to provide empirical evidence and practical recommendations for policymakers, urban planners, and community leaders on enhancing participatory planning projects. (i) To investigate the influence of participatory planning on community involvement in Penang, with a specific focus on decision-making procedures, inclusiveness, and social harmony. (ii) To examine the complex characteristics of community involvement in urban planning in Penang, specifically its influence on decision-making procedures, inclusiveness, social unity, and sustainability. (iii) To identify the elements that influence the efficacy of participatory planning policies and initiatives, as well as evaluate their contributions to the promotion of sustainable urban development. (iv) To provide empirical evidence and practical recommendations for policymakers, urban planners, and community leaders on enhancing participatory planning projects.

LITERATURE REVIEW

Participatory planning in urban environments entails the active involvement of the community in decision-making processes and the development of policies that influence the development of their cities. Adopting this method is essential for cultivating inclusiveness, openness, and responsibility, thereby advancing democratic and fair urban progress (Ethan, n.d.). Participatory planning incorporates the viewpoints of residents to guarantee that urban planning and development projects consider the requirements and preferences of the

community. Public forums, workshops, polls, and collaborative platforms are effective means of fostering strong communication between planners and the community (Anthony, 2023). The process of democratising urban planning allows disenfranchised people to exert control over their surroundings, resulting in outcomes that are fairer and more equitable. In addition, the incorporation of local knowledge improves the effectiveness of urban solutions, promoting community ownership and strengthening social cohesion. Efficient community involvement depends on a range of tools and techniques, such as public assemblies, questionnaires, group discussions, participatory mapping, digital platforms, and community advisory committees (Cinderby et al., 2021). These methods facilitate the meaningful participation of various stakeholders in urban planning processes, ensuring that development plans are in line with social, economic, and environmental goals.

Theoretical framework

The Social Exchange Theory, initially formulated by George Homans in 1958 and further enhanced in the 1970s, suggests that social conduct is shaped by a process of exchanging actions with the goal of maximising advantages and reducing drawbacks. This theory highlights the significance of perceived benefits and costs in influencing community participation, specifically in the context of community engagement in tourism and urban planning. Stakeholder engagement, benefit-sharing mechanisms, and conflict resolution procedures are essential strategies that are in line with this philosophy (Social Exchange Theory: Systematic Review and Future Directions, 2023).

Typically, researchers use mixed-methods approaches that use both quantitative surveys and qualitative interviews to investigate community opinions and behaviours in a systematic manner. According to the theory, the implementation of effective benefit-sharing models and conflict resolution processes can improve community involvement and promote the long-term viability of urban development. The Community Empowerment Theory, which emerged in the late 20th century, examines how communities might enhance their authority over development processes to attain resilience and sustainable development. This approach promotes the use of capacity building, participatory planning, and leadership development as techniques to give communities more authority in making decisions (Almalki, 2016). Methodologically, Participatory Action Research (PAR) and qualitative content analysis are frequently employed to evaluate community empowerment and involvement in development programmes. Communities that have been given power and authority tend to show better levels of involvement and ability to recover from challenges. This highlights the significance of inclusive and participatory methods in urban planning. This study combines Social Exchange Theory and Community Empowerment Theory to effectively solve the research gap found in the existing

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literature (Vaughn & Jacquez, 2020). The objective of this framework is to assess the impact of participatory on the empowerment of local communities and the promotion of peaceful and inclusive societies, specifically within the socio-cultural environment of Penang, Malaysia. Important factors and recurring ideas include:

1) Community Engagement: This variable, based on Social Exchange Theory, explores how the perceived advantages (such as the creation of jobs and improved infrastructure) and disadvantages (such as environmental harm and cultural disruption) affect the involvement of the community in tourism activities. Quantitative surveys are employed to assess the views and levels of engagement within a community (Rasoolimanesh et al., 2015).
2) Enhancing inclusivity in the process of making decisions: This variable, as highlighted by the Community Empowerment Theory, measures the degree to which local communities participate in decision-making processes linked to urban planning. Qualitative interviews offer valuable insights into these processes, emphasising the significance of inclusivity in fostering community empowerment (Malta, 2023).
3) Social cohesion refers to the level of social unity and cooperation within communities that are affected by urban planning operations. To evaluate this variable, qualitative interviews and case studies are conducted to analyse the social consequences of urban planning on the resilience of the community (Moustakas, 2023).
4) Capacity Building and Empowerment: Based on the principles of Community Empowerment Theory, this factor aims to enhance the skills, knowledge, and resources within a community to support the long-term growth of sustainable urban planning. Empirical evidence from case studies and participatory evaluations of tourist projects demonstrates the influence of capacity development initiatives on community empowerment (Wani et al., 2022).

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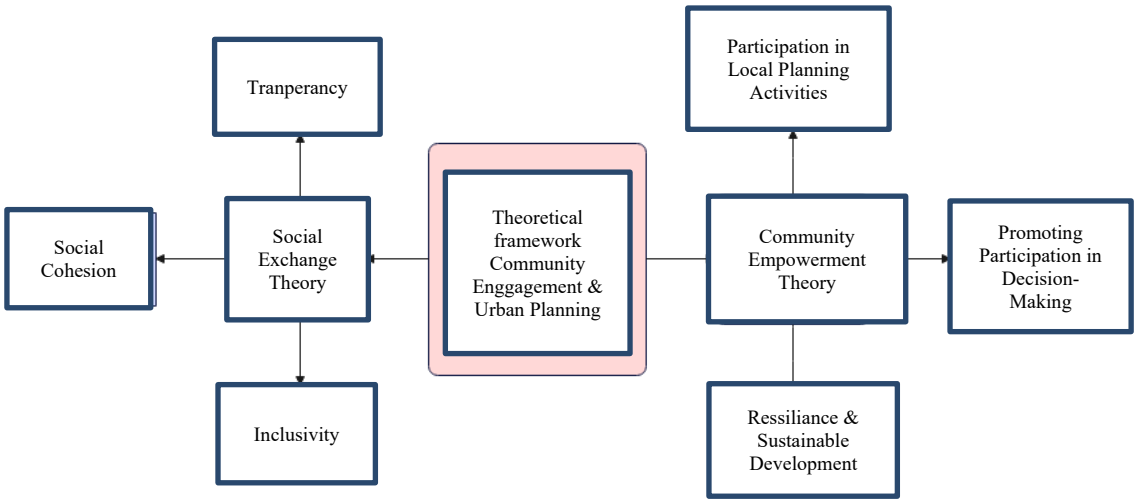


Figure 1: Theoretical Framework for Community Engagement and Urban Planning

RESEARCH METHODOLOGY

This study employed a mixed-methods approach grounded in pragmatism, integrating both quantitative surveys and qualitative interviews to explore the relationship between participatory planning and community engagement in Penang. This methodological choice is significant as it bridges objective measurements with context-rich community insights, offering a more nuanced understanding than single-method studies. The quantitative component consisted of structured surveys administered to 50 community members and stakeholders. Survey items assessed key domains, including perceived benefits of participatory planning, inclusivity, transparency, social cohesion, and engagement. Stratified random sampling ensured representation of Penang's diverse population. The data were analysed using SPSS, focusing on descriptive statistics and basic correlation patterns. The qualitative component involved semi-structured interviews with ten (10) informants, including policymakers, urban planners, community leaders, and sustainability advocates with 5–25 years of experience. Their diverse roles enriched the analysis of how participatory planning influences inclusivity, community ownership, and social cohesion. Thematic analysis was conducted using NVivo, and three key thematic maps were developed: (i) Social Cohesion, (ii) Inclusive Decision-Making, and (iii) Participation in Local Planning. This study's distinctiveness lies in its integration of theoretical grounding (Social Exchange Theory and Community Empowerment Theory) with practical stakeholder perspectives. By combining empirical data with thematic depth, it contributes a Malaysia-based framework for participatory urban governance that is both contextually grounded and globally relevant.

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ANALYSIS AND DISCUSSION

This study conducted a thorough analysis of data from fifty (50) respondents to investigate attitudes and factors associated with participatory planning and community participation in Penang. The respondents had a broad demographic profile, with an average age of around 38 years. The majority of respondents held bachelor's degrees (54%), and there was an equal distribution across genders. The descriptive statistics revealed predominantly favourable perceptions across important variables.

Demography of respondents

The data shows that respondents generally perceive participatory planning as beneficial to local communities in Penang. The majority of respondents (66%) rated the benefits of participatory planning as high (4) or very high (5), indicating a positive outlook towards involving the community in urban planning processes. After analysing the survey responses of fifty participants in Penang regarding the advantages of participatory planning, a number of significant themes were identified from the open-ended questions. Survey participants emphasised a range of favourable results associated with engaging in collaborative planning within their local area. The most prominent factor mentioned by a considerable majority of responders (32 out of 50) was "Community Empowerment".

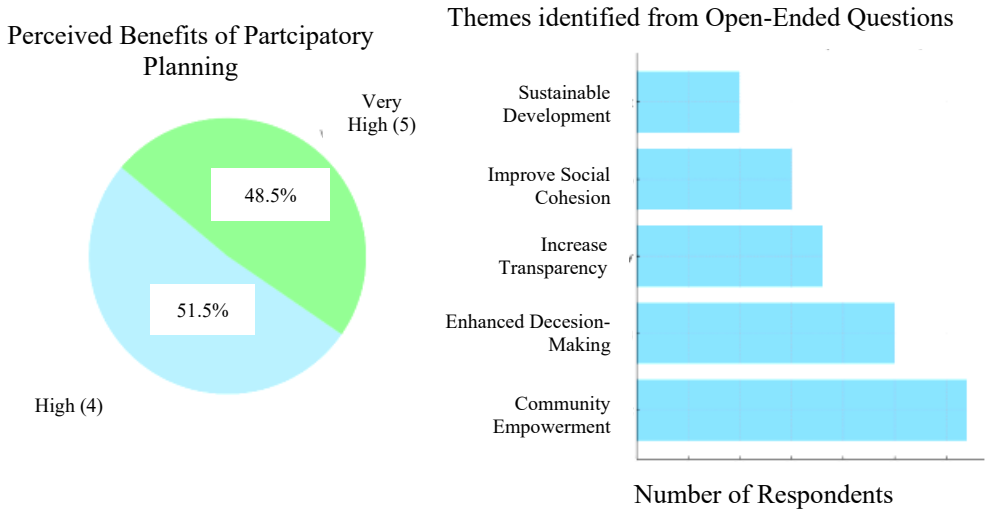


Figure 5: Demography of respondents

Participatory planning allows residents to have a significant say in decision-making processes, giving them the ability to influence and shape

initiatives that directly affect their lives. Another notable theme identified was "Enhanced Decision-Making", which was noted by twenty-five participants. These individuals emphasised that including the community in decision-making processes results in more well-informed and inclusive decisions that better correspond with local needs and goals. In addition, eighteen respondents stressed the need for "Increased Transparency", highlighting that participatory planning improves accountability and openness in urban development programmes. Fifteen respondents emphasised the significance of "Improved Social Cohesion", suggesting that participatory approaches promote enhanced unity and collaboration among community members. Ten respondents emphasised the importance of "Promotion of Sustainable Development", highlighting how participatory planning facilitates environmentally sustainable and socially responsible development practices. The responses highlight the various advantages of participatory planning in Penang, indicating that including communities in decision-making not only empowers them but also leads to more sustainable, transparent, and united urban settings.

Frequency of Participation in Local Planning

i. **Occasionally (56.0%)**: Most respondents participate occasionally in local planning, indicating that while they are involved, it is not a regular occurrence
ii. **Regularly (24.0%)**: A smaller portion of respondents regularly engage in local planning, suggesting a consistent interest or commitment to local planning processes.
iii. **Infrequently (12.0%)**: A moderate percentage of respondents participate infrequently, which may indicate limited time, interest, or awareness about planning opportunities.
iv. **Never (6.0%)**: A small percentage have never participated in local planning, which could reflect a lack of interest, opportunity, or knowledge about the planning processes available.

Ideas Incorporated in Local Planning Decisions

Yes (84.0%): A significant majority of respondents feel that their ideas are incorporated into local planning decisions. This indicates a positive perception of the inclusiveness and responsiveness of local planning processes.

No (16.0%): A minority of respondents believe their ideas are not incorporated, which could suggest some dissatisfaction or a perception that the planning process lacks inclusivity or transparency.

The respondents typically perceived the benefits of participatory planning as moderate, with an average rating of 3.58. This implies that, although

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the respondents acknowledged certain favourable characteristics, they did not overwhelmingly perceive participatory planning as very advantageous. Additional criteria associated with participatory planning, such as inclusiveness (the extent to which various community views are incorporated), transparency (the degree of openness and clarity in decision-making), and social cohesion (the feeling of community and togetherness), also obtained reasonable ratings, ranging from approximately 3.14 to 3.42. An important discovery from the correlation study is the notable and favourable connection between the perceived advantages of participatory planning and social cohesion. The correlation coefficient ($r = 0.36$, $p < 0.05$) indicates that there is a positive relationship between people's perception of advantages from participatory planning and their level of social cohesion. Put simply, if community members perceive participatory planning as beneficial, they are more inclined to have a sense of connection and cohesion with fellow community members. The relationship was additionally reinforced using visual examinations utilising scatter plots, which verified that the patterns exhibited in the data corresponded with the computed correlation coefficients. The visual analyses provided further evidence that the perceived advantages of participatory planning are associated with enhanced social cohesion within the community. This result suggests that promoting participatory planning could be a successful method for improving social unity and reinforcing community bonds. A study of categorical data revealed a significant preference for community involvement (74%) and the consideration of viewpoints (56%) in decision-making processes. The application of t-tests and ANOVA in hypothesis testing revealed that demographic factors, such as gender, had a significant influence on the perception of benefits ($t(48) = 2.14$, $p < 0.05$).

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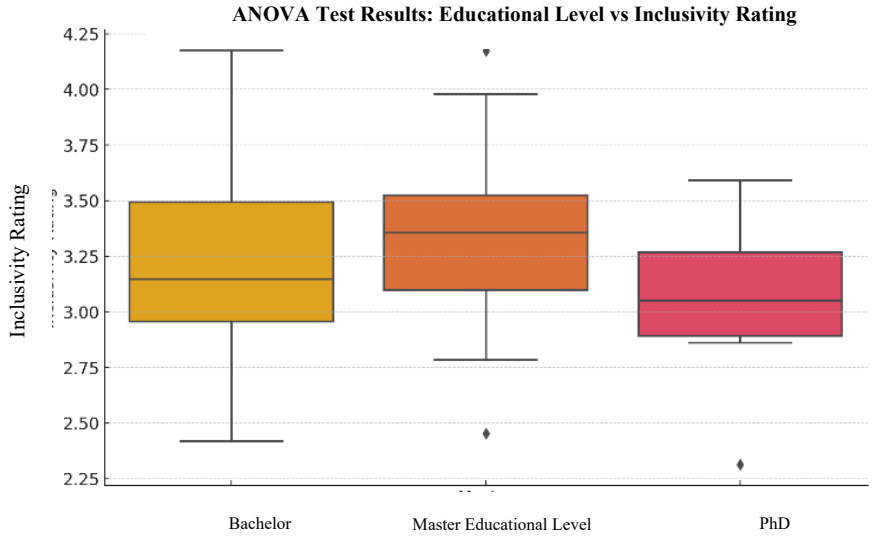


Figure 7: ANOVA Test Results for Educational Level vs Inclusivity Rating

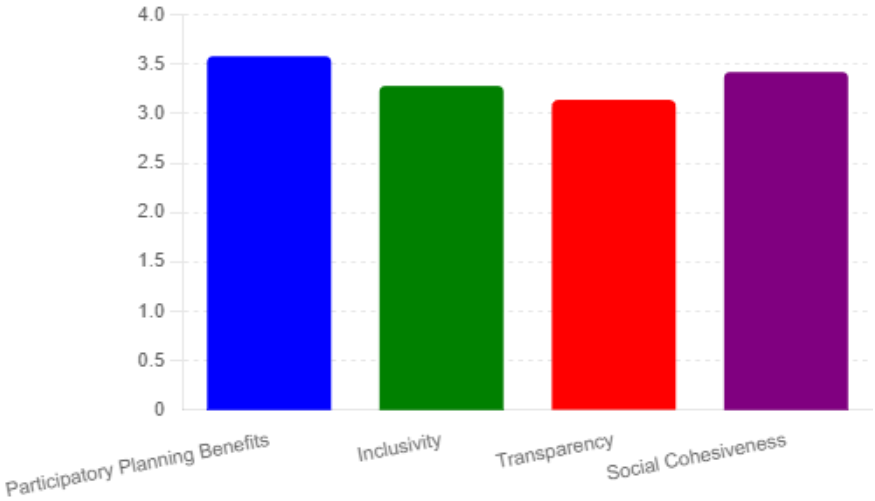


Figure 8: Results between Participatory Planning Benefits, Inclusivity, Transparency and Social Cohesiveness

A study of categorical data revealed a significant preference for community involvement (74%) and the consideration of viewpoints (56%) in decision-making processes. The application of t-tests and ANOVA in hypothesis

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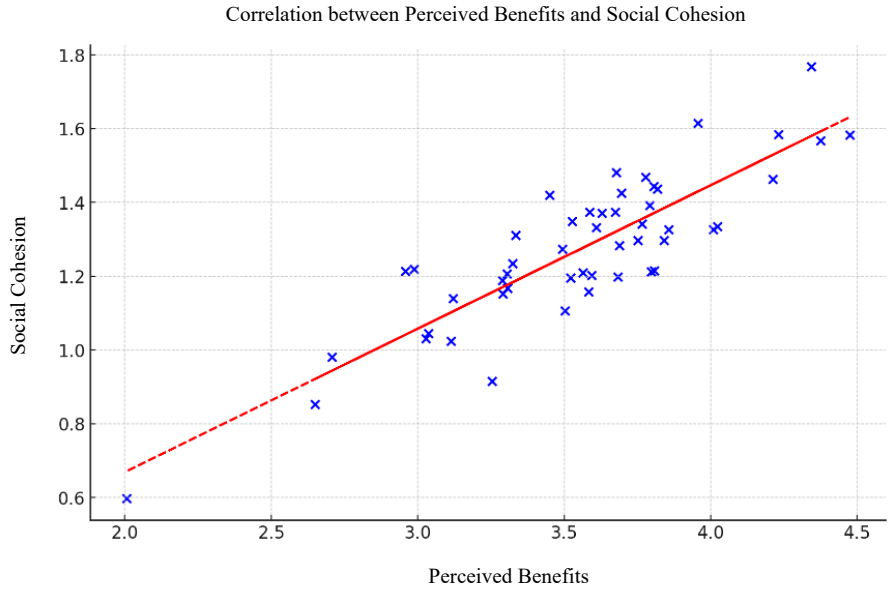


Figure 9: Results between perceived benefits and social cohesion

Gender vs Perceived Benefits

Additionally, educational level disparities were found to impact inclusivity ratings ($F(2, 47) = 3.21$, $p < 0.05$), highlighting the role of demography in shaping views. Cronbach's alpha coefficients demonstrated robust internal consistency when evaluating the reliability of survey scales. The reliability of the scale used to measure perceived benefits of participatory planning was excellent ($\alpha = 0.84$), as were the reliabilities of the scales used to measure community participation ($\alpha = 0.79$), inclusive decision-making ($\alpha = 0.77$), and social cohesion ($\alpha = 0.72$). The results highlight the dependability of the survey tool in capturing various aspects of community involvement and decision-making processes in the urban planning context of Penang.

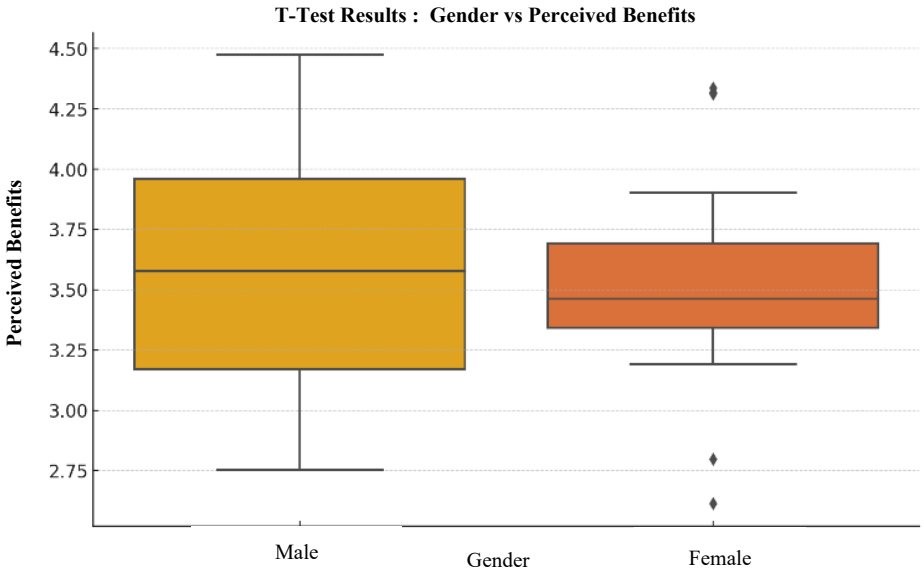


Figure 10: Results for T-Test Gender vs Perceived Benefits

Community Engagement:

Several observations were derived from the comments of fifty survey participants in Penang regarding community engagement in local planning activities. Most respondents (28 out of 50) claimed that they participate in local planning meetings or events occasionally, while twelve respondents reported engaging regularly. Only six respondents indicated that they engage in participation infrequently, while four respondents answered that they never participate. When asked if their ideas are considered in local planning decisions, a significant majority (42 out of 50) responded positively, indicating that they believe their thoughts are incorporated during the planning process. This indicates a generally favourable opinion of inclusivity in the community's decision-making processes. Respondents offered a variety of open-ended replies when discussing the variables that influence their participation in community planning. Twenty-two respondents said that the most reported element influencing involvement was "Relevance to Personal Interests and Needs". They highlighted the significance of issues that directly impact their local communities or personal circumstances as driving forces for involvement. Another prevalent theme identified was "Perceived Impact", which was started by eighteen respondents. These individuals emphasised their conviction that participation in the activity may lead to significant positive changes or enhancements in their community. The survey revealed that fourteen participants mentioned "Availability of Time" as a constraint, suggesting that their hectic schedules and other obligations

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occasionally hinder their involvement. Additional characteristics identified were "Trust in Decision-Makers" (10 participants), "Access to Information" (8 participants), and "Supportive Community Networks" (6 participants).

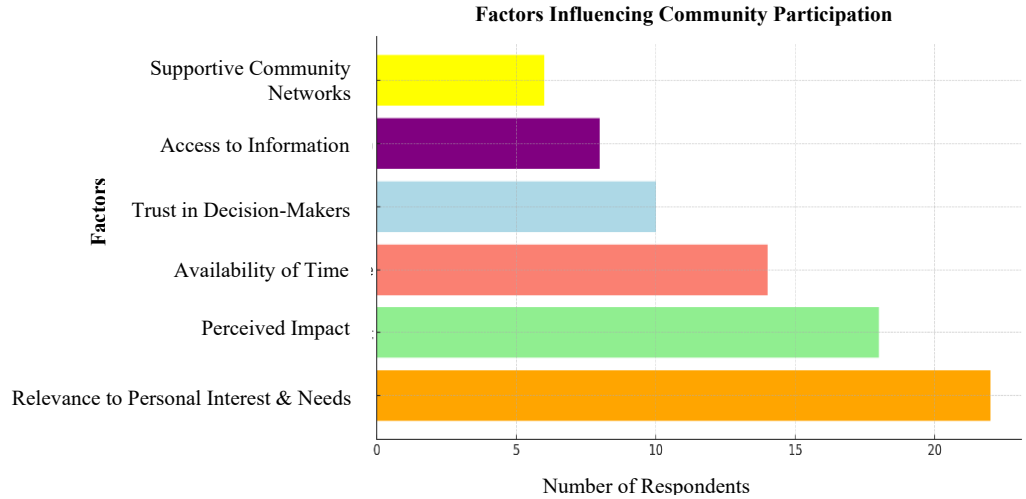


Figure 11: Factors Influencing Community Participation

Interview Results

To complement the survey findings, interviews were conducted with ten (10) participants, including community members, policymakers, and tourism operators. Thematic analysis focused on three key aspects: community engagement, inclusive decision-making, and social cohesion.

Community Engagement

Most participants demonstrated strong involvement in local planning, either through direct participation in sustainability initiatives (e.g., Int1, Int2) or via policy formulation (e.g., Int3, Int4). They emphasized the value of public dialogue and grassroots activism in shaping responsive urban planning. Notably, 6 out of 10 interviewees rated their engagement as high, reflecting a strong community-driven orientation in Penang.

Inclusivity in Planning Processes

Interviewees described urban and tourism planning processes as moderately inclusive. Stakeholders such as Int7 and Int8 highlighted improvements in how local input influenced zoning and infrastructure decisions. However, limitations due to bureaucratic procedures and underrepresentation of marginalised groups

were raised. Overall, inclusivity was rated moderate by the majority, with 6 of 10 responses falling into this category.

Social Cohesion

Participants reported mixed perceptions of social cohesion. While early tourism development was said to disrupt communal identity, current efforts—such as cultural preservation and inter-community events—are helping rebuild bonds.

This study offers a thorough analysis of community involvement, equitable decision-making, and societal harmony in relation to urban development and tourism in Penang. By combining both quantitative and qualitative data, a comprehensive knowledge of these processes can be achieved.

Major Discoveries Involvement of the Community

1) Quantitative Data: A significant majority (66%) of the participants expressed a favourable view of community engagement in urban planning, rating the benefits of participatory planning as high (4 or 5).
2) Qualitative findings reveal that actively participating in community-led initiatives (Int1, Int2) and policy formulation (Int3, Int4) plays a crucial role in shaping local regulations and improving community resilience.

Participatory Decision-Making

1) Quantitative Data: The average evaluations for the inclusivity and transparency of planning procedures were about 3.0, suggesting a modest level of perceived inclusion and transparency. Most respondents rated these aspects with scores ranging from 2 to 4.
2) Qualitative insights highlight the importance of advocates who support inclusive policies (Int7, Int8) and provide examples of community involvement that have had a significant influence (Int9, Int10). These insights demonstrate the advancement towards urban planning that is more inclusive and aligns with the specific needs and ambitions of the local community.

Social cohesion

1) Quantitative Data: The perception of social cohesion varies, with 36% of respondents expressing good cohesion, 44% reporting moderate cohesion, and 20% reporting weak cohesion. The influence of tourism on community bonds was varied, with substantial percentages ranking it as moderate (28%), high (30%), and very high (22%).
2) Qualitative Insights: Discussions indicate that tourism has a mixed impact on social cohesiveness, with both negative effects on cultural identity and positive efforts to strengthen communal bonds through cultural preservation (Int1, Int2).

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Policy and practice implications

Policy Formulation: Policymakers should prioritise the integration of community input in urban planning to improve inclusiveness and ensure that development initiatives are in line with local values and requirements. Community platforms can be used to establish interaction between citizens and authorities, which can enhance transparency and inclusivity in decision-making processes, leading to more effective resolutions of local concerns. Effective tourist management requires a delicate equilibrium between the expansion of tourism and the preservation of cultural heritage, as this is essential for fostering social harmony and facilitating sustainable development within communities.

ACKNOWLEDGEMENT

Permission to conduct fieldwork and collect data was granted by community leaders and relevant stakeholders in Penang. The authors gratefully acknowledge their support and cooperation, which made this research possible.

ETHICAL STATEMENT

This study was conducted in accordance with the research ethics guidelines of Universiti Utara Malaysia. All participants were informed of the purpose of the study and gave their voluntary informed consent prior to participation. Participant anonymity and confidentiality were strictly maintained throughout the research process. Consent to publish anonymized findings was also obtained from all respondents. The research involved no harm or risk to participants and adhered to ethical practices involving human subjects.

REFERENCES

Deep, N. G. (2023). Evaluating the impact of community engagement in urban planning on sustainable development. *World Journal of Advanced Research and Reviews*, *20*(3), 1633–1338. https://doi.org/10.30574/wjarr.2023.20.3.2453

Mubita, A., Libati, M., & Mulonda, M. (2017). The Importance and Limitations of Participation in Development Projects and Programmes. *European Scientific Journal ESJ*, *13*(5), 238. https://doi.org/10.19044/esj.2017.v13n5p238

Ethan, O. (n.d.). Participatory Urban Planning: Engaging Communities in Decision-Making. In *Department of Computer Science, University of Leads*.

Anthony, B. (2023). The Role of Community Engagement in Urban Innovation Towards the Co-Creation of Smart Sustainable Cities. *Journal of the Knowledge Economy*. https://doi.org/10.1007/s13132-023-01176-1

Cinderby, S., De Bruin, A., Cambridge, H., Muhoza, C., & Ngabirano, A. (2021). Transforming urban planning processes and outcomes through creative methods. *Ambio*, *50*, 1018–1034. https://doi.org/10.1007/s13280-020-01436-3

Social exchange theory: Systematic review and future directions. (2023). *Frontiers in Psychology*. https://doi.org/10.3389/fpsyg.2022.1015921

Almalki, S. (2016). Integrating Quantitative and Qualitative Data in Mixed Methods Research—Challenges and Benefits. *Journal of Education and Learning*, *5*(3), 288. https://doi.org/10.5539/jel.v5n3p288

Vaughn, L. M., & Jacquez, F. (2020). Participatory Research Methods – Choice Points in the Research Process. *Journal of Participatory Research Methods*, *1*(1). https://doi.org/10.35844/001c.13244

Rasoolimanesh, S. M., Jaafar, M., Kock, N., & Ramayah, T. (2015). A revised framework of social exchange theory to investigate the factors influencing residents' perceptions. *Tourism Management Perspectives*, *16*, 335–345. https://doi.org/10.1016/j.tmp.2015.10.001

Malta. (2023). The Concept of Strategy in Community Empowerment: A Literature Review. In *International Journal Publishing* (Vol. 5, Issue 3, pp. 24–25). https://influence-journal.com/index.php/influence/index

Moustakas, L. (2023). Social Cohesion: Definitions, Causes and Consequences. *Encyclopedia*, *3*(3), 1028–1037. https://doi.org/10.3390/encyclopedia3030075

Wani, M. D., Dada, Z. A., & Shah, S. A. (2022). The impact of community empowerment on sustainable tourism development and the mediation effect of local support: a structural equation Modeling approach. *Community Development*, *55*(1), 50–66. https://doi.org/10.1080/15575330.2022.2109703

Ibrahim, Z. (2007). *Urban conservation: A framework for community involvement in Malaysia*. Sheffield Hallam University; Sheffield Hallam University. http://shura.shu.ac.uk/19853/

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PAK KHLONG TALAT: THE SETTLEMENT AND EXPANSION PATTERN OF STORES, THE CASE OF FLOWER MARKET NEIGHBOURHOOD, BANGKOK, THAILAND

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Abstract

Pak Khlong Talat is one of the biggest flower markets in Bangkok, Thailand. The neighbourhood was built by commercial sectors and is considered an area with a strong sense of place that has created dimensions for the city for a long time. However, Pak Khlong Talat was not a flower market in the first place. In the past, this area used to be a fish market at the Pak Khlong port. After the transport method was shifted from the river to the road and new buildings were built, the Pak Khlong Talat neighbourhood was expanded, and flowers became the majority of product sales. Therefore, this research aims to explore the pattern of Pak Khlong Talat settlement through the establishment of shops in the Pak Khlong Talat area and to propose guidelines to support the future expansion of the flower market according to the place identity by using the field survey method with 154 stores, specifically, along Chakkraphet Road, the main road of the neighbourhood and categorised the store based on the type of good, store, and established year, to create value guides and analyst by the settlement pattern and theories. The study results found that the settlement of Pak Khlong Talat is linear along the road, which started with the transit-oriented development of the port area. Most of the goods sold and the type of stores in the market are flowers and shophouses, combined with the established year, more than 30 years, which shows sustainability. In conclusion, to propose guidelines for the future expansion of this neighbourhood, 29 stores that have high-value guides should be considered the main factor in maintaining the atmosphere and place identity of the Pak Khlong Talat neighbourhood.

Keywords: Settlement, Expansion, Pattern, Flower Market, Place Identity, Design Guideline

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INTRODUCTION

Pak Khlong Talat is an area with diversity in terms of culture, people, and commercials that can track back to the root of settlement in the core area of Bangkok, creating the identity of the place in Bangkok's old town. Pak Khlong Talat is the market located in Khwaeng Wang Burapha Phirom, Phra Nakhon, Bangkok, Thailand. Pak Khlong, in Thai, means the area where the canal and river are connected, and Talat means market. Therefore, this area is along the Chao Phraya River, where the Rop Krung Canal is connected and used as a port and market. With a strong sense of place, Pak Khlong Talat is one of the most popular tourist attractions in terms of cultural tourism (Preekran & Ongkasing, 2019), and it gathers people from around the world. Pak Khlong has been known for its diversity and liveliness, unlike any other flower market. As the 24-hour market, Pak Khlong Talat never sleeps. The activities happen daily: selling, trading, and more.

STUDY AREA

The main route of Pak Khlong Talat is Chakkraphet Road, a one-way road along the Chao Phraya River. This road was used as the main transportation after the period of King Rama V when the way of transportation was shifted from water to road (Pongprayoon, 1993). Therefore, most of the shops are attached to the road, creating an atmosphere in the Pak Khlong Talat neighbourhood where the stores compete to sell goods to people passing by. However, from the expansion and popularity of the market, the road seemed too small over time because the shops, especially vendors and booths, claimed the areas over the pathway and parts of the road. The expansion of this neighbourhood creates clusters of stores. On the one hand, these shops create an atmosphere of liveliness in the commercial community. However, on the other hand, the chaos created by stores affects pedestrians and traffic on the main road (Chaweeint, 2018). The government, therefore, has a policy to decrease trading on the pathway and move them into the market inside, but it is hard to find the balance between management and keeping place identity (Preekran & Ongkasing, 2019), as the trading atmosphere along the road becomes one of the senses of place.

Pak Khlong Talat History

Pak Khlong Talat is known as the flower market in the heart of Bangkok. However, the history of Pak Khlong Talat can be traced back to the early region of Rattanakosin. In this research article, we separate the phases of the Pak Khlong Talat settlement into 10 phases. At first, this area started with the port area where the Rob Krung Canal met the Chao Phraya River. The port was used as a fish market that transferred fish from the sea, which is the Thai Gulf, and a trade area for the merchants in the core area of Bangkok. Secondly, After the period of King

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Rama V, the fish port was abolished. Thus, the old fish port was used as the second port for the floating market connected with Tha Tien, the main port at the time. As the Pak Khlong Talat port area is smaller than Tha Tien port, the trading boats usually transfer between two ports more than stop at the Pak Khlong Talat port. After that, in the third phase, the old Chinese language school was devastated, and a group of shophouses were built instead. As the purpose of the shophouses was commercial, the identity of this place started to develop. However, in the fourth phase, the main market of this area was still the riverside, later the Organization Market, because water was still the main transportation route at that time. Later, trade expanded, and road transportation became the main means of transportation. As a result, the market area grew to the other side of the road and increased in the roadside areas. The sixth phase, in the time of Field Marshal P. Phibunsongkhram, was a transformation of the markets in Bangkok, the Provincial Fresh Market and traders along the wall of Wat Pho, Wat Phra Chetuphon Wimon Mangkhalaram Rajwaramahawihan, were moved into Pak Khlong Talat area. After the increase in trading density, in the seventh phase, the Yodphiman Market was built close to the Memorial Bridge. In addition, the new market was built on the opposite side of the road, later called the Thai Farmers Promotion Market, in the eighth phase. As the road was a more important way of transport, the traders tended to be at the pathway along Chakkraphet Road rather than inside the market and riverside, thus, creating the trading atmosphere, liveliness, and the unique identity of Pak Khlong Talat as the ninth phase. Finally, as Pak Khlong Talat was more popular with tourists, not only traders, the Yodphiman Riverwalk was built along the Chao Phraya River to be a tourist attraction. At present, Pak Khlong Talat covers the area of Yodphiman Market, Organization Market, Thai Farmers Promotion Market, and Yodphiman Riverwalk. The sequence of the settlement of Pak Khlong Talat is shown in Figure 1.

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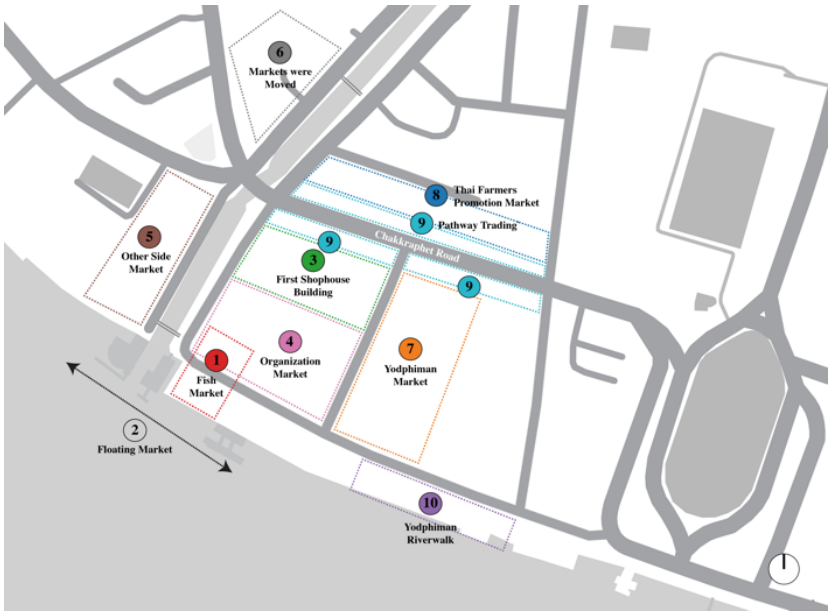


Figure 1: Map of Pak Khlong Talat Settlement
Source: Authors (2024)

LITERATURE REVIEW

Settlement Theory

Human settlement happens when people live in a group, such as villages and cities. In a settlement, the important components are people and space. The next important components are contact with each other and using various services and facilities to meet the needs of people in that group. The settlement, especially in urban areas, can be separated into 3 types: linear, radial, and gridiron, the elements include paths, nodes, edges, districts, and landmarks (Lynch, 1960).

As in urban areas planning to optimise the use of space and maximise economic benefit, the settlement form usually follows the economic aspects, such as transportation nodes (Kaewtawee et al., 2023), which led to transit-oriented development. The development spread out from the public transportation nodes. According to history, the area of Pak Khlong Talat started with the port area where the canal meets the river. In the past, this area used to be an important port area. Even though, at present, the port is deprioritised, the old settlement is still spread out from this area. After the development of the transportation node, the community, or trading areas, continued to grow along the roadside, causing linear settlement with the locals' contribution (Hassan et al., 2020).

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Place Identity Theory

Place identity is an environmental psychology concept that describes how a person's self-identity relates to their physical environment (Proshansky et al., 1983). It encompasses the various dimensions, meanings, and emotional connections that people associate with particular places and how these connections shape an individual's sense of self (Fuengfusakul, 2003). Place identity includes attachment and meaning (Scannell & Gifford, 2010), sense of belonging, continuity, self-categorization, social identity, and influence on behaviour and well-being. Place identity is about how a person's sense of who they are is influenced by their surroundings and how emotional and psychological bonds with places form an integral part of their identity (Twigger-Ross & Uzzell, 1996) (Fitri & Triyadi, 2015).

Creating a place identity involves fostering a strong emotional and psychological connection between people and specific locations, including community engagement, preserving and highlighting local history, design and aesthetics, sustainable and inclusive development, and promoting local culture and traditions, narrative, and branding. In the old town area, as in Pak Khlong Talat Neighbourhood, creating place identity or placemaking is necessary for sustainable development (Boonprasong, 2019). As the case study from Petaling Street in Malaysia, placemaking is also attributed to tourism experiences (Xiang & Mohamad, 2023).

Therefore, this research aims to find the pattern of Pak Khlong Talat settlement by establishing shops, types of goods, and stores in the Pak Khlong Talat area and propose guidelines to support the future expansion of the flower market according to the place identity.

RESEARCH METHODOLOGY

The frameworks used in this research include 4 steps: objective, review, survey, and analysis. Firstly, this research aims to find the pattern of Pak Khlong Talat settlement through the establishment of shops in the Pak Khlong Talat area and propose guidelines to support the future expansion of the flower market according to the place identity. Secondly, a literature review on the related topics, including settlement theories and the history of Pak Khlong Talat Neighbourhood, will be conducted to find settlement theories relevant to market formation. Thirdly, the field survey method collects store data regarding the type of goods, type of stores, and established year. Finally, the value of each store is analysed based on 3 factors to find the value guideline (Thinnakorn & Inpuntung, 2020) (Thinnakorn & Anurak, 2022), from 0 – 3, and the value and the settlement pattern are used simultaneously to propose the guideline for further expansion. This research was approached with mixed methods, quantitative surveys, and qualitative interviews.

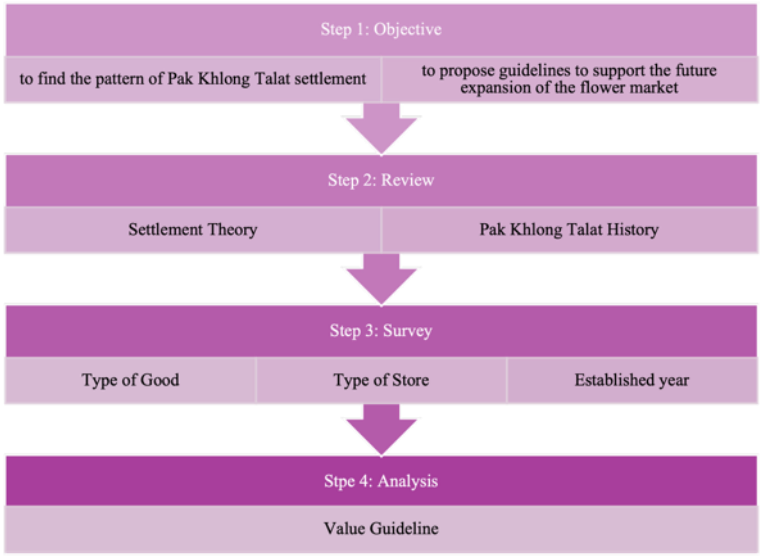


Figure 2: Research Methodology
Source: Authors (2024)

Survey Result

The survey of 154 stores along Chakkraphet Road can be classified into 4 main categories: type of goods, type of stores, established year, and value guide based on the factors that affect place-making (Ujang, 2012). Firstly, the type of goods can be separated into 8 types: flower, fruit and vegetable, food, religious goods, utensils, flower equipment, other, and not identified. Secondly, the type of stores can be separated into 4 types: shophouse, booth, vendor, and cart based on the urban vernacular features found in Pak Khlong Talat (Suwansawat, 2018). Thirdly, the established year can be separated into 7 periods: less than a year, 1 – 5 years, 6 – 10 years, 11 – 20 years, 21 – 30 years, more than 30 years, and not identified which are related to the phases of forming this neighbourhood.

Three factors from the field survey, type of goods, type of stores, and established year, are analysed to assess the value guide for future expansion guidelines, from 0 – 3 points in three categories (Thinnakorn & Anurak, 2022). The assessment of the value of stores is defined by a strong sense of place from the type of goods and the sustainability of the stores from the type of stores and established year in order to create the place identity for Pak Khlong Talat. The highest influence from each factor will get 1 point, and the second influence will get 0.5 points. As Pak Khlong Talat is known as the flower market (Tovivich, 2022), the type of goods that will keep the sense of place the most is flowers, followed by flower equipment and religious goods related to flowers and the overall atmosphere close to religious places. The most sustainable type of store

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is a shophouse, which shows the stability and opportunity for the business to continue. Finally, the longer the stores open, the higher sustainability; therefore, the stores that have been open for more than 30 years will get 1 point, and those that have been open between 10 – 20 years will get 0.5 points. The result of the field survey is shown in Table 1 below.

Table 1: Data of stores along Chakkraphet Road

No.	Picture	Type of Good	Type of Store	Established years	Value Guide	No.	Picture	Type of Good	Type of Store	Established years	Value Guide
001		Flower	Booth	10 years	1.50	078		Flower	Shop house	20 years	2.50
002		Flower	Shop house	N/A	2.00	079		Flower	Shop house	N/A	2.00
003		Flower	Shop house	2 years	2.00	080		Flower	Shop house	10 years	2.50
004		Other	Shop house	N/A	1.00	081		Flower	Booth	15 years	1.50
005		Food	Shop house	N/A	1.00	082		Flower	Shop house	30 years	3.00
006		Flower	Booth	30 years	2.00	083		Flower	Shop house	30 years	3.00
007		Flower	Booth	10 years	1.50	084		Flower	Booth	31 years	2.00
008		Flower	Shop house	10 years	2.50	085		Flower	Shop house	4 years	2.00
009		Flower	Shop house	20 years	2.50	086		Flower	Shop house	20 years	2.50
010		Utensil	Shop house	N/A	1.00	087		Flower	Shop house	20 years	2.50
011		Flower	Booth	38 years	2.00	088		Flower	Shop house	N/A	2.00
012		Flower	Shop house	N/A	2.00	089		Flower	Shop house	10 years	2.50
013		Flower	Shop house	20 years	2.50	090		Flower	Shop house	1 years	2.00
014		Flower	Shop house	13 years	2.50	091		Flower	Shop house	30 years	3.00
015		Flower	Shop house	N/A	2.00	092		Flower	Shop house	30 years	3.00

No.	Picture	Type of Good	Type of Store	Established years	Value Guide	No.	Picture	Type of Good	Type of Store	Established years	Value Guide
016		Flower	Booth	N/A	1.00	093		Flower	Shop house	N/A	2.00
017		Flower	Shop house	10 years	2.50	094		Flower	Shop house	N/A	2.00
018		Flower	Shop house	10 years	2.50	095		Flower	Shop house	N/A	2.00
019	-	Flower	Booth	5 years	1.00	096		Flower	Shop house	N/A	2.00
020		Flower	Shop house	6 years	2.00	097		Flower	Shop house	N/A	2.00
021		Religious	Shop house	N/A	1.50	098		Equipment	Shop house	N/A	1.50
022		Religious	Shop house	10 years	2.00	099		Flower	Shop house	N/A	2.00
023		Food	Shop house	N/A	1.00	100		Flower	Shop house	30 years	3.00
024		Other	Shop house	N/A	1.00	101		Flower	Booth	3 years	1.00
025		Religious	Shop house	N/A	1.50	102		Food	Shop house	60 years	2.00
026		N/A	Shop house	N/A	1.00	103		Flower	Shop house	10 years	2.50
027		Religious	Shop house	30 years	2.50	104		Flower	Shop house	20 years	2.50
028		Utensil	Shop house	N/A	1.00	105		Flower	Shop house	N/A	2.00
029		Fruit	Shop house	80 years	2.00	106		Flower	Shop house	5 years	2.00
030		Flower	Shop house	N/A	2.00	107		Flower	Shop house	6 years	2.00
031		Fruit	Shop house	30 years	2.00	108		Food	Shop house	60 years	2.00
032		Utensils	Shop house	N/A	1.00	109		Flower	Shop house	20 years	2.50
033		Fruit	Booth	30 years	1.00	110		Flower	Shop house	10 years	2.50

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No.	Picture	Type of Good	Type of Store	Established years	Value Guide	No.	Picture	Type of Good	Type of Store	Established years	Value Guide
034		Religious	Shop house	N/A	1.50	111		Flower	Shop house	N/A	2.00
035		Fruit	Shop house	N/A	1.00	112		Flower	Shop house	40 years	3.00
036		Flower	Shop house	3 years	2.00	113		Flower	Booth	14 years	1.50
037		Fruit	Shop house	60 years	2.00	114		Other	Shop house	N/A	1.00
038		Flower	Shop house	5 months	2.00	115		Flower	Booth	6 years	1.00
039		Fruit	Shop house	20 years	1.50	116		Flower	Booth	10 years	1.50
040		Other	Shop house	N/A	1.00	117		Equipment	Vendor	50 years	1.50
041		Flower	Shop house	3 years	2.00	118		Utensils	Vendor	10 years	0.50
042		Flower	Shop house	30 years	3.00	119		Food	Vendor	27 years	1.00
043		Flower	Shop house	N/A	2.00	120		Other	Vendor	30 years	1.00
044		Fruit	Booth	1 month	0.00	121		Flower	Vendor	3 years	1.00
045		Fruit	Booth	20 years	0.50	122		Flower	Vendor	40 years	2.00
046		N/A	Shop house	N/A	1.00	123		Flower	Vendor	6 years	1.00
047		Fruit	Shop house	50 years	2.00	124		Food	Vendor	20 years	0.50
048		N/A	Shop house	N/A	1.00	125		Flower	Booth	20 years	1.50
049		Food	Shop house	4 years	1.00	126		Religious	Booth	10 years	1.00
050		Flower	Shop house	20 years	2.50	127		Fruit	Booth	20 years	0.50
051		N/A	Shop house	N/A	1.00	128		Food	Cart	6 years	0.00

No.	Picture	Type of Good	Type of Store	Established years	Value Guide	No.	Picture	Type of Good	Type of Store	Established years	Value Guide
052		Utensils	Shop house	N/A	1.00	129		Food	Cart	3 years	0.00
053		Food	Cart	1 month	0.00	130		Fruit	Booth	30 years	1.00
054		Food	Cart	10 years	0.50	131		Fruit	Booth	30 years	1.00
055		Food	Cart	10 years	0.50	132		Flower	Booth	1 year	1.00
056		Food	Cart	36 years	1.00	133		Flower	Booth	1 month	1.00
057		Other	Shop house	N/A	1.00	134		Religious	Booth	3 years	0.50
058		Fruit	Shop house	N/A	1.00	135		Fruit	Booth	60 years	1.00
059		Utensils	Shop house	N/A	1.00	136		Flower	Booth	3 years	1.00
060		Flower	Shop house	10 years	2.50	137		Religious	Booth	30 years	1.50
061		Other	Shop house	N/A	1.00	138		Flower	Booth	1 year	1.00
062		Flower	Shop house	10 years	2.50	139		Religious	Booth	20 years	1.00
063		Flower	Shop house	N/A	2.00	140		Flower	Booth	7 years	1.00
064		Flower	Shop house	N/A	2.00	141		Flower	Booth	10 years	1.50
065		Flower	Shop house	7 years	2.00	142		Flower	Booth	20 years	1.50
066		Food	Shop house	2 years	1.00	143		Flower	Booth	10 years	1.50
067		Flower	Shop house	16 years	2.50	144		Flower	Booth	10 years	1.50
068		N/A	Shop house	N/A	1.00	145		Flower	Booth	22 years	2.00
069		Other	Shop house	N/A	1.00	146		Flower	Booth	30 years	2.00

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No.	Picture	Type of Good	Type of Store	Established years	Value Guide	No.	Picture	Type of Good	Type of Store	Established years	Value Guide
070		Flower	Shop house	20 years	2.50	147		Flower	Booth	40 years	2.00
071		Flower	Shop house	10 years	2.50	148		Flower	Booth	50 years	2.00
072		Flower	Shop house	2 years	2.00	149		Flower	Booth	17 years	1.50
073		Flower	Shop house	N/A	2.00	150		Flower	Booth	3 months	1.00
074		Equip ment	Shop house	30 years	2.50	151		Flower	Vendor	10 years	1.50
075		Flower	Shop house	N/A	2.00	152		Flower	Vendor	30 years	2.00
076		Flower	Booth	6 years	1.00	153		Flower	Booth	7 years	1.00
077		Fruit	Booth	40 years	1.00	154		Flower	Booth	12 years	1.50

Source: Authors (2024)

ANALYSIS AND DISCUSSION

The survey results show the stores in the Pak Khlong Talat area, especially along Chakkraphet Road, total 154 stores. The results include 3 factors, type of store, type of good, and established year, that affect the value of stores to keep the place identity and atmosphere of Pak Khlong Talat flower market. The majority type of goods in this area is flowers, 94 out of 154 stores, 61.04 per cent, followed by fruit and vegetable, 15 out of 154 stores, 9.74 per cent, and food, 14 out of 154 stores, 9.09 per cent. Religious goods, 9 out of 154 stores, 5.84 per cent, other goods, 8 out of 154 stores, 5.19 per cent. Utensils, 6 out of 154 stores, 3.90 per cent, not identified, 5 out of 154 stores, 3.25 per cent, and flower equipment, 3 out of 154 stores, 1.95 per cent. The results of the type of goods are shown in Figure 3 below.



Figure 3: Map of stores along Chakkraphet Road, classified by type of good
Source: Authors (2024)

The foundation of Pak Khlong Talat started with a group of shophouses in this type of store. Therefore, 95 out of 154 stores have shophouse stores, at 61.69 per cent, followed by booths, 43 out of 154 stores, 27.92 per cent; vendors, 10 out of 154 stores, 6.49 per cent; and carts, 6 out of 154 stores, 3.90 per cent. The results of this type of store are shown in Figure 4 below.



Figure 4: Map of stores along Chakkraphet Road, classified by type of store
Source: Authors (2024)

Some stores were opened for less than a year in the established year at 5 out of 154 stores, 3.25 per cent; stores with 1 – 5 established years, 17 out of 154 stores, 11.04 percent. Store with 6 – 10 established years, 31 out of 154

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stores, 20.13 percent; and store with 11 –20 established years, 22 out of 154 stores, 14.29 percent; stores with 21 – 30 established years, 19 out of 154 stores, 12.34 percent, store with more than 30 established years, 15 out of 154 stores, 9.74 percent, and not identified established years stores, 45 out of 154 stores, 29.22 percent. The results of the established year are shown in Figure 5 below.



Figure 5: Map of stores along Chakkraphet Road, classified by established year
Source: Authors (2024)

Discussion and Design Guideline

The field survey results show the relationship between the three factors and the value guide for stores. The criteria for the value guide, score 0 – 3, is a score of 0.00 – 1.00 points means less – value, a score of 1.50 – 2.00 points means moderate – value, and a score of 2.50 – 3.00 points means high – value (Thinnakorn & Inpuntung, 2020) (Thinnakorn & Anurak, 2022). The higher the value, the more the store should be considered to maintain the place identity of Pak Khlong Talat, considering the sustainability of the building based on economic and social factors to keep the place identity (Ujang, 2012). Of the 154 stores along Chakkraphet Road, 29 stores have a high–value, accounting for 18.83 per cent. Most of the high-value stores are shophouses that sell flowers, which is related to the place's identity that people are attached to and the income source for the community members that participate in the place-making process (Manzo & Perkins, 2006). The established year also shows the stores' sustainability in keeping the atmosphere even after the gentrification of the decades (Raja Othman, 2017). There are 68 moderate–value stores, at 44.16 per cent, which can be kept if necessary. Finally, 57 stores have less value, at 37.01 per cent. These stores are mostly temporary vendors, booths, or carts that are

easier to move and change due to the type of stores or established year and Organization of Street Vendors by the government (Chaweeint, 2018).

The settlement in this area started at the port, related to the expansion of the stores followed. The transit-oriented development, TOD, of Pak Khlong Talat started with the port for Chao Phraya River. After that the stores settlement is in linear along the main road, Chakkraphet Road, to attach people who pass by after the changed in transportation way. The expansion also spread to another side of the road created the market atmosphere along both sides and maintain it to the present (Preekran & Ongkasing, 2019).

To preserve the sense of place of Pak Khlong Talat, the buildings with the high impact on perception on place identity should be conserved in both architectural and cultural activity aspects by the collaboration of community members (Manzo & Perkins, 2006). The high-value stores indicated in the survey result show the 29 stores that created the image of the neighbourhood and appropriate for conserving (Abdullah, 1998) which are mostly flower stores in the shophouses with the high established year.

The results of the value guide of stores are shown in Figure 6 below. Therefore, some stores were closed at the time of the survey, which was 3:00 AM – 12 AM on weekdays and weekends, and the result was not identified in all topics, which could have resulted in lower values.



Figure 6: Map of stores along Chakkraphet Road, analysed by value guideline
Source: Authors (2024)

CONCLUSION

Pak Khlong Talat, a flower market in the core area of Bangkok, is one of the most unique places in Thailand. The place identity of this neighbourhood attracts tourists from around the world. However, the market expansion is spread

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unmanageable. The history of the area, theories, and field surveys of 154 stores in 3 factors show evidence of the settlement of Pak Khlong Talat in linear along the road, which started with the transit-oriented development, TOD, of the port area and expanded to the road created the place identity, the flower stores in the shophouses. The place-making processes were participated by community members with economic and social factors (Thinnakorn, et al., 2025). For the expansion and development, the 29 stores were assessed to maintain the place identity in the future.

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REFERENCES

Boonprasong, P. (2019). Place Identity in Use Transformation Process of Old Building in The Old Town. *The Journal of Architectural/Planning Research and Studies (JARS)*, *16*(2), 31 - 47.

Chaweeint, P. (2018). Organization of Street Vendors at Pak Khlong Talat Market, Phra Nakhon District, Bangkok. Master of Public Administration. Siam University.

Fitri, M & Triyadi, S. (2015). Community Cultures in Creating the Place-Bound Identity in Musi Riparian, Palembang. *Social and Behavioral Sciences*, *184*(May), 394-400.

Fuengfusakul, A. (2003). Identity: Review of theory and conceptual framework. Bangkok: National Research Council of Thailand.

Hassan, N. 'Adilah, Harun, N. Z., & Abdullah, A. (2020). The Formation of Social Capital in Malay Traditional Settlement. *Planning Malaysia*, *18*(12). https://doi.org/10.21837/pm.v18i12.748

Kaewtawee, R., Huang, S.Y., Thinnakorn, R., Thinnakorn, W., & Noithapthim, N. (2023). Shophouse Façades on Ratchadamnoen Road in Southern Thailand: A Taxonomic Study to Produce a Dataset for AI modelling. *ISVS e-journal*, *10*(10), 341 - 360.

Lewicka, M. (2008). Place Attachment, Place Identity, and Place Memory: Restoring the Forgotten City Past. *Journal of Environmental Psychology*, *28*(3), 209-231.

Lynch, K. (1960). The Image of the City. Cambridge.

Manzo, L. C., & Perkins, D. D. (2006). Finding common ground: The importance of place attachment to community participation and planning. *Journal of Planning Literature*, *20*(4), 335-350.

Pongprayoon, C. (1993). Human settlement theory and practice. Bangkok: Chulalongkorn University.

Preekran, R., & Ongkasing. C. (2019). Innovation Management of Creative Community Markets in Pak Khlong Talat Area. *Journal of Interdisciplinary Research: Graduate Studies, 8*(2).

Proshansky, H. M., Fabian, A. K., & Kaminoff, R. (1983). Place-identity: Physical world socialization of the self. *Journal of Environmental Psychology*, *3*(1), 57-83.

Raja Othman, R. N. (2017). The Impact of Gentrification on Local Urban Heritage Identity in Old Quarter, Melaka Heritage City. *Planning Malaysia*, *15*(2). https://doi.org/10.21837/pm.v15i2.272

Scannell, L., & Gifford, R. (2010). Defining place attachment: A tripartite organizing framework. *Journal of Environmental Psychology, 30*(1), 1-10. https://doi.org/10.1016/j.jenvp.2009.09.006

Suwansawat, C. (2018). Carry Boy. Retrieved July 15, 2024, from https://readthecloud.co/architect-carry/

Suwatcharapinun, S. (2012). Re-engaging "Phenomenology in Architecture" rethinking the use of "Root-Identity" and "Units of Analysis. *NAJUA: History of Architecture and Thai Architecture, 9*(2). 264-283.

Tovivich, S. (2022). The evaluation of contemporary art installation for Bangkok flower market revitalization: case study "form of feeling @ flower market". *Journal of Environmental Design, 9*(2), 2-25.

Thinnakorn, W., & Anurak, T. (2022). Valuing cultural landscape heritage in historic areas: Proposed assessment criteria from Thailand. International *Journal of Sustainable Development and Planning*, *17*(5), 1543-1551. https://doi.org/10.18280/ijsdp.170518

Thinnakorn, W., & Inpuntung, V. (2020). Valuable Vernacular Architectural Heritage: Tha Wang Community, Nakhon Si Thammarat Province. *Asian Journal of Arts and Culture*, *20*(1), 62–76.

Thinnakorn, W., Kaewtawee, R., Srimuang, K., & Ahmad, A. G. (2025). Sustainability assessment of vernacular architectural heritage: the case of Shino-European shophouse in Tha Wang historical neighbourhood, Thailand. *Cogent Arts & Humanities, 12*(1). https://doi.org/10.1080/23311983.2025.2482385

Twigger-Ross, C., & Uzzell, D. (1996). Place and identity processes. *Journal of Environmental Psychology*, *16*(3), 205-220. https://doi.org/10.1006/jevp.1996.0017.

Ujang, N. (2012). Place Attachment and Continuity of Urban Place Identity. *Social and Behavioural Sciences*, *49*(2). 156–167.

Xiang, T. H., & Mohamad, D. (2023). The Effect of Placemaking Attributes on Tourism Experiences: A Case Study of Petaling Street in Malaysia. *Planning Malaysia*, *21*(28). https://doi.org/10.21837/pm.v21i28.1336

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IMPACT OF A LINEAR CITY SPATIAL CONFIGURATION ON OLD TOWN AREA: THE CASE OF THA WANG OLD TOWN, NAKHON SI THAMMARAT, SOUTHERN THAILAND

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Abstract

Nakhon Si Thammarat, a city in southern Thailand, has changed over time following a linear pattern expanding along a north-south axis, characterized by the expansion of urban areas spreading out from its old center, and how these changes have affected Tha Wang Old Town area, once a vibrant trade center, it now struggles to maintain its functionality and spatial centrality have faced challenges amidst the Nakhon Si Thammarat city's growth. As Nakhon Si Thammarat city expanded, the Tha Wang Old Town area's importance changed. This research aims to find the changing pattern of Nakhon Si Thammarat city's Street layout and public space. the Impact on accessibility, connectivity, and liveability which affects the role of Tha Wang old town as a spatial center in the present day. By using analytical methodologies, Space Syntax, and Geographic Information Systems (GIS), to analyse the street layout and public space systems, as a spatial configuration change, based on periods of time. The results found that the urban area expanded to the east along the continuous road development has changed the potential of the spatial centrality of Tha Wang Old Town area over time. In conclusion, the study is not only about history but also about planning for the future. By understanding how a city's spatial patterns change over time to make better decisions about how to preserve their heritage while adapting to modern needs through spatial centrality cognition. The findings offer valuable insights for urban planners and policymakers, showing how to create cities that are both dynamic and maintain the vibrancy of urban life in the Old Town area with a set of knowledge about urban morphology.

Keywords: Spatial configuration, Urban expansion, Old Town, Space Syntax

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INTRODUCTION

The expansion of modern Nakhon Si Thammarat city has followed a longitudinal pattern along a north-south axis, closely paralleling the historic route of the Tha Wang Old Town area. Tha Wang Old Town, once a bustling urban center, is renowned for its numerous valuable vernacular architectural buildings that reflect the city's rich cultural heritage. However, the expansion of the urban area has significantly impacted these historical structures. Many of these buildings have suffered from abandonment or inappropriate repurposing due to the rapid urban development and modernization processes that have taken place.

This study seeks to analyze the urban configuration of Tha Wang Old Town to complement other aspects of its development. It introduces the application of space syntax techniques as a means to understand and assess the spatial potential of this historic area. Building upon earlier research conducted by Tinnakhon (2021) in the vicinity of Wat Phra Mahathat Woramahawihan, this study extends the investigation to include the adjacent Tha Wang Old Town area. The aim is to explore its spatial characteristics in greater detail and evaluate its integration within the contemporary urban environment.

The need for a comprehensive study of urban public spaces, including roads and sidewalks, becomes evident in this context. Previous studies on various historic towns, such as the George Town heritage site in Malaysia, have emphasized the importance of spatial analysis for understanding accessibility levels in these areas (Safizadeh, 2022). Tools like Space Syntax are utilized to analyze the spatial network configuration, building density, and land use mix. This analysis highlights the critical importance of integrating old and new structures to improve accessibility and ensure mobility equality within modern urban planning frameworks.

The study aims to leverage the results of urban spatial configuration analysis across different historical periods to gain insights into the evolution and transformation of the Tha Wang Old Town area. By highlighting the area's potential, the study seeks to evaluate the appropriateness and sustainability of urban development strategies. The objective is to provide valuable information that will guide urban planning decisions, ensuring that the development of Tha Wang Old Town is both respectful of its historical context and aligned with contemporary urban development principles. This approach aims to enhance the long-term viability and livability of Tha Wang Old Town, addressing both historical preservation and modern community needs.

LITERATURE REVIEW

Urban Spatial Configuration

Recent literature on urban configuration encompasses various theories and methodologies aimed at understanding and modelling the spatial organization of

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cities. Space Syntax theory emphasizes the relationship between urban structures and functions, highlighting the importance of accessibility measures in determining land values (Lykostratis, 2018). Additionally, the development of urban areas is influenced by the interaction between three-dimensional elements and free spaces, impacting the quality of public spaces and urban planning strategies. Furthermore, research delves into the emergence of universal patterns in cities over time, exploring processes like preferential attachment and reaction-diffusion that govern street structure growth and differentiation, ultimately shaping land use and building development (Al-Sayed, 2014). Advancements in deep learning have also sparked interest in automating urban planning processes, aiming to generate land-use configurations efficiently based on surrounding spatial contexts (Wang, 2020). These diverse studies collectively contribute to a comprehensive understanding of urban configuration dynamics and their implications for urban development and design.

Urban Old Town Conservation

Urban old town conservation can benefit significantly from space syntax analysis, as seen in studies focusing on historic cities like George Town in Malaysia (Fan,2024) and Trafalgar and Old Market Square (Mahmoud,2023). By utilizing space syntax theory, researchers can model and analyze the unique pedestrian landscapes of old towns, identifying issues like poor connectivity, safety concerns, and inadequate access to key attractions. This approach allows for a comprehensive spatial understanding, leading to the development of strategies to enhance pedestrian networks, optimize urban spaces, and preserve historical identities. Through the integration of space syntax with geographic information systems and regression analysis, a scientific basis is established for creating regional characteristics in urban spaces, guiding conservation efforts and urban planning in old town areas.

Space Syntax in urban planning

Space syntax theory is essential for analyzing spatial configurations and morphological changes in historic towns, as shown by research on cities like George Town (Fan, 2024). Using space syntax methods such as UCL DepthmapX simulations and axial maps, researchers assess pedestrian landscapes, network connectivity, and spatial intelligibility. This analysis uncovers key insights into structural issues, pedestrian flow patterns, and evacuation vulnerabilities, providing guidance for urban planning to improve accessibility, safety, and design in culturally significant historic areas.

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RESEARCH METHODOLOGY

This study employs a qualitative method approach, by use the geographic data of Nakhon Si Thammarat Old Town includes map review, and GIS data analysis. Spatial integration is measured using the space syntax technique with DepthmapX software.

The space syntax technique is an urban configuration tool derived from three main theories:

1. Theory of Natural Movement: The configuration of the urban grid influences the movement of people within the spatial environment. (Hillier, Penn et.al., 1993)
2. Theory of Movement Economy: Increased free movement within a denser urban grid provides opportunities for continuous activities, especially commercial activities, which in turn intensify the natural movement within the area. (Hillier, 1996)
3. Theory of Spatial Centrality: As the processes from the Theory of Movement Economy take effect, the area experiences increased density of natural movement, creating a multiplier effect that drives the area to become spatial centrality, thus forming the urban center. (Hillier, 1999)

Which synthesizes these theories, to examine the connectivity and potential of Tha Wang Old Town area in present day by compared the axial map in 3 phases of times, the values derived from the calculations of both global and local integration are compared to illustrate the variations and changes observed. to determine whether it functions as a central area.

Space Syntax is a method used to analyze the spatial configurations and their effects on movement and social interactions within buildings or urban environments. It relies on mathematical and graphical tools to understand how spatial layouts influence behavior and how different spaces relate to one another. This study scoped at four value form Space Syntax calculate such as:

1. Global Integration: Reflects overall centrality in the network.
2. Local Integration: Reflects connectivity within a specific area.
3. Synergy Coefficient: Evaluates the alignment between spatial layout and functional use.
4. Intelligibility Coefficient: Reflects ease of understanding and navigation.

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ANALYSIS AND DISCUSSION

Settlement and Development of Nakhon si Thammarat city



Figure 1: Nakhon Si Thammarat Province is situated in the South of Thailand.
Source: authors edited from google earth



Figure 2**:** Nakhon si Thammarat city near the coast
Source: authors edited from google earth

The development of urban areas takes various forms, influenced by different factors of each area that promote diverse patterns of settlement. Particularly in this study, the focus is on the urban area of the old town of Nakhon Si Thammarat. The original settlement was located along a beach known as 'Hat Sai Kaew beach,' a sandbar stretching north to south of east coast of Nakhon si Thammarat. This city is one of the significant ancient historical sites of the Malay Peninsula. Based on the discovery of ancient artifacts and Brahmanical religious sites that influenced this area in the 9th-10th Buddhist centuries (about 350 - 450 A.D), and the significant Buddhist site is Wat Phra Mahathat Woramahawihan. (Noonsuk, 2001) With the settlement on this area, urbanization occurred over time, leading to the expansion of Nakhon Si Thammarat and the construction of new roads at various times.

- Phase 1: before1965 Ratchadamnoen Road – The ancient road from settlement era.
- Phase 2: 1965 Phattanakan Khukwang Road was constructed.
- Phase 3: 1999 Therdprakkiat Road was constructed.

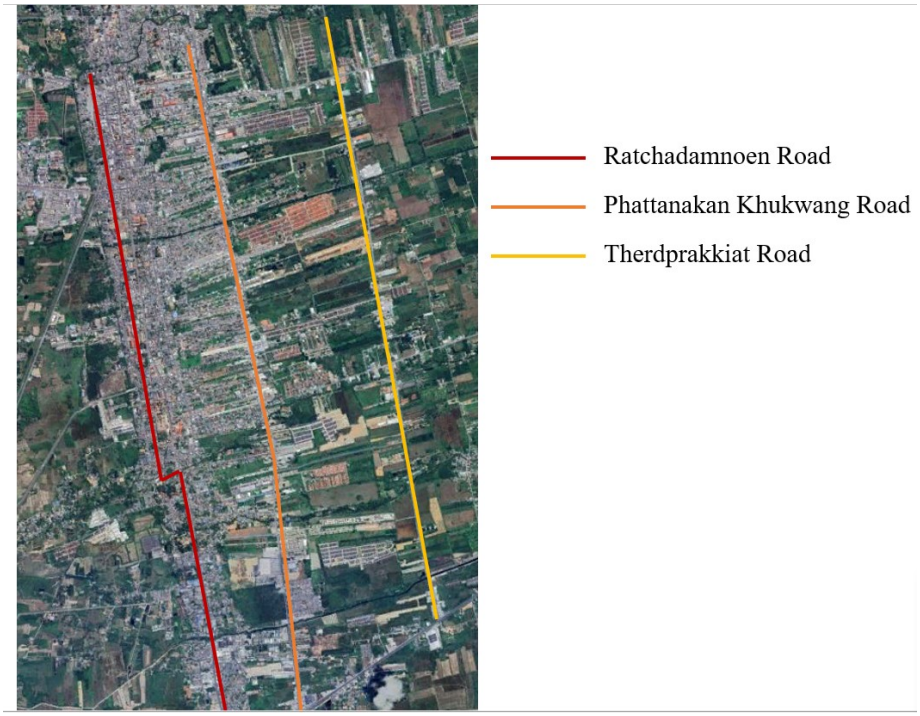


Figure 3: 3 Roads in 3 Phases in this study
Source: authors

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This urban expansion occurred urban transformation and changes of the spatial patterns of Nakhon Si Thammarat urban area. Since the three roads have continuously developed along the north-south axis, extending eastward in parallel, the increase in roads has led to the expansion of settlements. This expansion has affected the connectivity of transportation with the original central area. Urban development in Nakhon Si Thammarat city has been a subject of interest, focusing on conservation efforts and public space utilization (Thinnakorn, 2021; Thinnakorn & Chapklap, 2022).
Axial maps of Nakhon si Thammarat including Tha Wang old town shown the public space network within the boundaries of the roads defined in the study area.

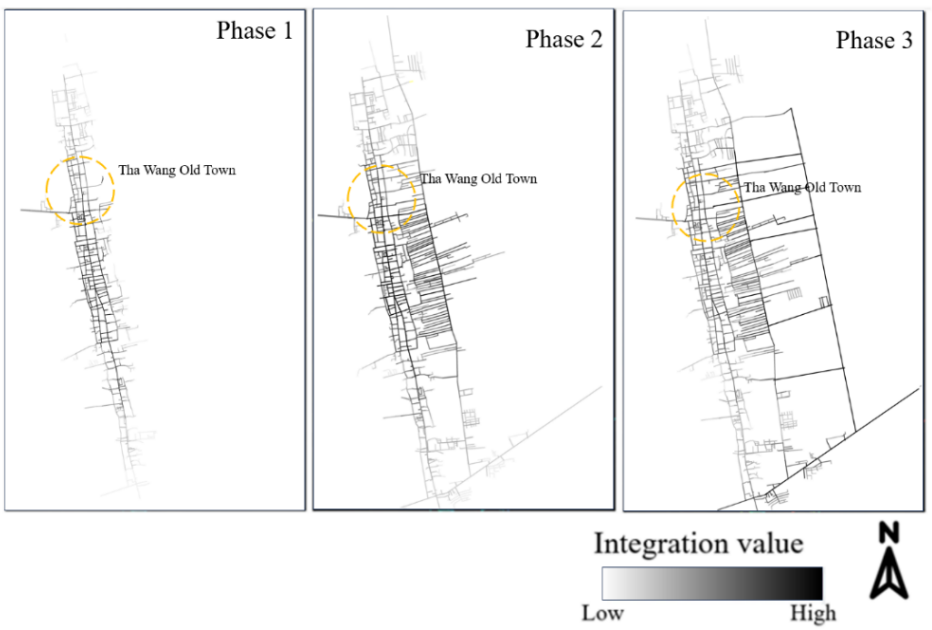


Figure 4: Nakhon Si Thammarat axial map - Global integration
Source: authors

In Figure 3, the Global Integration values, which serve as indicators of the potential for containing natural movement throughout the entire public space network based on the axial lines in each phase, exhibit changes over time. The axial lines are essentially the longest lines of sight and movement paths within the urban space, and they play a crucial role in determining the flow and accessibility of these spaces.

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In the initial phase, the old town's axial lines already exhibit certain integration values, suggesting a foundational structure that facilitates movement and connectivity. The integration values here reflect the traditional layout and historical pathways that have likely been in area for a long time.

In phase 2, the axial lines Tha Wang Old Town area show the highest integration values within this area. This phase highlights a peak in the accessibility and movement potential of the old town. The high integration values suggest that during this phase, the old town was a central hub for movement within the public space network. Tha Wang Old Town's streets and pathways were highly accessible, indicating that it likely served as a major point of convergence for people moving through the area.

In phase 3, Therdprakiat Road emerges as the area with the highest Global Integration values. This road becomes the new focal point for natural movement, surpassing the old town in terms of accessibility and centrality. The shift to Therdprakiat Road indicates that this area has become more integrated into the public space network, possibly due to new urban developments, changes in infrastructure, or modifications in traffic flow that enhance its accessibility.

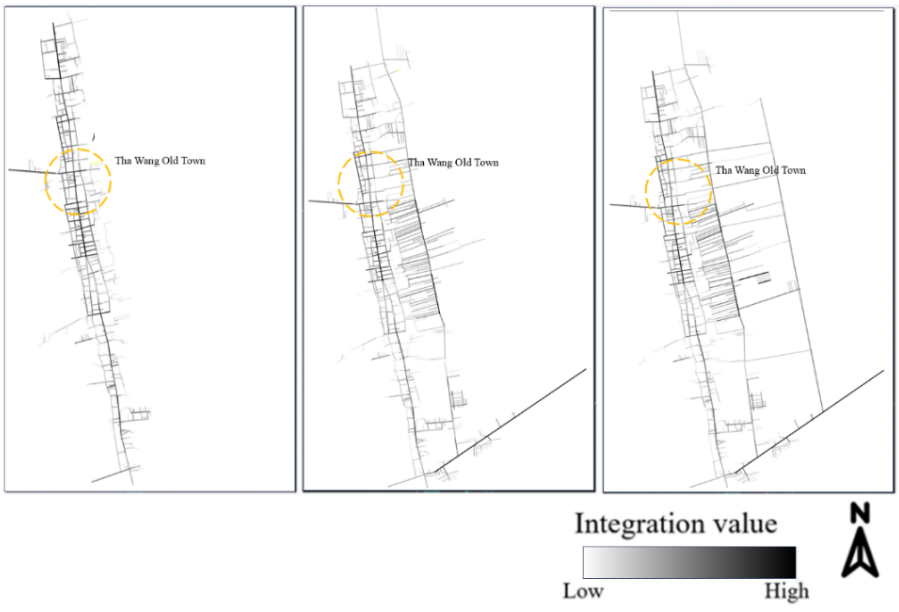


Figure 5: Nakhon Si Thammarat axial map - Local integration
Source: authors

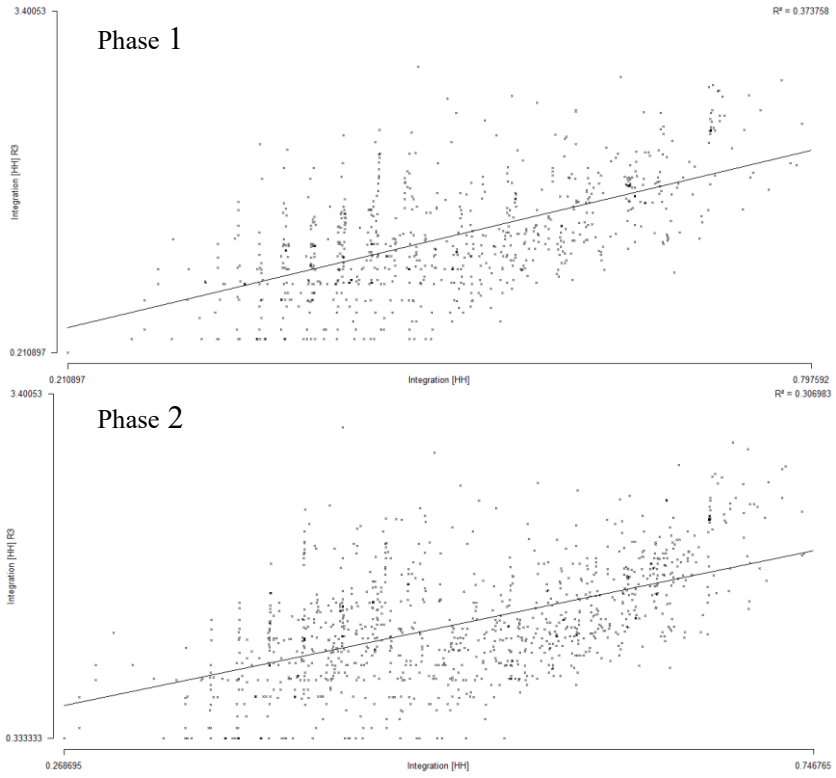
Local integration values provide insights into the density of natural movement potential within specific sub-areas of a city. These values help us

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understand how different sections of the urban space facilitate or restrict movement on a more localized scale. The analysis spans three phases, revealing important patterns and consistencies in the public space network.

Figure 4 indicates that the highest integration values in Phase 1 are concentrated around Ratchadamnoen Road. Specifically, the area around Wat Phra Mahathat Woramahawihan stands out with particularly high integration values. This suggests that these locations have been central to the movement patterns from the beginning, reflecting their significance in the urban layout.
In the second phase, the local integration values continue to show similar patterns to those observed in Phase 1. The points with the highest values remain around Ratchadamnoen Road and Wat Phra Mahathat Woramahawihan. This consistency indicates that these areas have consistently been key nodes for natural movement within the urban space.

By Phase 3, the local integration values continue to reflect a similar distribution. The areas around Ratchadamnoen Road and Wat Phra Mahathat Woramahawihan still exhibit the highest integration values. This indicates that, even as other parts of the city may have undergone changes, these specific locations have maintained their central role in the movement network.



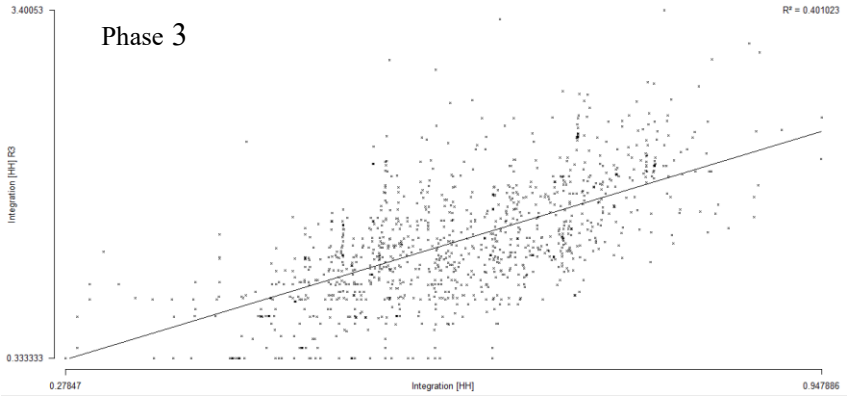
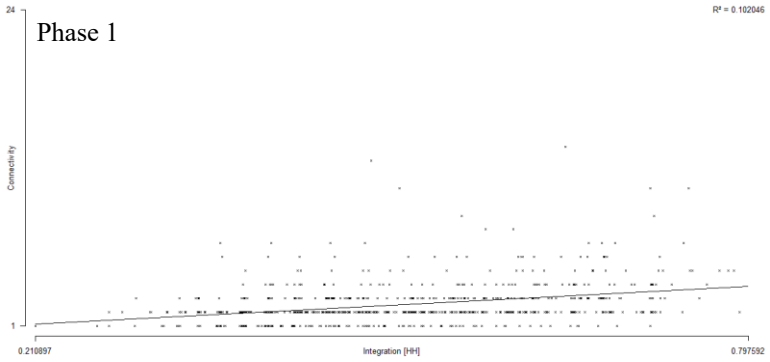


Figure 6 Synergy coefficient
Source: authors

The synergy coefficient values of the area, which demonstrate the potential for movement through the entire area network, do not yield very high R^2 values across all three phases. However, there is also not much significant change observed. As Figure 5 shown in Phase 1 = 0.37, Phase 2 = 0.30 and Phase 3 = 0.40, This indicates the potential for accommodating movement through the axial map network in all three phases. Despite the expansion of road alignments over time, it does not significantly increase the synergy coefficient values.



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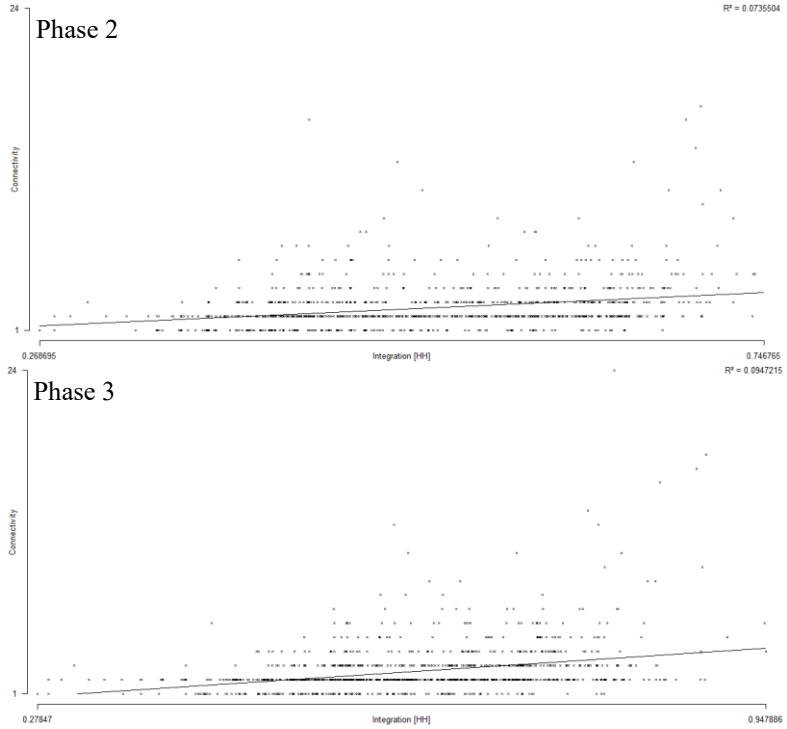


Figure 7: Intelligibility coefficient
Source: authors

The Intelligibility coefficient values, which represent the ability to understand the entire network while within the boundaries of each phase, have relatively low R^2 values across all phases. Furthermore, there is minimal change observed between phases. As Figure 6 shown in Phase 1 = 0.10, Phase 2 = 0.07 and Phase 3 = 0.09, This suggests that the public space network of Nakhon Si Thammarat city may be somewhat difficult for people to comprehend, making it easy to get lost.

Table 1: Summary of coefficient value

Phase	Synergy coefficient	Intelligibility coefficient
1	0.374	0.102
2	0.306	0.073
3	0.401	0.094

Source: Author's Calculation

The study revealed that the values calculated by the DepthmapX software using space syntax techniques showed that the Intelligibility coefficient (in table 1), which was initially highest in the first phase, decreased and then

increased sequentially. This suggests that the increase in roads does not necessarily indicate an improved understanding of movement within the area. As for the synergy coefficient, it decreased in phase 2 and slightly increased in phase 3, indicating a slight increase in the potential for movement through the Nakhon Si Thammarat area. The elongation of the city along the axis did not significantly affect the volume of traffic in the system, consistent with the local integration of all three phases, which did not differ significantly. Additionally, the global integration of the entire area in the first phase on Ratchadamnoen road significantly declined in phase 3, indicating the ability to become a new route accommodating traffic from the Therdprakkiat Road system. However, it is not yet clear whether this has influenced Tha Wang old town, including the global integration of the Tha Wang old town area, which has not changed significantly.

CONCLUSION

In conclusion, the spatial configuration of a linear city pattern of Nakhon Si Thammarat did not impact the Tha Wang old town area, the calculated values do not definitively demonstrate that the linear urban expansion of Nakhon Si Thammarat has significantly impacted the reduced utilization of the Tha Wang old town area. This finding denies the current observed realities. Additionally, referencing the previous study by Tinnakhon (2022), which similarly concluded that the urban expansion depicted by the axial map revealed high integration along the newly expanded roads, indicates the formation of a new urban center in Nakhon Si Thammarat. But analysis by Tinnakhon in the old town area surrounding Wat Phra Mahathat Woramahawihan highlights the failure to maintain global integration in this area due to utilised for public offices, religious places and schools. This hinders the grid intensification process which contradicts the findings of this study as well. Therefore, it suggests that study provides a basis for further research into additional contributing factors, offering a more comprehensive understanding of the underlying dynamics and their impact on urban development and spatial configuration, may be due to other socio-economic factors such as rental prices or area management. This could be further explored in future studies.

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DISCLOSURE STATEMENT

The authors declare no conflict of interest.

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REFERENCES

Al-Sayed, K. A. (2014). A systematic approach towards creative urban design. In *Design Computing and Cognition '12*. Dordrecht, The Netherlands: Springer. https://doi.org/10.1007/978-94-017-9112-0_8

Fan, M., Hedayati Marzbali, M., Abdullah, A., & Maghsoodi Tilaki, M. J. (2024). Using a space syntax approach to enhance pedestrians' accessibility and safety in the historic city of George Town, Penang. *Urban Science, 8*(1), 6. https://doi.org/10.3390/urbansci8010006

Hillier, B. (1996). *Space is the machine: A configurational theory of architecture*. Cambridge, UK: Cambridge University Press.

Hillier, B. (1999). Centrality as a process: Accounting for attraction inequalities in deformed grids. *Urban Design International, 4*(3–4), 107–127. https://doi.org/10.1057/udi.1999.19

Hillier, B., Penn, A., et al. (1993). Natural movement: Or, configuration and attraction in urban pedestrian movement. *Environment and Planning B: Planning and Design, 20*(1), 29–66. https://doi.org/10.1068/b200029

Lykostratis, K., Giannopoulou, M., & Roukouni, A. (2021). Measuring urban configuration: A GWR approach (pp. 479–488). Cham, Switzerland: Springer.

Lee, J. H., Ostwald, M. J., & Zhou, L. (2023). Socio-spatial experience in space syntax research: A PRISMA-compliant review. *Buildings*.

Mahmoud, A. A., Khalil, H. A. E., Sobhy, T., & Farouk, H. (2023). Space syntax as a vital tool to enhance urban spaces. *ERU Research Journal, 2*(3), 399–414. https://doi.org/10.21608/erurj.2023.211330.1025

Noonsuk, P. (2001). *The history of Nakhon Si Thammarat: The development of states on the Thai Peninsula from the sixth to the fourteenth centuries A.D.* Bangkok: Chulalongkorn University.

Safizadeh, M., Tilaki, M. J. M., Marzbali, M. H., & Abdullah, A. (2022). Smart city and spatial configuration: Assessing accessibility and intelligibility to increase mobility in the George Town heritage site, Malaysia. *Open House International, 48*(3), 521–541. https://doi.org/10.1108/ohi-06-2022-0150

Thinnakorn, R., & Chanklap, B. (2021). Influence of the global urban grid on natural movement within a local public space: Case study of Nakhon Si Thammarat Old Town, Thailand. *International Review for Spatial Planning and Sustainable Development, 10*, 174–191.

Wang, D., Fu, Y., Liu, K., Chen, F., Wang, P., & Lu, C. (2021). Automated urban planning for reimagining city configuration via adversarial learning: Quantification, generation, and evaluation. *arXiv*. https://doi.org/10.48550/arxiv.2112.14699

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THE RELATIONSHIP BETWEEN IMAGEABILITY QUALITY AND WALKING BEHAVIOR ON A HISTORIC COMMERCIAL STREET: LESSON FROM MALANG, INDONESIA

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Abstract

Walking is crucial for a sustainable and healthy life, but people's interest in walking, especially in Indonesia, still needs to grow. Previous research found that imageability is one of the urban design qualities that play a crucial role in facilitating interest in walking. Unfortunately, the role of imageability in this context has not been studied. Therefore, this research aims to fill the gap and explore the relationship between imageability and walking behavior in Kayutangan Street, Malang, Indonesia, a historic commercial area that has undergone renovation to accommodate pedestrian needs. This research employed a quantitative approach, applying a questionnaire survey method to 103 randomly selected participants on-site. Imageability quality was measured based on ten indicator variables obtained from previous research, including uniqueness, attractiveness, distinctiveness, recognizable quality, memorableness, unforgettable memory, impressiveness, legibility, pleasantness, and image quality, which was confirmed using factor analysis. The relationship between imageability quality and walking behavior was explored using regression analysis. The results show that imageability quality has a significant influence on the frequency of purposive walking ($p < 0.01$) but has no effect on discursive walking ($p > 0.05$). Furthermore, the results show that imageability has no significant impact on walking duration. However, a significant relationship exists between imageability and activity duration in the study area ($p < 0.01$). This research also found that memorableness is one of the imageability indicator variables that influence people's preference and interest in walking ($p < 0.05$).

Keywords: Imageability, Walking Behavior, Historic Street, Indonesia, Urban Design

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INTRODUCTION

Walking benefits individuals and the population in terms of both physical and psychological health (Constantinides et al., 2021; Hamidi & Moazzeni, 2019; Buzzatoni & Minaker, 2023). These physical and psychological aspects strengthen the argument that walking is closely related to health and environmental characteristics. The problem in Indonesia is that walking behavior still needs to improve, ranking among the worst in the world (Althoff et al., 2017; Indonesia Ministry of Health, 2018). Therefore, planning and design to support a walkable environment have always received more attention from year to year.

Although previous studies have identified factors that influence interest in walking, such as the physical attributes of the street, the role of urban design quality, particularly imageability, which is considered the most crucial determinant of urban design quality (Ewing, 2013; William & Stewart, 2024), remains underexplored. Previous studies have rarely discussed how mental images influence people's positive responses, such as attractiveness and uniqueness, in determining their desire to be active in public spaces. Therefore, this research aimed to fill this gap. It involves examining the relationship between imageability quality and walking behavior based on people's perceptions.

LITERATURE REVIEW

Imageability Quality in Urban Design

Imageability is the ability of an area to be easily recognized and remembered. It is characterized by the form of physical elements and their arrangement, which can evoke positive images and feelings. A place with good imageability is easy to recognize (recognizable), different from other places (distinct), and easy to remember (memorable) (Ernawati et al., 2018). Moreover, good imageability gives the area users a deep impression, generates certain feelings, and invites attention (Ewing, 2013). Imageability, facilitated by a well-organized physical environment, enables people to identify existing physical elements easily and group them into clear patterns (Lynch, 1960), thereby creating a pleasant space for activities (Ewing & Clemente, 2013).

Imageability can be measured both objectively and subjectively. Subjective measurements, based on users' perceptions, are essential to urban design (Badawi & Farag, 2018). According to Ewing & Handy (2009), although perceptions are individual, perceptions of a place can be obtained based on the objectivity of the physical environment that is unique to an area. Therefore, imageability in this research was evaluated based on users' perceptions.

Walking Behavior

Walking has been proven to offer many benefits for public health, social life, economic growth, and the environment (Hamidi & Moazzeni, 2019). Previous studies have found that socioeconomic status, including education level and

income, significantly influences physical activity, such as walking, in public areas (Cerin et al., 2009). Other factors influencing walking behavior include density, design diversity, accessibility, and distance to public transportation (Ewing & Cervero, 2010). Therefore, many factors affect walking behavior.

Walking can enhance happiness, cognitive functioning, positive mood, self-esteem, and quality of life (Kelly et al., 2017). These conditions support the argument in the previous discussion that an environment with good imageability influences positive human emotions. Therefore, walking and urban design quality go hand in hand in supporting human life in cities. However, only a few factors explained the relationship between walking behavior and the quality of urban design, specifically imageability. Therefore, it is essential to explore this relationship.

Imageability Quality and Walking Behavior

Figure 1 shows the hypothetical relation between urban design quality and walking behavior.

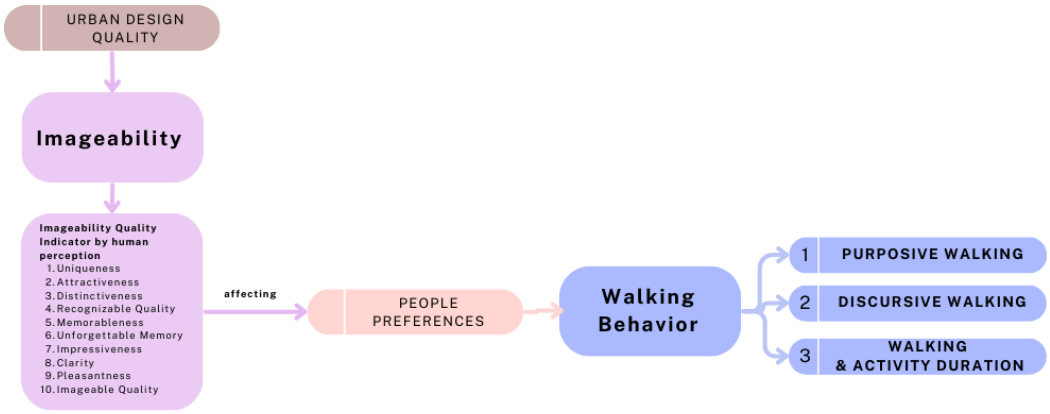


Figure 1: Hypothetical Relationship Model of Urban Design Quality, Imageability, and Walking Behavior

To explore the relationship between urban design quality and walking behavior, it is essential to recognize that urban environments can impact the mental health of people living in them (Lamblin et al., 2017; Buttazzoni & Minaker, 2023). Therefore, planning that focuses on walking activities aims to classify urban design features to develop urban areas that promote an active lifestyle. This design can be referred to as pedestrian and transit-oriented design principles. One of the key design features is imageability, which is related to mental health phenomena (Buttazzoni & Minaker, 2023). This situation can lead to identifying and responding to emotions and spiritual bonds between humans

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and various places (Williams & Stewart, 2024). During the process of connecting them, the physical attributes of the area influence the perception of street users, evoking emotional responses (Buttazzoni & Minaker, 2023). In this context, positive responses have been proven to influence users to perceive urban design more favorably, making them feel at home for a longer period of activities (Buttazzoni & Minaker, 2023). These previous findings showed the importance of imageability quality for walking behavior.

RESEARCH METHODOLOGY

This descriptive research employed a quantitative approach, utilizing a survey method, to explore community evaluations of the imageability quality of a historic commercial street and users' walking behavior in the area.

The research was conducted on Kayutangan Street, a historic commercial area frequently visited by locals and tourists in Malang-Indonesia. The area of Kayutangan Street was observed from the intersection of the twin building (Lafayette) to the Sarinah intersection.



Figure 2: The Study Street: Kayutangan Street

Population and Sample

The population in this research consists of all individuals who use Kayutangan Street. Participants were selected randomly. Following the procedure of Hull & Revell (1989) and Ernawati & Moore (2014), the researchers visited Kayutangan Street at various random times generated by www.randomizer.org. Upon each arrival, the first five individuals in view were invited to participate.

Initially, 105 respondents were included, but two were excluded due to incomplete responses in the questionnaire, resulting in 103 questionnaires ready for analysis.

Instrument and Research Variables

The primary instrument used in this research was a self-administered questionnaire to explore the quality of perceptual imageability and walking behavior. The questionnaires were distributed in situ. This requirement aims to assess the image of the Kayutangan historic commercial area in respondents' minds while they were in the location. The researchers accompanied the respondents when they filled out the questionnaires to help them understand the questions as needed. Research variables and their measurement techniques are presented in Table 1.

Table 1: Research Variables

No	Socio-Demographics and Characteristics of Respondents Variables	Measuring Technique
1	Age	Check Box
2	Gender	Check Box
3	Education	Check Box
4	Economic Level	Check Box
5	Occupation	Check Box
6	Origin	Check Box
7	Length of stay	Check Box
8	Frequency of visit	Check Box
9	District of Home address	Check Box
10	Frequency of activities	Check Box
No	**Imageability**	**Measuring Technique**
1	Uniqueness	Measurement uses a seven-point Likert Scale: Strongly disagree (1) – strongly agree (7)
2	Attractiveness	
3	Distinctiveness	
4	Recognizable quality	
5	Memorableness	
6	Unforgettable memory	
7	Impressiveness	
8	Clarity/Legibility	
9	Pleasantness	
10	Image quality	

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No	Walking Behavior	Measuring Technique
1	Discursive walking	Five-point multiple rating scales: very rarely (1) - very often (5)
2	Purposive walking	Five-point multiple rating scales: very rarely (1) - very often (5)
3	Walking purpose	Check box
4	Walking duration	Five-point multiple rating scales: <30 minutes (1) - >2 hours (5)
5	Activities duration	Five-point multiple rating scales: <30 minutes (1) - >2 hours (5)
6	Walking preferences	Seven-point multiple rating scales: Least prefer (1) – most prefer (7)

Source: developed from Ernawati & Moore (2014), Ewing et al. (2006), Ewing & Clemente (2013), Purciel & Marrone (2006), Ernawati (2020); Constantinides et al., 2021; Hamidi & Moazzeni, 2019)

This study employed factor analysis through principal component analysis to confirm whether the ten imageability indicator variables collectively measured the imageability of Kayutangan Street. The results yielded a single factor comprising ten imageability indicator variables. This result indicates that the ten indicator variables are genuine imageability indicators, explaining 65.2% of the variance in the population.

Data Analysis Techniques

This study employed descriptive statistics to examine the socioeconomic and demographic characteristics of the respondents. Mean score analysis was used to explore the imageability quality of the study area and determine the walking behavior of respondents. Furthermore, this study applied regression analysis to explore the relationship between imageability quality and walking behavior, which included purposive walking, discursive walking, walking duration, and activity duration. In this situation, imageability was treated as the independent variable, and walking behavior was the dependent variable. Additionally, this study also employed regression analysis to examine the influence of imageability quality on people's preferences for walking in the area. In this situation, imageability was treated as the independent variable, and people's preference was the dependent variable.

ANALYSIS AND DISCUSSION

The respondents consisted of 40.8% men and 59.2% women. Visitors to the study area were predominately aged 17-35 (84.4%), showing that the respondents were relatively homogeneous in terms of age and likely had similar abilities to interpret the questionnaires. Most respondents were High School, Bachelor, and Diploma graduates and had middle-class economic incomes. The study site, Kayutangan Street, attracts both visitors and locals, with 64,1% of the respondents being visitors to Malang City and 35,9% residents.

The length of stay of respondents in Malang City is also one of the factors that influenced respondents' assessment of the imageability quality of historic street design in Malang City. A person's period of residency influences their familiarity with the environment in which they live, which, in turn, affects their impression of the city's visual environment. Although respondents varied in their length of stay in Malang, the majority had lived there for one to five years (63,1%) or more than 20 years (24,3%). In these conditions, the respondents were familiar with the city's environment and could easily identify historic places within it. Moreover, most respondents visited the study area at least 2-3 times a week, showing they were well-acquainted with Kayutangan historic street.

Malang City is divided into five districts: Klojen, Lowokwaru, Blimbing, Kedungkandang, and Sukun. Most respondents who participated in this research lived in Lowokwaru District (69.9%) and Klojen District (21.4%), the city centers where the case study site is located. The remaining (8.7%) were evenly spread across other districts, representing the five districts.

People's Evaluation of Imageability Quality of the Historic Street

The factor analysis conducted on the ten indicator variables of imageability found that only one factor accounted for imageability, suggesting that a single, overarching imageability factor can collectively represent all ten variables observed, as presented in Table 2. Therefore, the following regression analysis, which was used to explore the relationship between imageability and walking behavior, utilized factor scores resulting from this factor analysis.

Table 2: Principal Component Analysis of Imageability Quality

Variables	Component Factor 1 Imageability
1. Uniqueness	.872
2. Attractiveness	.835
3. Distinctiveness	.819
4. Recognizable quality	.841
5. Memorableness	.876
6. Unforgettable memory	.721
7. Impressiveness	.767
8. Clarity	.805
9. Pleasantness	.804
10. Image quality	.719
Extraction Method: Principal Component Analysis. a. 1 Component extracted	

Table 2 presents the research findings, which corroborate prior research, indicating that the relationship between the indicator variables is a determinant of imageability. These findings suggest that the respondents in the

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study area have experienced a place with a pleasant memory atmosphere and can easily distinguish it from other regions. Respondents' perceptions of imageability quality, as shown in Table 4, can be categorized into three categories based on the mean score, as shown in Table 3.

Table 3: Categorization of Mean Score Assessment

Categorization of Mean Score	Interval of Quality
Low quality	$1.00 \leq M < 3.00$
Moderate quality	$3.00 < M < 5.00$
High/Good quality	$5.00 < M \leq 7.00$

Table 4: People's Evaluation of Imageability Quality and Walking Behavior

Variables of Imageability		Descriptive Statistics		Variables of Walking Behavior	Descriptive Statistics	
		Mean	Imageability Quality		Mean	People's Rating
1.	Uniqueness	5.76	High/Good	1. Discursive walking	2.40	Low
2.	Attractiveness	5.90	High/Good	2. Purposive walking	2.51	Low
3.	Distinctiveness	5.78	High/Good	3. Walking duration	1.80	Low
4.	Recognizable quality	5.74	High/Good	4. Activities duration	2.53	Low
5.	Memorableness	5.75	High/Good	5. Preferences for walking	5.50	High/Good
6.	Unforgettable memory	5.30	High/Good			
7.	Impressiveness	5.36	High/Good			
8.	Clarity	5.46	High/Good			
9.	Pleasantness	5.45	High/Good			
10.	Image quality	5.50	High/Good			

People's perceptions of the imageability quality of the Kayutangan historic commercial street show that the quality of imageability is high or good across all variables, with attractiveness scoring the highest (M = 5.90). This result further supports previous research by Ernawati (2020), which demonstrated that attractiveness is an essential factor in imageability. Despite the interest in walking and engaging in activities in the study area, the research found that respondents' walking behavior in the Kayutangan historic street was rated low ($M < 3$ on a five-point scale). The results in Table 4 correspond with statements from Althoff (2017) and the Indonesian Ministry of Health (2018) regarding the high level of physical inactivity among Indonesians. However, the study showed that people preferred walking and engaging in activities on Kayutangan Historic Street (M = 5.50).

The Influence of Imageability Quality on Purposive Walking

A linear regression analysis was conducted to investigate the impact of imageability quality on purposive walking, with imageability serving as the independent variable and purposive walking as the dependent variable.

Table 5: Model Summary of the Influence of Imageability on Purposive Walking

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.281[a]	.079	.070	.963

a. Dependent Variable: purposive walking
b. Predictors: (Constant), Imageability

Table 6: ANOVA of The Influence of Imageability on Purposive Walking

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.012	1	8.012	8.635	.004[b]
	Residual	93.716	101	.928		
	Total	101.728	102			

a. Dependent Variable: purposive walking
b. Predictors: (Constant), Imageability

The results indicate that imageability has a significant impact on purposive walking ($p < 0.01$). This research finding aligns with a previous study conducted by Nordh et al. (2017), which revealed that most individuals primarily walk from their residences to public transportation hubs rather than engaging for recreational purposes. Furthermore, a previous study found that imageability affects walking preference and influences walking for specific purposes, especially on commercial streets (Ernawati et al., 2018). Therefore, imageability as a trigger for travel experiences may not significantly affect walking activities, but it shows that walking bridges individuals to engage in recreational activities.

The Influence of Imageability Quality on Discursive Walking

Linear regression analysis was also employed to investigate the impact of imageability quality on discursive walking, with imageability serving as the independent variable and discursive walking as the dependent variable.

Table 7: Model Summary of the Influence of Imageability on Discursive Walking

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.191[a]	.036	.027	.951

a. Dependent Variable: discursive walking
b. Predictors: (Constant), Imageability

Table 8: ANOVA of The Influence of Imageability on Discursive Walking

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.452	1	3.452	3.814	.054[b]
	Residual	91.421	101	.905		

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Model	Sum of Squares	df	Mean Square	F	Sig.
Total	94.874	102			
a. Dependent Variable: discursive walking b. Predictors: (Constant), Imageability					

The results in Tables 7 and 8 show that imageability does not influence discursive walking ($p > 0.05$). When discussing people's motivation to visit a destination, three contexts of recreational activities, which include leisure, hedonism, and social activities, are considered (Su et al., 2021). Visitors' motivation is shaped by the experience of consuming products and services (Loncaric et al., 2021; Kim, 2017). Therefore, it is unsurprising that imageability affects purposive walking but not discursive walking due to the insufficient level of consumption of visitors' products and services.

The Influence of Imageability on Walking Duration

Regression analysis was used to examine the influence of imageability on walking duration, treating imageability as the independent variable and walking duration as the dependent variable.

Table 9: Model Summary of the Influence of Imageability on Walking Duration

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.104[a]	.011	.001	.857
a. Dependent Variable: walking duration b. Predictors: (Constant), Imageability				

Table 10: ANOVA of The Influence of Imageability on Walking Duration

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.810	1	.810	1.104	.296[b]
	Residual	74.122	101	.734		
	Total	74.932	102			
a. Dependent Variable: walking duration b. Predictors: (Constant), Imageability						

The findings suggest that imageability does not significantly affect the walking duration ($p > 0.05$). Despite a small effect of 1.1%, it cannot significantly impact overall interest in walking behavior. Many studies have discussed the motivation of people to stay in recreational destinations to enjoy their beauty (Kim et al., 2015; Mehmetoglu & Normann, 2013; Said & Maryono, 2018), but this does not necessarily mean that they enjoy the place by walking. Previous research has shown that people's experience of reaching a destination affects place satisfaction, indirectly highlighting the need for hedonism, refreshment, and engagement (Loncaric et al., 2021). The more activities, novelties, and uniqueness are obtained, the more exciting and memorable the destination

becomes. Indirectly, the better the imageability of a place, the higher the movement of activities and the desire for new experiences. This situation suggests that imageability may influence the duration of a person's enjoyment of a place, but it does not explicitly state that walking is the primary means of enjoying it; therefore, the walking duration could be shorter.

The Influence of Imageability Quality on Activity Duration

To investigate the impact of imageability quality on activity duration, this study employed linear regression analysis, with imageability serving as the independent variable and activity duration as the dependent variable.

Table 11: Model Summary of the Influence of Imageability on Activity Duration

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.282[a]	.079	.070	1.038

a. Dependent Variable: activity duration
b. Predictors: (Constant), Imageability

Table 12: ANOVA of The Influence of Imageability on Activity Duration

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.396	1	9.396	8.719	.004[b]
	Residual	108.837	101	1.078		
	Total	118.233	102			

a. Dependent Variable: activity duration
b. Predictors: (Constant), Imageability

The results, as presented in Table 11 and Table 12, show that imageability significantly influences activity duration ($p < 0.05$). This finding aligns with the previous discussion, which mentioned that good imageability corresponds to a high rate of activity variation. Various dimensions influence people's experiences (Loncaric et al., 2021). Kim (2017) also noted that travel satisfaction is a psychological state that accumulates over time through the consumption of travel experiences. Therefore, it is not surprising that various activities will prolong activity duration. Many studies discuss how attraction affects the duration of people's stays, but this does not specifically refer to walking activities. It could refer to other more interesting, unique, and new activities. Attractiveness can be formed through various activities that make a place attractive, unique, and easily recognizable (Constantinides et al., 2021; Guedoudj et al., 2020).

The Influence of Imageability Quality on People's Preferences for Walking in the Study Area

Table 13 illustrates the impact of the ten imageability indicator variables on individuals' preferences for walking and other activities.

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Table 13: ANOVA of The Influence of Imageability on People's Preferences for Walking and Doing Activities

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	77.811	1	77.811	115.682	.000[b]
	Residual	67.936	101	.673		
	Total	145.748	102			

a. Dependent Variable: people's preferences for walking and doing activities
b. Predictors: (Constant), Uniqueness, Attractiveness, Distinctiveness, Recognizable Quality, Memorableness, Unforgettable Memory, Impressiveness, Clarity, Pleasantness, Imageable Quality

The results indicate a significant influence of imageability on people's preference for walking and activities in the historic street ($p < 0.01$). However, further analysis shows that among imageability indicators, only the memorableness of Kayutangan Historic Street significantly influences people's preference for walking and activities ($p < 0.05$).

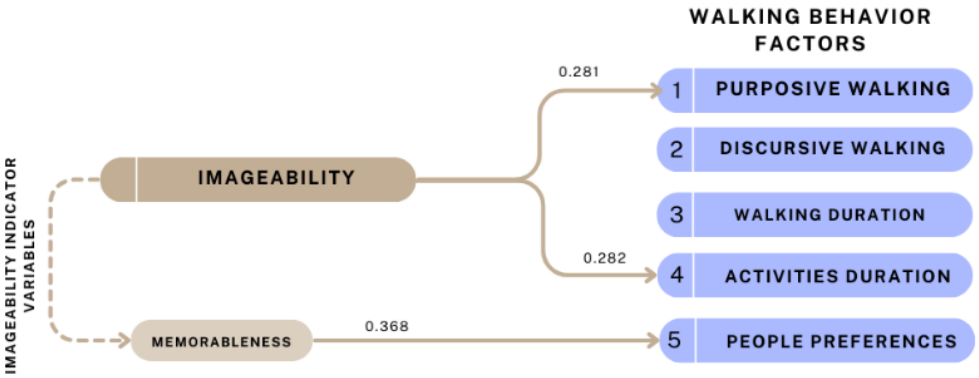


Figure 3: Study Results: The Relationship Between Imageability and Walking Behavior

The level of memorableness impacts individuals' motivation towards activities and purposive walking. Additionally, the case study site, Kayutangan Street, as a historical area, inherently possesses an atmosphere that evokes reminiscences of past experiences for individuals (Silva & Chapagain, 2013). The study results align with the argument that memory is a crucial element of visits to tourist sites, particularly historical areas (Kim, 2017). Meanwhile, memory is present because of the attraction and impression of something special and pleasant experiences that will be discussed again sometime in the future (Zhong et al., 2017). Memory can also be relied upon for unforgettable experiences (Kim, 2017; Sharma & Nayak, 2019; Yu et al., 2019). Therefore, memorableness indirectly affects other dimensions of imageability and significantly influences walking preference.

CONCLUSION

The results indicate that imageability affects purposive walking rather than discursive walking within the study area. Although imageability does not influence walking duration, it does influence activity duration. These findings suggest that although imageability does not significantly affect walking behavior, it does significantly impact the behavior pattern of visitor activities. Walking is not the main effect of design quality, but a place with high imageability accommodates a variety of activities. Moreover, the most significant imageability indicator affecting walking preference is memorableness, as the results show that mental images, in the form of memory, are vital in determining walking preferences. The research supports previous knowledge about the importance of pedestrian and transit-oriented principles in creating a sense of place, which triggers visitors' preference for walking.

However, this study's findings suggest that various urban design variables might reveal more factors influencing people's preference for walking in an urban historic street. Therefore, future studies should consider investigating other variables to reveal a more comprehensive understanding of urban design aspects that can increase the preference for walking, specifically in historic commercial streets, thereby promoting a more pedestrian-friendly environment.

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DISCLOSURE

There is no conflict of interest in this research.

REFERENCE

Althoff, T., Sosič, R., Hicks, J. L., King, A. C., Delp, S. L., & Leskovec, J. (2017). Large-scale physical activity data reveal worldwide activity inequality. *Nature, 547*(7663), 336–339. https://doi.org/10.1038/nature23018

Badawi, S., & Farag, A. A. (2018). Measuring the urban qualities of mixed-use streets. In *Conference on Architecture, Urbanism, Sociology, Development & Planning* (pp. 129–137). https://www.researchgate.net/publication/335099517_MEASURING_THE_URBAN_QUALITIES_OF_MIXED-USE_STREETS

Buttazzoni, A., & Minaker, L. (2023). Exploring the relationship between specific urban design features and adolescent mental health: The case of imageability, enclosure, human scale, transparency, and complexity. *Landscape and Urban Planning, 235*, 1–11. https://doi.org/10.1016/j.landurbplan.2023.104736

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Cerin, E., Leslie, E., Sugiyama, T., & Owen, N. (2009). Association of multiple physical activity domains with mental well-being. *Mental Health and Physical Activity, 2*(2), 55–64. https://doi.org/10.1016/j.mhpa.2009.09.004

Constantinides, et al. (2021). Imagine a walkable city: Physical activity and urban imageability across 19 major cities. *EPJ Data Science, 10*(56), 1–12. https://doi.org/10.1140/epjds/s13688-021-00313-7

Ernawati, J., & Moore, G. T. (2014). Tourists' and residents' impressions of a heritage tourism site: The case of Kampong Taman Sari, Indonesia. *Archnet-IJAR International Journal of Architectural Research, 8*(3), 181–194. http://dx.doi.org/10.26687/archnet-ijar.v8i3.383

Ernawati, J., Surjono, & Sudarmo, B. S. (2018). People's preferences of urban design qualities for walking on a commercial street. *IOP Conference Series: Earth and Environmental Science, 126*, 012206. https://doi.org/10.1088/1755-1315/126/1/012206

Ernawati, J. (2020). Imageability of a historic street and its influence on people's preference. *Advances in Engineering Research, 195*, 184–189. https://doi.org/10.2991/aer.k.200729.028

Ewing, R., & Handy, S. (2009). Measuring the unmeasurable: Urban design qualities related to walkability. *Journal of Urban Design, 14*(1), 65–84. https://doi.org/10.1080/13574800802451155

Ewing, R. (2013). Eight qualities of pedestrian- and transit-oriented design. *Urban Land*. Retrieved June 20, 2024, from https://urbanland.uli.org/industry-sectors/infrastructure-transit/eight-qualities-of-pedestrian-and-transit-oriented-design/

Ewing, R., & Clamente, O. (2013). Measuring urban design: Metrics for livable places. Island Press.

Ewing, R., & Cervero, R. (2010). Travel and the built environment: A meta-analysis. *Journal of the American Planning Association, 76*, 265–294. https://doi.org/10.1080/01944361003766766

Guedoudj, W., Ghenouchi, A., & Toussaint, J. Y. (2020). Urban attractiveness in public squares: The mutual influence of the urban environment and the social activities in Batna. *urbe. Revista Brasileira de Gestão Urbana, 12*, e20190162. https://doi.org/10.1590/2175-3369.012.e20190162

Hamidi, S., & Moazzeni, S. (2019). Examining the relationship between urban design qualities and walking behavior: Empirical evidence from Dallas, TX. *Sustainability, 11*, 2720. https://doi.org/10.3390/su11102720

Hull, R. B., & Revell, G. R. B. (1989). Issues in sampling landscapes for visual quality assessments. *Landscape and Urban Planning, 17*, 323–330. https://doi.org/10.1016/0169-2046(89)90086-8

Indonesia Ministry of Health. (2018). *Data Ponsel Dunia: Orang Indonesia Paling Malas Berjalan Kaki*. Retrieved June 20, 2024, from https://p2ptm.kemkes.go.id/informasi-p2ptm/data-ponsel-dunia-orang-indonesia-paling-malas-berjalan-kaki

Kim, J. H. (2017). The impact of memorable tourism experiences on loyalty behaviors: The mediating effects of destination image and satisfaction. *Journal of Travel Research, 57*(7), 856–870. https://doi.org/10.1177/0047287517721369

Kim, H. C., Chua, B. L., Lee, S., Boo, H. C., & Han, H. (2015). Understanding airline travellers' perceptions of well-being: The role of cognition, emotion, and sensory experiences in airline lounges. *Journal of Travel & Tourism Marketing, 33*(9), 1213–1234. https://doi.org/10.1080/10548408.2015.1094003

Jena, A. K., & Thengal, N. (2017). Level of self-actualization, socioeconomic status and job satisfaction of university and college teachers. *International Journal of Research, 4*(14), 3811–3831. Retrieved from https://edupediapublications.org/journals/index.php/IJR/

Kelly, P., Murphy, M., & Mutrie, N. (2017). The health benefits of walking. In C. Mulley, K. Gebel, & D. Ding (Eds.), *Walking. Transport and Sustainability* (Vol. 9, pp. 61–79). https://doi.org/10.1108/S2044-994120170000009004

Lamblin, M., Murawski, C., Whittle, S., & Fornito, A. (2017). Social connectedness, mental health and the adolescent brain. *Neuroscience & Biobehavioral Reviews, 80*, 57–68. https://doi.org/10.1016/j.neubiorev.2017.05.010

Loncaric, D., Prodan, M. P., & Dlacic, J. (2021). Memorable tourism experiences inspired by the beauty of nature. *Tourism and Hospitality Management, 27*(2), 315–337. https://doi.org/10.20867/thm.27.2.5

Lynch, K. (1960). *The image of the city*. Joint Center for Urban Studies.

Mehmetoglu, M., & Normann, Ø. (2013). The link between travel motives and activities in nature-based tourism. *Tourism Review, 68*(2), 3–13. https://doi.org/10.1108/TR-02-2013-0004

Nordh, H., Vistad, O. I., Skar, M., Wold, L. C., & Baerum, K. M. (2017). Walking as urban outdoor recreation: Public health for everyone. *Journal of Outdoor Recreation and Tourism, 30*, 60–66. https://doi.org/10.1016/j.jort.2017.09.005

Purciel, M., & Marrone, E. (2006). *Observational validation of urban design measures for New York City: Field manual*. Active Living Research Program, Robert Wood Johnson Foundation.

Said, J., & Maryono, M. (2018). Motivation and perception of tourists as push and pull factors to visit national parks. *E3S Web of Conferences, 31*, 08022. https://doi.org/10.1051/e3sconf/20183108022

Sharma, P., & Nayak, J. K. (2019). Understanding memorable tourism experiences as the determinants of tourists' behaviour. *International Journal of Tourism Research, 21*(4), 504–518. https://doi.org/10.1002/jtr.2278

Silva, K., & Chapagain, N. K. (2013). *Asian heritage management*. Routledge.

Su, L., Tang, B., & Nawjin, J. (2021). How tourism activity shapes travel experiences sharing: Tourist well-being and social context. *Annals of Tourism Research, 91*, 103316. https://doi.org/10.1016/j.annals.2021.103316

Williams, D. R., & Stewart, S. (2024). Sense of place: An elusive concept that is finding a home in ecosystem management. *Journal of Forestry, 96*(5), 18–23. https://doi.org/10.1093/jof/96.5.18

Zhong, Y. Y. S., Busser, J., & Baloglu, S. (2017). A model of memorable tourism experience: The effects on satisfaction, affective commitment, and storytelling. *Tourism Analysis, 22*(2), 201–217. https://doi.org/10.3727/108354217X14888192562366

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CHARACTERISTICS OF GEOGRAPHICAL LOCATION AS A BASIS FOR PLANNING SETTLEMENT AND OPEN SPACE IN INUNDATED AREA OF BENGAWAN SOLO RIVER DOWNSTREAM, LAMONGAN, INDONESIA

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Abstract

The presence of a floodplain is a risk to the survival of the inhabitants in an area due to the possibility of settlement being submerged by flood due to river overflow. The situation can lead to some social impacts on settlement structuring and management. Therefore, this research aimed to determine the minimum criteria required for a housing development area with a focus on land suitability, space configuration, utilities, and open space. Geographical location was identified using Rupa Bumi Indonesia (RBI) map, but the profile consisting of slope, inundation height and duration, land use, and space configuration was determined through space syntax. The results showed the basic pattern of settlement in the form of the physical and non-physical orientation of the area. The spatial configuration of residential areas had the highest space integration value of 0.84, and the lowest was 0.26, while the highest level of space depth was 28. Geographical characteristics were used as the basis for further development of settlement layout with due consideration for the land use and open space concepts.

Keywords: Geographic profile, Configuration, Settlement, Open space

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INTRODUCTION

Floodplain is a potential threat to the downstream of Bengawan Solo River Basin in Lamongan, East Java, Indonesia, due to the possibility of inundation flood influenced by the physical characteristics of the river area, the location shown in Figure 1. According to *Rencana Tata Ruang Wilayah* 2012-2031 (RTRW) of Lamongan Regency, the area has a relatively flat slope, which is in the form of an alluvial plain, floodplain, and riverbank. The land around the basin is used for agriculture, and the work behavior of the community forms the pattern. Meanwhile, floodplain landform shows the potential for flooding by rain and river overflows. For example, the rain patterns in the upstream river for the 1990- 2016 period caused high water discharge in the downstream area (Auliyani, Nining W, 2020), leading to the possibility of inundation at any time. The trend led to the designation of the land around the Bengawan River downstream for agriculture with full, partial, and no irrigation (Prabowo,1978 in Bulletin of Indonesian Economic Studies, 2006).



Figure 1: Research location
Source: Google Earth Satellite (2024), RTRW (2012)

The same trend was observed in the previous research conducted in Bangladesh, which divided the agricultural land use in the downstream with similar landforms into two, including the main inland used for different crops and the tidal for conditional planting (Seijger, 2019). Moreover, the increase in water discharge downstream has caused some changes in land use patterns from the original forest to the domination of agricultural activities and settlement (Fidiyawati, 2020). It was observed that the settlement located in the Bengawan Solo River downstream was based on the water orientation, with houses constructed partially or completely on stilts in the water area using building materials easily obtainable in the environment (Mulyati, 2016).

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The trend observed showed that the growth of settlement patterns in the downstream area was related to the natural, environmental, and social factors. For example, the environmental aspect was in the form of agricultural practices dominated by the cultivation of rice and field crops to provide economic opportunities for the community to survive. This further influenced the social aspect, which was associated with the ability to live in groups and form a unique settlement pattern. The variations in the factors observed in each area can lead to the development of unique settlement pattern designs compared to the others.

LITERATURE REVIEW

Geographical Location

The development of residential areas to ensure long-term sustainability is based on the characteristics of geographical location (Veni, 2016). For example, the development of settlement in a particular landform considered to be vulnerable to disaster requires focusing on mitigation practices (Yenen & Hamamcıoğlu, 2017). Those on the floodplain are required to adapt and develop modern settlements based on the area morphology (Zhu et al., 2019). The conversion of green land into residential areas can also influence flood risks based on the characteristics formed (Schober, 2020). Therefore, some of the criteria required to be assessed in the floodplain are land slope, inundation depth, length of inundation time, and land use (Sabaruddin, 2013).

The review of previous literature shows a research gap related to the development of physical settlement on inundated landforms. Therefore, the focus of this research is expected to be on sustainability after land use through the physical adaptation and orientation pattern of settlement to consider disaster risk as well as physical and non-physical accessibility. This is necessary because development is related to some criteria such as natural protection, landscape function, environmental ecosystems, connectivity, and integration. The natural protection aspect focuses on food production as well as the maintenance of soil quality, energy cycles, and natural resources. Moreover, quality of life elements includes mitigation of environmental risks such as floods, landslides, drought, and climate change. The physical components to be considered in building settlement and open space are land slope, as well as inundation duration and height.

Settlement Pattern

The dynamics of settlement located in the floodplain are expected to adapt to the prevailing disasters (Seher, 2016). Moreover, the settlements in inundated areas are influenced by the elevation and different cultures (Koteski, 2019), leading to the development of different regional landscapes and lifestyles based on geographical location as a form of survival (Ferdous, 2018). The concept of ideal

physical resilience is also recommended and facilitated in residential areas (McClymont et al., 2019). Infrastructures are also required to be improved to protect the social and cultural conditions in the environment, in addition to the construction of settlements on river bodies and embankments (Michiani, Junichiro Asano, 2019). Settlement patterns were initiated as a method to survive, and the process could be achieved in inundated areas through the consideration of the natural resources, energy sources, and response to disaster vulnerability. It is important to state that the pattern often found in peripheral areas is the linear rural settlement (Dorrel & Joseph P. 2020).

The research area selected is productive agriculturally and has economic value for the community. Meanwhile, previous research showed that the identification of economic value in any settlement led to the development and the need for the maintenance of the available resources, in this case, agricultural land. The existence of different social strata in the community located in an inundated area has led to several results. It was observed that the income of the community increased during stable inundation conditions when there was no flood overflow and river erosion (Ferdous et al. 2019). The developmental pattern of settlement in downstream areas always tends towards agricultural activities (Arifin, Fajri Rahman, 2020). The understanding of the resilience system related to settlement with participatory, socioecological, and sociopolitical conditions can lead to policy collaboration (Williams et al., 2019). The trend in the downstream river area has led to the formulation of policies related to inundation land use management (Restemeyer et al., 2019). It was reported that the development of settlements around rivers influenced the productivity of agricultural land (Yadav & G.S. Chauhan, 2020). However, the social conditions observed in the research area were not influenced by certain strata because the majority of people were farmers. The similarity of social status led to a settlement pattern capable of physically accommodating the needs of settlers, including security, comfort, and support for professions. The research gap identified is that there is no generally accepted, definite policy related to physical settlement patterns, with those conducted observed to be limited to macro spatial zoning without any detailed regulations on settlement patterns specific to regional resilience and local policies.

Configuration

Configuration is a key generator in spatial analysis to understand the morphology and structure of an area. The movement in the spatial configuration is influenced by the grid, which is the basic element related to spatial pattern analysis (Hillier, 1984). It is also important to state that the configuration focuses on the relationship between all the spaces (Peponis, Zimring, and Choi, 1990). Moreover, the measurement process focuses on determining the integration and

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depth, as well as the description of how a space is related to the others in a system. The depth is considered when the access to a space requires passing through several others, and the opposite is known as shallowness, which is the existence of a direct relationship between the spaces. The concept is also explained as the sequence of spaces that start from a certain point to another with a higher value. Furthermore, space configuration is related to the cultural typology associated with the space formed (Ayyıldız, S., Durak, Ş., 2023). It is achieved through the interaction between user behavior and the system applied (Karimi, 2023), including the relationship between regional spaces (Putra & Prabani Setio Hastorahmanto, 2023).

The research gap in the context of space configuration is related to the current development of settlement patterns, mostly due to some adaptation factors influencing the provision of open space and orientation of residential areas. Observation from the Bengawan Solo River downstream shows that settlement is oriented towards ensuring community survival. This is identified from the efforts made in maintaining green land for agriculture and introducing supervision factors by setting the orientation of settlement towards agricultural land and ensuring buildings are directed towards the main road. The spatial configuration in rural areas is in a regional pattern that is different from that in urban areas.

Open Space

The open space in urban and rural areas has different purposes and functions. This is observed from the fact that the open space in rural areas tends to grow naturally based on the community's behavior without any specific standard, but only through the contextual situation (Khan, 2019). The natural relationship between humans and the environment is contextually different, leading to the formation of three open spaces with a focus on production, protection from natural disasters, and health (Ramayana, 2017). Moreover, the open space in rural areas is mostly public due to the existence of landscape elements such as water, trees, and rich sunlight (Xu & Liyuan Huang, 2022). It is mostly unplanned and develops through a natural process to become functional for the users (Ischak et al., 2023). The research location has agriculturally productive open space in the form of fields as well as roads developed through the paths walked by the people to reach their respective homes. The trend shows that agricultural land is an open space often used by the community to ensure interaction.

RESEARCH METHODOLOGY

Mapping analysis was adopted in this research using map-based data related to Sekaran Village, Lamongan Regency, East Java, Indonesia. The satellite imagery was derived from the *Rupa Bumi Indonesia* (RBI) Map provided by the *Badan Informasi & Geospasial* (BIG) in 2024.

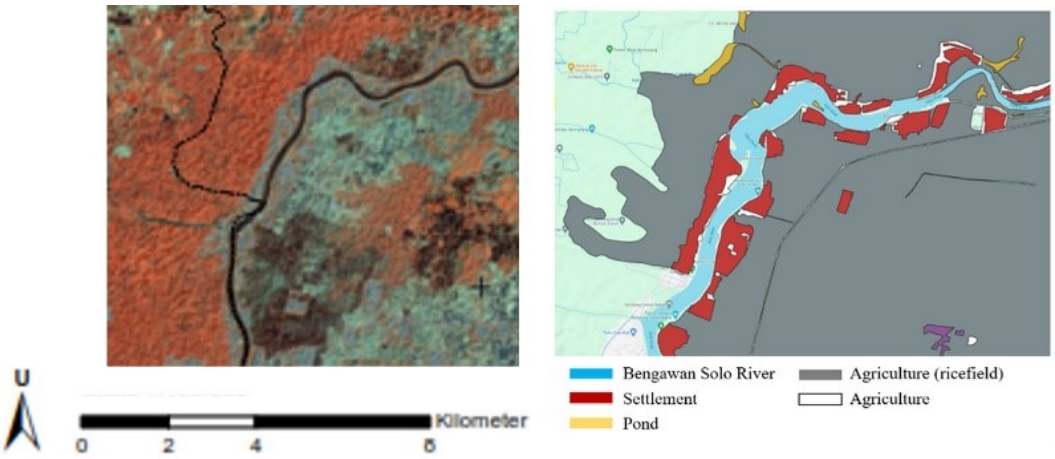


Figure 2: Land cover
Source: Rupa Bumi Indonesia (2024)

The map image in Figure 2 shows the area and also provides information on the land and water cover, as well as the slope classification.

Geographical characteristics were analyzed based on the environmental conditions of residential areas in the Bengawan Solo River downstream, specifically Sekaran Village, Lamongan Regency. The focus was on the determination of the vulnerability to inundation flood. This was achieved through the classification of land slope, depth, and period of flood inundation in Table 1, land use in Table 2, and space configuration in Table 3.

Table 1: Geographical profile classification

No	Classification	interval	Inundation depth (cm)	Inundation period (Hr)
1	Not Harmful	0 – 3 %	0 – 10	0 – 48,4
2	A little dangerous	3.1 % – 8 %	11 - 30	48,5 – 96,8
3	Quite dangerous	8.1 % - 15 %	31 - 50	96,9 – 145,6
4	Dangerous	15,1 % - 30 %	51 - 70	145,7 – 194
5	Very dangerous	> 30 %	> 70	> 194

Source: Sabaruddin (2013)

Table 2: Land use

No	Land Use
1	Agriculture
2	Fishery
3	Mining
4	Industry
5	Settlement

Source: Sabaruddin (2013)

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Table 3: Configuration variables

No	Variables	Indicator
1	Configuration	Axial map
		Integration
		Depth
2	Settlement	Physical orientation
		Nonphysical orientation
		Pattern

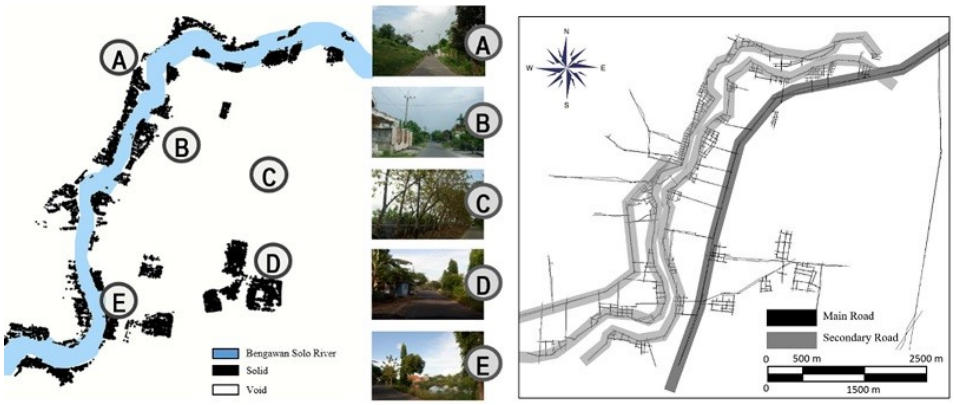
Source: Hillier (1984) and Analysis result

The configuration was analyzed by focusing on settlement patterns with criteria such as the relationship between road spaces. This was achieved using the newest Depthmap-X 0.50 tool developed by Turner to analyze social movement through axis, visual, and isovist lines (Turner, 2004). The integration and depth values showing the level of space between road and settlement are presented in Table 3. Moreover, the model applied to analyze urban typology was the space syntax method, which focused on the integration and depth of space as well as the relationship between influential elements. The type of open space in the neighborhood was assessed through the solid-void method. This is based on the criterion that the solid is the area covered by buildings, while the void includes the gaps between buildings, roads, and open space (Trancik, 1986).

The results of mapping and space configuration analyses were used to determine settlement typology with a focus on the patterns, orientation, types of open space, and tendencies toward regional space. These were based on geographical characteristics formed in the Bengawan Solo River downstream.

ANALYSIS AND DISCUSSION

The analysis results of geographical characteristics showed that the research area had a land slope of 0-2%, classified as a low category. The land use pattern was observed to be mainly for the productive cultivation of rice and corn. Moreover, the analysis of flood vulnerability showed that the inundation depth was 30 cm, and the longest duration was 72 hours. This led to the application of different housing models such as ground floor elevation, stage, and floating.



a b

Figure 3: settlement area and street corridor

The urban character was the main road corridor, which functioned as the access to the land, as presented in Figure 3. Meanwhile, the secondary road corridors were concentrated along the river area for settlement. It was also observed that there was an elongated pattern following the river flow, as shown in Figure 3a, with a cluster representing each residential group, and the commercial area was found in the space around the river. The result also showed that the width of the main road was 7 meters while the neighborhood road had 3 meters, as shown in Figure 3b. Settlement was observed to have access to the riverbank, which was designated as the development zone.

The axial result in Figure 4 shows that the red aspect of the space corridor has the highest integration value of 0.85, while the blue has the lowest, 0.26. This showed that the space corridor was the most dominant by serving as the endpoint as well as the connection between the surrounding road spaces, leading to the main road. It was further observed that the R^2 value of the zone was 0.035, classified as weak.

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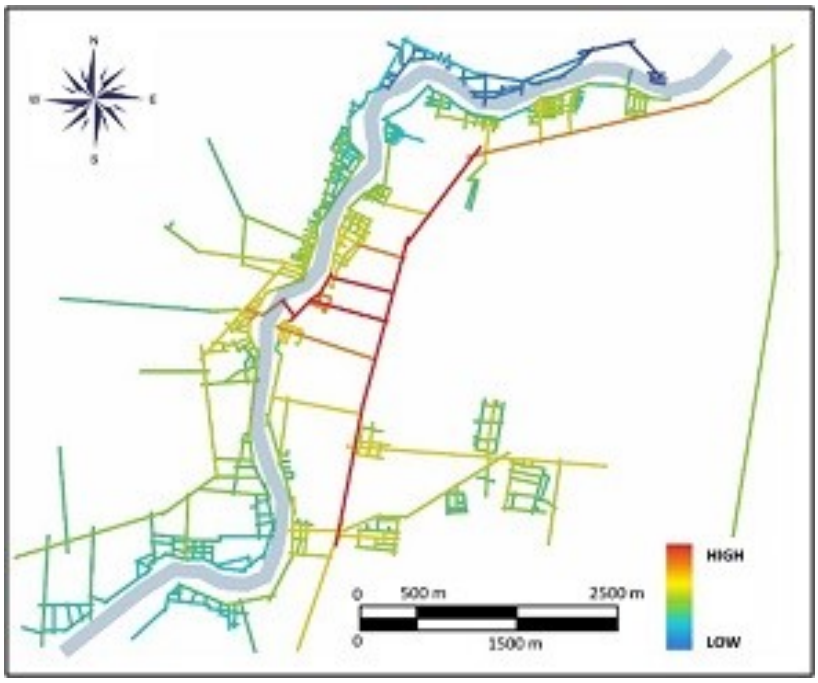


Figure 4: Axial Map Analysis

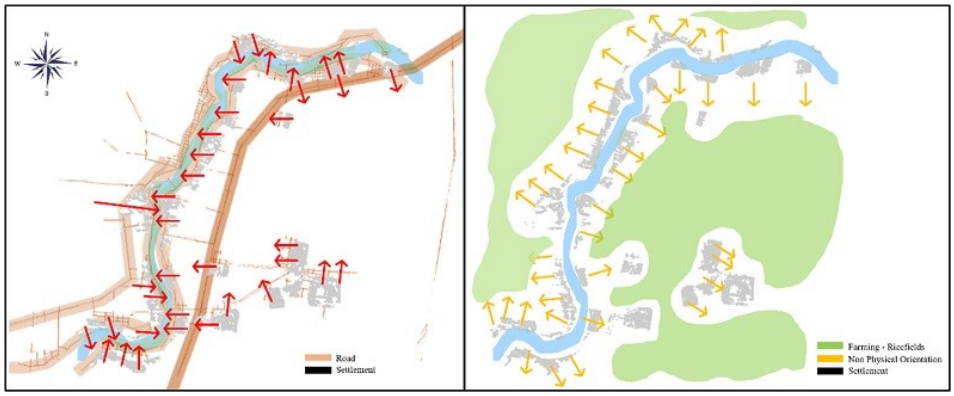
The analysis of the integration and connectivity showed that residential areas are accessible through a hierarchy of roads tiered towards the main road. The result also showed that the further distance of the connecting road space to the main road corridor was 28. Moreover, land use was dominated by agriculture, leading to the prioritization of access to agricultural land and residential areas, as well as the tendency of the community to gather and orient on the riverbank. Table 4 shows that the effect of connectivity on spatial integration was + 0.532079. This means that a lack of connectivity between areas can reduce spatial integration.

Table 4: Configuration result

ATTRIBUTES	**High**	**Low**
Nilai *Integration* (HH)	0.26	0.84
Nilai *Connectivity*	1	29
Nilai *Step depth*	0	28
Nilai R^2 (Regresi)	0.0352644	
Nilai Y = X	Y = 0.00776491 x + 0.532079	

Source: Analysis result (2024)

The spatial configuration showed that the settlement was oriented towards the riverbank area to meet the basic needs of life and utilize natural resources. The river was observed to be the main natural resource considered important for survival, and the adaptation of settlement was the major element of regional
resilience, in addition to the mitigation of disasters. This was identified from geographical characteristics such as inundation flood vulnerability, land slope, and dominance of agricultural land that led to the settlement pattern of the research area as described in Figure 5.



a b

Figure 5: Settlement Orientation

Based on Figure 5a, the road corridor is a physical factor influencing settlement patterns. This was because the physical orientation and direction of buildings were based on the flow of the road corridor that functioned as the main circulation access and link between the settlement and outside areas. The trend shows that the performance of a settlement can be determined through the existence of the road corridor. Meanwhile, Figure 5b shows the non-physical residential areas, and buildings are observed to be oriented towards agricultural areas. The intention is to ensure the control and security of the surrounding agricultural land. The non-physical orientation is important because the majority of people are farmers cultivating the surrounding land.

Open Space

Figure 6 shows that there are two different types of open space in the research area, including the road and productive green spaces. The road is the main open space often used for both ordinary social interaction and special community activities such as traditional ceremonies. Meanwhile, productive green space is

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in the form of agricultural land, normally used for social interaction during the process of farming.



Figure 6: Open space existing

The setting of open space

The river boundary line around the research area is presented in Figure 7. Riverbank is observed to be utilized for different activities such as agriculture and fisheries.



Figure 7: settlement area and riverbank area
***Source**: Result Analysis, Processed from Google Earth (2024)*

The trend shows that open space was zoned to ensure proximity to the people and accommodation of different activities. This was observed from the placement of residential areas in riparian spaces, agricultural settlements designated through orange color, as well as riverbank and agriculture presented in blue and red, respectively, in Figure 7. Moreover, open space, including gardens and support facilities for agriculture, serves as the transition between the settlement and the agriculture-river border in Figure 8.



Figure 8: Urban setting, riverbank, settlement, and farming

Open space is arranged to provide a transition that combines the urban park for residents, a waterfront area, and a plantation arrangement. Meanwhile, the agricultural area is equipped with supporting buildings that function as fields, greenhouses, and a mini traditional market.

CONCLUSION

In conclusion, this research aimed to understand the adaptation of settlement through the utilization of available resources for survival. The geographical profile of the research area showed a low slope and potential for inundation flood, thereby providing the community with the local knowledge to turn the disasters into natural resources through agriculture, fisheries, and trade. This shows that downstream river areas with floodplain landforms have high economic value for people capable of managing the condition. Therefore, there is a need for accurate spatial management for regional resilience. Some of the inundation flood management identified in residential areas was the elevation of the ground floor of buildings, stilt structures, and floating house models. The geographical settlement adaptation has led to the continuous development of the area to have a regional center with a space configuration consisting of roads, buildings, and land use.

Settlement pattern analysis showed physical and non-physical orientation to ensure the relationship between humans and space reflected the characteristics of rural areas. The physical aspect was observed oriented towards the direction of the road space, while the non-physical aspect is related to agricultural land. Moreover, social relations and interactions were conducted in an open space.

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Naturally, without any special design, such as the road and productive green spaces. The spatial configuration was observed to influence the thematic open space used in transiting between waterfront, residential, and agricultural areas. Therefore, open space was identified to provide an additional function in addition to the utilization for agricultural purposes.

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REFERENCES

Arifin, Z., & Rahman, F. (2020). Bermukim di tepian sungai: Kasus pemukiman komunitas melayu ogan, Sumatera Selatan. *ETNOSIA: Jurnal Etnografi Indonesia*, *5*(1), 33–49.

Auliyani, D., & Wahyuningrum, N. (2020). Pola hujan di bagian hulu daerah aliran sungai bengawan solo dalam perencanaan pemanfaatan sumber daya air. *Jurnal Penelitian Pengelolaan Daerah Aliran Sungai (JPPDAS)*, *4*(1), 53–62. https://doi.org/10.20886/jppdas.2020.4.1.53-62

Ayyıldız, S., & Durak, Ş. (2024). Space syntax analysis of the spatial configuration of Yalova traditional rural houses. *Nexus Network Journal*, *26*, 27–48. https://doi.org/10.1007/s00004-023-00746-9

Badan Informasi Geospasial. (n.d.). *Shapefile Rupa Bumi Indonesia*. Retrieved July 16, 2024, from https://tanahair.indonesia.go.id

Dorrel, D., & Henderson, J. P. (2020). *Introduction to human geography*. University of North Georgia.

Ferdous, M. R., Wesselink, A., Brandimarte, L., Slager, K., Zwarteveen, M., & Di Baldassarre, G. (2018). Socio-hydrological spaces in the Jamuna River floodplain in Bangladesh. *Hydrology and Earth System Sciences*, *22*, 5159–5173.

Ferdous, M. R., Wesselink, A., Brandimarte, L., Slager, K., Zwarteveen, M., & Di Baldassarre, G. (2019). The costs of living with floods in the Jamuna Floodplain in Bangladesh. *Water*, *11*(6), 1238. https://doi.org/10.3390/w11061238

Fidiyawati, M., Cahyadi, N., & Candra, D. S. (2020). *Analisa perubahan pola dan tata guna lahan sungai bengawan solo dengan menggunakan citra satelit multitemporal (Studi Kasus: Kabupaten Lamongan)*. http://digilib.its.ac.id/public/ITS-Undergraduate-16583-3507100046

Google. (n.d.). *Sekaran, Lamongan Regency, East Java* [Google Earth satellite view]. Retrieved May 23, 2024, from https://earth.google.com/

Hillier, B., & Hanson, J. (1984). *The social logic of space*. Cambridge University Press.

Ischak, P., Winandari, W., & Wijayanto, O. (2023). The typology of public open space in peri-urban unplanned settlement: Case study: Kampong of Kalipaten, Tangerang, Indonesia. *Indonesian Journal of Urban and Environmental Technology*, *6*(1), 36–48.

© 2025 by MIP

Karimi, K. (2023). The configurational structures of social spaces: Space syntax and urban morphology in the context of analytical, evidence-based design. *Land*, *12*(11), 2084. https://doi.org/10.3390/land12112084

Khan, A. M. (2019). Revisiting planning standards for open spaces in urban areas from global and national perspectives. *Journal of Bangladesh Institute of Planners*, *12*, 1–20.

Koteski, C. (2019). Elevation of village settlements by municipalities in the river basin of Crna Reka and their importance for development of tourism in the Republic of Macedonia. *Journal of Tourism and Hospitality Management*, 16–23.

McClymont, K., Morrison, D., Beevers, L., & Carmen, E. (2019). Flood resilience: A systematic review. *Journal of Environmental Planning and Management*.

Michiani, M. V., & Asano, J. (2019). Physical upgrading plan for slum riverside settlement in traditional area: A case study in Kuin Utara, Banjarmasin, Indonesia. *Frontiers of Architectural Research*, *8*, 378–395.

Mulyati, A., Soewarno, N., Ronald, A., & Sarwadi, A. (2016). Karakteristik spasial permukiman vernakular perairan di Sulawesi Tengah (Characteristic settlement on the spatial of aquatic vernacular at Central Sulawesi). *Jurnal Manusia dan Lingkungan*, *23*(1), 122–128.

Pemerintah Kabupaten Lamongan. (n.d.). *RTRW Kabupaten Lamongan 2012–2031*.

Peponis, J., Zimring, C., & Choi, Y. K. (1990). Finding the building in wayfinding. *Environment and Behavior*, *22*, 555–590.

Prabowo, D. (1978). Allocation of farm resources in the Solo River Basin. *Bulletin of Indonesian Economic Studies*.

Putra, H. A., & Hastorahmanto, P. S. (2023). Space syntax in the adjustment of space patterns of sofbol stations in Surabaya. *Journal of Architecture & Environment*, *22*(2), 153–168.

Ramayana. (2017). City and its open spaces. *International Journal of Scientific & Technology Research*, *6*(2).

Restemeyer, B., Van Den Brink, M., & Woltjer, J. (2019). Decentralized implementation of flood resilience measures – A blessing or a curse? Lessons from the Thames Estuary 2100 Plan and the Royal Docks Regeneration. *Planning Practice & Research*, *34*(1), 62–83. https://doi.org/10.1080/02697459.2018.1546918

Sabaruddin, & Ariastita, P. G. (2013). Skenario tutupan lahan kawasan banjir berdasarkan tingkat bahaya di Kecamatan Babat Kabupaten Lamongan. *Jurnal Sains Dan Seni Pomits*, *2*(1).

Schober, B., Hauer, C., & Habersack, H. (2020). Floodplain losses and increasing flood risk in the context of recent historic land use changes and settlement developments: Austrian case studies. *Journal of Flood Risk Management*, e12610.

Seher, W., & Löschner, L. (2016). *Settlement dynamics in floodplains: From assessing future flood hazard exposure to developing spatial adaptation measures*. Interpreavent 2016 – Conference Proceedings.

Seijger, C., Datta, D. K., Douven, W., van Halsema, G., & Khan, M. F. (2019). Rethinking sediments, tidal rivers and delta livelihoods: Tidal river management as a strategic innovation in Bangladesh. *Water Policy*, *21*(1), 108–126.

Trancik, R. (1986). *Finding lost space: Theories of urban design*. Van Nostrand Reinhold Company.

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Turner, A. (2004). *Depthmap 4 | A researcher's handbook*. Bartlett School of Graduate Studies, UCL, London. http://www.vr.ucl.ac.uk/depthmap/handbook/depthmap4r1.pdf

Veni. (2016). Evaluasi kesesuaian lahan untuk permukiman di kanagarian painan kecamatan iv jurai kabupaten pesisir selatan. *Jurnal Kepemimpinan dan Pengurusan Sekolah*, *1*(2).

Williams, D. S., Máñez Costa, M., Sutherland, C., Celliers, L., & Scheffran, J. (2019). Vulnerability of informal settlements in the context of rapid urbanization and climate change. *Environment & Urbanization*, *31*(1), 157–176. https://doi.org/10.1177/0956247818819694

Xu, H., & Huang, L. (2022). Comparative analysis of urban and rural public space environment design based on multimedia information. *Advances in Multimedia*, *2022*, 1–11. https://doi.org/10.1155/2022/1446545

Yadav, D. S., & Chauhan, G. S. (2020). Water resource scarcity and its impact on masses in Bundelkhand region: A case study of Mahoba district (U.P.), India. *Journal of Global Resources*, *6*(1), 31–37.

Yenen, Z., & Hamamcıoğlu, C. (2017). Evolution of hierarchy of settlements in river-basin scale towards climate change. *International Journal of Global Warming*, *11*(2).

Zhu, M., Dong, J., & Gao, Y. (2019). The research on temporal–spatial distribution and morphological characteristics of ancient settlements in the Songhua River Basin. *Sustainability*, *11*, 932.

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THE INFLUENCE OF CAMPUS BUILT ENVIRONMENT CHARACTERISTICS ON WALKING BEHAVIOR AMONG COLLEGE STUDENTS

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Abstract

College students' sedentary and inactive lifestyles often lead to health issues like obesity and depression. The campus-built environment is crucial for encouraging college students' walking behavior, directly impacting their physical and mental health. However, it is unclear to what extent the campus-built environment characteristics contribute to college students' walking behavior. Therefore, this study aims to investigate the influence of campus-built environment characteristics on college students' walking behaviour. Utilizing the Neighborhood Environment Walkability Scale (NEWS) and the International Physical Activity Questionnaire (IPAQ), this study collected data from 687 students at two universities in China through a questionnaire survey and analysed the data using multiple regression techniques. The results show that land use diversity, accessibility, and infrastructure significantly influence walking behavior, totally explaining 26.3% of the variance. These findings highlight the importance of a walkable campus environment in promoting college students' walking behaviour, which is beneficial to their physical and mental health. Consequently, this study provides empirical evidence on specific built environment characteristics that encourage walking, serving as a valuable resource for future campus planning and health-promotion policy development.

Keywords: Campus Built Environment; Walking Behavior; College Student; Health

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INTRODUCTION

In the current context of rapid urbanisation, walking as an effective mode of physical activity has become a central concern in a number of areas, including public health, sustainable transport and urban planning(Bornioli et al., 2019; M. Liu et al., 2022; Van Holle et al., 2015). The United Nations and the World Health Organization, in their Sustainable Development Goals (SDGs) and Universal Health Coverage (UHC) programmes, have highlighted the building of pedestrian-friendly environments and the promotion of green mobility, such as walking, as the key measures to promote community cohesion, enhance the health benefits for residents and achieve sustainable development(Sacks et al., 2020; Siqueira et al., 2021).

Under the high-intensity and fast-paced lifestyle, the general public, particularly college students, face significant health challenges including obesity and depression(Wang Mohan, 2019; Mihailova & Kaminska, 2016; Sabra et al., 2007). The rapid expansion of transportation and logistics sectors, coupled with the pervasive use of the Internet, has fostered a sedentary lifestyle among college students (Wang. 2019). This sedentary behavior leads to inadequate physical activity, increasing various health risks.(Hargens et al., 2021; W. Liu et al., 2021). Research suggests that walking serves as a vital daily transportation mode for college students and an effective means to boost physical and mental health (ZHOU, 2019; Pfisterer et al., 2022). It effectively alleviates stress, enhances mood, and bolsters psychological resilience (Harun & Nashar, 2017; Mu & Lao, 2022). Additionally, walking plays a key role in promoting green and sustainable development on campus (Liao et al., 2022; Ramakreshnan et al., 2020).

Over the past two decades, China's higher education institutions have seen remarkable growth, with the number of college and university rising from 1,041 in 2000 to 2,738 in 2020, and student enrollment increasing from 5.56 million to 32.85 million(Zhang et al., 2024). Despite this expansion, the development often overlooked the importance of campus built environment, leading to inadequate walking paths, poor accessibility, and unappealing landscaping(Zhang et al., 2023). These deficiencies have significantly degraded the walking experience, diminishing students' inclination to walk frequently(Liao et al., 2022; M. Liu et al., 2022). Additionally, Chinese university campuses are usually characterised by their closed boundary(Liao et al., 2022), and on-campus housing is typically required for students(Sun et al., 2018). Students' daily lives are largely confined within these campuses, where they frequently walk between various functional areas. In this environment, in addition to fulfilling commuting needs, walking has become a habit of life for students.

Although research has confirmed that the campus built environment significantly influences walking behavior, most related studies are still focused on Western countries (Hajrasouliha, 2017; Soares et al., 2022), with relatively few studies on Asia, particularly China (Mu & Lao, 2022; Zhang et al., 2024).

These studies primarily explore the characteristics of the built environment, such as land use, accessibility, walking infrastructure, and safety, and their impact on walking behavior (Liao et al. 2022; Horacek et al. 2018). Given the rapid expansion of higher education in China, many campuses are facing challenges such as improving space utilization efficiency and enhancing landscape aesthetics. These issues highlight the importance of studying the characteristics of the built environment in the context of high-density educational environments in China. Therefore, to address these issues, this study aims to investigate the influence of the campus built environment on college students' walking behaviour. The goal is to inform campus planning and design, ultimately fostering healthier and more active campus lifestyles.

LITERATURE REVIEW

Walking, as a low-cost and easily adhered to physical activity, has been widely recognised as important in maintaining and enhancing individual health. Numerous interdisciplinary studies, including preventive medicine, public health and urban planning, have highlighted the positive role of daily physical activity in the prevention and control of chronic diseases(Clemente et al., 2016; McTiernan et al., 2019; Teuber & Sudeck, 2021). García-Hermoso et al. (2018) found that Colombian college students who walked to and from school had lower obesity rates and better metabolic health indicators than their less active peers. This underscores the importance of walking during young adulthood, a critical period for preventing obesity and metabolic syndrome (Haase et al., 2004). Additionally, walking significantly reduces mental stress. Bang et al. (2017) showed that college students participating in the Campus Forest Walking Programme experienced notable reductions in depressive symptoms and enhanced parasympathetic nerve activity, boosting mental health. Walking also promotes social interactions, increasing communication opportunities, fostering harmonious interactions(Bang et al., 2017;Kim & Yang, 2017), and enhancing a sense of belonging and social capital (Liao et al., 2022). In conclusion, walking positively impacts college students' physical and mental health and facilitates social interactions, enhancing the overall quality and sustainability of campus life. The realization of these benefits largely depends on the environment in which the pedestrians are situated, particularly the design and functionality of the built environment.

In exploring how the urban built environment influences walking behavior, researchers have identified various key factors, including accessibility, connectivity, and infrastructure. Cervero and Kockelman's '3D' principles—Density, Diversity, and Design—highlight core urban design elements that enhance walkability(Cervero & Kockelman, 1997). Alfonzo (2005), drawing on Maslow’s Hierarchy of Needs, categorized the walking-related aspects of the built environment into five ascending levels: Feasibility, Accessibility, Safety,

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Comfort, and Pleasurability. Additionally, the Neighborhood Environment Walkability Scale (NEWS) integrates eight critical dimensions such as residential density, land use diversity, street connectivity, access to services, pedestrian infrastructure, traffic safety, aesthetics, and crime safety to assess their impact on walking behavior(Cerin et al., 2009, 2010). Recent empirical studies, including those by Liu et al. (2023), confirmed significant correlations between elements like street greening and accessibility to public facilities with increased walking duration. Koo et al. (2022) further validated that the quality of pedestrian infrastructure and neighborhood greening significantly affect walking choices. Collectively, these insights have not only highlighted the importance of the urban built environment for walking but also provided crucial references for related research in campus environments. This, in turn, helps identify the campus environmental factors that influence student walking behavior.

In the context of university campuses, some studies have found that various built environment factors influence student walking behavior. Peachey & Baller (2015) discovered that land use diversity, aesthetics, and connectivity was closely linked to increased walking activities. Afsar et al. (2015) emphasized the role of accessibility and connectivity in enhancing walking behavior in a Malaysian university, noting a preference among students for specialized pedestrian shortcuts. Horacek et al. (2012) identified the safety of pathways as a critical element in assessing campus built environment. Similarly, Liao et al. (2022) found that factors such as connectivity, walking infrastructure, and safety positively influenced walking behavior by enhancing campus walkability. Molina-García et al. (2019) demonstrated that effective walking infrastructure significantly promoted active commuting in Spain. King et al. (2020) noted that aesthetic enhancements on campus could extend the duration students engaged in walking, benefiting their physical and mental health. Additionally, researchers analyzed 13 US campuses and concluded that safety and infrastructure were pivotal in fostering physical activity among students(Horacek et al., 2018).

As mentioned above, walking significantly enhances the physical and mental health of college students and fosters social interactions. Research has demonstrated that various characteristics of the built environment, including land use diversity, accessibility, connectivity, walking infrastructure, aesthetics, and safety, profoundly affect walking behavior. However, the specific influences of campus built environments on walking behavior differs across geographical and cultural contexts, indicating that research findings vary widely based on location and culture background. Consequently, this study seeks to investigate the relationship between the campus built environment and college students' walking behaviour in the Chinese context.

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RESEARCH METHODOLOGY

Study Area and Sample Size

This study was conducted in Anyang City, Henan Province, China, home to seven universities and technical colleges with a total enrolment of nearly 130,000 students. Two public universities, Anyang Institute of Technology and Anyang Normal University, were selected as the areas for this study, as shown in Figure 1. These two universities were selected due to their similarity in terms of level, size, campus environment, and operational history, enhancing the generalizability and reliability of the findings(Creswell , 2017). The two public universities enroll about 52,000 students(Yanyan Wang et al., 2023). Following Krejcie and Morgan's formula, a minimum sample size of 381 was determined necessary to achieve a 95% confidence level and a 5% margin of error(Krejcie & Morgan, 1970). Data was collected via a simple random sampling method from 796 students at two universities using an online questionnaire during June and July 2023. To maintain data quality, questionnaires completed in less than three minutes, with overly uniform or incomplete responses, were excluded as invalid. After data cleaning, 687 valid responses were retained, meeting the sample size requirements for the study.

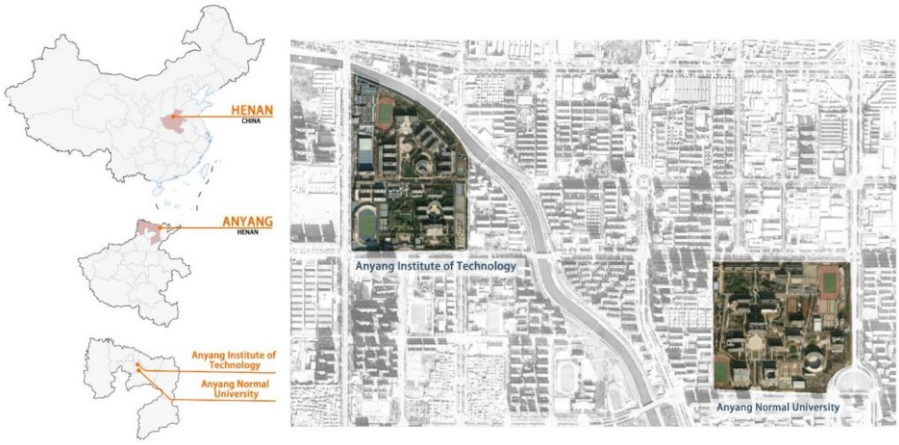


Figure 1: Location of this study.

Research Instrument

The research instrument for this study was a questionnaire divided into three sections: demographic characteristics (gender, grade, and major), campus built environment, and walking behavior. This study utilized the Neighbourhood Environment Walkability Scale (NEWS) adopted from Cerin et al. (2007), renowned for its reliability and validity(Cerin et al., 2009), to measure the campus built environment. Six dimensions of the scale were used in this study: land use diversity (e.g., distance from dormitory to facilities such as library, canteen,

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classroom buildings; 10 items; Cronbach's alpha=0.93), accessibility (e.g., availability of public transportation, sidewalk obstacles; 7 items; Cronbach's alpha=0.9), connectivity (e.g., presence of shortcuts; 3 items; Cronbach's alpha=0.79), infrastructure (e.g., availability of resting facilities, routine maintenance; 9 items; Cronbach's alpha=0.91), aesthetics (e.g., campus landscape, campus air quality; 6 items; Cronbach's alpha=0.87), and safety (e.g., speed limits, pedestrian-vehicle conflicts; 4 items; Cronbach's alpha=0.81). Except for the land use mix diversity, the ratings for the other five subscales ranged from "strongly disagree" (1) to "strongly agree" (5). Land use mix diversity was assessed based on the walking distance from the dormitories to various facilities, with response options ranging from 1 to 5 minutes to over 30 minutes.

In addition, walking behaviour in this study was measured using the International Physical Activity Questionnaire (IPAQ), known for its high reliability and validity(Deforche et al., 2010). Participants reported their walking activities performed in the past 7 days, including frequency of activity (days in the past week) and duration (minutes per day). These data were used to compute the total minutes walked per week, providing a quantitative measure of walking behavior.

Data Analysis

Data analysis in this study was conducted using SPSS 26.0 software. Initially, descriptive statistics were calculated to understand the basic features of the data. Correlation analyses were then performed to explore relationships between dependent and independent variables. The presence of multicollinearity was examined using collinearity statistics. Subsequently, multiple regression analysis was carried out. Given the positively skewed distribution of the walking time data, a logarithmic transformation was applied to enhance data normality and linearity(Ding et al., 2012; D. K. Lee, 2020), thus improving the analysis's interpretability. Demographic variables were included as control factors in the regression model. Lastly, the model's explanatory power was evaluated by assessing the amount of explained variance and the significance of the standardized regression coefficients.

ANALYSIS AND DISCUSSION

Results

Table 1 shows the demographic characteristics of the participants in this study. Regarding gender, males comprised a larger proportion at 399 (58.1%), while females totaled 288 (41.9%). For grade distribution, Year 2 students formed the largest group at 29.3%, followed by Year 1 students at 26.8% (184 students), Year 3 students at 25.6% (176 students), and Year 4 students at 18.3% (126 students). Among academic majors, students in Science, Technology,

Engineering, and Mathematics (STEM) constituted the majority with 361 (52.6%), followed by humanities and social sciences with 198 (28.8%), and arts and other majors with 128 (18.7%).

Table 1. Descriptive statistics of demographic variables (N=687)

Variables	Categories	Frequency	Percentage（%）
Gender	Male	399	58.1
	Female	288	41.9
Grade	Year 1	184	26.8
	Year 2	201	29.3
	Year 3	176	25.6
	Year 4	126	18.3
Major	STEM	361	52.5
	Humanities and Social Sciences	198	28.8
	Arts and Other Fields	128	18.7

Table 2 outlines the descriptive statistics and correlation analysis results between walking behavior and various characteristics of the campus built environment. The analysis indicates that land use diversity, accessibility, connectivity, infrastructure, aesthetics, and safety each positively correlate with the length of walking time.

Table 2 Descriptive statistics and Pearson's correlations for dependent and independent variables

	M±SD	1	2	3	4	5	6	7
1.Walking(min/week)	415.89±229.56	1						
2.Land use-diversity	3.28±0.974	.265**	1					
3.Accessibility	3.36±0.990	.365**	.311**	1				
4.Connectivity	3.75±0.965	.208**	.402**	.267**	1			
5.Infrastructure	3.48±0.913	.356**	.421**	.308**	.419**	1		
6.Aesthetic	3.56±0.919	.195**	.298**	.263**	.444**	.397**	1	
7.Safety	3.67±0.915	.179**	.255**	.193**	.395**	.323**	.317**	1

**Correlation is significant at the 0.01 level (2-tailed).

Prior to conducting regression analyses, the study assessed multicollinearity among predictor variables using tolerance and Variance Inflation Factor (VIF) metrics(Oke et al., 2019). According to Table 3, all independent variables demonstrated tolerance values greater than 0.1 and VIF values less than 10, confirming the absence of multicollinearity and validating

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the robustness of the regression model. The model showed a significance level of 0.000 (F=14.014, $p < 0.001$), indicating that it is suitable for predicting walking behavior. The coefficient determination value (R^2) shows that the percentage of dependent variables that can be predicted by the independent variables(Hair et al., 2014).

Table 3. Regression Coefficients

Model	Beta	t	Sig.	Tolerance	VIF
Gender	0.016	0.465	0.642	0.923	1.083
Grade	-0.068	-1.96	0.05	0.927	1.079
Major	-0.039	-1.152	0.25	0.959	1.043
Land use diversity	0.088	2.23	**0.026**	0.71	1.409
Accessibility	0.229	6.095	**0.000**	0.782	1.279
Connectivity	-0.008	-0.181	0.856	0.634	1.577
Infrastructure	0.187	4.547	**0.000**	0.654	1.53
Aesthetic	0.007	0.173	0.863	0.712	1.405
Safety	0.018	0.478	0.633	0.788	1.269
R			0.512		
R^2			0.263		
F			14.014***		

Note: Standardized coefficients are reported; ***P<0.001

As shown in Table 3, the model results indicate that 26.3% ($R^2 = 0.263$) of college student walking behaviour can be explained by the independent variables. After adjusting for demographic factors, three key predictors emerged as significant: land use diversity (β=0.088, p=0.026), accessibility (β=0.229, p<0.001), and infrastructure (β=0.187, p<0.001). Conversely, connectivity (β=-0.008, p=0.856), aesthetics (β=0.007, p=0.863), and safety (β=0.018, p=0.633) did not significantly impact walking behavior.

DISCUSSION

Analysis results reveal that land use diversity positively affects walking duration, indicating that land use diversity can encourage more frequent walking among students. Supporting this, Ramakreshnan et al. (2020) identified land use diversity and proximity to services as key factors enhancing walking behavior, underscoring the benefits of a high-density mix of uses. Similarly, Keat et al. (2016) highlighted the impact of walking distances between critical facilities like student housing and academic buildings, suggesting that shorter distances might reduce walking deterrents. Based on these insights, future campus planning

should focus on enhancing mixed land use and minimizing distances between key facilities to promote walking.

Accessibility significantly and positively influences walking behaviour. It enhances the convenience and practicality of walking, which is integral to daily student activities, thereby strongly predicting the total walking hours of college students. This result aligns with previous studies emphasizing the significant impact of accessibility on walking. For instance, Lee & Shepley (2020) emphasized the importance of optimizing campus accessibility, specifically by reducing the walking obstacles, as essential for promoting student walking. Similarly, Simonson et al. (2013) noted that improving campus accessibility not only facilitates walking but also positively correlates with an enhanced educational experience for students.

Regarding walking infrastructure, it also showed a significant positive effect on walking behaviour, underscoring its critical role in promoting pedestrian activity. Improvements in infrastructure, including regular maintenance, resting areas, waste bins, well-maintained pavements, ample shade, and adequate nighttime lighting, not only make walking more comfortable but also more appealing. These enhancements encourage students to more frequently choose walking as their preferred mode of transportation. This is supported by Bang et al. (2017), whose research found that a campus forest walking program significantly boosted walking behavior by optimizing the walking environment.

Meanwhile, connectivity, safety, and aesthetics do not significantly influence walking, which appears inconsistent with other studies. For instance, Raswol (2020) assessed the quality of the walking environment on Iraqi campuses, with a particular emphasis on safety, which had a direct impact on students' walking. Similarly, Afsar et al. (2015) found that shortcuts and the connectivity of sidewalks on campuses were significant factors in influencing students' walking decisions. A potential explanation for this phenomenon is that connectivity and safety ranked highly in the assessment of the campus built environment in this study, suggesting that in campus environments where basic standards of connectivity and safety are already met, their improvement has a lesser direct impact on walking behaviour. As the teaching, living, and other services at this study site are more centralized and located at relatively short distances, students may not need to rely on multiple routes or shortcuts in their decision to walk.

Furthermore, the environmental characteristics of Chinese campuses, such as relative closeness and strict on-campus traffic management (for example, strict speed limits and restrictions on the entry of non-campus staff vehicles), already ensure a certain level of safety for walking. Consequently, safety may be perceived as a basic expectation rather than a variable factor, rendering the additional influence of safety factors on walking behaviour insignificant (Foster et al., 2010). This emphasizes the importance of considering environmental

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characteristics in different contexts when studying walking behaviour, as the effectiveness of influencing factors can vary across contexts.

Moreover, while the campus aesthetics may increase the overall attractiveness of the environment, it may have a limited direct influence on walking behaviour. Similar findings were found in a study by Deforche et al. (2010), which noted that campus aesthetics have a limited direct influence and may be less significant compared to other factors such as accessibility and walking infrastructure.

The findings highlight that although connectivity, aesthetics, and safety are important, land use diversity, accessibility, and infrastructure play a more crucial role in enhancing walking behavior on campuses. Consequently, campus planning and design strategies should prioritize these elements to effectively encourage active walking among students.

CONCLUSION

This study elucidates the impact of land use diversity, accessibility, infrastructure, connectivity, aesthetics, and safety on college students' walking behavior, using regression analysis to assess these factors. Key findings demonstrate that land use diversity, accessibility, and infrastructure notably increase the duration of walking among students by enhancing service diversity, optimizing pathway access, and improving infrastructure. These insights provide a solid empirical foundation for designing campus environments that promote active lifestyles and lay the groundwork for further studies in Asian countries on the effects of such environments on student health. It is envisioned that campus planners and designers will use these results to develop spaces that encourage more walking and activity among students.

The study faces certain limitations that should be considered. Firstly, it was conducted in Anyang, China, at specific universities, which may not fully represent other university environments, thus potentially limiting the broader applicability of the findings. Secondly, the reliance on self-reported questionnaires to measure walking behavior might compromise data accuracy. To enhance data reliability in future research, the use of objective tracking tools such as accelerometers or pedometers is recommended to more accurately measure walking behavior(Chaudhry et al., 2020).

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REFERENCES

Afsar, B., Mohd Yunos, M. Y., Othuman Mydin, M. A., & Mohd Yusof, M. J. (2015). Perceived Pedestrian Environment Functional Factors which are Associated with Walking in Tropical University Campus. *Applied Mechanics and Materials*, *747*, 161–164. https://doi.org/10.4028/www.scientific.net/amm.747.161

Alfonzo, M. A. (2005). To walk or not to walk? The hierarchy of walking needs. *Environment and Behavior*, *37*(6), 808–836. https://doi.org/10.1177/0013916504274016

Bang, K. S., Lee, I., Kim, S., Lim, C. S., Joh, H. K., Park, B. J., & Song, M. K. (2017). The effects of a campus Forest-Walking program on undergraduate and graduate students' physical and psychological health. *International Journal of Environmental Research and Public Health*, *14*(7). https://doi.org/10.3390/ijerph14070728

Bornioli, A., Parkhurst, G., & Morgan, P. L. (2019). Affective experiences of built environments and the promotion of urban walking. *Transportation Research Part A: Policy and Practice*, *123*(January), 200–215. https://doi.org/10.1016/j.tra.2018.12.006

Cerin, E., Conway, T. L., Saelens, B. E., Frank, L. D., & Sallis, J. F. (2009). Cross-validation of the factorial structure of the Neighborhood Environment Walkability Scale (NEWS) and its abbreviated form (NEWS-A). *International Journal of Behavioral Nutrition and Physical Activity*, *6*(1), 32. https://doi.org/10.1186/1479-5868-6-32

Cerin, E., Macfarlane, D. J., Ko, H. H., & Chan, K. C. A. (2007). Measuring perceived neighbourhood walkability in Hong Kong. *Cities*, *24*(3), 209–217. https://doi.org/10.1016/j.cities.2006.12.002

Cerin, E., Sit, C. H. P., Cheung, M. chin, Ho, S. yin, Lee, L. chun J., & Chan, W. man. (2010). Reliable and valid NEWS for Chinese seniors: Measuring perceived neighborhood attributes related to walking. *International Journal of Behavioral Nutrition and Physical Activity*, *7*, 1–14. https://doi.org/10.1186/1479-5868-7-84

Cervero, R., & Kockelman, K. (1997). Travel demand and the 3Ds: Density, diversity, and design. *Transportation Research Part D: Transport and Environment*, *2*(3), 199–219.

Chaudhry, U. A. R., Wahlich, C., Fortescue, R., Cook, D. G., Knightly, R., & Harris, T. (2020). The effects of step-count monitoring interventions on physical activity: systematic review and meta-analysis of community-based randomised controlled trials in adults. *International Journal of Behavioral Nutrition and Physical Activity*, *17*, 1–16.

Clemente, F. M., Nikolaidis, P. T., Martins, F. M. L., & Mendes, R. S. (2016). Physical activity patterns in university students: Do they follow the public health guidelines? *PloS One*, *11*(3), e0152516.

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.

Deforche, B., Van Dyck, D., Verloigne, M., & De Bourdeaudhuij, I. (2010). Perceived social and physical environmental correlates of physical activity in older adolescents and the moderating effect of self-efficacy. *Preventive Medicine*, *50*(SUPPL.), S24–S29. https://doi.org/10.1016/j.ypmed.2009.08.017

© 2025 by MIP

Ding, D., Sallis, J. F., Conway, T. L., Saelens, B. E., Frank, L. D., Cain, K. L., & Slymen, D. J. (2012). Interactive effects of built environment and psychosocial attributes on physical activity: A test of ecological models. *Annals of Behavioral Medicine*, *44*(3), 365–374. https://doi.org/10.1007/s12160-012-9394-1

Foster, S., Giles-Corti, B., & Knuiman, M. (2010). Neighbourhood design and fear of crime: A social-ecological examination of the correlates of residents' fear in new suburban housing developments. *Health and Place*, *16*(6), 1156–1165. https://doi.org/10.1016/j.healthplace.2010.07.007

García-Hermoso, A., Quintero, A. P., Hernández, E., Correa-Bautista, J. E., Izquierdo, M., Tordecilla-Sanders, A., Prieto-Benavides, D., Sandoval-Cuellar, C., González-Ruíz, K., & Villa-González, E. (2018). Active commuting to and from university, obesity and metabolic syndrome among Colombian university students. *BMC Public Health*, *18*, 1–7.

Haase, A., Steptoe, A., Sallis, J. F., & Wardle, J. (2004). Leisure-time physical activity in university students from 23 countries: Associations with health beliefs, risk awareness, and national economic development. *Preventive Medicine*, *39*(1), 182–190. https://doi.org/10.1016/j.ypmed.2004.01.028

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate data analysis seventh (7th) edition*. Pearson New International Edition. Pearson.

Hajrasouliha, A. H. (2017). Master-planning the American campus: Goals, actions, and design strategies. *Urban Design International*, *22*, 363–381.

Hargens, T. A., Scott, M. C., Olijar, V., Bigman, M., & Edwards, E. S. (2021). Markers of poor sleep quality increase sedentary behavior in college students as derived from accelerometry. *Sleep and Breathing*, *25*, 537–544.

Harun, N. Z., & Nashar, A. (2017). Developing a framework for streetscape design to promote walkability in Malaysian campus. *Advanced Science Letters*, *23*(4), 2761–2765. https://doi.org/10.1166/asl.2017.7616

Haskell, W. L., Lee, I.-M., Pate, R. R., Powell, K. E., Blair, S. N., Franklin, B. A., Macera, C. A., Heath, G. W., Thompson, P. D., & Bauman, A. (2007). Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. *Circulation*, *116*(9), 1081.

Horacek, T. M., Dede Yildirim, E., Kattelmann, K., Brown, O., Byrd-Bredbenner, C., Colby, S., Greene, G., Hoerr, S., Kidd, T., & Koenings, M. M. (2018). Path analysis of campus walkability/bikeability and college students' physical activity attitudes, behaviors, and body mass index. *American Journal of Health Promotion*, *32*(3), 578–586.

Horacek, T. M., Dede Yildirim, E., Kattelmann, K., Brown, O., Byrd-Bredbenner, C., Colby, S., Greene, G., Hoerr, S., Kidd, T., Koenings, M. M., Morrell, J., Olfert, M. D., Phillips, B., Shelnutt, K., & White, A. (2018). Path Analysis of Campus Walkability/Bikeability and College Students' Physical Activity Attitudes, Behaviors, and Body Mass Index. *American Journal of Health Promotion*, *32*(3), 578–586. https://doi.org/10.1177/0890117116666357

Horacek, T. M., White, A. A., Greene, G. W., Reznar, M. M., Quick, V. M., Morrell, J. S., Colby, S. M., Kattelmann, K. K., Herrick, M. S., & Shelnutt, K. P. (2012).

Sneakers and spokes: An assessment of the walkability and bikeability of US postsecondary institutions. *Journal of Environmental Health*, *74*(7), 8–15.

Keat, L. K., Yaacob, N. M., & Hashim, N. R. (2016). Campus walkability in Malaysian public universities: A case-study of universiti malaya. *Planning Malaysia*, *5*, 101–114. https://doi.org/10.21837/pmjournal.v14.i5.196

Kesaniemi, Y. A., Danforth, E., Jensen, M. D., Kopelman, P. G., Lefèbvre, P., & Reeder, B. A. (2001). Dose-response issues concerning physical activity and health: an evidence-based symposium. *Medicine & Science in Sports & Exercise*, *33*(6), S351–S358.

Kim, H., & Yang, S. (2017). Neighborhood walking and social capital: The correlation between walking experience and individual perception of social capital. *Sustainability*, *9*(5), 680.

King, S. B., Kaczynski, A. T., Knight Wilt, J., & Stowe, E. W. (2020). Walkability 101: A Multi-Method Assessment of the Walkability at a University Campus. *SAGE Open*, *10*(2). https://doi.org/10.1177/2158244020917954

Koo, B. W., Guhathakurta, S., & Botchwey, N. (2022). How are neighborhood and street-level walkability factors associated with walking behaviors? A big data approach using street view images. *Environment and Behavior*, *54*(1), 211–241.

Krejcie, R. V, & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, *30*(3), 607–610.

Lee, D. K. (2020). Data transformation: a focus on the interpretation. *Korean Journal of Anesthesiology*, *73*(6), 503–508.

Lee, J., & Shepley, M. M. (2020). College campuses and student walkability: Assessing the impact of smartphone use on student perception and evaluation of urban campus routes. *Sustainability (Switzerland)*, *12*(23), 1–17. https://doi.org/10.3390/su12239986

Liao, B., Xu, Y., Li, X., & Li, J. (2022). Association between Campus Walkability and Affective Walking Experience, and the Mediating Role of Walking Attitude. *International Journal of Environmental Research and Public Health*, *19*(21), 14519. https://doi.org/10.3390/ijerph192114519

Liu, J., Ettema, D., & Helbich, M. (2023). Street view environments are associated with the walking duration of pedestrians: The case of Amsterdam, the Netherlands. *Landscape and Urban Planning*, *235*, 104752.

Liu, M., Zhao, S., & Li, J. (2022). Associations among perceived built environment, attitudes, walking behavior, and physical and mental state of college students during COVID-19. *Travel Behaviour and Society*, *28*(2), 170–180. https://doi.org/10.1016/j.tbs.2022.04.003

Liu, W., Yuan, Q., Zeng, N., McDonough, D. J., Tao, K., Peng, Q., & Gao, Z. (2021). Relationships between college students' sedentary behavior, sleep quality, and body mass index. *International Journal of Environmental Research and Public Health*, *18*(8), 3946.

McTiernan, A., Friedenreich, C. M., Katzmarzyk, P. T., Powell, K. E., Macko, R., Buchner, D., Pescatello, L. S., Bloodgood, B., Tennant, B., & Vaux-Bjerke, A. (2019). Physical activity in cancer prevention and survival: a systematic review. *Medicine and Science in Sports and Exercise*, *51*(6), 1252.

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Mihailova, A., & Kaminska, I. (2016). Lung volumes related to physical activity, physical fitness, aerobic capacity and body mass index in students. *SHS Web of Conferences*, *30*, 17.

Molina-García, J., Menescardi, C., Estevan, I., Martínez-Bello, V., & Queralt, A. (2019). Neighborhood built environment and socioeconomic status are associated with active commuting and sedentary behavior, but not with leisure-time physical activity, in university students. *International Journal of Environmental Research and Public Health*, *16*(17), 1–12. https://doi.org/10.3390/ijerph16173176

Mu, T., & Lao, Y. (2022). A Study on the Walkability of Zijingang East Campus of Zhejiang University: Based on Network Distance Walk Score. *Sustainability (Switzerland)*, *14*(17), 1–17. https://doi.org/10.3390/su141711108

Oke, J., Akinkunmi, W. B., & Etebefia, S. O. (2019). Use of correlation, tolerance and variance inflation factor for multicollinearity test. *GSJ*, *7*(5), 652–659.

Peachey, A. A., & Baller, S. L. (2015). Perceived built environment characteristics of on-campus and off-campus neighborhoods associated with physical activity of college students. *Journal of American College Health*, *63*(5), 337–342.

Pfisterer, J., Rausch, C., Wohlfarth, D., Bachert, P., Jekauc, D., & Wunsch, K. (2022). Effectiveness of Physical-Activity-Based Interventions Targeting Overweight and Obesity among University Students—A Systematic Review. *International Journal of Environmental Research and Public Health*, *19*(15), 9427.

Ramakreshnan, L., Fong, C. S., Sulaiman, N. M., & Aghamohammadi, N. (2020). Motivations and built environment factors associated with campus walkability in the tropical settings. *Science of the Total Environment*, *749*, 141457. https://doi.org/10.1016/j.scitotenv.2020.141457

Raswol, L. M. (2020). Qualitative Assessment for Walkability: Duhok University Campus as a Case Study. *IOP Conference Series: Materials Science and Engineering*, *978*(1). https://doi.org/10.1088/1757-899X/978/1/012001

Sabra, A. A., Taha, A. Z., Al-Sebiany, A. M., Al-Kurashi, N. Y., & Al-Zubier, A. G. (2007). Coronary heart disease risk factors: prevalence and behavior among male university students in Dammam City, Saudi Arabia. *J Egypt Public Health Assoc*, *82*(1–2), 21–42.

Sacks, E., Schleiff, M., Were, M., Chowdhury, A. M., & Perry, H. B. (2020). Communities, universal health coverage and primary health care. *Bulletin of the World Health Organization*, *98*(11), 773–780. https://doi.org/10.2471/BLT.20.252445

Simonson, S., Glick, S., & Ellen C. Nobe, M. (2013). Accessibility at a public university: student's perceptions. *Journal of Facilities Management*, *11*(3), 198–209. https://doi.org/10.1108/JFM-06-2012-0025

Siqueira, G. D., Adeel, A., Pasha, P., Balushi, A. A., & Shah, S. A. (2021). Sustainable Transportation and Policy Development: A Study for Impact Analysis of Mobility Patterns and Neighborhood Assessment of Walking Behavior. In *Sustainability* (Vol. 13, Issue 4). https://doi.org/10.3390/su13041871

Soares, I., Venhorst, V., Weitkamp, G., & Yamu, C. (2022). The impact of the built environment on creativity in public spaces of Dutch university campuses and science parks. *Journal of Urban Design*, *27*(1), 91–109.

Sun, C., Cheng, J., Lin, A., & Peng, M. (2018). Gated university campus and its implications for socio-spatial inequality: Evidence from students' accessibility to local public transport. *Habitat International*, *80*, 11–27.

Teuber, M., & Sudeck, G. (2021). Why do students walk or cycle for transportation? Perceived study environment and psychological determinants as predictors of active transportation by university students. *International Journal of Environmental Research and Public Health*, *18*(4), 1390.

Van Holle, V., Van Cauwenberg, J., Deforche, B., Van de Weghe, N., De Bourdeaudhuij, I., & Van Dyck, D. (2015). Do psychosocial factors moderate the association between objective neighborhood walkability and older adults' physical activity? *Health and Place*, *34*, 118–125. https://doi.org/10.1016/j.healthplace.2015.05.004

Wang Mohan. (2019). *A study of strategies for designing campus environments in cold-weather universities based on physical activity promotion*. Harbin Institute of Technology.

Yanyan Wang, Xiao Jialin, Wang Li, & Wang Zhenkang. (2023). The Path of Students' Physical Education and Healthy Behavior in the Perspective of Healthy Cities--An Yang City College Students as an Example. *Contemporary Sports Technology*, *13*(22), 58–62.

Zhang, Z., Fisher, T., & Wang, H. (2024). Campus environmental quality and streetscape features related to walking activity. *Journal of Asian Architecture and Building Engineering*, *23*(1), 405–423. https://doi.org/10.1080/13467581.2023.2220780

Zhang, Z., Wang, H., Pang, L., Fisher, T., & Yang, S. (2023). Comparisons of Built Environment Correlates of Walking in Urban and Suburban Campuses: A Case Study of Tianjin, China. *Land*, *12*(11), 1972.

ZHOU, C. (2019). Effects of fitness walking and jogging on weight loss of overweight and obese college students. *Chinese Journal of School Health*, 213–215.

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CYCLING TOWARDS SUSTAINABILITY: MOTIVATIONS FOR BICYCLE USE IN URBAN SETTINGS

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Abstract

This paper examines the motivations behind the choice of cycling as a mode of transportation in urban settings, with an emphasis on its contribution to sustainable urban mobility. Addressing the critical need for sustainable transportation alternatives, this research investigates the multifaceted reasons that encourage individuals to adopt cycling, encompassing personal health, environmental sustainability, economic benefits, and the influence of urban infrastructure. Utilizing a mixed-methods approach that combines an extensive review of current literature with primary data from semi-structured interviews with 200 urban cyclists, the study unveils a complex set of motivators for cycling. Key findings indicate that health benefits and environmental awareness are significant drivers, yet the availability and quality of urban cycling infrastructure emerge as pivotal in enabling the decision to cycle. The main contribution of this research lies in the detailed analysis of the relationship between personal motivators and infrastructural elements. It demonstrates that comprehensive urban planning and policy support are essential in promoting bicycle use. This study provides valuable insights to urban planners and policymakers on how dedicated cycling paths, safety measures, and public awareness campaigns can effectively encourage a shift towards bicycle use in alignment with broader public health and environmental objectives. The research underscores the essential role of comprehensive urban planning and policy support in promoting cycling, highlighting how dedicated cycling paths, safety measures, and public awareness campaigns can effectively encourage a shift towards bicycle use. By elucidating the diverse motivations for cycling within an urban cohort of 200 respondents, this study offers valuable insights for urban planners and policymakers aiming to foster sustainable mobility solutions that align with broader environmental and public health objectives.

Keywords: Cycling, Sustainability, Motivations, Bicycle Use, Urban Setting

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INTRODUCTION

In the face of escalating environmental concerns, congested urban centers, and the global imperative for sustainable living, the bicycle re-emerges not merely as a relic of a bygone era but as a pivotal instrument of modern urban mobility (Brogan, 2022). The quest for sustainable transportation solutions has led to a renewed interest in cycling, a mode of transportation that offers significant environmental, health, and economic benefits. Despite its potential, the adoption of cycling in urban settings varies significantly, influenced by a complex interplay of factors that include not only individual preferences but also broader social, economic, and infrastructural elements.

The urban environment presents unique challenges and opportunities for cyclists. Cities around the globe are at different stages of fostering a cycling culture, with varying degrees of success (Buehler & Goel, 2022). Critical to this endeavor is understanding the motivations that drive individuals to opt for cycling over other forms of transportation (Biassoni et al., 2023). Research has proven that motivations for cycling encompass a range of factors, from the desire for physical fitness to economic savings to a commitment to reducing one's carbon footprint. However, the barriers to cycling, such as perceived safety concerns, lack of infrastructure, and social norms, also play a significant role in shaping urban cycling habits (Félix et al., 2019).

This study aims to dissect these motivations and barriers within the context of urban settings, focusing on how individual, social, and environmental factors converge to influence cycling behavior. Drawing on the responses of 200 individuals, this research employs a mixed- methods approach, integrating quantitative data from surveys with qualitative insights from interviews. This methodology allows for a nuanced understanding of the motivations for cycling, offering a comprehensive view that encompasses the diverse experiences and perspectives of urban cyclists.

In exploring the motivations for bicycle use in urban settings, this paper seeks to contribute to the broader dialogue on sustainable urban mobility, highlighting the role of cycling in achieving environmental sustainability goals and enhancing the quality of urban life. Through this investigation, we aim to provide insights that can inform policy decisions and urban planning strategies, fostering environments that support and encourage cycling as an integral component of sustainable urban development.

LITERATURE REVIEW

Benefit of Cycling

Cycling offers a multitude of benefits that make it an attractive mode of transportation in urban settings. One of the primary benefits is its positive impact on public health. Regular cycling is associated with improved cardiovascular health, reduced risk of chronic diseases, and enhanced mental well-being (Oja et

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al., 2011). A study by Andersen et al. (2000) highlighted that people who cycle to work experienced a 39% lower risk of mortality compared to those who did not engage in physical activity. Additionally, cycling helps in managing weight and reducing the incidence of obesity, which is a growing concern in many urban areas (Gordon-Larsen et al., 2009).

Environmentally, cycling is a zero-emission mode of transport that significantly reduces urban air pollution and greenhouse gas emissions. Gössling and Choi (2015) highlighted that the widespread adoption of cycling in urban areas can lead to substantial reductions in CO_2 emissions, contributing to climate change mitigation efforts. Moreover, by decreasing the reliance on motor vehicles, cycling helps to alleviate traffic congestion, thereby improving air quality and reducing noise pollution in cities (Pucher et al., 2010).

Economically, cycling is a cost-effective mode of transportation. It reduces transportation costs for individuals by eliminating the need for fuel, parking fees, and vehicle maintenance expenses (Litman, 2013). On a broader scale, cities with high cycling rates can save on healthcare costs due to the improved health of their populations and reduced road infrastructure maintenance expenses (de Hartog et al., 2010). For instance, a study conducted in Copenhagen estimated that for every kilometer cycled, society enjoys a net benefit of 0.16 EUR, largely due to health benefits and reduced pollution costs (Gössling & Choi, 2015). Furthermore, cycling promotes social inclusivity and community interaction. It is accessible to a wide range of socio-economic groups, including those who may not afford a car or other forms of motorized transport (Aldred, 2012). Cycling infrastructure, such as bike lanes and parking facilities, can transform urban spaces into more livable and community-friendly environments, encouraging social cohesion (Pucher et al., 2010).

In summary, the benefits of cycling are extensive and multifaceted. It enhances public health, reduces environmental impact, offers economic advantages, and fosters social inclusivity. These benefits underscore the importance of promoting cycling as a key component of sustainable urban mobility strategies. Therefore, by understanding and leveraging these benefits, urban planners and policymakers can develop more effective interventions to encourage cycling in cities.

Motivations for Bicycle Use

The motivations for choosing cycling in urban settings are diverse, encompassing health, environmental, economic, and social factors. Health benefits are significant, as cycling improves cardiovascular fitness, reduces chronic disease risk, and enhances overall well-being (Oja et al., 2011). Studies suggested that regular cyclists have lower obesity rates and better mental health outcomes (Gordon-Larsen et al., 2009). Environmental awareness also motivates cycling. As concerns about climate change and air quality grow, many choose cycling to reduce their

carbon footprint and promote sustainability (Gössling & Choi, 2015). Economically, cycling is cost-effective, eliminating fuel, parking, and maintenance expenses. It is accessible to lower-income groups and helps cities save on healthcare and infrastructure costs (Litman, 2013; de Hartog et al., 2010). Social factors also influence cycling. It promotes community interaction and is perceived as a modern, efficient mode of transport. Social norms and supportive environments increase cycling adoption (Aldred, 2016). Personal enjoyment and satisfaction from cycling also play a crucial role (Heinen et al., 2010).

In summary, health benefits, environmental consciousness, economic savings, and social influences are key motivations for urban cycling. Understanding these motivations is essential for developing policies and infrastructure that promote cycling as a sustainable urban transport mode.

Policy and Planning

In Malaysia, policy and planning for cycling infrastructure have been gaining momentum, particularly in urban areas such as Kuala Lumpur and Penang. The Malaysian government has initiated several projects aimed at promoting cycling, including the development of dedicated bike lanes, bike-sharing programs, and the integration of cycling paths with public transportation networks. For example, the Penang Bicycle Lane Master Plan (Government of Penang, 2021) aims to create a comprehensive network of bike lanes throughout the island, encouraging both locals and tourists to adopt cycling as a mode of transportation. Additionally, initiatives like the (Kuala Lumpur City Hall, 2021) Kuala Lumpur Car-Free Morning event promote cycling by closing certain roads to motor vehicles, thereby encouraging residents to cycle in a safer environment.

Internationally, cities like Copenhagen, Amsterdam, and Portland have set exemplary standards for cycling policy and infrastructure. Copenhagen's commitment to becoming carbon-neutral by 2025 includes extensive investments in cycling infrastructure, resulting in over 60% of its residents commuting by bike daily. Meanwhile, Amsterdam, known for its robust cycling culture, has implemented policies that prioritize cyclists, including widespread bike lanes, traffic lights synchronized for cyclists, and ample bike parking facilities. At the same time, in Portland, the city's Bicycle Plan for 2030 outlines ambitious goals to make cycling a cornerstone of its transportation system. This includes the creation of extensive bikeway networks and supportive policies such as bicycle- friendly zoning regulations and financial incentives for cycling commuters.

Both Malaysia and these international examples highlight the significance of comprehensive urban planning and policy support in promoting cycling. While Malaysia is in the early stages of developing its cycling infrastructure, lessons can be drawn from cities that have successfully integrated cycling into their transportation systems. Key strategies include the development of extensive and connected bike lanes, integration with public transport, public

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awareness campaigns, and safety measures. By adopting these practices, Malaysia can enhance its efforts to promote cycling and achieve sustainable urban mobility.

Case Studies and Comparative Analyses

This research examines case studies from cities both within and outside Malaysia to draw comparative insights into effective cycling promotion strategies. In Malaysia, Penang serves as a notable example with its Bicycle Lane Master Plan, aiming to establish a comprehensive network of bike lanes across the island. The initiative has demonstrated promising results, with increased cycling rates among both locals and tourists. Kuala Lumpur's Car-Free Morning events also highlight the potential of temporary traffic interventions to boost cycling in urban environments by providing safe, car-free zones for cyclists.

Internationally, Copenhagen stands out with its extensive cycling infrastructure and ambitious goals to become carbon-neutral by 2025. Over 60% of Copenhagen's residents commute by bike daily, supported by a network of over 400 kilometers of dedicated bike lanes, traffic signals for cyclists, and cycling superhighways that connect suburban areas to the city center. Similarly, Amsterdam's robust cycling culture is facilitated by policies that prioritize cyclists, such as extensive bike lanes, bike-friendly traffic laws, and ample bike parking facilities, resulting in nearly 50% of all city trips being made by bicycle. Comparing these cases, several key strategies emerge. Both Penang and international cities like Copenhagen and Amsterdam emphasize the importance of comprehensive and connected bike lane networks. Safety measures, such as well-lit paths and traffic calming, are crucial in making cycling a viable and attractive option. Integration with public transportation, as observed in Amsterdam, enhances the convenience and practicality of cycling. Public awareness campaigns and community events, like Kuala Lumpur's Car-Free Mornings, play a significant role in changing public attitudes towards cycling.

These case studies underscore the critical role of infrastructure, policy support, and cultural acceptance in promoting cycling. Notably, Malaysia can draw valuable lessons from international examples to further develop its cycling initiatives, focusing on creating safe, accessible, and integrated cycling environments that encourage sustainable urban mobility.

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Table 1: Comparison of Cycling Initiatives in Various Cities

City	Daily Cycling Rate (%)	Bike Lane Network (km)	Key Initiatives
Penang	15	120	Bicycle Lane Master Plan
Kuala Lumpur	5	50	Car-Free Morning events
Copenhagen	60	400	Carbon-neutral goal, cycling superhighways
Amsterdam	50	500	Extensive bike lanes, bike-friendly traffic laws
Portland	25	300	Bicycle Plan for 2030, bike-friendly zoning

Source: (*Global Bicycle Cities Index*, 2023)

Conclusion of Literature Review

The research on "Cycling Towards Sustainability: Motivations for Bicycle Use in Urban Settings" provides a comprehensive examination of various factors that encourage urban cycling, integrating health, environmental, economic, and social dimensions. A significant strength of this study is its mixed-methods approach, which combines extensive literature reviews with primary data from semi-structured interviews, offering a balanced understanding of cycling motivations. The findings align with existing research, such as Oja et al. (2011) and Gordon-Larsen et al. (2009), confirming the health benefits of cycling and the role of environmental awareness in promoting sustainable transportation (Gössling & Choi, 2015). However, the study also highlights critical gaps that require further exploration.

Despite the emphasis on the importance of urban infrastructure, as supported by Pucher and Buehler (2012), this research suggests that more studies are needed to understand the long-term impacts of infrastructural investments on urban mobility patterns. Additionally, while valuable comparisons are made with international examples like Copenhagen and Amsterdam, there is a lack of data from low- and middle-income countries, limiting the generalizability of the findings. The research also calls for more interdisciplinary studies, integrating urban planning, public health, and social psychology to develop holistic approaches to cycling promotion.

RESEARCH METHODOLOGY

This study employed a mixed-methods approach to explore the motivations behind bicycle use in urban environments. This approach allowed for a detailed examination of both quantitative and qualitative aspects of cycling motivations,

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offering a more nuanced understanding of the factors that encourage urban residents to cycle.

Research Design

This study employs a mixed-methods approach, combining quantitative surveys with qualitative semi-structured interviews. This design allows for a comprehensive understanding of the motivations and barriers to cycling in urban settings, particularly in Jitra, Kedah. The mixed-methods approach enables the integration of numerical data and personal narratives to provide a holistic view of cycling behaviors and perceptions.

Population and Sample

The target population for this study comprises urban cyclists in Jitra, Kedah. The sample size of 200 respondents was determined to be sufficient for achieving a representative sample of the urban cycling population in this area. This decision is supported by previous studies, which have considered a sample size of 200 adequate for detecting significant effects and providing reliable insights (Heinen et al., 2010; Fishman et al., 2013; Pucher & Buehler, 2012).

A stratified random sampling method was employed to ensure diversity within the sample, reflecting the broader population demographics. The population was stratified based on key demographic variables such as age, gender, and occupation. This approach ensures that various subgroups within the population are adequately represented, enhancing the generalizability of the findings.

Statistical power analysis indicated that a sample size of 200 would provide adequate power to detect significant effects with a margin of error of ±5% at a 95% confidence level. Additionally, comparisons with similar studies in the field support the adequacy of this sample size for generalizing findings to the urban population. Previous research by Heinen et al. (2010), Fishman et al.
(2013), and Pucher and Buehler (2012) demonstrated that a sample size of 200 is sufficient for reliable and valid results in urban cycling studies.

Research Instruments

The research instruments used in this study consist of structured questionnaires and semi-structured interview guides. The structured questionnaire was developed to collect quantitative data and includes several sections: demographic information (age, gender, occupation, and income level), cycling behavior including the frequency of cycling (daily, weekly, monthly), primary purposes for cycling (commuting, errands, recreation), the average distance traveled per trip, and duration of typical cycling trips. Additionally, the questionnaire covers motivations for cycling, such as health benefits, environmental concerns, economic savings, and social and lifestyle factors. It also assesses cycling infrastructure and safety by

asking about the availability and quality of bike lanes, perceived safety of cycling routes, access to bike-sharing programs, and common issues faced while cycling.

The semi-structured interview guide was used to conduct in-depth interviews with a subset of survey respondents. The guide covered areas such as personal cycling experiences, including daily routines and specific incidents. This comprises perceptions and attitudes towards cycling as a mode of transportation, views on current cycling infrastructure and suggestions for improvement, barriers to cycling such as unsafe road conditions and lack of bike lanes, motivations and benefits derived from cycling, and policy and infrastructure suggestions to promote cycling. The combination of these two instruments enables comprehensive and in-depth data collection, providing a holistic understanding of cycling behaviors and perceptions in Jitra, Kedah.

Data Collection Procedures

Data collection was conducted over a period of two months. The surveys were distributed both online and in person. Online surveys were disseminated through social media platforms, community forums, and email lists targeting residents of Jitra. In-person surveys were conducted at key locations frequented by cyclists, such as parks, community centers, and bicycle shops. Informed consent was obtained from all respondents prior to their participation. Participants were informed about the purpose of the study, the voluntary nature of their participation, and the confidentiality of their responses.

Semi-structured interviews were conducted with a subset of survey respondents who volunteered for the follow-up interviews. These interviews were conducted either face-to-face or via telephone, depending on the respondents' preferences and availability. Each interview lasted approximately 30 to 45 minutes.

Quantitative Analysis

Statistical analysis was performed using SPSS software. Descriptive statistics (e.g., mean, median, mode, standard deviation) were used to summarize demographic information and cycling behaviors. Inferential statistics, such as t- tests and regression analysis, were employed to identify significant relationships between variables. For example, the relationship between the frequency of cycling and the perceived safety of cycling routes was examined.

Qualitative Analysis

Interview transcripts were analyzed using thematic analysis, with the data being coded and organized into themes using NVivo software. The coding process involved several steps. First, in the open coding phase, initial codes were assigned to segments of the text that appeared significant or interesting. Next, during axial coding, these initial codes were grouped into broader categories or themes. Finally, in the selective coding phase, core themes that encapsulated the main ideas and

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patterns in the data were identified. This systematic approach ensured that the qualitative data were thoroughly examined and that the key insights were effectively captured.

Integration of Quantitative and Qualitative Data

To provide deeper insights and connect the quantitative and qualitative data, this study employed a process of triangulation and mixed-methods integration. Quantitative data from the surveys were cross-verified with qualitative data from the interviews to ensure reliability and validity. For example, survey data on cycling frequency and motivations were compared with interview narratives to validate and enrich the findings. Key themes identified from the qualitative analysis were used to contextualize and explain quantitative findings. This includes providing detailed descriptions of specific safety issues faced by cyclists when quantitative data indicates significant safety concerns. Additionally, points of convergence, where quantitative and qualitative data align, and divergence, where they differ, were identified to provide a comprehensive understanding of the research problem. Accordingly, this enables the development of targeted interventions to promote cycling as a sustainable mode of urban transportation in Jitra, Kedah.

ANALYSIS AND DISCUSSION

The analysis of this study revealed several key insights into the cycling behavior, motivations, and challenges faced by urban cyclists in Jitra, Kedah. Quantitative data indicated that health benefits are the primary motivator for cycling, followed by environmental concerns and economic savings. However, significant safety concerns due to inadequate infrastructure were also highlighted. The qualitative data provided a deeper context, with personal narratives emphasizing the need for better cycling paths and road safety measures.

Table 2: Motivation for Cycling

Motivation	Percentage of Respondents
Health Benefits	70%
Environmental Concerns	50%
Economic Savings	45%
Social and Lifestyle	30%

Table 2 highlights the primary motivations for cycling among respondents in Jitra, Kedah. Health benefits are the leading motivator, with 70% of respondents cycling to improve their physical health. Environmental concerns motivate 50% of respondents, reflecting a commitment to reducing carbon footprints. Economic savings, cited by 45%, underscore cycling's cost-effectiveness compared to other transportation modes. Additionally, 30% are driven by social and lifestyle factors, enjoying the social interactions and modern,

efficient nature of cycling. These insights suggest that promoting cycling through improved infrastructure and public awareness can enhance urban health and sustainability.

In summary, the motivations for cycling in Jitra, Kedah are multifaceted, encompassing health, environmental, economic, and social dimensions. Understanding these motivations is crucial for developing targeted interventions that can effectively promote cycling. Notably, policy measures such as creating more dedicated cycling lanes, improving road safety, and conducting public awareness campaigns can address the barriers and enhance the appeal of cycling. Thus, by fostering a supportive environment for cyclists, urban planners and policymakers can contribute to the broader goals of public health and environmental sustainability.

Table 3: Cycling Behavior

Cycling Behavior	**Percentage of Respondents**
Daily	50%
3-5 times a week	30%
1-2 times a week	20%
< 5 km per trip	30%
5-10 km per trip	50%
> 10 km per trip	20%
< 15 minutes per trip	35%
15-30 minutes per trip	40%
> 30 minutes per trip	25%

Table 3 provides insights into the cycling behavior of respondents in Jitra, Kedah. The data indicates that 50% of respondents cycle daily, indicating a high level of regular engagement in cycling activities. This suggests that for many, cycling is an integral part of their daily routine, likely for commuting to work, school, or other daily activities. Additionally, 30% of respondents cycle three to five times a week, while 20% cycle once to twice a week. This frequency distribution highlights that a significant proportion of the population uses cycling regularly, although not daily. These respondents might use cycling as a supplementary mode of transport or for specific activities such as errands or recreational purposes. The table also indicates that 30% of respondents typically cycle less than 5 kilometers per trip. This short distance suggests that cycling is primarily used for local travel within the urban area, making it a convenient and efficient mode of transportation for short commutes.

In summary, the cycling behavior in Jitra, Kedah, suggests a strong inclination towards regular cycling, with a substantial portion of the population engaging in daily or frequent cycling. This behavior underscores the potential of cycling as a sustainable and practical urban transport solution. To further support and encourage this behavior, urban planners and policymakers should focus on

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enhancing cycling infrastructure, ensuring safety, and promoting cycling as a viable alternative to other forms of transportation.

Table 4: Perceived Safety of Cycling Routes

Perceived Safety	Percentage of Respondents
Very Safe	25%
Somewhat Safe	35%
Unsafe	40%

Table 4 illustrates that 25% of respondents feel cycling routes in Jitra are very safe, 35% consider them somewhat safe, and 40% perceive them as unsafe. This highlights significant safety concerns, with nearly three-quarters of respondents finding the routes less than very safe. The data underscores the urgent need for improvements in cycling infrastructure to enhance safety and encourage more people to cycle. Addressing these safety issues is crucial for promoting cycling as a sustainable transportation option in Jitra.

Qualitative Insights

The thematic analysis of the interview transcripts highlighted several themes related to motivations for cycling, which enriched the understanding gained from the survey data. Key themes included:

- **Personal Health and Well-being:** Many participants described cycling as a key component of their fitness routine and valued the physical and mental health benefits it provided (Ma et al., 2021). Some mentioned the sense of freedom and relaxation experienced while cycling, which contributed to their well-being.
- **Environmental Responsibility:** A strong sense of personal responsibility towards reducing carbon footprints was evident (Schübel, 2023). Participants often discussed their choice to cycle as part of a broader lifestyle commitment to environmental sustainability.
- **Economic Considerations:** The cost-effectiveness of cycling, especially in terms of saving money on public transport or fuel for cars, was frequently mentioned (Yu et al., 2018). For some, this was particularly crucial given the economic uncertainties.
- **Urban Cycling Infrastructure:** The availability and quality of cycling infrastructure, such as bike lanes and parking, were cited as crucial factors influencing the decision to cycle (Adsule & Kadali, 2024). Participants also expressed a desire for further improvements in infrastructure to enhance safety and convenience.
- **Community and Social Interaction:** Several cyclists spoke of the community aspect of cycling, including participation in cycling groups and the social interactions that arose from cycling in urban spaces (Ravensbergen et al., 2024).

The analysis of cycling behavior, motivations, and perceived safety in Jitra, Kedah, reveals important insights. Health benefits, environmental concerns, and economic savings are the primary motivators for cycling, underscoring the multifaceted appeal of cycling as a mode of transportation. Despite these strong motivators, significant barriers such as safety concerns and inadequate infrastructure hinder the wider adoption of cycling. The data indicates that a considerable proportion of respondents perceive cycling routes as unsafe, highlighting the need for substantial improvements in cycling infrastructure.

To promote cycling as a viable and sustainable urban transportation option, it is essential for urban planners and policymakers to address these safety concerns. In addition, enhancing the availability and quality of bike lanes, implementing better road maintenance, and conducting public awareness campaigns can create a more supportive environment for cyclists. Thus, by focusing on these areas, Jitra can foster a safer and more attractive cycling culture, contributing to broader public health and environmental sustainability goals.

CONCLUSION

The research conducted in Jitra, Kedah, reveals critical insights into the motivations and barriers faced by urban cyclists. Health benefits, environmental sustainability, and economic savings emerge as the primary drivers for individuals choosing to cycle. Studies such as those by Oja et al. (2011) and Gordon-Larsen et al. (2009) supported these findings, highlighting the significant health benefits of cycling. Additionally, research by Gössling and Choi (2015) emphasized environmental awareness among urban cyclists. Despite these positive motivations, the study highlights significant safety concerns, with 40% of respondents rating cycling routes as unsafe. This underscores the urgent need for enhanced cycling infrastructure to support and encourage cycling (Pucher & Buehler, 2012).

To effectively promote cycling as a viable and sustainable mode of urban transportation, it is essential for policymakers and urban planners to address these safety issues. Key recommendations include the development of dedicated bike lanes, better road maintenance, and comprehensive public awareness campaigns aimed at promoting cycling safety. By implementing these improvements, Jitra can foster a safer and more attractive cycling environment, ultimately contributing to improved public health, reduced environmental impact, and a more vibrant urban community.

This study highlights the multifaceted benefits of cycling and the critical steps needed to overcome existing barriers. By prioritizing the enhancement of cycling infrastructure, Jitra can set a precedent for other urban areas, demonstrating the significant impact of supportive policies and infrastructure on promoting sustainable urban mobility (Fishman et al., 2013; Heinen et al., 2010). However, the research also identified barriers to cycling, including safety concerns, adverse

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weather conditions, and social stigma. This highlights areas where urban planning and community initiatives can further improve to make cycling a more attractive and viable option for a broader segment of the population.

In conclusion, this study contributes valuable insights into the motivations for bicycle use in urban settings, offering evidence-based recommendations for urban planners, policymakers, and community organizations aimed at promoting cycling as a cornerstone of sustainable urban mobility. By addressing both the incentives and obstacles associated with cycling, cities can harness their full potential as a mode of transportation that benefits not only individual health and well-being but also the environmental sustainability and social vitality of urban communities.

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REFERENCES

Adsule, P., & Kadali, B. R. (2024). Analysis of contributing factors in decision to bicycle in developing countries context. *Transport Policy*, *147*, 50–58. https://doi.org/10.1016/j.tranpol.2023.12.015.

Aldred, R. (2012). *Incompetent or too competent? Negotiating everyday cycling identities in a motor dominated society. Mobilities, 7(2), 149-164.*

Andersen, L. B., Schnohr, P., Schroll, M., & Hein, H. O. (2000). *All- cause mortality associated with physical activity during leisure time, work, sports, and cycling to work. Archives of Internal Medicine, 160(11), 1621-1628.*

Biassoni, F., Lo Carmine, C., Perego, P., & Gnerre, M. (2023). Choosing the Bicycle as a Mode of Transportation, the Influence of Infrastructure Perception, Travel Satisfaction and Pro- Environmental Attitude, the Case of Milan. *Sustainability*, *15*(16), 12117. https://doi.org/10.3390/su151612117

Brogan, U. (2022). Liberation on Two Wheels: Class, Gender and the Bicycle in Literature. In *The Alternative Modernity of the Bicycle in British and French Literature, 1880-1920* (pp. 69–139). Edinburgh University Press. https://doi.org/10.3366/edinburgh/9781474488600.003.0003

Buehler, R., & Goel, R. (2022). *A global overview of cycling trends* (pp. 137–158). https://doi.org/10.1016/bs.atpp.2022.04.007

de Hartog, J. J., Boogaard, H., Nijland, H., & Hoek, G. (2010). *Do the health benefits of cycling outweigh the risks? Environmental Health Perspectives, 118(8), 1109-1116.*

Félix, R., Moura, F., & Clifton, K. J. (2019). Maturing urban cycling: Comparing barriers and motivators to bicycle of cyclists and non- cyclists in Lisbon, Portugal. *Journal of Transport & Health*, *15*, 100628. https://doi.org/10.1016/j.jth.2019.100628

Fishman, E., Washington, S., & Haworth, N. (2013). Bike Share: A Synthesis of the Literature. *Transport Reviews*, *33*(2), 148–165. https://doi.org/10.1080/01441647.2013.775612

Global Bicycle Cities Index. (2023).

Gordon-Larsen, P., Boone-Heinonen, J., Sidney, S., Sternfeld, B., Jacobs Jr, D. R., & Lewis, C. E. (2009). *Active commuting and cardiovascular disease risk: the CARDIA study. Archives of Internal Medicine, 169(13), 1216-1223.*

Gössling, S., & Choi, A. (2015). *Transport transitions in Copenhagen: Comparing the cost of cars and bicycles. Ecological Economics, 113, 106-113.*

Government of Penang. (2021). *Penang Bicycle Route Master Plan*. Heinen, E., van Wee, B., & Maat, K. (2010). Commuting by Bicycle: An Overview of the Literature. *Transport Reviews*, *30*(1), 59–96. https://doi.org/10.1080/01441640903187001

Kuala Lumpur City Hall. (2021). *KL Car Free Morning Program*.

Litman, T. (2013). *Evaluating non-motorized transportation benefits and costs. Victoria Transport Policy Institute.*

Ma, L., Ye, R., & Wang, H. (2021). Exploring the causal effects of bicycling for transportation on mental health. *Transportation Research Part D: Transport and Environment*, *93*,102773. https://doi.org/10.1016/j.trd.2021.102773

NYC DOT. (2014). *Protected bicycle lanes in NYC. New York City Department of Transportation.*

Oja, P., Titze, S., Bauman, A., de Geus, B., Krenn, P., Reger-Nash, B., & Kohlberger, T. (2011). Health benefits of cycling: a systematic review. *Scandinavian Journal of Medicine & Science in Sports*, *21*(4), 496–509. https://doi.org/10.1111/j.1600-0838.2011.01299.x

Pucher, J., Dill, J., & Handy, S. (2010). *Infrastructure, programs, and policies to increase bicycling: An international review. Preventive Medicine, 50, S106-S125.*

Ravensbergen, L., Ilunga-Kapinga, J., Ismail, S., Patel, A., Khachatryan, A., & Wong, K. (2024). Cycling as social practice: a collective autoethnography on power and vélomobility in the city. *Mobilities*, *19*(2), 329–343. https://doi.org/10.1080/17450101.2023.2211238

Schübel, H. (2023). Individuals' responsibilities to remove carbon. *Critical Review of International Social and Political Philosophy*, 1–21. https://doi.org/10.1080/13698230.2023.2260241

Shaheen, S. A., Guzman, S., & Zhang, H. (2010). *Bikesharing in Europe, the Americas, and Asia: past, present, and future. Transportation Research Record, 2143(1), 159-167.*

Teschke, K., Harris, M. A., & Reynolds, C. (2012). *Route infrastructure and the risk of injuries to bicyclists: A case-crossover study.*

American Journal of Public Health, 102(12), 2336-2343.

Yu, W., Chen, C., Jiao, B., Zafari, Z., & Muennig, P. (2018). The Cost- Effectiveness of Bike Share Expansion to Low-Income Communities in New York City. *Journal of Urban Health*, *95*(6), 888–898. https://doi.org/10.1007/s11524-018-0323-x

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THE RELATIONSHIP BETWEEN URBAN PARK LANDSCAPE PERCEPTION AND PLACE ATTACHMENT IN PARK CITY, CHINA

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Abstract

Based on the Park City concept proposed by the Chinese government in response to rapid urbanization, urban parks should be constructed to be open and shared to enhance place attachment. Research indicates that visitors' perceptions of urban green space benefit their management and people's quality of life. However, how the landscape perception of urban parks is associated with residents' place attachment is poorly understood. This study aimed to gain more empirical insights into the associations between the perceived quality of urban parks and the two components of public place attachment (i.e., place dependence and place identity) in Park City, China. An online survey collected 237 questionnaires from Huancheng Park visitors in Chengdu City (the pilot city of the Park City concept). The questionnaire included three parts: demographic characteristics, landscape perception (i.e., *nature*, *serene*, *space*, *refuge*, *culture*, *prospect*, and *social*), and a place attachment scale. Factor analysis and regression analyses were subsequently conducted. The results indicated that (1) landscape perception is more able to affect place identity than place dependence, (2) the dimensions of landscape perception (excluding *space* and *social*) had a significant positive effect on place attachment and place identity, and (3) the dimensions of landscape perception (except *serene*) had a significant positive effect on place dependence. Therefore, during construction, *nature*, *culture*, *prospect*, and *space* dimensions of urban park landscape perception should receive more attention to enhance the public sense of identity and belonging and promote Park City's sustainable development.

Keywords: Landscape perception, Place attachment, Urban Park, Park City, China

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INTRODUCTION

Urbanization has led to the uniformity of urban construction and the serious homogenization of urban public space landscapes, reducing people's feelings about the place. The loss of this sense of place not only affects people's emotional perception of urban space, but also reflects the limitations of modern urban space design in responding to human needs. Traditional function-oriented spatial layouts are no longer sufficient to meet the public's expectations for a high-quality living environment (Elif et al., 2023). Urban spaces urgently need to transition from being merely "functional" toward being "experiential" and "affective."

In this context, place attachment (PA) has attracted increasing attention from scholars and urban policymakers as an important psychological concept describing the emotional and functional connections between individuals and specific locations (Patwardhan et al., 2020). Previous studies have shown that strong PA not only enhances individuals' willingness to use and protect public spaces but also contributes to equitable urban planning, improved well-being, and enhanced social cohesion (Albers et al., 2021). Understanding the formation and influencing factors of PA is therefore essential for creating inclusive, resilient, and people-oriented urban spaces.

In recent years, increasing attention has been paid to the role of environmental perception in shaping place attachment. Urban parks, as a key type of green space, serve multiple functions: they support ecological health, offer spaces for daily recreation and social interaction, and contribute to residents' physical and mental well-being (Zhu et al., 2022). Moreover, parks often reflect local culture and memory, shaping urban identity and enhancing users' emotional connection to place. Their landscape features and perception significantly influence how people interact with and evaluate park environments (Amira et al., 2019). Therefore, understanding the impact of park landscape perception on sense of place provides important insight into human–environment interaction in urban settings.

Presently, numerous cities in China are renewed and revitalized while urban development is gradually shifting from 'incremental expansion' to 'stock optimization'. High-quality development is reflected in improving the living environment and the satisfaction of residents' expectations for a better life. Moreover, the "Park City" concept was first proposed in Chengdu in February 2018, marking a shift in urban planning towards ecological civilization, liveability, and green infrastructure-led development (Zhang et al., 2023). As a result, urban parks in Park City should pay more attention to the public perception of urban park landscapes. By studying the landscape perception that influences PA, urban planners and policymakers can create more inclusive, engaging, and sustainable urban park environments and promote Park City's sustainable development.

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This study aimed to investigate the effect of urban park landscape perception on PA in Park City, China. The following research questions were sought to be addressed in this paper: (i) What are the visitors' landscape perceptions of urban parks in Park City? (ii) What are the visitors' PAs to urban parks in Park City? (iii) What are the relationships between visitors' urban park landscape perceptions and PA in Park City?

LITERATURE REVIEW

Landscape Perception

Landscape perception of urban parks is essential for enhancing the quality of life in urban areas. Recently, Amira et al. (2019) highlighted the importance of urban park effectiveness through visitors' perceptions, emphasizing criteria contributing to positive park experiences. Moreover, the perceived sensory dimensions (PSDs) put forward by Grahn and Stigsdotter (2010) are the most widely used and typical tools to evaluate the quality and characteristics of landscapes (Xie et al., 2023). The eight dimensions included in the PSDs are *nature*, *serene*, *space*, *rich in species*, *social*, *prospect*, *culture*, and *refuge*. Researchers examined the relationship between these eight landscape features and people's restorativeness, emotion, and experience in parks. For example, Xie et al. (2023) discovered that perceived park characteristics quality had a significantly positive effect on satisfaction. Qi et al. (2021) found that the eight PSDs of artificial lake space, except for *social*, were positively correlated with overall satisfaction and restorativeness, and *serene* was the most significant characteristic. Conversely, Chen et al. (2019) discovered that *rich in species* and *culture* were the least common, while *social* was the most common dimension of perception. Because the importance of landscape perception dimensions cannot be precisely ranked, empirical research is required. Most significantly, limited research is available on the relationship between PSDs and PA in urban parks in Park City.

Place Attachment (PA)

PA is a multidimensional concept that has been extensively studied across various disciplines. It involves emotional bonds and connections individuals form with specific places (Patwardhan et al., 2020). Place identity (PI) and place dependence (PD) are two dimensions of PA. The PI concept is considered the cognitive facet of the person–place relationship, contributing to personal and social identity to define the individual's identity (Albers et al., 2021). On the other hand, PD refers to the functionality of a resource in one place that cannot be transferred to other places and cannot be compared with other places regarding the functions of the place (Patwardhan et al., 2020). While additional PA dimensions, including familiarity and social bonding, have been studied recently,

PI and PD remain the fundamental PA dimensions in research, with crucial roles in shaping individuals' relationships with places (Plunkett et al., 2019).

The literature on PA has highlighted its importance in explaining tourists' emotions and behaviour, particularly in tourism, urban planning, psychology, and environmental management (Kuo et al., 2021). Moreover, PA is not static but dynamic and is influenced by various factors, including social interactions, personal experiences, and psychological evaluations (Beccaria et al., 2021). Overall, research on PA helps clarify the relationship and interaction mechanism between people and their environment.

Park City

Park City is a city in a park whose concept is based on Howard's Garden City, Singapore's Garden City, Qian Xuesen's Shan-Shui City, and London's National Park City (Zhang et al., 2023). With the humanistic characteristics of people-oriented cities, Park City represents a new phase in urban development and a theoretical innovation based on domestic and foreign urban development models. Although Park City differs from the combination of 'Park' and 'City', urban parks are vital in developing and constructing park cities as green ecological products shared by all people (Zhang & Xu, 2023).

Although extensive research has been conducted on Park Cities in China since 2018, international research on Park Cities is limited. The literature on this topic includes park visitation or use, park behaviour or preference (Swapan et al., 2022), accessibility (Tan et al., 2022), environmental effect (Feng et al., 2023), landscape perception (Zhang et al., 2022; Zhu et al., 2022), equity-efficiency (Zhang & Xu, 2023), and audio-visual integration (Yang et al., 2023). Moreover, studies related to landscape perception have indicated that *serene* and *refuge* in the PSDs considerably affect the restorative components of attention (Zhu et al., 2022). In terms of different values, different landscapes attract different groups (Zhang et al., 2022). However, a small body of literature is available on urban park landscape perception and PA in Chengdu Park City.

RESEARCH METHODOLOGY

Study Area

This study was conducted in Chengdu Huancheng Park, which is located within 500 metres on each side of Chengdu's first metropolitan beltway and on seven surrounding wedge-shaped plots of land, spanning 12 districts and encompassing 133 square kilometres of ecological land (Figure 1). Huancheng Park, comprising lines and beads in a chain, is a unique carrier of Park City in China.

Since the completion of the greenway system of Huancheng Park in 2022, many Chengdu citizens have actively engaged in leisure activities. With convenient transportation and tourism, the park caters to local citizens and

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undertakes activities for people from the surrounding areas of Chengdu and foreign tourists.

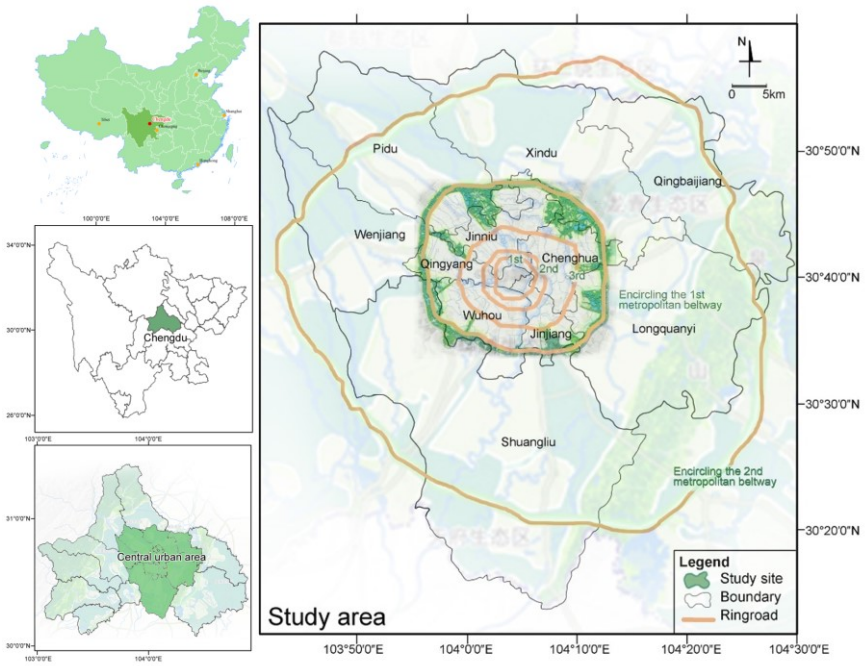


Figure 1: Location of the Study Area
Source: Chengdu institute of planning & design (2019)

Questionnaire and Data Collection

The questionnaire included three sections: sociodemographic variables, a landscape perception scale, and a PA scale. The respondents were adults with a self-reported age of 18 years or older who have visited Huancheng Park. First, respondents were asked if they had ever been to Chengdu Huancheng Ecological Park. If they responded 'No', no further responses were needed, and they were excluded from the analysis. Respondents could enter the data collection part of the questionnaire after ensuring they had visited the case sites.

The social demographic statistics table in the first part included the following seven aspects: gender, age, educational background, occupation, arrival time, transportation, and place of origin.

The second part was designed to collect the respondents' perceptions of Huancheng Park using seven PSDs: *nature*, *serene*, *space*, *refuge*, *culture*, *prospect*, and *social* (modified from the eight PSD scale of Grahn and Stigsdotter, 2010) (refer to Table 2). A five-point Likert scale (i.e., 1 = strongly disagree, 2 = disagree, 3 = neither, 4 = agree, and 5 = strongly agree) was used to measure 30

items. The respondents were asked to rate their agreement score for each sentence on the scale. The reliability was good (i.e., Cronbach's alpha: *nature*, 0.883; *serene*, 0.828; *space*, 0.832; *refuge*, 0.847; *culture*, 0.817; *prospect*, 0.815; and *social*, 0.906).

The third section included the 8-item PA scale [including PI (4 items) and PD (4 items)] (refer to Table 3), which was examined as per Jorgensen & Stedman (2001) with a five-point Likert scale and proved to have good validity (i.e., Cronbach's alpha: PI, 0.825; PD, 0.833).

This study used the 'Wen Juan Xing' app with participants' agreement to complete a questionnaire survey. The questionnaires were distributed from February 20 to March 15, 2024, and 250 questionnaires were collected. Except for 13 invalid questionnaires, 237 valid questionnaires were obtained; the recovery rate of valid questionnaires was 94.80%.

ANALYSIS AND DISCUSSION

Analysis

Data was analysed using SPSS version 27.0. The internal consistency of the different scales was calculated. Furthermore, the mean of each variable was calculated based on the different items that comprised each subscale. Additionally, the descriptive statistics [mean (M) and standard deviation (SD)] of all the variables were calculated. Correlations and regression analyses of urban park landscape perception and PA were conducted using a similar program.

Socio-demographic Statistics

Statistical analysis of the basic characteristics of the respondents was mainly described from eight aspects: gender, age, educational background, place of origin, occupation, income, means of transportation, and travel time. The valid questionnaire samples were statistically analysed, as shown in Table 3.

Regarding sex, 48.95% of respondents were men, and 51.05% were women. The largest proportion of respondents was 18–25 years old (35.44%), followed by 26–35 (17.62%), and 36–45 (17.05%). Regarding educational background, people with a degree were the most represented (48.95%), and those with college degrees or above accounted for 56.12%, indicating that the sample's overall knowledge and cultural level were relatively high. Regarding occupation, students (28.27%) and company or enterprise employees (21.94%) were the main visitors. Regarding transportation means to reach the park, public transportation (28.69%) was the most popular, followed by cycling. Green travel methods were chosen by 26.16% of the respondents. Regarding travel time, the time spent reaching the park was 15–30 minutes (41.35%), followed by fewer than 15 minutes (31.65%), indicating that most visitors can access the park conveniently within 30 minutes. Regarding the place of origin, Chengdu locals accounted for

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61.18% of respondents, which means in addition to residents, this park also attracted man tourists.

Table 1: Summary of the Sociodemographic Characteristics of the Survey Respondents.

Total		Frequency	Percentage
Gender	Male	121	51.21%
	Female	116	48.79.%
Age	17 and below	13	5.49%
	18-25 years old	84	35.44%
	26-35 years old	42	17.62%
	36-45 years old	41	17.05%
	46-60 years old	38	16.28%
	61 and above	19	8.11%
Occupation	Student	67	28.27%
	Company or corporate occupation	52	21.94%
	Private business owner	29	12.24%
	Civil servants	25	10.75%
	Teachers, doctors and other institutions	25	10.34%
	Freelance work	22	9.28%
	Retiree	2	0.84%
	Other	15	6.33%
Qualifications	Junior high school and below	19	8.02%
	High school/Secondary technical school	46	19.41%
	Diploma	39	16.46%
	Degree	116	48.95%
	Master and above	17	7.17%
Means of transportation	Public transportation (bus/subway)	68	28.69%
	Walk	67	28.27%
	Cycling (bicycle / electric car)	62	26.16%
	Private car	34	14.35%
	Other	6	2.53%
Travel time	<15 min	75	31.65%
	15-30 min	98	41.35%
	30-60 min	47	19.83%
	>1 h	17	7.17%
Place of origin	Residents	145	61.18%
	Tourists	92	38.82%

Source: Author's Calculation

Urban Park Landscape Perception

The visitors' urban park landscape perception was investigated according to seven aspects of PSDs suggested by Grahn & Stigsdotter (2010). The results indicated that the visitors had a generally positive attitude towards urban park landscape perceived quality, as represented by a mean composite score of 3.95 (SD = 0.94) and a mean range of 3.68–4.09 (refer to Figure 2). The most common positive attitudes were *space* (M = 4.05, SD = 0.86). The highest mean score items were 'The vegetation in the park is growing well with varied contours' (M = 4.09, SD = 0.85) and 'There are sunny places and shady places in the park' (M = 4.09,

SD = 0.88). The item with the lowest mean score was related to 'It is possible to watch entertainment, like a park concert' (*M* = 3.68, *SD* = 0.90).

Table 2: Descriptive Statistics of Urban Park Landscape Perception

Variable	Label	Item	Mean	SD
Nature	N1	The vegetation in the park is growing well with varied contours	4.09	0.897
	N2	The topography of the park is full of changes.	4.01	0.934
	N3	The urban park has a natural quality.	3.99	0.923
	N4	The urban park has a wild and untouched quality.	3.84	1.007
Serene	Se1	The urban park is silent and calm	3.94	0.955
	Se2	One is able to spend time here without coming into contact with too many people.	3.88	0.989
	Se3	The park is clean and well-maintained	3.99	0.866
	Se4	There is no traffic noise from the surroundings.	3.73	0.976
Space	Sp1	The park is experienced as spacious and free	4.06	0.928
	Sp2	The space for people to gather in the park is not crossed by roads and paths.	4.05	0.867
	Sp3	There are sunny places and shady places in the park.	4.09	0.779
	Sp4	The plants and terrain can be combined to create changes in the spatial pattern.	4.01	0.873
Refuge	R1	Recreation and leisure facilities can meet the needs of visitors	4.04	0.927
	R2	Corresponding places in the park are equipped with safety facilities.	3.85	0.943
	R3	It feels safe to spend time in the urban park.	4.01	0.948
Culture	C1	The overall landscape reflects the local culture or creates a historical experience.	3.73	1.078
	C2	The urban park is decorated with statues.	3.82	0.984
	C3	The urban park has different water features.	4.06	0.866
	C4	The plant landscape can reflect the local culture.	3.8	1.069
Prospect	P1	The urban park has a good view	4.03	0.913
	P2	Landscape nodes with good visual effects	3.96	0.88
	P3	The urban park has various viewing angles.	4.03	0.848
Social	So1	It is possible to watch entertainment	3.68	1.069
	So2	It is possible to watch exhibitions.	3.84	1.022
	So3	It is possible to visit a restaurant or a simpler open-air restaurant.	3.73	1.048
	So4	There are several seats and benches.	4.03	0.938
	So5	Road access in the park	4.03	0.916
	So6	There is access to restrooms.	4.07	0.929
	So7	The roads are well-lit up.	4.08	0.847
	So8	There are plenty of people and movements.	4.03	0.88

Source: Author's Calculation

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Place Attachment

The mean scores for visitors' PA after visiting the urban park were measured using the PA Scale (Liu et al., 2021), which comprised two dimensions. The results indicated that the respondents had generally a positive PA toward the urban park, as represented by a mean composite score of 3.79 (SD = 1.03) and a mean range of 3.61–3.81 (Figure 3). Moreover, the visitors reported more positive emotions about PI (M = 3.85, SD = 1.01) than PD (M = 3.72, SD = 1.05).

Table 3: Descriptive Statistics of Place Attachment

Variable	Label	Item	Mean	SD
Place Identity	PI1	Everything in this place is a reflection of me	3.89	0.957
	PI2	This place has a special meaning to me.	3.98	0.936
	PI3	I feel that I can truly be myself in this place.	3.91	0.939
	PI4	This place reflects the type of person I am	3.63	1.144
Place Dependence	PD1	I truly miss this place when l am away	3.81	0.977
	PD2	No more ideal place than this place	3.84	0.993
	PD3	This place is the best place for doing the things that I enjoy most.	3.64	1.125
	PD4	As far as I am concerned, there are better places to be than in this place.	3.61	1.086

Source: Author's Calculation

Influence of Urban Park Landscape Perception on PA

Correlation and regression analyses were conducted to identify the relationship between urban park landscape perception and PA. The results of 2-tailed Pearson correlation analyses revealed a positive correlation between PA and *nature* (r = 0.579, $p < 0.01$), *serene* (r = 0.390, $p < 0.01$), *space* (r = 0.386, $p < 0.01$), *refuge* (r = 0.595, $p < 0.01$), *culture* (r = 0.461, $p < 0.01$), *prospect* (r = 0.557, $p < 0.01$), and *social* (r = 0.448, $p < 0.01$).

Regression analyses explored the relationship between urban park landscape perception and PA components (i.e., PI and PD). Landscape perception significantly influenced PA (F = 101.981, $p < 0.001$), which explained 50.4% of the PA variance (Table 4). *Nature*, *prospect*, *refuge*, *culture*, and *serene* [except *space* ($p > 0.05$) and *social* ($p > 0.05$)] significantly impacted PA, with the degree of influence in the following order: *nature* (0.258) > *prospect* (0.235) > *refuge* (0.176) > *culture* (0.130) > *serene* (0.094). The nature dimension of landscape perception was a salient predictor of PA (β = 0.258, t = 7.470, $p < 0.01$). In contrast, *space* ($p > 0.05$) and *social* ($p > 0.05$) hardly affected PA.

Landscape perception significantly affected PI (F = 99.617, $p < 0.001$), which explained 49.8% of the PI variance (Table 5). Similarly, *nature* was a major PI predictor (β = 0.272, t = 7.821, $p < 0.01$). *Space* ($p > 0.05$) and *social* ($p > 0.05$) also had few impacts on PI. *Nature*, *prospect*, *refuge*, *culture*, and *serene* impacted PI with degrees of influence in the following order: *nature* (0.272) > *prospect* (0.209) > *refuge* (0.164) > *culture* (0.112) > *serene* (0.096).

Table 4: Results of the Regression Analyses of Landscape Perception on PA.

	B	SE B	β	t	p	VIF
(Constant)	0.250	0.153		1.636	0.102	
Nature	0.256	0.034	0.258	7.470	0.000	1.694
Serene	0.094	0.030	0.094	3.107	0.002	1.292
Space	0.051	0.034	0.048	1.499	0.134	1.459
Refuge	0.177	0.042	0.176	4.202	0.000	2.494
Culture	0.117	0.032	0.130	3.651	0.000	1.787
Prospect	0.221	0.034	0.235	6.499	0.000	1.695
Social	0.019	0.035	0.021	0.534	0.594	2.158
R^2			0.504			
F			101.981			
P			<0.001			

Source: Author's Calculation

Table 5: Regression Analysis Results of Landscape Perception on PI.

	B	SE B	β	t	p	VIF
(Constant)	0.290	0.154		1.733	0.084	
Nature	0.124	0.034	0.272	7.821	0.000	1.694
Serene	0.071	0.031	0.096	3.163	0.002	1.292
Space	0.112	0.034	0.049	1.515	0.130	1.459
Refuge	0.346	0.042	0.164	3.887	0.000	2.494
Culture	0.131	0.032	0.112	3.139	0.002	1.787
Prospect	0.194	0.034	0.209	6.020	0.000	1.695
Social	0.041	0.035	0.046	1.169	0.243	2.158
R^2			0.498			
F			99.617			
P			<0.001			

Source: Author's Calculation

Table 6: Regression Analysis Results of Landscape Perception on PD.

	B	SE B	β	t	p	VIF
(Constant)	-0.011	0.165		-0.069	0.945	
Nature	0.138	0.037	0.127	3.752	0.000	1.694
Serene	-0.046	0.033	-0.041	-1.400	0.162	1.292
Space	0.130	0.036	0.112	3.561	0.000	1.459
Refuge	0.175	0.045	0.159	3.875	0.000	2.494
Culture	0.272	0.034	0.274	7.909	0.000	1.787
Prospect	0.134	0.036	0.126	3.421	0.001	1.695
Social	0.178	0.038	0.180	4.728	0.000	2.158
R^2			0.502			
F			101.075			
P			<0.001			

Source: Author's Calculation

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Landscape perception significantly affected PD (F = 101.075, p < 0.001), which explained 50.2% of the PI variance (Table 6). Interestingly, *culture* was a salient predictor of PD (β = 0.274, t = 7.909, p < 0.01), with degrees of influence in the following order: *culture* (0.274) > *social* (0.180) > *refuge* (0.159) > *nature* (0.127) > *prospect* (0.126) > *space* (0.112). *Serene* (p > 0.05) negatively impacted PD.

DISCUSSION

This study was conducted at Chengdu Huancheng Park and investigated PD and PI from seven dimensions of landscape perception: *nature*, *serene*, *space*, *refuge*, *culture*, *prospect*, and *social*. Landscape perception affected PI more than PD among the PA dimensions. Similarly, respondents' PI (M = 3.85) was higher than their PD (M = 3.72). PI is an essential link in the connection between an individual and their environment and affects the environment in which they live. Therefore, studying landscape design and improving the public's perception of landscapes is necessary to improve PI and PD, which significantly influence affective responses and well-being (Bazrafshan et al., 2023). They are central to achieving a harmonious coexistence between man and nature and fundamentally ensuring people's well-being by protecting the ecological environment, which is a core of Park City.

Generally, visitors had positive attitudes towards urban park landscape perception as each dimension represented a mean score of around 4.0. However, not all aspects of landscape perception significantly impacted the two constructs, PI and PD. In this study, *nature*, *prospect*, *refuge*, and *culture* were found critical in forming PA, including PI and PD. *Space*, *social* and *serene* were not the most significant PA dimensions because *space* (p > 0.05) and *social* (p > 0.05) had no significant impacts on PA and PI, and *serene* (p > 0.05) scarcely impacted PD.

Nature was the most salient predictor of PA and PI, similar to a previous study (Akpınar, 2021). Thus, nature should be highlighted in urban park design and management, and natural resources should be used to create a green environment and healthy ecosystem. Moreover, in addition to increasing the local green area rate and promoting green development, natural parks can help reduce stress and provide space for physical and mental relaxation, positively impacting human mental health (Wang et al., 2020). Physical and mental happiness and health also help promote PA formation (Gillespie et al., 2022). *Prospect* and *refuge* were at the medial level. With the support of Park City's policy, more people are participating in parks. The visitors are of different ages and identities, indicating different needs. Therefore, comprehensively considering multiple aspects of *refuge* is necessary to promote the public's sense of security, comfort, and belonging in the environment and promote a better understanding of the relationship between people and places (Qi et al., 2021). *Culture* also had a significant impact on PA and the most significant dimension of PD (β = 0.274).

However, *culture* got the lowest mean score ($M = 3.85$), which means that visitors had a low level of perception of the local culture or historical experience embodied in the landscape of Huancheng Park. Therefore, this component should be considered in park design improvements. Every city has its own unique cultural and historical background. Facilities and landscapes in the park can become carriers of urban memory, such as sculptures and monuments, forming a park landscape with 'stories and connotations' that resonate with the public (Bazrafshan et al., 2023). In this study, although *space* got the highest mean score ($M = 4.05$), it had no significant impact ($p > 0.05$) on PA and PI. A high *space* score indicated that the park was experienced as spacious and free and had a certain amount of connectedness (Grahn & Stigsdotter, 2010). Additionally, one can move around in it, which does not help build emotional bonds with the place and reduces PI. Surprisingly, *social* had no significant impact on PI ($p > 0.05$); however, it was the second significant dimension for PD ($\beta = 0.180$). The results illustrated that social interaction can effectively increase visitors' PD, improving the parks' utilization rate and functional value. However, PI is usually influenced by many factors, such as personal experience and background, rather than just social perceptions (Gillespie et al., 2022). Additionally, the lowest mean score of items was related to 'It is possible to watch entertainment, like a park concert' ($M = 3.68$), though the mean score of *social* was the fourth ($M = 3.93$). Therefore, urban parks should provide opportunities to actively engage in social interactions: to talk, eat, drink, dance, shop, or play, to improve the public's PA and happiness (Stoltz & Grahn, 2021). Finally, *serene* ($p > 0.05$) scarcely impacted PD, indicating that the park is in an undisturbed, silent, and calm environment (Grahn & Stigsdotter, 2010). It is also replaceable in Chengdu based on the urban park construction since the Park City concept has been proposed.

This study faced the same constraints as other studies on landscape perception and PA. First, the sample was not typical of the urban population. It is recommended that future studies employ more representative samples and consider expanding the population to encompass a greater variety of socioenvironmental situations. Another limitation of the study is related to the perceived sensory dimensions of park visitors. Recently, several scholars have studied the visual and auditory senses separately and suggested that visual imagery may be an important indicator of park soundscapes (Yang et al., 2023). As a result, future studies could further investigate the relationships between each sensory dimension in urban parks to demonstrate a better relationship between the effects of the park environment and the sense of place. Third, this study included only the basic demographic characteristics of the participants, while PA and landscape perception were significantly associated with physical and psychological health status (Li et al., 2023).

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CONCLUSION

Based on the new Park City concept proposed by the Chinese government in response to rapid urbanization, urban parks should be constructed to be open and shared to enhance PA. Individuals' perceptions of their surroundings are crucial in shaping their attachment to a place. A survey of 247 urban park visitors revealed that the perceived quality of the landscape significantly affected PA, especially the PI aspect. Additionally, the dimensions of landscape perception (excluding *space* and *social*) had a significant positive effect on PA and PI, whereas the dimensions of landscape perception (except *serene*) had a significant positive effect on PD. Moreover, this study provides practical insights for construction and marketing strategies to enhance the public sense of identity and belonging and promote Park City's sustainable development.

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REFERENCES

Akpınar, A. (2021). How perceived sensory dimensions of urban green spaces are associated with teenagers' perceived restoration, stress, and mental health? *Landscape and Urban Planning*, *214*. https://doi.org/10.1016/j.landurbplan.2021.104185

Albers, T., Ariccio, S., Weiss, L. A., Dessi, F., & Bonaiuto, M. (2021). The role of place attachment in promoting refugees' well-being and resettlement: A literature review. In *International Journal of Environmental Research and Public Health* (Vol. 18, Issue 21). MDPI. https://doi.org/10.3390/ijerph182111021

Amira, F., Shafee, A., & Kamaruddin, S. M. (2019). The Effective Characteristics of an Urban Park Through Visitors Perception Case Study: KLCC Park. In *Built Environment Journal* (Vol. 16, Issue 2).

Bazrafshan, M., Spielhofer, R., Wissen Hayek, U., Kienast, F., & Grêt-Regamey, A. (2023). Greater place attachment to urban parks enhances relaxation: Examining affective and cognitive responses of locals and bi-cultural migrants to virtual park visits. *Landscape and Urban Planning*, *232*. https://doi.org/10.1016/j.landurbplan.2022.104650

Beccaria, L., McIlveen, P., Fein, E. C., Kelly, T., McGregor, R., & Rezwanul, R. (2021). Importance of attachment to place in growing a sustainable Australian Rural Health Workforce: A rapid review. In *Australian Journal of Rural Health* (Vol. 29, Issue 5, pp. 620–642). John Wiley and Sons Inc. https://doi.org/10.1111/ajr.12799

Chen, H., Qiu, L., & Gao, T. (2019). Application of the eight perceived sensory dimensions as a tool for urban green space assessment and planning in China.

Urban Forestry and Urban Greening, *40*, 224–235. https://doi.org/10.1016/j.ufug.2018.10.001

Elif Merve ALPAK, A., Tuğba DÜZENLİ, A., & Emine TARAKÇI EREN, A. (2023). Does "Place Identity" Support Sustainability of Community at the Urban Parks. In *Online Journal of Art and Design* (Vol. 11, Issue 1).

Feng, X., Yu, J., Xin, C., Ye, T., Wang, T., Chen, H., Zhang, X., & Zhang, L. (2023). Quantifying and Comparing the Cooling Effects of Three Different Morphologies of Urban Parks in Chengdu. *Land 2023, Vol. 12, Page 451*, *12*(2), 451. https://doi.org/10.3390/LAND12020451

Gillespie, J., Cosgrave, C., Malatzky, C., & Carden, C. (2022). Sense of place, place attachment, and belonging-in-place in empirical research: A scoping review for rural health workforce research. *Health and Place*, *74*. https://doi.org/10.1016/j.healthplace.2022.102756

Grahn, P., & Stigsdotter, U. K. (2010). The relation between perceived sensory dimensions of urban green space and stress restoration. *Landscape and Urban Planning*, *94*(3–4), 264–275. https://doi.org/10.1016/j.landurbplan.2009.10.012

Jorgensen, B. S., & Stedman, R. C. (2001). SENSE OF PLACE AS AN ATTITUDE: LAKESHORE OWNERS ATTITUDES TOWARD THEIR PROPERTIES. *Journal of Environmental Psychology*, *21*(3), 233–248. https://doi.org/10.1006/JEVP.2001.0226

Kuo, H. M., Su, J. Y., Wang, C. H., Kiatsakared, P., & Chen, K. Y. (2021). Place attachment and environmentally responsible behavior: The mediating role of destination psychological ownership. *Sustainability (Switzerland)*, *13*(12). https://doi.org/10.3390/su13126809

Li, X., Zhang, X., & Jia, T. (2023). Humanization of nature: Testing the influences of urban park characteristics and psychological factors on collegers' perceived restoration. *Urban Forestry and Urban Greening*, *79*. https://doi.org/10.1016/j.ufug.2022.127806

Liu, Q., Zhu, Z., Zhuo, Z., Huang, S., Zhang, C., Shen, X., van den Bosch, C. C. K., Huang, Q., & Lan, S. (2021). Relationships between residents' ratings of place attachment and the restorative potential of natural and urban park settings. *Urban Forestry and Urban Greening*, *62*. https://doi.org/10.1016/j.ufug.2021.127188

Patwardhan, V., Ribeiro, M. A., Payini, V., Woosnam, K. M., Mallya, J., & Gopalakrishnan, P. (2020). Visitors' Place Attachment and Destination Loyalty: Examining the Roles of Emotional Solidarity and Perceived Safety. *Journal of Travel Research*, *59*(1), 3–21. https://doi.org/10.1177/0047287518824157

Plunkett, D., Fulthorp, K., & Paris, C. M. (2019). Examining the relationship between place attachment and behavioral loyalty in an urban park setting. *Journal of Outdoor Recreation and Tourism*, *25*, 36–44. https://doi.org/10.1016/j.jort.2018.11.006

Qi, Y., Fang, X., Gao, T., & Qiu, L. (2021). The Effects of Artificial Lake Space on Satisfaction and Restorativeness of the Overall Environment and Soundscape in Urban Parks. *Frontiers in Built Environment*, *7*. https://doi.org/10.3389/fbuil.2021.664442

© 2025 by MIP

Stoltz, J., & Grahn, P. (2021). Perceived sensory dimensions: An evidence-based approach to greenspace aesthetics. *Urban Forestry and Urban Greening*, *59*. https://doi.org/10.1016/j.ufug.2021.126989

Swapan, M. S. H., Iftekhar, M. S., & Li, X. (2022). Factors Influencing Use–diversity of Urban Parks: A Cross-cultural Study Between Chengdu (China) and Perth (Australia). *Environment and Urbanization ASIA*, *13*(2), 203–217. https://doi.org/10.1177/09754253221120616

Tan, R., Wang, R., Wang, Y., Yi, D., Chen, Y., Cai, W., & Wang, X. (2022). The Park city perspective study: Revealing the park accessibility influenced by experiences of visitors under different travel modes. *Frontiers in Environmental Science*, *10*, 924996. https://doi.org/10.3389/FENVS.2022.924996/BIBTEX

Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C. S., & Ho, R. C. (2020). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *International Journal of Environmental Research and Public Health*, *17*(5). https://doi.org/10.3390/ijerph17051729

Xie, X., Li, Y., Wang, R., & Gou, Z. (2023). Park Recreation Intention and Satisfaction of Blue-Collar Workers Based on the ACSI Model: A Case Study of Anning Industrial Park in Yunnan. *Land*, *12*(4). https://doi.org/10.3390/land12040798

Yang, Z., Zhao, X., Zhu, L., Xia, Y., Ma, Y., Wu, J., Xiong, X., Yang, N., & Lu, M. (2023). Research on the Healing Potential of Urban Parks from the Perspective of Audio-Visual Integration: A Case Study of Five Urban Parks in Chengdu. *Land 2023, Vol. 12, Page 1317*, *12*(7), 1317. https://doi.org/10.3390/LAND12071317

Zhang, J., & Xu, E. (2023). Investigating the spatial distribution of urban parks from the perspective of equity-efficiency: Evidence from Chengdu, China. *Urban Forestry & Urban Greening*, *86*, 128019. https://doi.org/10.1016/J.UFUG.2023.128019

Zhang, K., Tang, X., Zhao, Y., Huang, B., Huang, L., Liu, M., Luo, E., Li, Y., Jiang, T., Zhang, L., Wang, Y., & Wan, J. (2022). Differing perceptions of the youth and the elderly regarding cultural ecosystem services in urban parks: An exploration of the tour experience. *Science of The Total Environment*, *821*, 153388. https://doi.org/10.1016/J.SCITOTENV.2022.153388

Zhang, Z., Ma, G., Lin, X., & Dai, H. (2023). Accessibility in a multiple transport mode urban park based on the "D-D" model: A case study in Park City, Chengdu. *Cities*, *134*. https://doi.org/10.1016/j.cities.2023.104191

Zhu, Z., Hassan, A., Wang, W., & Chen, Q. (2022). Relationship between PSD of Park Green Space and Attention Restoration in Dense Urban Areas. *Brain Sciences 2022, Vol. 12, Page 721*, *12*(6), 721. https://doi.org/10.3390/BRAINSCI12060721

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AN ASSESSMENT OF MODAL SPLIT AND OCCUPANCY OF VEHICLE ON URBAN ROUTE: THE CASE STUDY OF JALAN PAHANG, KUALA LUMPUR, MALAYSIA

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Abstract

Urban transportation in Kuala Lumpur, particularly along Jalan Pahang, faces severe congestion due to an increasing number of private vehicles. This study assesses the modal split, identifies influencing factors, and evaluates public transportation efficiency. Using CCTV footage, data was collected from camera registered as CN275 (inbound) and CN290 (outbound). Findings indicate that private vehicles dominate, with over 70% being Single Occupancy Vehicles (SOVs), while High Occupancy Vehicles (HOVs) and buses remain underutilized. This highlights an inefficient transport system. The study suggests that road expansion projects alone will not alleviate congestion but may instead encourage more private vehicle use. The research recommends enhancing public transportation services, adopting intelligent traffic management systems, and implementing policies to promote HOVs, ultimately fostering sustainable urban mobility.

Keywords: High Occupancy Vehicle (HOV), Single Occupancy Vehicle (SOV), Modal Split, Traffic Congestion, Public Transport.

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INTRODUCTION

Malaysia's transport system has evolved significantly since British colonial rule; however, Kuala Lumpur continues to experience severe congestion due to excessive reliance on private vehicles. Despite an extensive road network spanning 290,099.38 km, public transport inefficiencies persist due to limited accessibility, unreliable services, and inadequate route coverage. Rapid urbanization exacerbates these issues, leading to longer travel distances and reinforcing car dependence, particularly on SOVs.

Malaysia's transport system has evolved since British colonial rule transitioning from basic road networks to an expansive infrastructure supporting national connectivity. However, despite this development, Kuala Lumpur continues to face severe traffic congestion, primarily due to the public's heavy reliance on private vehicles. Based on Ariffin, R. N. R. et al. (2013), the growing urban population and increasing household incomes have led to a rise in motor vehicle ownership. With a road network extending 290,099.38 km across the country, Malaysia has made considerable investments in its transportation infrastructure. Despite an extensive road network, public transport remains inefficient due to poor accessibility, unreliable services, and route constraints. Rapid urbanization has further contributed to longer travel distances and reinforced car dependence, making private vehicles, particularly SOVs, the dominant mode of transport. However, public transport remains inefficient due to several critical challenges, including:

- Poor Accessibility – Many areas in Kuala Lumpur and its surrounding regions are underserved by public transit, making it difficult for commuters to rely on buses and trains for daily travel.
- Unreliable Services – Public transport often experiences delays, breakdowns, and inconsistent scheduling, leading to passenger dissatisfaction and a preference for private vehicles.
- Route Constraints – Limited transit routes and inadequate coverage in suburban and developing areas further discourage public transport use.

These issues are exacerbated by rapid urbanization, which has contributed to increasing travel distances and reinforcing car dependency. As a result, private vehicles, particularly SOVs, dominate the city's transport landscape, worsening traffic congestion and environmental pollution. This study examines the modal split along Jalan Pahang by analysing travel behaviour and its impact on congestion while exploring solutions for a more balanced transport system. It evaluates the ratio of SOVs to HOVs and buses, assesses the limitations of current CCTV-based data collection, and explores how Artificial Intelligent

(AI) and Internet of Thing (IoT) can enhance transport data accuracy and planning.

The objective of this study is to analyse the modal split along Jalan Pahang focusing on Single Occupancy Vehicles (SOVs), High Occupancy Vehicles (HOVs), and bus utilization. and explore solutions to foster a more balanced and sustainable transport system in Kuala Lumpur. It evaluates the ratio of SOVs to HOVs and buses, assesses the effectiveness of current data collection methods, and investigates technological advancements for transport planning. It assess the limitations of CCTV-based data collection in capturing accurate modal split information and explore alternatives or integration of AI and IoT to improve transport planning with an aims to provide recommendations for sustainable transportation policies to address congestion effectively. By identifying existing gaps in the transportation system, this study seeks to develop strategies that promote a more balanced and efficient modal split, ultimately encouraging the shift from private vehicles to high-occupancy and public transport options.

LITERATURE REVIEW

Transportation In Kuala Lumpur

Kuala Lumpur’s road network plays a crucial role in both economic and social development, spanning approximately 330,000 square kilometres. A well-maintained transportation infrastructure enhances a city's global competitiveness and economic viability (Chuen et al., 2014). As the capital of Malaysia, Kuala Lumpur's strategic central location and well-established administrative framework have significantly contributed to its rapid growth, fostering advancements in transportation, governance, and economic expansion.

Historically, the city's transportation network has evolved alongside its urban development. The railway transport system was the earliest transport network since the late 19th century, stimulating economic and urban expansion and reinforcing Kuala Lumpur’s role as a major economic hub (Wahab 1990). The period between 1984 and 1999 saw the implementation of several major road infrastructure projects, including the Kuala Lumpur Traffic Dispersal Scheme, Inner and Middle Ring Roads, and the Radial Urban Highway. These projects aimed to facilitate smoother traffic flow and accommodate the growing number of vehicles on the road. Urban development efforts during this period were concentrated within the Central Planning Area, as well as four New Growth Areas: Damansara, Wangsa Maju, Bukit Jalil, and Bandar Tun Razak

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Figure 1: Road length in 1990,2000,2021
Source: Kuala Lumpur Structure Plan 2040

The development of public transportation began in 1995 with the introduction of Commuter Services, followed by the launch of the STAR and PUTRA Light Rail Transit (LRT) systems (Kuala Lumpur Structure Plan 2040). These initiatives marked a significant step towards establishing an integrated public transport system within the city. However, despite these efforts, road expansion has consistently outpaced railway development, leading to a transportation system that remains heavily reliant on private vehicles. In 1990, the total length of roads in Kuala Lumpur was 96.52 km, compared to just 41 km of railway lines, with a single railway station in operation. By 2021, the road network had expanded significantly to 342.25 km, whereas railway infrastructure, though improved, only reached 156 km, with 103 stations. This imbalance has resulted in a transport system that continues to be dominated by roads, leading to severe traffic congestion and escalating environmental concerns.

The rapid pace of urbanization and ineffective land use planning have further exacerbated traffic congestion in Kuala Lumpur. Many newly developed areas lack adequate access to public transport, forcing residents to rely on private vehicles for their daily commutes. Chee (1991) criticized Kuala Lumpur's urban planning strategy, arguing that it failed to effectively address traffic congestion. The city's development patterns have often been compared to those of North American suburbs, where urban sprawl and car dependency prevail due to the absence of well-integrated public transportation networks. Additionally, many housing estates in Kuala Lumpur have not been designed to support efficient public transit systems, further limiting accessibility and usage.

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Table 1: Length of Road and Railway and Number of Stations

Year	Road	Railway	Station	Percentage
1990	96.52 km	41km	1	-
2000	259.65km	94km	66	21%
2021	342.25km	156km	103	24.2%

Source: Kuala Lumpur Structure Plan 2040

Key Transportation Challenges in Kuala Lumpur

Kuala Lumpur faces three primary transportation challenges that contribute to worsening congestion and inefficiencies in urban mobility:

1. High Dependency on Private Vehicles

The majority of Kuala Lumpur's residents rely on private cars due to shortcomings in the public transport system. Overcrowding, frequent delays, and safety concerns deter commuters from using public transit, leading to increased SOV usage. While private vehicles provide convenience and flexibility, they significantly contribute to road congestion, air pollution, and increased travel times.

2. Urban Sprawl and Long Commutes

The expansion of Kuala Lumpur's metropolitan area has resulted in urban sprawl, forcing residents to travel longer distances for work, education, and daily activities. Although transit-oriented development (TOD) initiatives have been introduced to integrate housing with public transport networks, their implementation has not been effective in reducing congestion. Many residents still find it more convenient to use private vehicles rather than rely on underdeveloped public transport options.

3. Outdated Data Collection Methods

The use of outdated CCTV systems to monitor traffic and modal split presents a major obstacle to effective policymaking. Current surveillance systems lack the ability to accurately classify vehicle types, count occupancy rates, and analyze real-time transport patterns. This results in unreliable data, making it difficult for authorities to design evidence-based transportation policies. The inability to capture precise modal split data further prevents targeted interventions aimed at reducing SOV dominance and promoting HOVs and public transport.

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Public Transportation In Kuala Lumpur

Public transportation in Kuala Lumpur, comprising buses, rail services, and taxis, has experienced moderate development over the years. While significant efforts have been made to expand and modernize the public transport system, challenges related to accessibility, efficiency, and public preference for private vehicles continue to hinder its full potential in addressing urban mobility issues.

Before the 1990s, buses served as the primary mode of public transportation in Kuala Lumpur. Due to the lack of a well-integrated rail system, commuters heavily relied on bus services to travel within the city and its surrounding areas. However, as urbanization accelerated, the need for a more efficient and extensive public transport network became evident. By 2000, Kuala Lumpur's public transport infrastructure had expanded significantly, with the city boasting 209 km of electrified rail lines, including commuter trains operated by KTM and Light Rail Transit (LRT) systems (Hidayati et al., 2021) These developments were aimed at reducing congestion and providing an alternative to private vehicle use. However, despite these improvements, public transport ridership has seen a steady decline in recent years, while private vehicle ownership has continued to rise. This trend has exacerbated traffic congestion, undermining the efforts to create a more sustainable urban transport system (Tham & Anuar, 2012).

The current Public Transport Infrastructure in Kuala Lumpur are Buses and Rail Services. The Buses play a crucial role in Kuala Lumpur’s public transport system by complementing rail services and providing connectivity to areas not directly served by the train network. The city currently operates an extensive bus network, which includes:

- 83 Rapid Bus routes, serving key residential and commercial areas.
- 14 GoKL routes, offering free bus services to improve urban mobility.
- 17 other stage bus routes, catering to commuters in various districts (Kuala Lumpur Structure Plan 2040).

Despite the availability of multiple bus routes, accessibility remains moderate, primarily due to poor route planning, inconsistent scheduling, traffic congestion, and insufficient coverage in suburban areas. Many commuters still find bus travel inconvenient due to long waiting times, overcrowding, and unreliable services. Additionally, lack of dedicated bus lanes on major roads, including Jalan Pahang, further reduces the efficiency of bus services, making private vehicle use a more attractive option for daily commuters.

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Rail Network

Kuala Lumpur's rail system, which consists of Express Rail Link (ERL), monorail, KTM commuter trains, and Light Rail Transit (LRT), appears extensive on paper. However, low ridership and inefficiencies have prevented it from becoming the dominant mode of transport. While rail services offer relatively faster travel times compared to buses, several factors contribute to the underutilization, including:

- Limited last-mile connectivity - Many rail stations are not well-integrated with feeder bus services, making it difficult for passengers to reach their final destinations conveniently.
- Inconsistent service frequency - Train intervals, particularly during non-peak hours, are often long, discouraging ridership.
- Overcrowding during peak hours - Although ridership remains low overall, commuters frequently experience overcrowding on popular routes during rush hours, reducing passenger comfort.
- High fares compared to perceived service quality - Some commuters find rail fares relatively high, especially when considering the service reliability and accessibility challenges.

As a result of these limitations, many residents prefer private vehicles over public transport, further aggravating congestion in the city. Without improvements in reliability, frequency, and connectivity, Kuala Lumpur's rail system will struggle to compete with the convenience of personal car usage.

Private Vehicle and The Rise of Car Ownership

Private cars have become the dominant mode of transport due to their convenience, door-to-door access, and status symbol. Car ownership in Malaysia is rising, with 17.2 million registered cars, surpassing motorcycles and goods vehicles (Daim, 2023). In 1980, 65% of trips into Kuala Lumpur were made by private cars, increasing to 67.4% in 1990, while public transport use declined. The rising number of vehicles has led to traffic congestion, pollution, and environmental degradation (Abdullah, 2010).

Experts, including Dr. Khulanthayan, emphasize that building more roads is not a solution; instead, demand management and investment in public transport, especially rail-based systems, are crucial. Rail transport is safer, congestion-free, and punctual, while buses remain the safest road-based transport. To tackle congestion, promoting ridesharing (HOV) over single-occupancy vehicles (SOV) is an efficient and cost-effective strategy, reducing reliance on expanding infrastructure while optimizing existing resources. This aligns with the research aim of enhancing public transport and encouraging shared mobility.

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Factors Influencing the Increase in Car Ownership

Car ownership is influenced primarily by income, with wealthier individuals purchasing more cars as a status symbol. A study by Azhar & Zahari (2022) found that 72.4% of the B40 group view cars as a necessity, despite traffic congestion. However, M40 (13.5%) and T20 (1.6%) show lower car dependency. Many still rely on private vehicles due to limited public transport options. Malaysia's easy access to car ownership with financing options and affordable second-hand vehicles contrasts with Singapore's strict policies. In Singapore, buyers must obtain a Certificate of Entitlement (COE) and pay multiple government fees, significantly increasing costs and controlling car numbers (Chan, 2025). Additionally, Singapore enforces a 10-year COE renewal system, while Malaysia lacks an End-of-Life Vehicle (ELV) policy, leading to rising vehicle numbers and worsening congestion. By 2040, Malaysia's registered passenger cars are expected to reach 12.64 million (Kassim et al., 2020). To curb car dependency, implementing an ELV policy, ownership fees, and improved public transport could promote sustainability and reduce congestion.

Modal Split

A study by Mohamad (2017) on work trip travel patterns in Kuala Lumpur found that 92.6% of commuters use a single mode of transport, with limited intermodal travel due to difficulties in transferring between different transportation options. The findings also indicated a higher prevalence of private car usage compared to public transport. The study explored the impact of socio-demographic factors on travel behavior, categorizing commuters into four main groups: private car users, public transport users, non-motorized travellers (cyclists/pedestrians), and multimodal commuters. By comparing these groups, the research aimed to identify key differences in travel patterns.

In 2022, the modal split between public transport and private vehicles was 25:75, highlighting the dominance of private cars. To tackle congestion, the Traffic Master Plan 2040 (PITKL2040) focuses on enhancing public transport efficiency, accessibility, and safety to encourage a shift away from private vehicles. One successful global example is South Korea's Cheonggyecheon project, where an elevated freeway was demolished and replaced with a sustainable urban space. Despite initial concerns about the cost of the restoration, a total of 281 million USD was reportedly spent solely on the restoration. The project improved traffic flow, increased land value, and led to a rise in bus and subway ridership. (Landscape Performance Series, 2024).

Policy And Issues of Urban Sprawl in Malaysia

Urban sprawl, emerging in the late 20th century, is marked by low-density development, heavy reliance on private cars, traffic congestion, and

environmental issues (Naeem et al., 2016). Greenbelts and urban growth boundaries help limit sprawl, conserve land, and promote compact development, reducing infrastructure costs. Successful implementation requires high-density areas supported by public transport (Naeem et al., 2016).

Malaysia's 2006 urbanization policy proposed growth boundaries, but poor coordination between federal and local governments hindered enforcement. Despite efforts like the 2011 MRT expansion, urban development continues along major transport routes (Naeem et al., 2016).

Kuala Lumpur's 2021 land use data highlights extensive urbanization (78.8%), with limited undeveloped land (21.2%) (Kuala Lumpur Structure Plan 2040). The TOD (Transit-Oriented Development) strategy aims to increase density near public transport hubs, expand rail networks, and optimize land use to curb sprawl. However, TOD requires large land areas, raising concerns that current policies focus more on accommodating growth than controlling it.

Data Collection Method

Traffic congestion is classified into Recurrent Congestion (RC) and Non-Recurrent Congestion (NRC) (Anbaroglu et al., 2014). RC occurs daily during peak hours, caused by high travel demand, inadequate capacity, or poor signal control (Han & May, 1989). NRC is unpredictable, caused by accidents, vehicle breakdowns, weather, or special events (Dowling et al., 2004). Advancements in smart transportation use CCTV and IoT for traffic management, logistics, and safety (Dewi, 2021). China enhances traffic monitoring with drones using TPH-YOLOv5++ technology, which improves detection speed and accuracy while reducing computational costs (Zhao et al., 2023).

Increase The Rate of HOV Compared To SOV

Every day, 6 million vehicles enter Kuala Lumpur, with 2.2 million doing so during peak hours (Law, 2024). While enhancing public transportation is essential, additional measures are necessary, as Malaysians heavily rely on private cars. Some propose solutions to address issue of congestion include Variable Charging Based on Occupancy, Time-of-Day Pricing, and Integration with Public Transport to encourage carpooling and reduce traffic congestion (Tan, 2024). Singapore's Electronic Road Pricing (ERP) system, which adjusts toll rates based on real-time traffic conditions, has proven effective in managing congestion (Tan 2024) Additionally, a double-decker bus can replace 53 to 100 private cars, significantly reducing both traffic congestion and carbon emissions (Ortúzar, 2019). However, for this shift to be successful, public transport must be reliable, offering real-time updates, improved accessibility, and better infrastructure (Bachok et al., 2008; Soh et al., 2014). By implementing congestion-based pricing and enhancing transit systems, Kuala Lumpur can take

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significant steps toward easing traffic congestion and promoting sustainable urban mobility.

RESEARCH METHODOLOGY

This study adopts a quantitative research approach to analyze modal split calculations and data collection methods for urban travel in Kuala Lumpur. Primary data is obtained through on-site surveys and direct observations conducted at key locations, focusing on critical factors such as travel patterns, mode choices, trip purposes, and user demographics. To ensure a comprehensive representation of urban travel behavior, survey respondents include daily commuters, students, and working professionals. Additionally, observational data is recorded to validate self-reported responses, offering deeper insights into traffic conditions and mode share distribution.

Secondary data is sourced from government reports, transport authority databases, and academic studies to complement the primary data and provide contextual background for analysis. This includes information on existing transportation policies, infrastructure development plans, and demographic statistics that influence urban mobility trends. The collected data is processed and analysed using statistical methods, including descriptive analysis and regression modelling, to identify key factors affecting mode choice.

ANALYSIS AND DISCUSSION

This study examines traffic patterns and modal split along Jalan Pahang in Kuala Lumpur to gain a deeper understanding of urban travel behavior. Data was collected using CCTV footage to analyze the preference for various transport modes, including Single-Occupancy Vehicles (SOVs), High-Occupancy Vehicles (HOVs), and buses. The findings offer valuable insights into traffic volume, vehicle usage trends, and the challenges associated with achieving an efficient transportation system.

The research employed a quantitative approach, supplemented by observational data from CCTV recordings. Data collection was conducted on Tuesdays, Wednesdays, and Thursdays during peak hours, specifically from 7:00 AM to 9:00 AM and 6:00 PM to 8:00 PM. The study focused on two key locations: CN275 Jalan Pahang (inbound) and CN290 Jalan Pahang (outbound). The traffic count encompassed private cars, motorcycles, and buses, with data recorded at 15-minute intervals to ensure accuracy and reliability.

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Traffic Volume

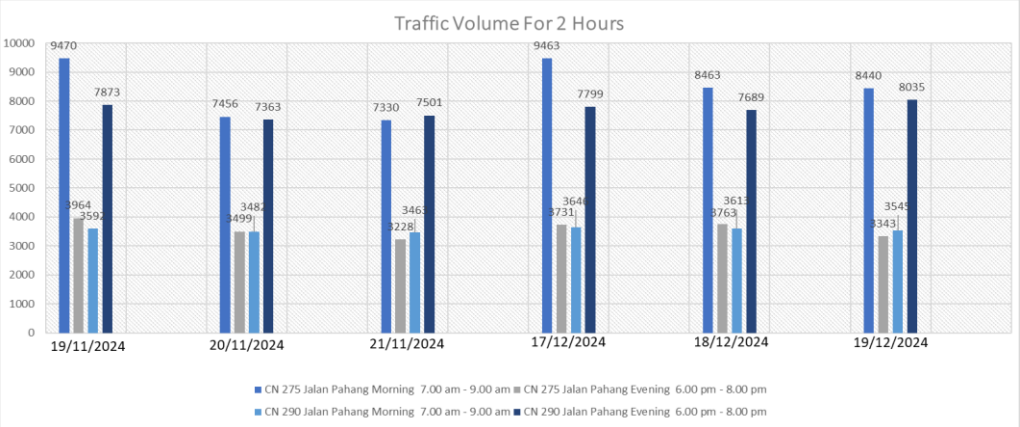


Figure 2: Graph on Traffic Volume for 2 Hours
Source: Field study

The analysis revealed a notable variation in traffic volume between morning and evening peak hours. In the morning, the highest inbound traffic was recorded at CN275 Jalan Pahang, with 9,470 vehicles on November 19, 2024. Conversely, the highest outbound traffic was observed at CN290 Jalan Pahang in the evening, reaching 8,035 vehicles on December 19, 2024. These findings highlight that Jalan Pahang serves as a major commuting corridor, with a significant influx of vehicles into the city in the morning and a substantial outflow in the evening.

Additionally, a comparison between peak-hour traffic and Average Daily Traffic (ADT) revealed that peak-hour travel accounts for 16% of total daily traffic, while off-peak hours contribute only 6%. This indicates that traffic congestion is predominantly a peak-hour issue, suggesting that redistributing traffic loads through improved transport policies and demand management strategies could help alleviate congestion.

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Vehicle Preferences

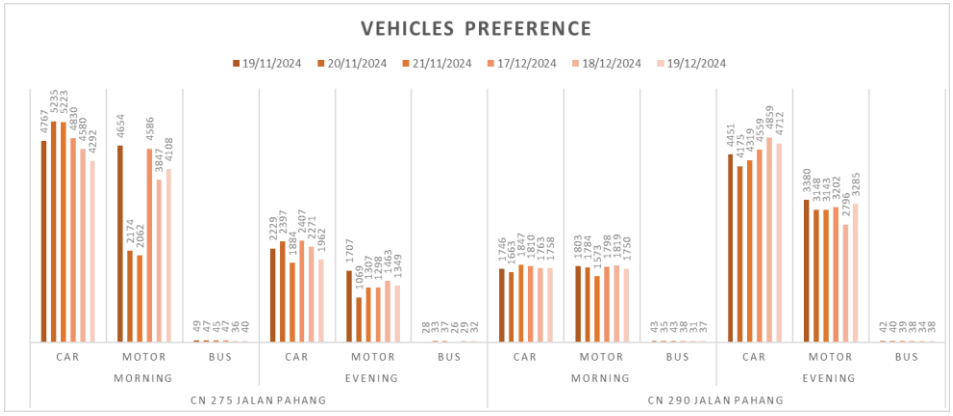


Figure 3: Graph of Vehicle Preference
Source: Field study

The findings confirm that private vehicles, particularly cars, dominate the road network, followed by motorcycles, while buses remain the least used mode of transport. Many commuters prefer private cars due to their convenience, reliability, and perceived status. However, this reliance on private vehicles caused congestion, especially during peak hours.

Car Occupancy Analysis

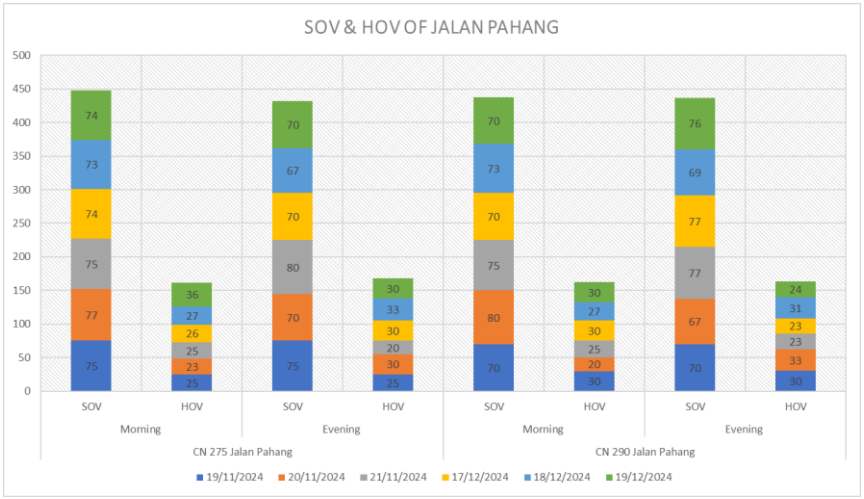


Figure 4: SOV & HOV of Jalan Pahang
Source: Field Study

One of the key challenges identified is the high prevalence of Single-Occupancy Vehicles (SOVs). The data revealed that most cars carried only one passenger, leading to inefficient road usage and exacerbating congestion. Despite its potential to alleviate traffic, carpooling (HOVs) remains minimal. Historical data from Mohamad and Kigundu (2007) showed that 70% of vehicles crossing major ring roads in Kuala Lumpur were SOVs. If this trend persists, traffic congestion will continue to escalate.

Bus Occupancy

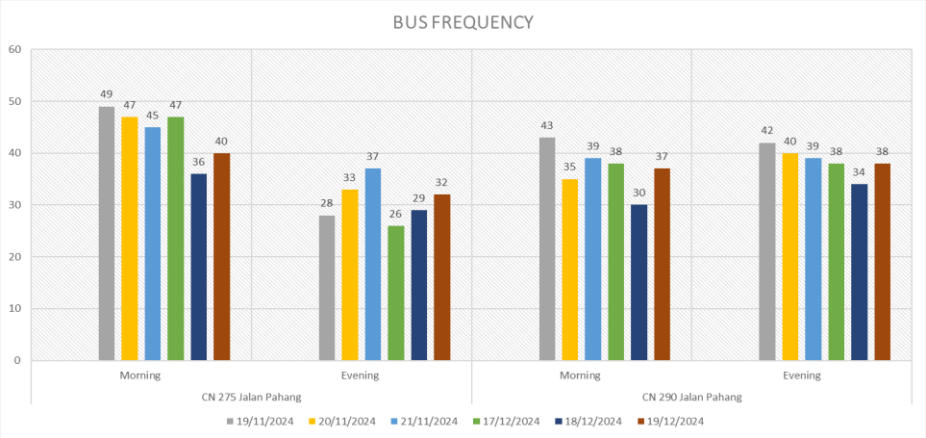


Figure 5: Bus Frequency
Source: Field study

As seen in Figure 4 bus frequency and occupancy along Jalan Pahang. The data revealed that bus frequency is inadequate, averaging only 24 buses per hour per direction during peak hours. While some buses operated at full capacity, others ran with half or even quarter-full loads. This suggests that buses may not be available frequently enough to meet demand, or that they are not attractive enough for commuters.

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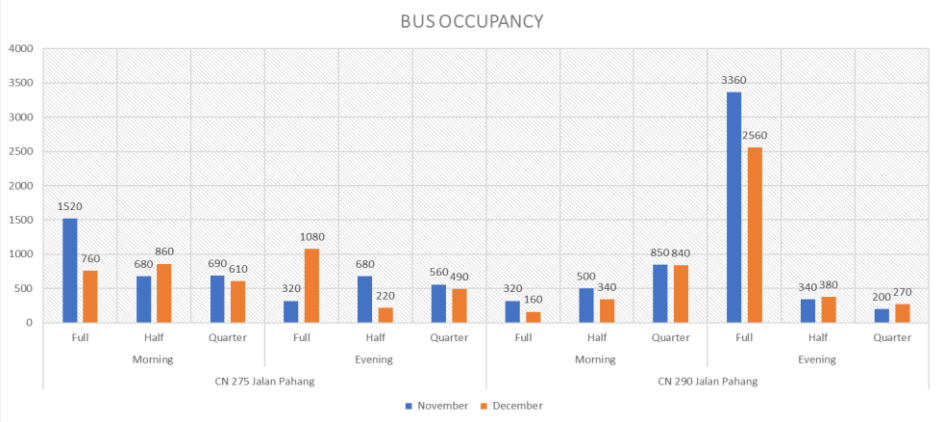


Figure 6: Bus Occupancy
Source: Field study

A comparison of morning and evening bus ridership, as shown in Figure 5, revealed that buses departing Kuala Lumpur in the evening were more crowded than those arriving in the morning. This suggests a potential mismatch between service availability and passenger demand.

Modal Split

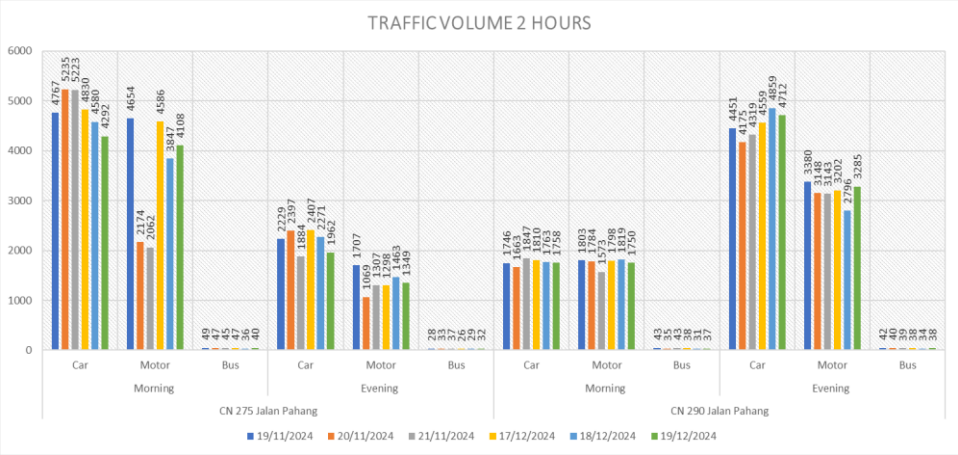


Figure 7: Traffic Volume For 2 Hours By vehicles
Source: Field study

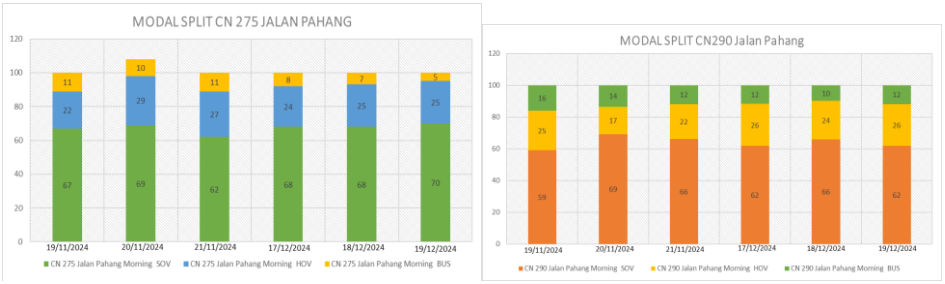


Figure 8: Modal Split in the Morning CN275 Jalan Pahang
Source: Field study

The study analyzed the modal split for Jalan Pahang, categorizing transport usage into three groups: Single-Occupancy Vehicles (SOVs), High-Occupancy Vehicles (HOVs), and buses. The findings confirmed that private vehicles remain the dominant mode of transport, while buses account for only a small fraction of total trips, as illustrated in Figures 6 and 7. Currently, Kuala Lumpur's modal split stands at 25:75 in favor of private vehicles, falling significantly short of the city's 70:30 public transport target set for 2040.

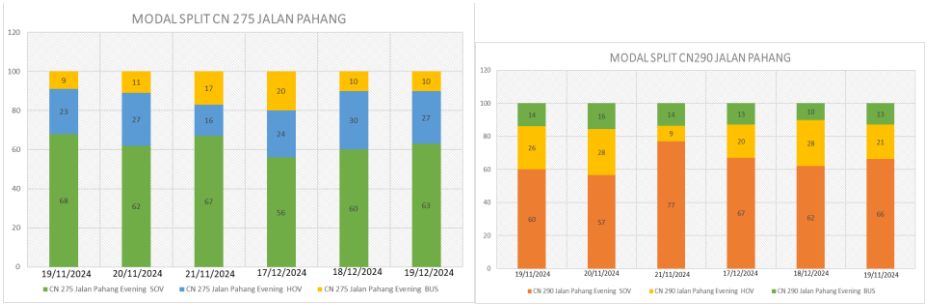


Figure 9: Modal Split in the Morning CN290 Jalan Pahang
Source: Field Study

If current trends persist, Kuala Lumpur will face significant challenges in achieving its public transport goals, leading to worsening traffic congestion. Strengthening bus services and encouraging carpooling are crucial steps toward creating a more balanced and efficient transportation systrm.

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INFERENTIAL ANALYSIS

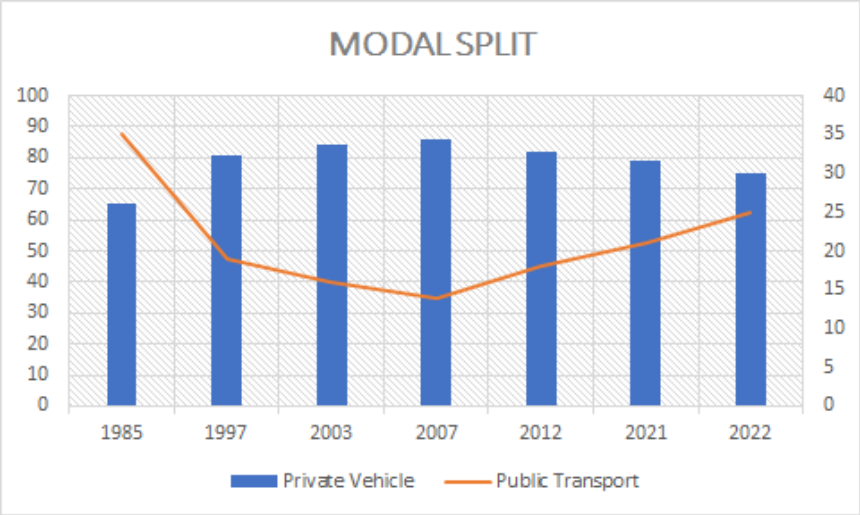


Figure 10: Modal Split of Kuala Lumpur
Source: KLCCC

Kuala Lumpur's modal split is 25:75, favouring private vehicles over public transport while the Kuala Lumpur City Council aims for 70:30 by 2040. However Figure 9 show a declining trend of public transport use and this can be a factor that worsen the congestion in Kuala Lumpur.

Table 2 : Regression Analysis

Types	Coefficients	Standard Error	t Stat	P-value
Intercept	0.232881717	2.586776571	0.090027767	0.930478337
X Variable 1	0.38970924	0.04034605	9.65916703	1.09898E-05

Regression analysis identified a strong correlation between car dependency and traffic congestion but a weak relationship between private vehicle use and public transport expansion. This indicates that increasing road capacity alone will not resolve congestion. Achieving the 70:30 target requires improvements in public transportation, increased bus frequency, and effective carpooling incentives. Without these measures, traffic congestion will continue to escalate.

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RECOMMENDATION

The decline in public transport ridership and the increase in car dependency pose significant challenges for Kuala Lumpur's sustainable urban development. The existing transport system is unable to effectively reduce congestion, lower carbon emissions, and provide an attractive alternative to private vehicle use. To address these issues, it is crucial to implement targeted improvements, particularly in areas like Jalan Pahang, where heavy traffic congestion remains a persistent problem. The recommendation of the study are:

1. ***Improved Data Collection and Traffic Monitoring***
   Data collection should be taken during peak hour and the technology should be upgraded for more accurate data for example in China where they are using advanced technologies like AI, IoT, and drones using TPH-YOLOv5++ can improve data efficiency. Also, tracking SOVs, HOVs, and bus services will further enhance data accuracy on transportation and will able to improve the gap in transportation in order to achived 70:30 of public transport and private vehicle modal split.

2. ***Promoting Public Transportation and Carpooling by Giving Incentives***
   Lowering public transport costs through subsidies or discounts makes it more affordable, encouraging people to switch from cars to public transport. Offering off-peak discounts helps prevent overcrowding. Additionally, toll discounts for carpooling incentivize shared rides, promoting HOV usage. This practice can help reduce congestion during peak hours.

3. ***Expanding and Enhancing Public Transport Networks***
   As Malaysia moves towards 2030, upgrading the public transport system is essential. Modernizing buses can improve safety and attract more users. Displaying bus schedules at stops ensures reliability beyond websites. Real-time tracking provides accurate arrival times, making public transport accessible for all ages. A reliable, extensive system can encourage a shift from private vehicles, reducing congestion. Improving overall public transport infrastructure will further enhance service quality.

4. ***Implementing Electronic Road Pricing at Hotspots Prone to Traffic Congestion***
   Electronic Road Pricing (ERP) charges vehicles for using specific roads during peak hours or in congested areas. This helps reduce traffic, lower pollution, and encourage public transport use. By increasing driving costs during peak times, ERP discourages unnecessary trips, easing congestion and improving travel time reliability. It is most effective where efficient public

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transport offers a convenient alternative, emphasizing the need to enhance public transport infrastructure.

5. ***Strengthening Policies with End-of-Life Vehicle (ELV) Regulations, Make Car Purchases More Restrictive and Mandate Public Transport For Workers.***
   Strengthen policies by implementing End-of-Life Vehicle (ELV) regulations to ensure proper vehicle disposal and recycling, reducing environmental hazards and promoting sustainability. This can also help lower the number of cars in Malaysia. Additionally, stricter car purchase measures, such as higher taxes, stricter loan approvals, or quotas, can discourage excessive private vehicle ownership. Mandating public transport for workers and allowing private vehicles only with at least four passengers can ease traffic, reduce emissions, and promote sustainable commuting in the same time increase the HOV rather than SOV.

6. ***Implementing Sustainable Mobility***
   Incorporate sustainable transportation policies into city planning, such as mixed-use zoning, cycling paths, and pedestrian-friendly streets, to reduce car dependency. This promotes sustainable urban mobility, reduces congestion, and makes public transport more appealing. The Ministry of Transportation should collaborate with planners to improve zoning and address issues like urban sprawl.

CONCLUSION

To alleviate congestion in Kuala Lumpur, it is essential to enhance bus frequency and expand route coverage, particularly during peak hours, to improve the reliability of public transportation. Implementing carpooling incentives, such as High-Occupancy Vehicle (HOV) lanes and toll discounts, can help reduce the number of Single-Occupancy Vehicles (SOVs) on the roads. Additionally, optimizing bus routes, refining schedules, and ensuring punctual service will make public transport a more attractive alternative to private vehicles.

Stronger transportation policies, including congestion charges and restrictions on private vehicle usage, can further encourage commuters to shift towards public transit. The integration of AI-based traffic management systems can enhance real-time monitoring, optimize traffic flow, and reduce delays. Furthermore, improving first- and last-mile connectivity through well-designed pedestrian walkways and dedicated bike lanes will promote sustainable mobility and decrease reliance on private cars.

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REFERENCES

Abdullah, A. R. (2010). *Carpooling in Kuala Lumpur: Issues and challenges*. Kuala Lumpur: University of Malaya Press

Anbaroglu, B., Heydecker, B., & Cheng, T. (2014). Classification of traffic congestion using spatiotemporal patterns. *Transportation Research Part C: Emerging Technologies, 42*, 1-14.

Ariffin, R. N. R., & Zahari, R. K. (2013). Sustainable urban transport in Klang Valley: Current trends and future challenges. *Journal of Transport and Sustainable Cities, 8*(2), 55-72.

Azhar, N. H., & Zahari, H. M. (2022). Car ownership demographics and travel behavior in Kuala Lumpur. *Malaysian Journal of Transport Studies, 15*(1), 100-120.

Bachok, S., Yue, W. L., & Zito, R. (2008). Real-time public transport information and its impact on commuter satisfaction. *International Journal of Transportation Planning, 6*(4), 88-101.

Chan, R. (2025). Car ownership regulations and control measures in Singapore. *Singapore Transport Review, 10*(1), 32-48.

Chee, W. T. (1991). Land use planning and its impact on traffic congestion in Kuala Lumpur. *Journal of Urban Planning & Development, 5*(2), 20-37.

Chiu Chuen, O., Karim, M. R., & Yusoff, S. (2014). Mode choice between private and public transport in Malaysia: A comparative study. *Asian Transport Journal, 22*(3), 99-115.

Daim, N., & Nizam, F. (2022). *Kuala Lumpur Traffic Master Plan 2040: Strategies for sustainable urban mobility*. Kuala Lumpur City Hall.

Dewi, N. K. (2021). IoT applications in smart transportation: A review of emerging trends. *International Journal of Smart Cities, 9*(2), 150-165.

Dowling, R., Skabardonis, A., Carroll, M., & Wang, Z. (2004). Measuring and analyzing traffic congestion in urban areas. *Transportation Research Record, 1895*(1), 50-60.

Han, L. D., & May, A. D. (1989). Operational problems in urban traffic management. *Journal of Traffic Engineering & Control, 7*(4), 88-105.

Hidayati, I., Yamu, C., & Tan, W. (2021). You have to drive: Impacts of planning policies on urban form and mobility behavior in Kuala Lumpur, Malaysia. *Journal of Urban Management*, *10*(1), 69-83.

Jabatan Kerja Raya. (2022). *Malaysia Road Statistics 2022*. Ministry of Works Malaysia.

Kassim, K. A., et al. (2020). *End-of-life vehicles in Malaysia: Challenges and policy recommendations*. Environmental Studies Journal, 14(3), 200-218.

Landscape Performance Series. (2024, May 28). *Cheonggyecheon Stream Restoration Project.* Landscape Architecture Foundation

 © 2025 by MIP

Mohamad, J., & Kiggundu, A. T. (2007). The rise of private cars in Kuala Lumpur: Consequences for sustainable transport. *Southeast Asian Transport Journal, 18*(2), 56-75.

MOHAMAD, D. J. B. (2017). Realities of modal choice in Kuala Lumpur: Transport Planning for the disadvantaged. *Planning Towards a Caring Society, (January)*.

Naeem, M. A., Shamsuddin, S., & Sulaiman, A. B. (2016). *Policies and issues concerning urban sprawl and compact development paradigm adoption in Greater Kuala Lumpur, Malaysia*.

Ortúzar, J. D. D. (2019). *Sustainable urban mobility: Strategies for reducing congestion*. Oxford University Press.

Soh, K. L., et al. (2014). Improving public transport in Malaysia: A framework for future development. *Journal of Transport Policy & Research, 7*(1), 78-92.

StreetLight Data. (2024). *Transportation data analytics for sustainable mobility*.

Tan, D. (2024). *Surcharges for single-occupancy vehicles in Kuala Lumpur: A policy proposal*. Kuala Lumpur Policy Review, 5(2), 88-102.

Tham, G. M., & Anuar, N. K. (2012). Urban transportation issues: A case study at Kuala Lumpur, Malaysia.

Wahab, I. B. (1990). Urban transport in Kuala Lumpur. *Cities*, *7*(3), 236-243.

Zhao, Q., Liu, B., Lyu, S., Wang, C., & Zhang, H. (2023). TPH-YOLOv5++:
Boosting object detection on drone-captured scenarios with cross-layer asymmetric transformer. *Remote Sensing*, *15*(6), 1687.

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RESPONSE ACTIONS TO THE COVID-19 PANDEMIC IN A WORLD HERITAGE SITE: A CASE STUDY OF THE OLD TOWN OF LIJIANG, CHINA

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Abstract

Nowadays, heritage is seen as a significant tourism resource that contributes to developing quality tourism destinations. Places with world heritage are filled with valuable cultural and economic resources. However, with the outbreak of the COVID-19 pandemic, the tourism sector has been hit hard by this inevitable global crisis. COVID-19 has negatively impacted World Heritage Sites (WHS), resulting in reduced tourism revenue, decreased employment in the tourism sector, and loss of local community livelihoods. Yet the COVID-19 pandemic also provides a chance for heritage sites to adjust and improve tourism management and development, therefore WHS can address the challenges brought by other inevitable crisis in the future. This study aims to explore the actions taken to address the challenges brought by the COVID-19 pandemic, using the Old Town of Lijiang (OToL), a cultural WHS in China, as a case study. A qualitative approach was adopted, and in-depth interviews were conducted with multiple stakeholders including government officials, local residents, and business owners. The findings reveal that OToL implemented a series of effective response actions, including effective government response management, strict pandemic prevention actions, application of technology, active participation of local communities and business owners, and public publicity and education. These actions contributed to maintaining social and economic stability while facilitating tourism recovery. The experiences of OToL provide valuable lessons for other World Heritage Sites in designing adaptive responses to future crises and promoting sustainable tourism development in a post-pandemic context.

Keywords: World Heritage Sites, Old Town of Lijiang, Response actions

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INTRODUCTION

Heritage has been seen as a significant tourism resource and contributes to quality tourism destination development (Pavlic et al., 2020). Places with world heritage are filled with valuable cultural and economic resources. However, with the outbreak of the COVID-19 pandemic, the tourism sector has been hit hard by this inevitable global crisis. In early 2020, the world was confronted with an unexpected global crisis caused by the outbreak of the coronavirus disease (COVID-19) pandemic (UNESCO, 2021a). The COVID-19 pandemic has already impacted all aspects of our daily lives, such as the way we work and study, the way people interact and spend time together (UNESCO, 2021a). According to data from the World Tourism Organization, international tourist arrivals dropped by 74% in 2020, and destinations worldwide accommodated 1 billion fewer international arrivals in 2020 than in 2019 due to the unprecedented drop in demand and travel restrictions (UNWTO, 2020). Due to the COVID-19 pandemic is the unprecedented global crisis and the tourism industry has been hit hard by the pandemic; many studies have conducted to analyze the impact of the COVID-19 pandemic on tourism sector (Chibaya & Mashokob, 2022; Gössling, et al.,2020; Sigala,2020; Uğur & Akbıyık, 2020), relatively few studies have focused on the actions taken to address the crisis within WHS, particularly in China.

As many WHS in China serve as major tourist attractions, which contribute significantly to the local and national economy, thus it is imperative to explore actions to address the COVID-19 impact on WHS in China for safeguarding cultural and natural treasures, supporting local communities, and promoting sustainable tourism development in the post COVID-19 era. Despite some global studies exploring management adaptations and community resilience, there remains a significant gap in research on how Chinese WHS—especially those with active tourism economies—have responded to the COVID-19 crisis. Therefore, this study adopts a qualitative approach to investigate the response actions taken to address the COVID-19 pandemic in a cultural WHS, using the Old Town of Lijiang as a case study.

LITERATURE REVIEW

Cultural heritage

According to UNESCO (2022a), heritage is our legacy from the past, what we live with today, and what we pass on to future generations. It is recognized as a valuable tourism resource that contributes to the development of high-quality destinations (Pavlic et al., 2020). World Heritage Sites (WHS) are categorized as natural, cultural, or mixed (UNESCO, 2022a). While natural heritage includes naturally occurring phenomena such as mountains and rivers (Timothy, 2011), cultural heritage reflects human creativity and history, encompassing both

tangible and intangible elements. As noted by Ismail, Masron, and Ahmad (2014), cultural heritage can be divided into three categories: the built environment (e.g., buildings and townscapes), the natural environment (e.g., agricultural landscapes and coastlines), and the artefact environment (e.g., books, objects, and artworks).

Cultural heritage tourism holds substantial value, not only for its economic and social contributions but also for its role in reinforcing cultural identity, reviving traditions, and preserving monuments (Ismail, Masron & Ahmad, 2014). It reflects the way of life, customs, and artistic expressions passed down through generations. Given its importance, this study focuses on cultural heritage tourism in China, with a case study of the Old Town of Lijiang. Listed as a UNESCO World Heritage Site since 1997, Lijiang is renowned for its rich cultural significance and popularity among both domestic and international tourists (Qi, 2021; Fang, 2017). The next section introduces the Old Town of Lijiang in more detail.

Old town of Lijiang

The Old Town of Lijiang (OToL) is located on the Lijiang plain at an elevation of 2,400 meters in southwest Yunnan, China, surrounded by mountain passes that historically served as strategic routes (UNESCO, 2022b) (see Figure 1). Water from the Yulong Snow Mountain feeds into the Heilong Pool (Black Dragon Pond), which then supplies a network of canals that run through the town (UNESCO, 2022b). OToL consists of three main areas: Dayan Old Town, Baisha, and Shuhe. Dayan, established in the Ming dynasty as a commercial centre. Baisha, established during the Song and Yuan dynasties, lies 8 km north of Dayan, while Shuhe is located 4 km to the northwest. These clusters, nestled between mountains and waterways, reflect a rich blend of local cultures, folk traditions, and architectural heritage spanning several centuries (UNESCO, 2022b).

The vivid urban space, the vigorous water system, the harmonious building complexes, the comfortable residences of appropriate size, the pleasant environment, and the folk art of unique style combine to form an outstanding example of human habitat (UNESCO, 2022b). Beyond its valuable built heritage, the most significant element of the OToL is its local community—the Naxi minority. As one of China's 56 recognized ethnic groups, the Naxi people are primarily concentrated in Lijiang, Yunnan Province. Renowned for their rich artistic traditions in poetry, painting, sculpture, music, and dance, the Naxi culture forms the "living heritage" of the OToL. Their language, customs, and traditional lifestyle are still actively preserved and practiced, serving as the cultural soul of the heritage site and a major attraction for visitors interested in authentic cultural experiences (Baidu, 2022).

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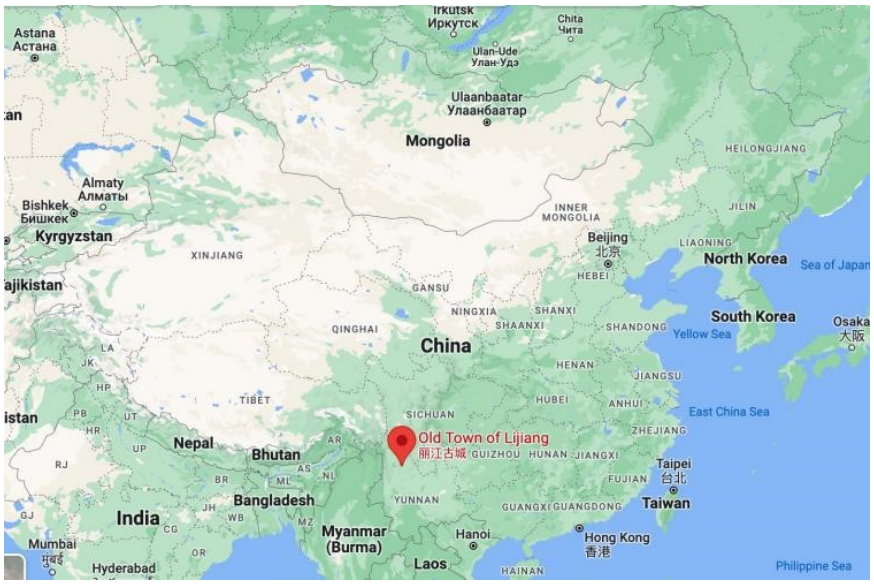


Figure 1: Location of the OToL
(Source: Google Maps, 2024)

Response actions to address the COVID-19 pandemic in tourism sector

Many studies have proposed strategic frameworks to support tourism recovery during the COVID-19 pandemic (Bhatia et al., 2022; Brouder, 2020; Bulchand-Gidumal, 2022; Gössling et al., 2020; Hall et al., 2021; Higgins-Desbiolles, 2021; Ioannides & Gyimóthy, 2020; Sharma et al., 2021; Sigala, 2020; Stankov et al., 2020). However, most of these strategies remain theoretical and have not been widely implemented in practice. Therefore, it is crucial to investigate concrete actions that have been taken on the ground to address the crisis in the tourism sector. According to UNWTO, many countries have implemented fiscal policy to support travel and tourism during the pandemic, for instance, the Chinese government has asked banks to extend the terms of business loans and commercial landlords to reduce rents; refunding travel agencies and improving infrastructure, etc. In Malaysia, the government has launched three economic stimulus packages worth US$59.9 billion (RM260 billion) based on three main strategies of protecting social welfare, supporting businesses and strengthening the economy (UNWTO, 2024). New Zealand also launched economic packages and government loans to support tourism sector (UNWTO, 2024).

Sigala (2020) identified specific actions in response to the pandemic, including the implementation of social distancing policies, redesigning tourism experiences for smaller groups, and shifting to outdoor and private activities. Winery experiences, museum visits, tours, sports events, and in-room dining and entertainment are being reimagined to feature smaller groups of tourists and

outdoor activities; hotels are focusing on in-room entertainment and amenities instead of shared facilities to minimize contact (Sigala, 2020).

Tourism businesses have upgraded hygiene protocols, promoted health certifications, and adapted offerings to enhance customer trust (Sigala, 2020). Some have used this period to improve service quality and differentiate products, while also investing in employee training and revising human resource policies to build workforce resilience (Kuščer et al., 2022). Moreover, according to Bulchand-Gidumal (2022), COVID-19 has highlighted the vulnerability and sensitivity of the tourism industry, implementing smart technology can enhance destination management, positioning destinations more effectively to handle crises like the COVID-19 pandemic. He highlights the significance of applying technology and artificial intelligence to address the COVID-19 in tourism sector.

METHODOLOGY

The study employs the qualitative research approach; in order to achieve the research's aim and objectives, this research adopts a case study approach, choosing one famous WHS in China—the Old Town of Lijiang in Yunnan Province—as an example. Different stakeholders of the OToL tourism were interviewed, respondents include government, local residents, local business owners (Table 1 is the summary of respondents). Considering the research objective and data saturation, the number of interviewees was determined. A senior government officer was interviewed to provide authoritative insights into the official policies, emergency responses, and pandemic management strategies. This respondent was selected due to his extensive institutional knowledge, ensuring access to accurate data and policy-level perspectives necessary for understanding governmental actions and tourism governance during the crisis. In terms of the local residents, the interviewees must be native Naxi people living in the OToL, five interviewees are selected according to their age, gender and occupation. The selection considered diversity in age, gender, and occupation, allowing for a comprehensive understanding of how different demographic groups within the community responded to the pandemic. Lastly, local business owners are people who own the store in the OToL area, the study chooses five business owners of different sizes and types, including guesthouses, medium-sized restaurants, souvenir shops, and cultural or entertainment-oriented services. Their inclusion allows the study to investigate how entrepreneurs responded through adaptation, innovation or government support.

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Table 1: summary of interview respondents

Stakeholder group	Code	Gender	Age Group	Profession	Rationale for Inclusion
Government	GOV-1	Male	30-40	Director of the Heritage Protection Department of the Management Bureau	Deep understanding of relevant policies and response coordination
Local resident	RES-1	Female	60+	Housewife	To capture how different demographic groups maintained cultural life and community resilience through various forms of local action.
	RES-2	Male	40-50	Tour guide	
	RES-3	Female	20-30	University student	
	RES-4	Female	30-40	Artisan (shawl)	
	RES-5	Male	60+	Cultural worker (retired)	
Business owner	BUS-1	Male	30-40	Guesthouse owner	To explore practical response actions and business model adjustments in response to pandemic challenges.
	BUS-2	Female	40-50	Restaurant manager	
	BUS-3	Male	30-40	Souvenir shop owner	
	BUS-4	Female	20-30	Cafe owner	
	BUS-5	Male	60+	Director of cultural courtyard	

DISCUSSION

Response actions to address the COVID-19 pandemic

The actions have been taken to address the COVID-19 pandemic is valuable to WHS, the OToL responded to the pandemic rapidly, and all stakeholders participated in fighting the COVID-19 campaign to mitigate the negative

impacts of the pandemic (see Figure 2). The actions to address the COVID-19 pandemic are organized in five aspects: effective government response management, strict pandemic prevention actions, application of technology, active participation of local communities and business owners, and public publicity and education (Table 2 presents the actions to address the pandemic in the OToL).

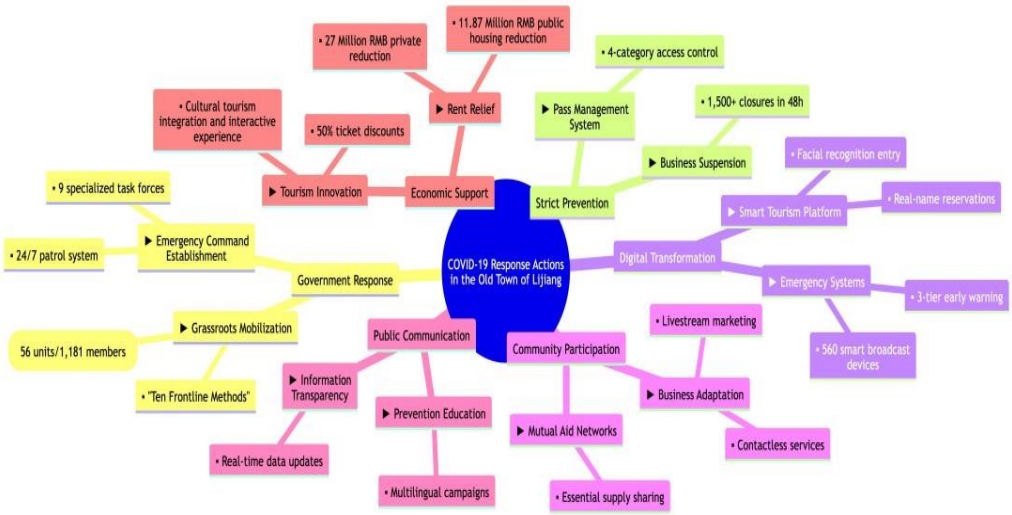


Figure 2: Mind map of the response actions in the OToL

Effective government response management

Establishing pandemic prevention and control headquarters

In response to the COVID-19 outbreak, the Old Town of Lijiang (OToL) swiftly established a pandemic prevention and control headquarters. As GOV-1 stated, "We had to act quickly and systematically—our immediate goal was to stop tourist flow and isolate risks." On January 25, 2020, the OToL World Heritage Conservation and Management Bureau issued a work plan to suspend tourist reception and launched an emergency response involving all staff. Nine specialized working groups were formed to handle access control, logistics, public information, market order, and merchant coordination. Over 20 checkpoints were set up at major entrances, and more than 1,500 businesses were closed within two days, leaving only essential services such as inns and pharmacies open. Meanwhile, a dedicated team assisted stranded tourists with refunds, relocation to guesthouses, and basic health monitoring.

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Strengthening Frontline Governance and Grassroots Mobilization in Pandemic Control

To strengthen the frontline of pandemic prevention in the OToL, the OToL Protection Administration, in collaboration with the OToL Management Co., Ltd., Dayan Street Office, the local law enforcement brigade, and the old town police station, implemented the "Ten Frontline Working Methods." Guided by the principle of "preventing external import and internal spread," these efforts aimed to refine responsibilities, reinforce measures, and establish the strictest defense line within the scenic area, effectively disrupting transmission routes and minimizing infection risks.

In addition, grassroots political mobilization played a vital role. According to GOV-1, "The success of our early containment efforts relied on both professional coordination and grassroots political leadership." The Party Working Committee of the OToL World Heritage Conservation and Management Bureau cancelled Spring Festival holidays and swiftly deployed 56 grassroots party organizations and 1,181 Communist Party members to the frontline. Under the guidance of the "five-leader" model, party members actively participated in joint prevention and control efforts, demonstrating a strong commitment to public safety and contributing to the stability and recovery of the old town.

Rental Relief for Public Housing and Private Tenants

To mitigate the economic impact of COVID-19 on the tourism sector, Lijiang allocated 30 million yuan in tourism development funds to support cultural and tourism enterprises through scenic spot construction, tourism promotion, and loan interest subsidies. The government also suspended a total of 15.24 million yuan in quality guarantee deposits for 87 travel agencies. Additionally, rent relief measures were introduced: 271 public housing tenants in the OToL received a three-month rent reduction totaling 11.87 million yuan. The OToL Protection Administration and Dayan Subdistrict Office also called on private landlords to reduce rents, resulting in over 27 million yuan in additional reductions. These joint efforts aimed to ease financial burdens and support business recovery during the suspension of tourism activities.

Tourism transformation and tickets discount

During the pandemic prevention and control period, Lijiang resolutely implemented a 50% reduction in ticket prices for state-owned scenic spots to benefit tourists. At the same time, efforts were made to develop new products and formats such as leisure vacation, health preservation, and cultural research and learning, promoting the transformation of the tourism industry from a "ticket economy" and "sightseeing economy" to a cultural tourism integration and

interactive experience. GOV-1 noted, “We used the pandemic period as an opportunity to rethink tourism—we encouraged innovation beyond the traditional sightseeing model.”

The OToL launches some cultural tourism innovation activities, such as the game map "My World: The Old Town of Lijiang" has been launched, along with the OToL national style Carnival and the introduction of "The Old Town of Lijiang: Floating Life" and Yunxi scripted murder mystery game. These new ways to experience the ancient town allow Lijiang's culture to be showcased through a "game + tourism + culture" model, providing visitors with a deeper immersive experience and boosting the development of Lijiang's cultural and creative industries.

Conduct emergency drills for pandemic prevention and control

To enhance emergency preparedness, the OToL conducted a COVID-19 drill simulating a real-life scenario in which a tourist from a high-risk area showed an abnormal temperature. The exercise covered all key procedures—from detection and reporting to isolation and disinfection—and involved full coordination among departments. GOV-1 stated, “Drills were not symbolic—they were essential to test and refine our coordination, speed, and decision-making in real scenarios.” The drill effectively assessed the scenic area's command system and emergency response capacity, while also improving staff awareness and readiness for future public health emergencies.

Strict pandemic prevention actions

Pass management, the Old Town of Lijiang formulates pandemic control measures

Since the suspension of tourist reception, the OToL pandemic control headquarters and its nine working groups have continuously adjusted their strategies based on evolving conditions. On February 5, 2020, they implemented the "Old Town of Lijiang Pass" system to regulate movement within the scenic area, issuing passes to original residents, business operators, stranded tourists, and migrant workers. As GOV-1 described, “Controlling who could enter and exit was one of the hardest yet most necessary decisions—we had to protect residents and preserve order.” This measure enhanced the control of entry and exit to ensure effective pandemic management. Meanwhile, business owners were promptly mobilized to close their shops. By January 26, 2020, all businesses except essential inns and pharmacies had shut down. Authorities also used WeChat, phone calls, and radio broadcasts to notify residents and business owners not to return until tourist reception resumed.

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Application of technology

The transformation and upgrading of tourism in Lijiang rely heavily on technological support. The development of smart tourism has played a crucial role in facilitating pandemic response and sustaining long-term tourism development. GOV-1 explained "We began developing smart tourism in 2019, and it has since become a vital tool in helping us respond effectively to the COVID-19 pandemic."

Since the reopening of the OToL on February 20, 2020, for visitors from Yunnan and other low-risk areas, smart tourism technologies have been fully utilized to manage visitor flow and ensure safety. Standard features such as online reservations, staggered visiting times, and capacity limits were introduced through Lijiang's smart tourism platform.

Smart services like online ticketing, facial recognition for entry, and self-guided tour systems have enhanced both visitor safety and satisfaction. When the number of tourists in the scenic area peaked at 20,000, the platform triggered a Level-3 warning. In response, 560 smart emergency broadcasts and 27 digital guidance screens were activated to support real-time crowd control and safe evacuation. To strengthen health and safety management, a smart terminal system was implemented requiring visitors to scan ID cards and complete real-name registration, replacing manual check-ins. These technologies have enabled safer, faster, and more efficient entry processes.

As the pandemic eased, business operations in the OToL gradually resumed. The number of entrance checkpoints was adjusted to 16, with staff working in rotating shifts to maintain 24-hour monitoring. Smart tourism has not only helped the OToL respond effectively to COVID-19 but has also laid the foundation for sustainable, tech-driven tourism management.

Active participation of local communities and business owners

During the interviews, both local residents and business owners demonstrated active engagement in addressing the negative impacts of the COVID-19 pandemic. All residents' respondents reported taking practical measures such as regularly disinfecting public and private spaces, sharing protective supplies and daily necessities, and forming mutual aid groups to support vulnerable families. "We helped each other through the hardest times—sometimes just delivering a bag of rice made a big difference," said a middle-aged resident (RES-2). Many also reported gradually adjusting their emotional state by learning more about the virus and actively cooperating with government efforts. "Once we understood what was happening, we stopped panicking and started doing what we could to help," noted a retired cultural worker (RES-5).

Business owners, meanwhile, adapted to survive financial hardship, particularly during lockdowns and business closures. Some had to lay off

employees or rent out parts of their premises to cover basic costs. “I had no guests, so I rented rooms to tenants just to make ends meet,” said one guesthouse owner (BUS-1). Many turned to smart technologies to transform their business models. Many business owners increasingly adopted e-commerce and social media platforms to promote and sell their products, implementing contactless services such as online reservations, deliveries, and self-pickup options. “Going online helped us stay in touch with customers—we had no other choice,” explained a souvenir seller and cafe owner (BUS-2,3). Based on the pandemic situation, many owners (BUS1-5) have flexibly adjusted employees' working hours and shifts to reduce the density of people in stores and ensure a safe working environment.

A particularly successful case is BUS-1, a guesthouse owner who began livestreaming on social media in early 2020. “I started by simply sharing stories about the Old Town and Naxi culture,” he recalled. His creative broadcasts attracted more than 1.7 million followers on TikTok and helped drive significant tourist interest in OToL. He now leads a network of 57 guesthouses in adopting livestreaming as a core marketing strategy. As BUS-1 said :“The pandemic forced us to change—and it turned out to be an opportunity.” Through a combination of mutual support, digital adaptation, and entrepreneurial resilience, both local residents and businesses have played a vital role in the community’s recovery and long-term transformation.

Public publicity and education

In order to reduce the panic and anxiety caused by the COVID-19 among local residents and cope with the psychological impact of the pandemic on local residents of the OToL. The OToL has strengthened publicity and education efforts, disseminating preventive knowledge and measures to local residents and tourists through various channels to raise awareness and create a strong community defense atmosphere. Additionally, actions for information transparency have been implemented, with timely disclosure of pandemic information and preventive measures to boost public confidence and reduce panic. This has united the residents of the old town to collectively combat the pandemic.

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Table 2: Summary of response actions to address the COVID-19 in the OToL and Supporting Respondent Code

Category	Description	Supporting respondent code
Effective government response management	Establishing pandemic prevention and control headquarters; Strengthening Frontline Governance and Grassroots Mobilization in Pandemic Control; Rental Relief for Public Housing and Private Tenants; Tickets discount and tourism transformation; Conduct emergency drills for pandemic prevention and control	GOV-1
Strict pandemic prevention actions	Implemented the "Old Town of Lijiang Pass" system	GOV-1
Application of technology	Smart tourism platforms for real-name registration, ticketing, facial recognition, crowd control, and early warning systems.	GOV-1
Active participation of local communities and business owners	Residents self-organized aid networks, disinfection, emotional adjustment; business owners turned to livestreaming, e-commerce, flexible shifts.	RES-1-5, BUS-1-5
Public publicity and education	Health education, transparent communication of pandemic updates, reducing panic and improving awareness among residents and tourists.	GOV-1

CONCLUSION

This study examined the response actions taken to address the COVID-19 pandemic in the OToL, a WHS in China. The findings highlight a comprehensive and coordinated response actions involving effective government response management, strict pandemic prevention actions, application of technology, active participation of local communities and business owners, and public publicity and education. These actions collectively contributed to the stabilization and recovery of tourism in the OToL while strengthening resilience at both institutional and community levels. The case of OToL offers practical insights for other World Heritage Sites seeking to enhance their preparedness and responsiveness to future crises. By integrating governance, technology, and grassroots engagement, OToL demonstrates a localized yet adaptable approach to crisis management in heritage tourism settings. This study has some limitations. It focuses on a single case study and

is based on qualitative interviews with a limited number of stakeholders. Therefore, the findings may not be universally generalizable. Future research could explore comparative cases across different heritage sites and examine how action strategies evolve over time, particularly in response to ongoing global challenges.

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REFERENCES

Baidu. (2022). *Introduction of Naxi minority*. Retrieved April 4, 2022, from https://baike.baidu.com/item/纳西族/130795?fr=aladdin

Bhatia, A., Roy, B., & Kumar, A. (2022). A review of tourism sustainability in the era of Covid-19. *Journal of Statistics and Management Systems*, *25*(8), 1871–1888.

Brouder, P. (2020). Reset redux: Possible evolutionary pathways towards the transformation of tourism in a COVID-19 world. *Tourism Geographies*, *22*(3), 484–490.

Bulchand-Gidumal, J. (2022). Post-COVID-19 recovery of island tourism using a smart tourism destination framework. *Journal of Destination Marketing & Management*, *23*, 100689.

Chibaya, T., & Mashokob, D. (2022). The Covid-19 pandemic on cultural heritage tourism in Zimbabwe: Post-Covid-19 recovery strategies. *The Dyke*, *16*(3), 1–21.

Fang, X. (2017). The discussion about the maintenance of authenticity of the culture and the relationship between hosts and guests of debugging in the development of ancient town tourism—Take Lijiang Ancient City as an example. *Hsmet*, *96*, 532–543. https://doi.org/10.2991/hsmet-17.2017.107

Gerami, F., Khan, N. A., & Hosseini, Z. (2022). Digitization of world heritage sites of Iran as a tool for facilitating online access during worldwide pandemic: Case study of Pasargadae World Heritage Site. *Library Philosophy and Practice (ejournal)*, 6564.

Google. (2024). *Old Town of Lijiang, Yunnan, China* [Map]. Google Maps. https://www.google.com/maps/place/Old Town of Lijiang Gössling, S., Scott, D., & Hall, C. M. (2020). Pandemics, tourism and global change: A rapid assessment of COVID-19. *Journal of Sustainable Tourism*, *29*(1), 1–20.

Hall, C. M., Scott, D., & Gössling, S. (2021). Pandemics, transformations and tourism: Be careful what you wish for. In *Global Tourism and COVID-19* (pp. 123–144). Routledge.

Higgins-Desbiolles, F. (2021). Socialising tourism for social and ecological justice after COVID-19. In *Global Tourism and COVID-19* (pp. 156–169). Routledge. Ioannides, D., & Gyimóthy, S. (2020). The COVID-19 crisis as an opportunity for

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escaping the unsustainable global tourism path. *Tourism Geographies*, *22*(3), 624–632.

Ismail, N., Masron, T., & Ahmad, A. (2014). Cultural heritage tourism in Malaysia: Issues and challenges. In *SHS Web of Conferences*, *12*, 01059. EDP Sciences.

Kuščer, K., Eichelberger, S., & Peters, M. (2022). Tourism organizations' responses to the COVID-19 pandemic: An investigation of the lockdown period. *Current Issues in Tourism*, *25*(2), 247–260.

Pavlic, I., Puh, B., & Miškovic, L. (2020). The perception of travellers and the world heritage site image. *Tourism*, *68*(2), 181–194. https://doi.org/10.37741/T.68.2.6

Qi, D. (2021). Study on the sustainable development of world heritage sites from the perspective of comprehensive tourism—Taking the Ancient Town of Lijiang as an example. *Foreign Economic Relations & Trade*, *3*, 107–111.

Sharma, G. D., Thomas, A., & Paul, J. (2021). Reviving tourism industry post-COVID-19: A resilience-based framework. *Tourism Management Perspectives*, *37*, 00786.

Sigala, M. (2020). Tourism and COVID-19: Impacts and implications for advancing and resetting industry and research. *Journal of Business Research*, *117*, 312–321.

Stankov, U., Filimonau, V., & Vujičić, M. D. (2020). A mindful shift: An opportunity for mindfulness-driven tourism in a post-pandemic world. *Tourism Geographies*, *22*(3), 703–712.

Timothy, D. J. (2011). *Cultural heritage and tourism: An introduction* (4). Channel View Publications.

Uğur, N. G., & Akbıyık, A. (2020). Impacts of COVID-19 on global tourism industry: A cross-regional comparison. *Tourism Management Perspectives*, *36*, 100744.

United Nations Educational Scientific and Cultural Organization (UNESCO). (2021a). *World Heritage in the face of COVID-19*. Retrieved June 26, 2022, from https://unesdoc.unesco.org/ark:/48223/pf0000377667?posInSet=1&queryId=e301e4b7-07f8-4127-89c5-1687ee921e30#

United Nations Educational Scientific and Cultural Organization (UNESCO). (2021b). *Living Heritage in the face of COVID-19*. Retrieved June 26, 2022, from https://unesdoc.unesco.org/ark:/48223/pf0000377671.locale=en

United Nations Educational Scientific and Cultural Organization (UNESCO). (2022a). *About World Heritage*. Retrieved June 26, 2022, from https://whc.unesco.org/en/about/

United Nations Educational Scientific and Cultural Organization (UNESCO). (2022b). *The Old Town of Lijiang*. Retrieved June 26, 2022, from https://whc.unesco.org/en/list/811

United Nations World Tourism Organization (UNWTO). (2020). *Tourism and COVID-19*. Retrieved June 17, 2023, from https://webunwto.s3.eu-west-1.amazonaws.com/s3fs-public/2020-03/COVID19_NewDS_0.pdf

United Nations World Tourism Organization (UNWTO). (2024). *COVID-19: Measures to support travel and tourism*. Retrieved June 26, 2024, from https://www.unwto.org/tourism-data/covid-19-measures-to-support-travel-tourism

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LOCAL-PHYSICAL TOURISM AMENITIES IN GUBUGKLAKAH VILLAGE, BASED ON SPACE CONFIGURATION

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Abstract

Gubugklakah village, as one of the tourist towns in the Mount Bromo Tengger Semeru area, needs significant efforts to strengthen its community by building a thematic village ready to serve tourists to recover from the downturn caused by the pandemic. The main concept is Desa Wisata, with local tourism facilities physically transforming into the image of Gubugklakah village, supported not only by community involvement but also by a sustainable tourism facilities sector. The tourism facilities provided by the community are in a sustainable tourism village on the hillside. The installation of these local facilities should involve the entire community, who are also the owners of the tourism community. These tourist facilities in Gubugklakah Village were developed by the community using local physical resources. Their placement is constrained by the topography of the village which can determine the spatial structure of the tourist facilities. This research examines the concept of establishing tourist facilities based on spatial configuration using space syntax techniques, to identify points of achievement and harmonize with community activities that have the potential for physical-local tourist facilities. The placement technique is determined by where individuals conduct their daily activities in areas that have the potential to become activity centers, how they are reached, and their distance from the main access. These activities are seen as having the potential to increase visitors' interest in using tourist facilities. Their local physical materials were used to shape the place. The resulting geographical structure was found to help the community assert its identity. In terms of community participation, these services fostered more trust and attachment to the place in remote mountainous areas.

Keywords: local-physical, amenities, mountainous

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INTRODUCTION

In the context of the quality of urban space, in addition to public space, other forms of space must be included in the urban fabric. These are community spaces that are shared by a group of people—a family or an institution—and are managed collaboratively by them (Praliya & Garg, 2019). Communal spaces are simply more regulated and organized versions of public places. They give all the benefits of public areas while reducing negative side effects such as crime, trash accumulation, and so on. It can be observed here that public engagement is crucial in presenting these shared areas. This research aims to show how common spaces as tourist facilities are utilized to strengthen the resilience of tourist villages after the pandemic.

The presence of communal spaces in a community of citizens is critical to fostering citizen engagement. Citizen participation in community affairs is significantly influenced by the social environment, as evaluated by the overall level of social cohesion, and the physical environment. Without a doubt, the demonstrable effect of communal space was indisputable. Indeed, community spaces indirectly promote citizen involvement by encouraging the development of place-based social capital as well as neighborhood attachment (Zhu, 2015).

LITERATURE REVIEW

Mountainside communities, in contrast to other types of settlements, have limited communal spaces. Contoured topography, generally linear and even scattered settlements, low temperatures, and more frequent rainy weather cause residents to want to meet with their families in their own private spaces. At first inspection, the space between buildings appears to be either a communally owned community space or a state facility meant for public use. On the mountain slopes, however, this is not the case. Some of the spaces between the buildings are privately owned. It is imperative to recognize that empty fields and land, which are primarily under private ownership, are being left unused and open to public access without authorization. It still includes the village area (Nuryanto & Rahaju, 2007). In this situation, communal space includes not just public space but also space organized by the community in a self-help or participatory manner. So, in this scenario, communal space is not just space for the public, but also space organized by the community in a self-help/participatory manner.

Kampong Koena is a new thematic kampong in Gubugklakah tourism village that focuses on locally wise tourism services. Tourists visiting this village are treated as guests in a residence. In this concept, individuals are served and welcomed as if they were distant relatives visiting. Tourists who want to visit Mount Bromo will be served with the usual hospitality of this Muslim Tengger tribe, in addition to staying in people's houses. Changes in communal space are quite likely to occur because of the attempts to realize this thematic village. This tourist village is characterized by tourist amenities such as homestays, small

businesses, and local handicrafts, indicating that entrepreneurial activities are supportive of tourism. Shared spaces are designed based on a multitude of socio-economic and socio-cultural functions. Communal spaces have a high intensity of use and social use, demonstrating the importance of communal space function in daily community activities (Ariestadi et al., 2018). As one of the tourism facilities linked to the local environment, changes to this community space are unavoidable. Classification based on these functions can distinguish two categories of amenities. (Table 1)

Table 1. Kinds of communal spaces, such as socio-economic and socio-cultural

Socio-economic Amenities	**Socio-cultural Amenities**
Homestay	Kampong
Gift shop	Terrace
Craft shop	Fields
Culinary	Corridor
Small trade	Crossroad

Source: (Ariestadi et al., 2018)

Tourist amenities were initially part of the land use plan, and they are also regional public facilities. As a result, regional public facilities influence the location of tourism facilities. Various domestic and global research on the influence of regional public facilities on the location of tourism facilities have been conducted. Shimizu noted that for the tourism business to create jobs and attract foreign currency, the central government typically must establish public infrastructure such as water supply, sewage systems, ports, airports, parks, motorways, and so on. (Shimizu & Okamoto, 2022). Others suggested first developing infrastructure, such as accommodation facilities, restaurants, transportation facilities (airports, trains, etc.), ensuring security, conducting more promotional activities, lowering tour fees, and so on, to satisfy tourists' interest, which is very beneficial to the tourism industry. (Islam & Akter, 2021). Khan discovered that the primary variables influencing the tourism business and even the world economy are peace, natural beauty, transportation facilities, friendliness, good hospitality of the people, and historical landmarks. (Khan et al., 2020). In addition, Wang noted that strategic location selection, such as proximity to train stations and car parks, heavily influences the operational performance of international tourist hotel operations (Wang et al., 2021). Y. L. Ding et al. also revealed that transport and parking convenience, as well as distance from public facilities, are important criteria in homestay site selection (Zhang et al., 2022). Both stated that the evaluation and planning of regional tourist towns should integrate transportation-related facilities and organizations (e.g., aviation, shipping, railways, highways, tour bus services, and cruise ship

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operators), local or federal public facilities, local schools at all levels, and other resources and services.

Some researchers noted that undesirable facilities affect the quality of life of residents in neighboring areas, jeopardize their safety and health, and reduce property values, thus affecting the location of local tourism facilities (Hu et al., 2019). However, these undesirable facilities are necessary for the operation of the entire community. Rong used multicriteria evaluation to select cemetery sites (Ma et al., 2022).

They found that public facilities, generally have the belief that "it will never be in my backyard" in terms of undesirable facilities such as thermal power plants, sewage treatment waste disposal, petrol tanks, gas stations, waste treatment plants (incinerators), cemeteries (crematoriums), funeral cemeteries, columbariums, electrical substations, prisons, nuclear power plants, and nuclear waste storage sites.

As with other mountainside tourist villages, the placement of conceptualized tourist facilities requires a special approach. Contoured land conditions, relatively linear and even scattered settlements, low temperatures, and more frequent rainy weather, cause residents to prefer to gather with their families in their private spaces. Tourists will also need extra energy to reach the facility. A tourist facility is unquestionably a publicly owned space designed for communal or public use. However, this is not the reality found on the slopes of the mountains. Some of the spaces between buildings are privately owned. Empty land, and fields, which are used for daily activities, and sports, are mostly private property that has not been utilized and is then left to be used by the public until one day they use it. Even historically, it still includes the village area (Nuryanto & Rahaju, 2007). Therefore, the tourism facilities needed in the development of a tourism village are not just spaces for the public but also organized by the community in a self-help/participatory manner. To determine the appropriate placement of tourist facilities for tourists, space syntax analysis can help through the connectivity of the movement patterns of tourists and residents. The many tourist facilities in Gubugklakah Tourism Village that highlight local wisdom-based tourism services give hope to tourists visiting this village to get services as guests in residence. In the concept, they are served and welcomed like distant relatives who come to visit. In addition to staying in people's homes, tourists who want to go to the tourist destination of Mount Bromo will be served the typical hospitality of this Muslim Tengger tribe.

Gubugklakah Village consists of several linear alleys that are home to its residents. The advantages of this village, in addition to its strategic location on the main route to the destination of Mount Bromo Tourism, are also the potential kinship and cohesiveness of its citizens in realizing their village as a tourist village. Various efforts are made to reinforce the identity of the tourist village by strengthening the character of the village with the use of local materials, either in

terms of history or abundance in the vicinity, in existing tourist facilities. The placement of tourist facilities that play an important role in optimizing the tourism industry in Gubugklakah village, is a long-term step that can involve the village community as the owner of Gubugklakah tourism village.

RESEARCH METHODOLOGY

This study will employ a quantitative research strategy based on space syntactic analysis. The data required is a map of the area showing the main circulation routes, secondary roads, and building masses in the study area. Topographical conditions are also needed to confirm its role in the placement of building masses and tourist facilities. The space syntax analysis tool can deliver results in the form of spatial configuration. Space configuration is a container with a relationship in which things are associated with one another to establish an area structure that humans can use in carrying out their daily activities. Knowing the shape or structure of the area created based on the values at the three stages of analysis, namely connectedness, integrity, and intelligibility, is one of the outputs of this analytical activity. These data can help to support the study's findings as well as the theory utilized, namely the urban form. Space Syntax is the creation of a new theory that views space as a part of social activity (Hillier, 2007). Several modifications of this theory occurred in tandem with the development of new techniques for spatial analysis, particularly computer-based analysis, over time. The 'configuration notion' is the main result of this development. Produce of quantitive measure of configuration using depthmap tools to be modeling analyze, it has a produce of axial mapping with colour indicator. Red colour means a highly integration number from the space, blue colours mean lowest number of integration space. Where configuration is defined as a co-presence-induced relationship or linkage. Building by investigating the impact of building design and innovation on the workplace. A syntaxis overlay use to analyze about the correlation between space and social movement in area. Result from this step uses as a basic concept to creating a tourism facility. Steadman did another space syntactic study in which he enumerated building shapes using geometric clarification, construction indicators, and environmental restrictions (Shayesteh & Steadman, 2015). Overall, space syntax will emerge as a new paradigm in spatial planning research that can be integrated with a variety of different methodologies. This is what space syntax accomplishes; it can combine physical and social data into a single picture display and attempts to understand how humans create and use spatial configurations in social and cultural interactions in the built environment (Prasasti et al., 2015).

RESULTS AND DISCUSSION

Increase the visual potential of tourist facility linkages to strengthen post-pandemic tourism community resilience. The location of tourist amenities based

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on geographical factors demonstrates the sustainability of tourism facilities. The impact of various characteristics of geographical conditions on the location of tourist facilities influences the indicators of placement of tourist facilities. According to Navratil, several indicators and analyses determine, among others, spatial indicators, nearest neighbor analysis, kernel estimation of the level of probability of occurrence, and analysis of distances and locations in certain environments (Navrátil et al., 2012)

The dominant trend in homestays is moving from urban areas to cooler upland areas and ponds in rural areas. If the guesthouse or homestay is closely linked to the main access, then the campgrounds and resorts are located near the water's surface in warmer areas. In accommodation facilities, the proximity function is formed - related to the distance of the location of a tourist attraction (Prideaux, 2002), because tourists generally want to be within walking distance of a tourist spot.

Apart from these two geographic issues (temperature and distance), another important element of the selection of the location of a tourist facility is the benefit of the agglomeration of economic activities, which precedes entrepreneurial entities in creating spatial clusters (Porter, 2000). However, socio-cultural factors must also support this aspect of the community. An important variable in creating spatial clusters is the size of the cluster, namely the size of the communal space and its relationship to the socio-economic and cultural activities of the community. Gubugklakah has a high slope topography and a single linear access (Figure 1), therefore the visual configuration revealed by space syntactic analysis emphasizes the upward and turning circulation of the primary route.

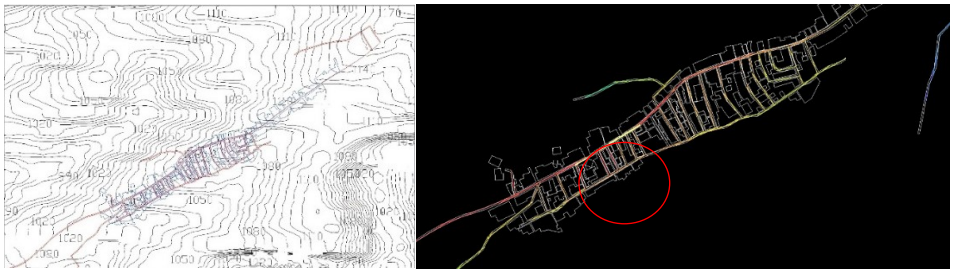


Figure 1. Axial Mapping area

Axial mapping is formed from the combination of topography and accessibility of the area, which is syntactically seen in the color of the circulation lines. The visual configuration that occurs is developed to get the best point visually, the closest access, and has the potential as a placement point for tourist facilities. The results in Figure 2 were compared to field observations to establish the potential for socio-cultural activities.

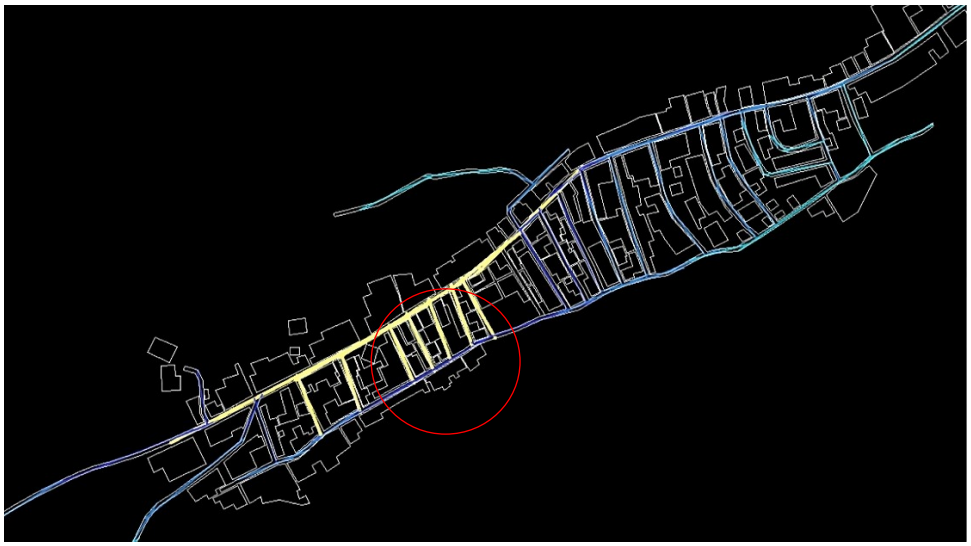


Figure 2. Selection of the highest connectivity

Each circulation line within the potential area has a different connectivity and line length. The line that shows a high connectivity number and the longest line, is potentially the most easily and widely accessible gathering area (zero depth step). The steps depth of each circulation related to the main path supplied in Table 2 is specified to support the spot area as a social place.

Table 2. Result of shortest step depth for placement of tourist facilities.

Ref Number	Connectivity	Line Length	Step Depth
92	11	272.61	0
0	4	103.22	1
84	9	238.61	1
85	6	177.07	1
86	6	155.12	1
90	5	113.54	1
93	4	108.8	1
95	3	107.32	1
96	4	103.84	1
98	7	253.16	1
99	10	439.67	1
100	4	104.85	1

Based on the results of the axial area mapping and the selection of the highest connectivity area, the researcher then compared it with the activities of residents and the condition of space utilization by the community as a tourist facility. The result is that all areas with potential in connectivity and accessibility have potential activities that support tourism activities. The use of physical

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elements of local space and buildings is utilised for tourist amenities. Some of the activities carried out include making gates, signages, optimising residentials as homestays, strengthening landmarks as regional icons, and community communal areas that become places for local cultural activities. The visual changes that occur between the conditions before and after the economic use of local physical materials make the residential area a tourist amenity with a local character that is different from the others.

The designation of a high-connectivity area necessitates a shift in the function of residential space into homestay tourism facilities in Gubugklakah Village, as evidenced using local materials on the facades of buildings that reflect the village's history, both in socio-economic and socio-cultural tourism facilities. This strengthens the relationship between community ownership of these facilities. The conditions before and after the change are shown in the following figure 3.

Before	after
	
	



Figure 3. The condition before and after the change.

CONCLUSION

This study shows how Gubugklakah is attempting to develop local physical character-based tourism to build the resilience of a post-pandemic tourist village. The placement of tourism amenities promotes connectivity to the village's main axis and the shortest reach of the main axis. During the spatial limitations of Gubugklakah Village, communal space is one of the spaces utilized as tourism amanities, especially in the most visual connectivity areas. Through space syntax, the intersection between connectivity and accessibility can be found there. Some types of communal space in Gubugklakah Village are categorized as empty land, which is owned by residents and has not been optimally utilized as tourist

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infrastructure. The connectivity and accessibility of the areas formed show that some are still used as areas of daily activity for residents. The second area is the terrace or yard of the house, the front part of the house that is used for residents' activities, as well as being used as an area for interaction between residents. This terrace/yard has the potential to be a social space that shows a culture of cooperation between villagers. At specific times, the third space is exclusively designated for socializing by the residents. This place is deliberately made by placing it on a special building object, such as a musholla, or in the middle of a residential corridor. The fourth place is a street intersection, that is used by residents before starting their morning activities. The intersection is a public space that can be used for various cultural activities. The next place is a highway, a village road that serves as a public space that doubles as a circulation path as well as a space for residents' activities. The end of the alley is a node of community activities that is also used as a signage of the Gubugklakah Village tourism area. The utilisation of local physical elements in this tourist amenity changes the socio-economic tourist amenity to a socio-cultural one.

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DISCLOSURE STATEMENT

The authors declare that there are no conflicts of interest regarding the publication of this article. No financial or personal relationships have inappropriately influenced the content or interpretation of this research. All views expressed in this manuscript are solely those of the authors and do not represent the positions of their affiliated institutions.

REFERENCES

Ariestadi, D., Sudikno, A., Wulandari, L., & Surjono, S. (2018). Identification of communal space in historical multi-ethnic city of Gresik. In *AIP Conference Proceedings* (Vol. 1977). https://doi.org/10.1063/1.5042993

Hillier, B. (2007). *Space is the machine: a configurational theory of architecture*.

Hu, H., Zhang, J., Wang, C., Yu, P., & Chu, G. (2019). What influences tourists' intention to participate in the Zero Litter Initiative in mountainous tourism areas: A case

study of Huangshan National Park, China. *Science of The Total Environment*, *657*, 1127–1137. https://doi.org/10.1016/J.SCITOTENV.2018.12.114

Islam, S. M. F., & Akter, Sk. R. (2021). Problems and Prospects of Tourism Industry in Bangladesh: A Study on Cumilla District. *South Asian Journal of Social Studies and Economics*, *10*(4), 27–35. https://doi.org/10.9734/sajsse/2021/v10i430271

Khan, N., Hassan, A. U., Fahad, S., & Naushad, M. (2020). Factors Affecting Tourism Industry and Its Impacts on Global Economy of the World. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3559353

Ma, X. L., Wang, R., Dai, M. L., & Ou, Y. H. (2022). The action logic and interpretation framework of residents' resistance in rural tourism development. *Journal of Hospitality and Tourism Management*, *51*, 79–87. https://doi.org/https://doi.org/10.1016/j.jhtm.2022.02.031

Navrátil, J., Švec, R., Pícha, K., & Doležalová, H. (2012). The Location of Tourist Accommodation Facilities: A Case Study of the Šumava Mts. and South Bohemia Tourist Regions (Czech Republic). *Moravian Geographical Reports*, *20*, 50–63.

Nuryanto, N., & Rahaju, S. (2007, October 14). Kajian Fenomenologi-Hermenitik pada Ruang Publik Arsitektur Vernakular Sunda dan Prospek Pemanfaatannya: Kasus Kampung Ciptarasa dan Ciptagelar, Sukabumi-Jawa Barat. *Conference of LPPM Institut Teknologi Bandung (ITB)*.

Porter, M. E. (2000). *Economic Development Quarterly / February 2000 Porter / Local Clusters Research and Practice Location, Competition, and Economic Development: Local Clusters in a Global Economy*.

Praliya, S., & Garg, P. (2019). Public space quality evaluation: prerequisite for public space management. *The Journal of Public Space*, *Vol. 4 N. 1 | 2019 | FULL ISSUE*, 93–126. https://doi.org/10.32891/jps.v4i1.667

Prasasti, I., Suwarsono, N., & Mustika, S. (2015). The Effect of Environmental Condition Changes On Distribution Of Urban Heat Island In Jakarta Based On Remote Sensing Data. In *International Journal of Remote Sensing and Earth Sciences* (Vol. 12, Issue 1).

Prideaux, B. (2002). Building Visitor Attractions in Peripheral Areas – Can Uniqueness Overcome Isolation to Produce Viability? *International Journal of Tourism Research*, *4*, 379–389. https://doi.org/10.1002/jtr.387

Shayesteh, H., & Steadman, P. (2015). Coevolution of urban form and built form: a new typomorphological model for Tehran. *Environment and Planning B: Planning and Design*, *0*, 0. https://doi.org/10.1068/b140002p

Shimizu, T., & Okamoto, H. (2022). Tourism infrastructure and the environment: how does environmental regulation affect welfare, tourism industry, and domestic wage inequality? *The Japanese Economic Review*. https://doi.org/10.1007/s42973-021-00109-4

Wang, N., Fang, M., Beauchamp, M., Jia, Z., & Zhou, Z. (2021). An indigenous knowledge-based sustainable landscape for mountain villages: The Jiabang rice terraces of Guizhou, China. *Habitat International*, *111*, 102360. https://doi.org/https://doi.org/10.1016/j.habitatint.2021.102360

Zhang, Y., Qin, H., Ye, Y., & Ding, W. (2022). The effect of low impact development facilities on evapotranspiration in an outdoor space of urban buildings. *Journal of Hydrology*, *608*, 127647. https://doi.org/10.1016/J.JHYDROL.2022.127647

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Zhu, Y. (2015). Toward community engagement: Can the built environment help? Grassroots participation and communal space in Chinese urban communities. *Habitat International*, *46*, 44–53. https://doi.org/10.1016/J.HABITATINT.2014.10.013

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EXAMINING THE EFFECTS OF PERCEIVED VALUE ON BEHAVIORAL INTENTION OF GREEN TOURIETS IN HULUNBUIR GRASSLAND, CHINA

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Abstract

This paper reviews relevant research on green tourism, extends the Theory of Planned behavior (TPB) model, perceived value, and Stimulus-Organism-Response (SOR) theory, and develops a mechanism model to investigate how perceived value influences green tourists' behavioral intentions in the context of the Hulunbuir Grassland. To address the research gap concerning the underlying mechanisms influencing tourists' behavioral intentions in the context of green tourism, this study collected and analysed data from 311 green tourists. Statistical techniques were employed to examine the data, and Structural Equation Modeling (SEM) was used to test the proposed hypotheses and validate the theoretical framework. Empirical findings indicate that perceived value consists of four dimensions—environmental, emotional, functional, and social value—with environmental value exerting the strongest positive influence on green tourists' behavioral intentions. However, the effects of behavioral attitude and perceived behavioral control on behavioral intention were found to be statistically insignificant, whereas subjective norms exhibited a significant influence. The primary contribution of this study lies in the integrated application of the Theory of Planned Behavior (TPB), perceived value theory, and the Stimulus–Organism–Response (SOR) framework to the context of green tourism. This comprehensive theoretical model underscores the pivotal role of perceived value in shaping tourists' behavioral intentions. This provides a scientific basis and practical guidance for policy formulation aimed at green tourism development in Hulunbuir Grassland, thereby promoting its sustainable tourism growth. The novelty of the research stems from its comprehensive analysis of these roles of environmental, emotional, functional, and social values in green tourism through a multidimensional approach to perceived value, addressing gaps in existing literature and enhancing the understanding of factors affecting green tourists' behavioral intentions.

Keywords: Perceived Value, behavioral Intention, TPB, Green Tourism

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INTRODUCTION

The tourism industry is one of the most visible and rapidly growing sectors in the global economy, playing a crucial role in driving national economies (Manzoor., 2019). While tourism is recognized for its role in promoting economic advancement, it also brings about significant detrimental impacts. The environmental impacts of the tourism industry have become increasingly prominent. Many studies show that tourism is one of the main causes of global warming (Koçak et al., 2020). Tourism-related direct carbon emissions are estimated to contribute approximately 5% to the world's total carbon output. (Li et al., 2022). These impacts can cause long-term damage to local ecosystems, weakening the sustainability and attractiveness of the tourism industry.

As the concept of sustainable development has penetrated the tourism industry, the concept of green tourism has emerged globally as a key industry for balancing economic development and environmental conservation. As a balanced industry, green tourism expands and strengthens the link between tourism and conservation (Stronza, Hunt, & Fitzgerald ,2022). Green tourism emphasizes environmental protection, sustainable development, cultural preservation, and the promotion of environmental awareness and responsibility among tourists through tourism activities. Once the concept of green tourism was introduced, it was widely recognized by the international community and academics. Staying in green hotels reflects positive environmental behavior (Song & Soopramanien, 2019), green management improves the sustainable performance of the tourism industry (Raharjo.,2019), and green tourism can act as a catalyst for economic restructuring, provide population stability. There is broad scholarly consensus that green tourism, as a sustainable form of tourism, plays a vital role in shaping the growth and competitiveness of emerging tourist destinations. (Lu et al., 2021). In this context, the study of green tourism is crucial to better understand and promote the sustainable development of tourism destinations. This research focuses on analysing the effect of perceived value on tourists' behavioral intentions in the Hulunbuir Grassland, with the objective of constructing a theoretical model to explain the behavioral dynamics of green tourists in this region. The results of this study will provide deeper insights into the tourism industry in the Hulunbuir grasslands and thus facilitate the transition of tourism towards the goal of sustainable development.

LITERATURE REVIEW

SOR model

SOR model holds that external stimuli produce emotional changes through individual subjective active processing. After 1982, some scholars gradually introduced SOR model into marketing and consumer behavior, and established the theory that the stimulus generated by marketing environment or marketing

content affects purchasing decision by changing consumers' internal perception. In this paper, SOR model is used to understand the individual psychological state and physiological state of tourists. Tourists' perceived value to Hulunbuir Grassland is an external stimulus, which is ultimately reflected in tourists' individual behavior (behavioral intention), in which behavioral attitude, behavioral norms and perceived behavior control are organic variables.

Stimulus variable: Perceived Value

The concept of perceived value as a stimulus variable in the SOR model derives from consumer behavior theory, which considers consumers' feelings and attitudes to understand their tendency to be attracted to products or services (Y. Yu et al., 2023). This paper is based on an analysis of the current state of green tourism in the Hulunbuir Grasslands. It proposes that the perceived value of green tourists can be divided into four categories: environmental, social, emotional and functional. Bala.(2023) pointed out that environmental value affects people's willingness to buy organic and environmentally friendly products. Therefore, the environmental value of green tourism in this paper refers to the perceived value tourists place on the protection, uniqueness of the natural landscape, biodiversity, and ecosystem. Social value includes the value of the product in enhancing the social status or significance of the consumer in the social circle, including the recognition and appreciation of others (Zhang et al., 2020). Based on these concepts, taking Hulunbuir Grassland as the background, this paper defines tourists' social perceived value of green tourism as the perceived utility of tourists' communication with specific social groups. Emotion is an important factor affecting social behavior (Iweala et al., 2019). In this study, emotional value refers to the affective benefits that green tourists derive from engaging in green tourism activities.Watanabe et al. (2020) believe that the perceived practical value of organic food is closely related to its functional value.The functional value of green tourism mentioned in this paper refers to the value obtained by green tourists when they choose Hulunbuir Grassland as a tourist destination.

Organismic variables: Behavioral Attitudes (BA), Behavioral Norms (BN) and Perceived Behavioral Control (PBC)

TPB is a universally applied and suggested theory for predicting human behavior that claims individuals tend to act by changing their attitudes (Darmansyah et al., 2020). This study adopts TPB as the theoretical basis because it is suitable and able to explain the relationship between the key variables and factors of this study. Based on analyzing the current situation of green tourism in Hulunbuir City, the paper proposes three dimensions of green tourism planning behavior theory: Green Tourism Behavior Attitude(GTBA), Green Tourism Subjective Norms(GTSN), and Green Tourism Perceived Behavioral Control(GTPBC).

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Behavioral attitude refers to an individual's overall evaluation of a specific behavior, reflecting both positive and negative perceptions, and indicating their tendency to support or oppose engaging in that behavior.

SN is an individual's perception of social pressure when performing a certain behavior. Therefore, individuals' beliefs and behaviors may be shaped by influential figures in their social environment, such as family, religious authorities, or political figures (Ghaderi et al., 2019).Individuals are influenced by important people or organizations around them when deciding whether to perform a behavior, which affects their behavioral decisions.

PBC describes how individuals evaluate the potential obstacles they might face when attempting to carry out a specific behavior. PBC is based on the belief that control is available. These beliefs are related to factors that may promote or hinder the implementation of the behavior, including required skills and abilities, time, money, and other resources (Ajzen, 2020).

Response variable behavioral Intention

Tourists' BI are a critical area of interest for the tourism industry, significantly influencing destination development (Afshardoost & Eshaghi2020). Drawing from existing literature, this paper posits that tourists' green tourism behavioral intentions encompass their tendencies in selecting tourism destinations, engaging in tourism activities, and utilizing environmental resources (Ibnou-Laaroussi et al., 2020). These intentions involve tourists' willingness and behavior concerning their choice of destinations, modes of participation in tourism activities, and efforts in protecting and sustainably using environmental resources (Shen & Shen., 2021).

Research hypotheses

Relationship between PV and BA, SN and PBC

Tran & Le.,(2020) stated that perceived value, as a new paradigm, is a crucial prerequisite for forming behavioral intentions. Previous studies have consistently demonstrated that perceived customer value serves as a robust predictor of both customer satisfaction and consumers' purchase intentions.PV encompasses perceived benefit and perceived risk (Loh & Hassan, 2022). An elevated perceived value in green tourism is typically linked to more positive tourist attitudes toward such experiences. At the same time, perceived value is not fixed; it can vary across individuals based on personal needs and contextual factors, and may also be shaped by the influence of others. This is because consumers are affected by their friends, relatives, co-workers, business associates, or others around them.

Accordingly, the following hypothesis is formulated.

H1: PV positively impacts BA.
H1a: EV positively impacts BA.
H1b: SV positively impacts BA.
H1c: EMV positively impacts BA.
H1d: FV positively impacts BA.
H2: PV positively impacts SN.
H2a: EV positively impacts SN.
H2b: SV positively impacts SN.
H2c: EMV positively impacts SN.
H2d: FV positively impacts SN.
H3: PV is positively related to PBC
H3a: EV is positively related to PBC
H3b: SV is positively related to PBC
H3c: EMV is positively related to PBC
H3d: FV is positively related to PBC

The association among PA, SN, PBC and BI

Lee et al. (2020) **found** that both attitude and telepresence **act as mediators** influencing **BI** in the relationship between VR quality factors and **BI.** The findings of Hassan et al. (2021) demonstrated that PA and PBC were key predictors positively influencing BI in ecotourism settings. SN **mean** that individuals are influenced by important people or **organizations** around them in their **behavioral** choices. The more supportive the people or **organizations** around them are, the stronger the willingness to perform, and the less pressure the individual feels. Numerous scholars have argued that individuals' **BI** are significantly influenced by external pressures(Saari et al., 2021). Lin & Roberts. (2020) **conducted an in-depth study** on TPB and proposed that SN **is considered the main predictor** of **BI** influencing food security. In addition to their personal **behavior**, tourists participating in green tourism to the Hulunbuir Grassland are often influenced by their family, friends, colleagues, the media, and other surrounding environmental factors. Positive media representation of the Hulunbuir Grassland, coupled with social support from family and friends, can significantly enhance tourists' willingness to revisit and their likelihood of recommending the destination to others. In contrast, negative media coverage or lack of social endorsement may reduce these intentions. Ajzen. (2020) argues that the behavior of individuals is very complex, and that the behavior of individuals can be affected by other people or factors in addition to their own attitudes and intentions. These factors may hinder or constrain consumers from producing actual **behavior**. Therefore, Ajzen's Theory of Planned Behavior (TPB) extends the Theory of Reasoned Action by incorporating the construct of PBC, thereby enhancing its explanatory power. In tourism-related research, PBC

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has been empirically validated as a mediating factor influencing consumers' intention to repurchase hotel mobile payment services Sun et al.(2020). Based on this theoretical foundation and prior findings, the following hypotheses are proposed:

H4: PA, SN, PBC positively impact BI
H4a: PA positively impacts BI
H4b: SN positively impacts BI
H4c: PBC positively impacts BI

The influential relationship between PA and BI

It has been argued that analysing behavior through perceived value provides a better understanding of **behavior** (Oriade & Schofield, 2019). Perceived value is the most **critical determinant** of customer **behavior** (Peng et al., 2019). Perceived value tends to influence human behavioral intention by affecting its two main dimensions. A high perceived value of a product or service increases consumers' willingness to reuse it, thus strengthening their intention to revisit. Afshardoost & Eshaghi, (2020) stated that expectations and perceived value **have a greater effect** on **revisit intention** than satisfaction and visitor management. Most of the related literature confirms a significant positive relationship between PA and BI (Ghorbanzadeh et al.,2021). Accordingly, the following hypothesis is formulated:

H5: PV positively impacts BI
H5a: EV positively impacts BI
H5b: SV positively impacts BI
H5c: EMV positively impacts BI
H5d: FV positively impacts BI

Based on prior research, this study developed a conceptual model, as illustrated in Figure 1.

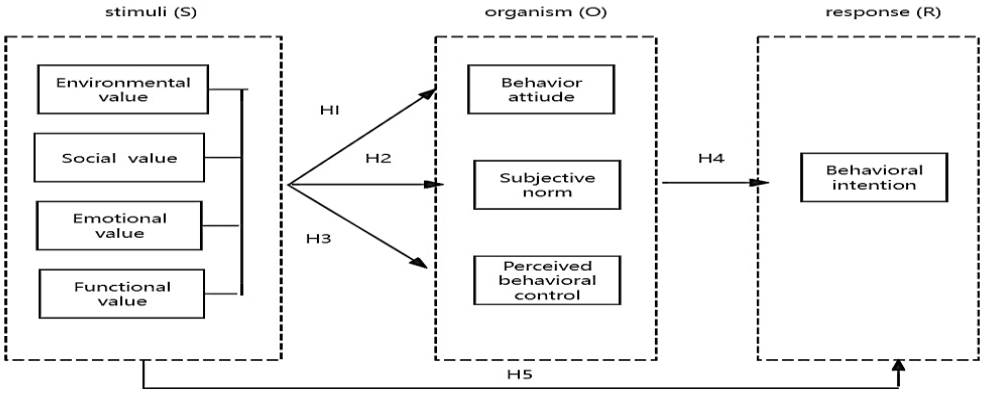


Figure 1: Conceptual model
Source: Author's Analysis

RESEARCH METHODOLOGY

Data collection

The Hulunbuir Grassland was selected as the study site owing to its abundant ecotourism resources and its prominence as a major green tourism destination that appeals to environmentally conscious travellers. The respondents of this study were green tourists. The study population included Chinese green tourists who had visited or were currently visiting the Hulunbuir Grassland. Since green tourists differ from ordinary tourists and no specific tourism organization in China caters exclusively to them, the AAAA National Wetland Park in the Hulunbuir Grassland was selected for this study due to its high ecological protection requirements. This study involved the design and distribution of a self-administered questionnaire to tourists visiting or travelling to the Hulunbuir Grassland. The data were analysed using SPSS and AMOS software, with SEM methodology providing descriptive and statistical results.

Measures

This study employed a five-point Likert scale for all items, with response options ranging from 1 ("totally disagree") to 5 ("strongly agree"). The formal questionnaire was collected in the AAAA National Wetland Park of the Hulunbuir Grassland, which was primarily frequented by tourists visiting the Hulunbuir Grassland. Three hundred seventy-four people participated in filling out the questionnaire from May 1 to May 15, 2024, of which three hundred eleven questionnaires were valid, resulting in an effective recovery rate of 83.1%. The valid questionnaires were statistically analysed, as shown in Table 1.

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ANALYSIS AND DISCUSSION

Profile of respondents

Table 1 presents the demographic and general characteristics of the 311 respondents who participated in this study. Firstly, the number of men and women is relatively balanced, approximately 9:10. Individuals aged 26 to 55 years make up 80.39%, indicating that the primary demographic engaging in green tourism at the Hulunbuir Grassland is middle-aged individuals. Their incomes are predominantly in the range of 5,000 yuan. Given their age, most hold a bachelor's degree.

Regarding respondents' occupations, 43.9% are employees of enterprise companies, followed by freelancers (17.04%) and students (12.86%). Age, education, and income enable the respondents to have a certain level of knowledge about green tourism and the means to choose green tourism options. Based on this analysis, it can be concluded that the respondents in this study are representative.

Table1: Sample profile(n=311)

		N	%
Gender	Male	148	47.59
	Female	163	52.41
Age	18-25	40	12.86
	26-35	76	24.44
	36-45	112	36.01
	46-55	62	19.94
	56-65	21	6.75
Educational level	High school or below	42	13.5
	associate degree	121	38.91
	Bachelor's Degree	133	42.77
	Master degree or above	15	4.82
Monthly income (¥)	Less than3,000	65	20.9
	3,000 to 5,000	149	47.91
	5,000 to 10,000	76	24.44
	Greater than 10,000	21	6.75
Job	Student	40	12.86
	Party and Government Organizations	7	2.25
	Institutions	38	12.22
	Employees of enterprises and companies	134	43.09
	Self-employed	13	4.18
	Freelancers	53	17.04
	Farmers	1	0.32
	Retirees	20	6.43
	Military Personnel	4	1.29
	Others	1	0.32

Source: questionnaire survey &Author's Calculation

Reliability and Validity analyses

Table 2 reports a Cronbach's Alpha of 0.936 for the questionnaire, indicating excellent internal reliability based on SPSS 22.0 analysis. This value exceeds the commonly accepted threshold of 0.900, suggesting excellent internal consistency of the instrument. CR values for each dimension of the research constructs exceeded the threshold of 0.70, suggesting satisfactory internal consistency and overall reliability of the questionnaire. As shown in Table 3, the overall KMO of the questionnaire in the KMO Bartlett's test is 0.936. This high value, approaching the upper bound of the scale, indicates excellent sampling adequacy and confirms that the data are appropriate for conducting factor analysis, suggesting that meaningful underlying factors can be extracted. KMO measures for each variable dimension are above 0.685, reflecting a suitable level of sampling adequacy and confirming the robustness of the questionnaire's construct validity. Combining the above analyses, further modelling can be done. The analysed parameters for each dimension of model reliability and validity are presented in Table 2.

Table 2: The summary table of reliability and validity analysis parameter

Factors and Items	Item	Standardized Factor loadings	Cronbach's Alpha	CR	AVE	KMO
Environmental Value(EV)	EV1	.79	.87	.83	.62	.74
	EV2	.79				
	EV3	.79				
Social Value(SV)	SV1	.79	.90	.86	.60	.84
	SV2	.76				
	SV3	.78				
	SV4	.76				
Emotional Value(EV)	EV1	.79	.93	.88	.60	.91
	EV2	.75				
	EV3	.79				
	EV4	.79				
	EV5	.76				
Function Value(FV)	FV1	.79	.90	.84	.58	.85
	FV2	.74				
	FV3	.75				
	FV4	.77				
Behavioral Attitude(BA)	BA1	.78	.90	.85	.59	.85
	BA2	.75				
	BA3	.76				
	BA4	.79				
Subjective Norms(SN)	SN1	.78	.88	.84	.64	.74
	SN2	.79				
	SN3	.84				
	PBC1	**.77**	.86	.82	.60	.74
	PBC2	.80				

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Factors and Items	Item	Standardized Factor loadings	Cronbach's Alpha	CR	AVE	KMO
Perceived behavioral Control(PBC)	PBC3	.77				
behavioral Intentions(BI)	BI1	.79	.936	.90	.64	.91
	BI2	.84				
	BI3	.81				
	BI4	.81				
	BI5	.75				

Source: questionnaire survey &Author's Calculation

Correlation analysis

In order to test hypotheses H1 to H5, this paper uses AMOS24.0 software to draw the influence paths between each variable based on the conceptual model constructed in Figure 1, and fits the model using maximum likelihood method. Table 3 presents the model fit indices, all of which fall within acceptable thresholds, suggesting that the structural equation model demonstrates a satisfactory overall fit.

Table 3: Model adaptation level

Targets	Numerical value	Fit criteria	Fit result
CMIN (Chi-Square Minimum Discrepancy)	87	-	Better
DF (Degrees of Freedom)	501.738	-	Better
CMIN/DF (Chi-Square Minimum Discrepancy / Degrees of Freedom)	1.227	<3	Better
GFI (Goodness-of-Fit Index)	0.909	>0.9	Better
NFI (Normed-of-Fit Index)	0.934	>0.9	Better
IFI (Incremental Fit Index)	0.987	>0.9	Better
RMSEA (Root Mean Square Error of Approximation)	0.027	<0.05	Better
TLI (Tucker-Lewis Index)	0.985	>0.9	Better
RFI (Relative Fit Index)	0.985	>0.9	Better
CFI (Comparative Fit Index)	0.987	>0.9	Better

Source: questionnaire survey &Author's Calculation

Before performing SEM, it is essential to evaluate the model's goodness-of-fit to ensure its adequacy for representing the observed data. In this study, a series of widely accepted fit indices were employed, including CMIN, degrees of freedom (DF), CMIN/DF, GFI, NFI, IFI, RMSEA, TLI, CFI, RFI, and CFFI. According to the results presented in the model fit table, the value of CMIN/DF is 1.227, which is well below the recommended threshold of 3, indicating a good fit. The values of other fit indices are as follows: GFI = 0.909, NFI = 0.934, IFI = 0.987, TLI = 0.985, RFI = 0.925, and CFI = 0.987—all exceeding the commonly accepted cutoff value of 0.90, suggesting that the model

demonstrates strong goodness-of-fit. Moreover, the RMSEA value is 0.027, which is below the recommended maximum of 0.05, further supporting the model's suitability. Taken together, these fit indices indicate that the structural equation model developed in this study fits the empirical data well. The model specification is therefore deemed appropriate for subsequent hypothesis testing and path analysis.

Hypothesis testing

As illustrated in Figure 2 and Table 4, the hypothesized relationships were confirmed among the stimulus variable (PV), the organismic variables (BA, SN, and PBC), and the response variable (BI). All four dimensions of PV positively impact BA, SN, and PBC although the strength of these effects varied. Specifically, FV ($\beta = 0.261$, $p < 0.001$) and SV ($\beta = 0.286$, $p < 0.001$) were identified as the most significant factors influencing BA. EV($\beta = 0.160$, $p < 0.05$) and EMV($\beta = 0.184$, $p < 0.01$) also demonstrated significant beneficial effects, though their influence was relatively weaker.

Table 4: Path coefficients of structural equation model

Hypothetical	Path	Estimate	S.E.	C.R.	P	Standardization coefficient
H1a	EV→BA	0.154	0.07	2.217	0.027	0.16
H1b	SV→BA	0.28	0.066	4.217	***	0.286
H1c	EMV→BA	0.172	0.06	2.864	0.004	0.184
H1d	FV→BA	0.266	0.066	4.02	***	0.261
H2a	EV→SN	0.347	0.084	4.147	***	0.324
H2b	SV→SN	0.16	0.077	2.079	0.038	0.148
H2c	EMV→SN	0.14	0.071	1.977	0.048	0.135
H2d	FV→SN	0.248	0.077	3.204	0.001	0.22
H3a	EV→PBC	0.086	0.082	1.051	0.293	0.084
H3b	SV→PBC	0.136	0.077	1.77	0.077	0.131
H3c	EMV→PBC	0.321	0.072	4.46	***	0.326
H3d	FV→PBC	0.262	0.077	3.379	***	0.244
H4a	EV→BI	0.114	0.079	1.438	0.151	0.099
H4b	SV→BI	0.314	0.069	4.539	***	0.303
H4c	EMV→BI	-0.04	0.069	-0.577	0.564	-0.037
H5a	EV→BI	0.268	0.083	3.232	0.001	0.241
H5b	SV→BI	0.096	0.076	1.264	0.206	0.085
H5c	EMV→BI	0.109	0.071	1.535	0.125	0.102

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H5d	FV→BI	0.127	0.079	1.603	0.109	0.108

Source: questionnaire survey &Author's Calculation

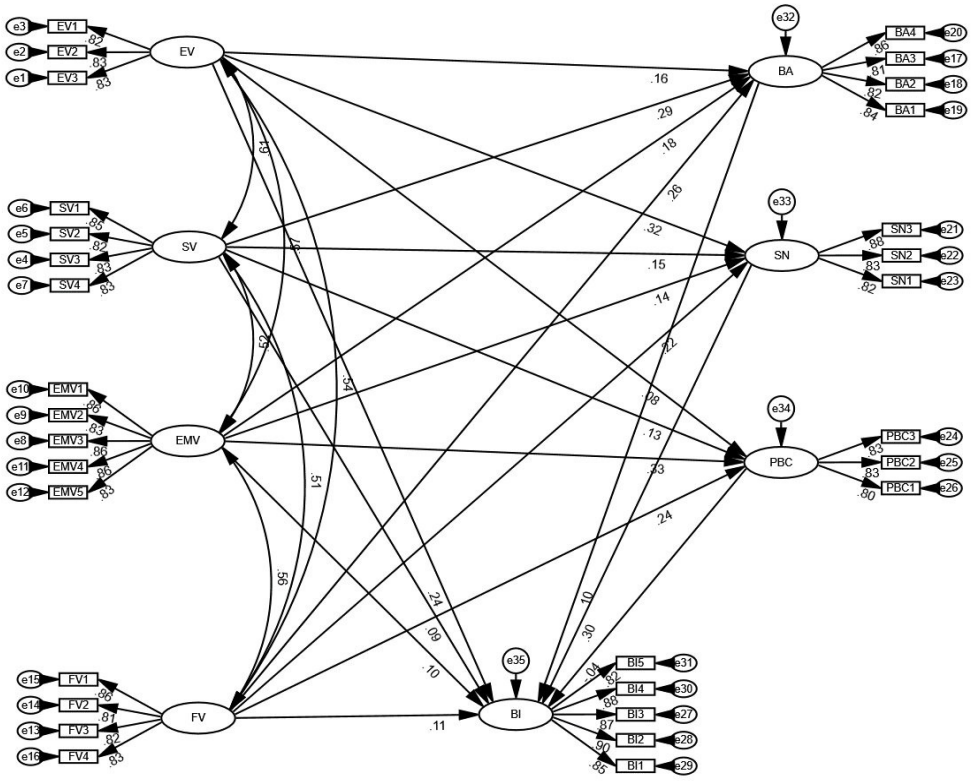


Figure 2： The influence mechanism model of the relationship between perceived value and behavioral intention

Source: questionnaire survey &Author's Calculation

Among the four dimensions of PV influencing SN, EV exerted the strongest effect ($\beta = 0.324$, $p < 0.001$). Although FV ($\beta = 0.220$, $p < 0.01$), SV ($\beta = 0.148$, $p < 0.05$), and EMV ($\beta = 0.135$, $p < 0.05$) also had statistically significant impacts, their effects were comparatively weaker than that of EV.

Regarding PBC, PV ($\beta = 0.326$, $p < 0.001$) and FV ($\beta = 0.244$, $p < 0.001$) played a dominant role. In contrast, SV ($\beta = 0.131$, $p = 0.077$) and EV ($\beta = 0.084$, $p = 0.293$) had relatively limited effects, with SV being significant at the 0.1 level and EV not being significant. All four dimensions of PV exhibited positive influences on BA, SN, and PBC, albeit to varying extents. Notably, the strength of these effects and their relative contributions differed across the respective dependent variables.

According to the results presented in Table 4, a meaningful favorable association was found between SN and BI($\beta = 0.303$, $p < 0.001$), whereas no significant influence was detected for BA ($\beta = 0.099$, $p = 0.151$) and PBC($\beta = -0.037$, $p = 0.564$).

As shown in Table 4, EV exerted the strongest direct effect on BI($\beta = 0.241$, $p < 0.01$), providing partial support for Hypothesis H5. Although Functional Value ($\beta = 0.108$, $p = 0.109$), EMV ($\beta = 0.102$, $p = 0.125$), and SV ($\beta = 0.085$, $p = 0.206$) also demonstrated positive effects, none of these reached statistical significance.

CONCLUSION

By applying a questionnaire-based approach combined with SEM, this paper explores the influence of PV on tourists' BI in the context of Hulunbuir Grassland. The results are summarized as follows:

PV—comprising EV, EMV, FV, and SV—positively influences GTBI. Among these, EV demonstrates the most pronounced impact, indicating that a heightened sense of environmental responsibility and ecological awareness directly motivates individuals to engage in green tourism activities. To this end, the Hulunbuir Grassland government should strengthen environmental protection efforts, such as restoring grassland and wetland ecosystems, addressing pollution problems, and implementing policies to mitigate human impacts. Finally, SN is the most significant factor affecting BI. These finding highlights that the opinions and expectations of significant others have a considerable influence on tourists' decisions to engage in green tourism. In the context of Chinese culture, the influence of social norms on BI is particularly strong, and collective norms and social expectations are influential. By contrast, neither BA nor PBC demonstrates a statistically significant direct influence on BI. Moreover, this study provides both theoretical support and practical guidance for formulating policies aimed at advancing green tourism in the Hulunbuir Grassland, thereby fostering the sustainable development of the local tourism industry.

REFERENCES

Afshardoost, M., & Eshaghi, M. S. (2020). Destination image and tourist behavioral intentions: A meta-analysis. *Tourism Management*, *81*(May), 104154. https://doi.org/10.1016/j.tourman.2020.104154

Ahn, J., & Kwon, J. (2020). Green hotel brands in Malaysia: perceived value, cost, anticipated emotion, and revisit intention. *Current Issues in Tourism*, *23*(12), 1559–1574. https://doi.org/10.1080/13683500.2019.1646715

Ajzen, I. (2020). The theory of planned behavior: Frequently asked questions. *Human behavior and Emerging Technologies*, *2*(4), 314–324. https://doi.org/10.1002/hbe2.195

Bala, R., Singh, S., & Sharma, K. K. (2023). Relationship between environmental knowledge, environmental sensitivity, environmental attitude and environmental behavioral

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intention – a segmented mediation approach. *Management of Environmental Quality: An International Journal*, *34*(1), 119–136. https://doi.org/10.1108/MEQ-08-2021-0202

Darmansyah, Fianto, B. A., Hendratmi, A., & Aziz, P. F. (2020). Factors determining behavioral intentions to use Islamic financial technology: Three competing models. *Journal of Islamic Marketing*, *12*(4), 794–812. https://doi.org/10.1108/JIMA-12-2019-0252

Ghaderi, Z., Hatamifar, P., & Ghahramani, L. (2019). How smartphones enhance local tourism experiences? *Asia Pacific Journal of Tourism Research*, *24*(8), 778–788. https://doi.org/10.1080/10941665.2019.1630456

Ghorbanzadeh, D., Shabbir, M. S., Mahmood, A., & Kazemi, E. (2021). Investigating the role of experience quality in predicting destination image, perceived value, satisfaction, and behavioral intentions: a case of war tourism. *Current Issues in Tourism*, *24*(21), 3090–3106. https://doi.org/10.1080/13683500.2020.1863924

Hassan, H. M. K., Das, S., & Quader, M. S. (2021). Evaluating Students' behavioral Intentions Towards Ecotourism: an Extended Theory Of Planned behavior Perspective. *Tourism Review International*, *25*(4), 403–418. https://doi.org/10.3727/154427221X16245632411944

Ibnou-Laaroussi, S., Rjoub, H., & Wong, W. K. (2020). Sustainability of green tourism among international tourists and its influence on the achievement of green environment: Evidence from North Cyprus. *Sustainability (Switzerland)*, *12*(14), 1–24. https://doi.org/10.3390/su12145698

Iweala, S., Spiller, A., & Meyerding, S. (2019). Buy good, feel good? The influence of the warm glow of giving on the evaluation of food items with ethical claims in the U.K. and Germany. *Journal of Cleaner Production*, *215*, 315–328. https://doi.org/10.1016/j.jclepro.2018.12.266

Koçak, E., Ulucak, R., & Ulucak, Z. Ş. (2020). The impact of tourism developments on CO2 emissions: An advanced panel data estimation. *Tourism Management Perspectives*, *33*(April 2019). https://doi.org/10.1016/j.tmp.2019.100611

Lee, M., Lee, S. A., Jeong, M., & Oh, H. (2020). Quality of virtual reality and its impacts on behavioral intention. *International Journal of Hospitality Management*, *90*, 102595. https://doi.org/10.1016/j.ijhm.2020.102595

Li, H., Qu, P., & Luo, F. (2022). Impact of Tourists' Perceived Value and Sense of Social Responsibility on the Low-Carbon Consumption behavior Intention: A Case Study of Zhangjiajie National Forest Park. *Forests*, *13*(10). https://doi.org/10.3390/f13101594

Lin, N., & Roberts, K. R. (2020). Using the theory of planned behavior to predict food safety behavioral intention: A systematic review and meta-analysis. *International Journal of Hospitality Management*, *90*(May 2019), 102612. https://doi.org/10.1016/j.ijhm.2020.102612

Loh, Z., & Hassan, S. H. (2022). Consumers' attitudes, perceived risks and perceived benefits towards repurchase intention of food truck products. *British Food Journal*, *124*(4), 1314–1332. https://doi.org/10.1108/BFJ-03-2021-0216

Manzoor, F., Wei, L., Asif, M., Ul Haq, M. Z., & Ur Rehman, H. (2019). The contribution of sustainable tourism to economic growth and employment in Pakistan. *International*

Journal of Environmental Research and Public Health, *16*(19). https://doi.org/10.3390/ijerph16193785

Oriade, A., & Schofield, P. (2019). An examination of the role of service quality and perceived value in visitor attraction experience. *Journal of Destination Marketing and Management*, *11*(October 2018), 1–9. https://doi.org/10.1016/j.jdmm.2018.10.002

Peng, L., Zhang, W., Wang, X., & Liang, S. (2019). Moderating effects of time pressure on the relationship between perceived value and purchase intention in social E-commerce sales promotion: Considering the impact of product involvement. *Information and Management*, *56*(2), 317–328. https://doi.org/10.1016/j.im.2018.11.007

Raharjo, K. (2019). The role of green management in creating sustainability performance on the small and medium enterprises. *Management of Environmental Quality: An International Journal*, *30*(3), 557–577. https://doi.org/10.1108/MEQ-03-2018-0053

Saari, U. A., Damberg, S., Frömbling, L., & Ringle, C. M. (2021). Sustainable consumption behavior of Europeans: The influence of environmental knowledge and risk perception on environmental concern and behavioral intention. *Ecological Economics*, *189*(August). https://doi.org/10.1016/j.ecolecon.2021.107155

Shen, K., & Shen, H. (2021). Chinese traditional village residents' behavioral intention to support tourism: an extended model of the theory of planned behavior. *Tourism Review*, *76*(2), 439–459. https://doi.org/10.1108/TR-11-2019-0451

Song, Z., & Soopramanien, D. (2019). Types of place attachment and pro-environmental behaviors of urban residents in Beijing. *Cities*, *84*(December 2017), 112–120. https://doi.org/10.1016/j.cities.2018.07.012

Sun, S., Law, R., & Schuckert, M. (2020). Mediating effects of attitude, subjective norms and perceived behavioral control for mobile payment-based hotel reservations. *International Journal of Hospitality Management*, *84*(July 2019), 102331. https://doi.org/10.1016/j.ijhm.2019.102331

Tran, V. D., & Le, N. M. T. (2020). Impact of service quality and perceived value on customer satisfaction and behavioral intentions: Evidence from convenience stores in Vietnam. *Journal of Asian Finance, Economics and Business*, *7*(9), 517–526. https://doi.org/10.13106/JAFEB.2020.VOL7.NO9.517

Watanabe, E. A. de M., Alfinito, S., Curvelo, I. C. G., & Hamza, K. M. (2020). Perceived value, trust and purchase intention of organic food: a study with Brazilian consumers. *British Food Journal*, *122*(4), 1070–1184.
https://doi.org/10.1108/BFJ-05-2019-0363

Yu, Y., Lang, M., Zhao, Y., Liu, W., & Hu, B. (2023). Tourist Perceived Value, Tourist Satisfaction, and Life Satisfaction: Evidence From Chinese Buddhist Temple Tours. *Journal of Hospitality and Tourism Research*, *47*(1), 133–152. https://doi.org/10.1177/10963480211015338

Zhang, Y., Xiao, C., & Zhou, G. (2020). Willingness to pay a price premium for energy-saving appliances: Role of perceived value and energy efficiency labeling. *Journal of Cleaner Production*, *242*, 118555. https://doi.org/10.1016/j.jclepro.2019.118555

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STRATEGIC PLANNING FOR SUSTAINABLE HISTORICAL TOURISM DEVELOPMENT AT SUMBERAWAN TEMPLE IN MALANG, INDONESIA: A VISITOR-BASED ASSESSMENT USING IMPORTANCE-PERFORMANCE ANALYSIS

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Abstract

The Sumberawan temple is a heritage building from the Singasari Kingdom and it is located at the spring of Mount Arjuna. This small stupa-shaped building is considered a place of worship for Buddhists and other religious groups, as well as a symbol of spring preservation. Currently, the Sumberawan temple is being developed as a historical tourist attraction. Due to its religious, cultural, and ecological significance, the development of historical tourism at the site requires appropriate and sustainable strategies. Therefore, this research used the Important Performance Analysis (IPA) method to evaluate the performance of the Sumberawan temple as a tourist attraction, place of worship, and ecological monument. Data were collected through field observations and presented descriptively. Subsequently, a survey was carried out using a questionnaire to determine the performance of the site based on visitors' perceptions. The field observations focused on the availability of facilities, their maintenance, condition, function, and ease of use, with the main attributes being facilities, visitor experience, pricing, and accessibility. A quantitative analysis was then carried out based on the results of field observations and IPA analysis. In conclusion, this research proposed strategies for developing the Sumberawan temple, including building and improving tourist facilities (focusing on quadrants I and III), and engaging all stakeholders in the management of the site.

Keywords: heritage, sustainable, springs, tourism

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INTRODUCTION

The Sumberawan temple is a cultural heritage site constructed during the late period of the Majapahit Kingdom (14th-15th centuries) (Suwardono, 2003). Located in Toyomerto Village, Singosari District, at the foot of Mount Arjuna, this temple sits on a water source that creates swamps within a forest. It is situated approximately 20 km north of the center of Malang City.

The Sumberawan temple is the only stupa temple in East Java (Nugroho et al., 2021) and it serves as a place of worship for both Buddhists and other religious groups. The temple is recognized as a *punden*, an ancient Javanese building for ancestor worship, and its water is considered sacred *tirta amerta* (Titisari, 2021). Typically, stupa store relics (Orzech, 2015; Snodgrass, 1992), and at the Sumberawan temple, the 'relic' discovered beneath the stupa is regarded as the sacred water, *tirta amerta*. The existence of the temple and its *tirta amerta* is also reflected in the toponyms of Toyomerto and Sumberawan Villages. The name Toyomerto is derived from the words *toya* (water) and *amerta* (life), representing the ancient Hindu-Javanese belief in sacred spring water. Furthermore, the name Sumberawan refers to the location of the source in the form of *rawan* (swamps).

Apart from being a place of worship, the Sumberawan temple has become a natural and cultural-historical tourism destination (Fadli et al., 2021). This provincial-scale cultural heritage building is designed with a bell-shaped stupa constructed of andesite stone (Titisari, Antariksa, Wulandari, et al., 2017). The uniqueness of the architecture blends with the natural landscape with the dominance of water sources, pine forests, cool air, and a mountain-foot village atmosphere. The location of the Sumberawan temple is quite remote, separated from settlements, thereby making it perfect for ritual activities and natural tourism. The site is used for a variety of reasons, including camping, rest places, outbound excursions, study tours, art performances, festivals, and natural recreation. Natural tourism has a lot of promise in East Java because of its rich biodiversity and charming landscapes (Hakim, 2008). The Sumberawan temple along with its stunning natural landscapes, draws a large number of tourists. In 2023, the average number of tourists per month was 950, largely for leisure trips, an increase from 800 monthly tourists in 2021-2022.

Parking lots, inns, prayer rooms, toilets, stalls, ticket boxes, temple guard posts, camping sites, public pools, sacred pools, meditation buildings, a traditional dance studio, and a religious-ceremonial equipment store are among the tourist facilities available in the Sumberawan temple. Before the COVID-19 pandemic, the site was equipped with spots for selfies, signage, and other recreational facilities, which are now in despair. The development of tourism at the Sumberawan temple needs to integrate historical culture and ecological conservation since both aspects are intertwined in shaping the cultural landscape

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(Titisari, 2021). Additionally, tourism development must be carefully managed to ensure that it adheres to conservation and sustainable development guidelines. For ages, the Sumberawan Springs has provided communities with an essential supply of water. Therefore, the cultural-historical tourism development of the temple must consider both natural and cultural-historical conservation.

The purpose of this research is to create a long-term strategy for sustainable-historical tourism development at the Sumberawan temple. Sustainable tourism development aims to integrate ecological and cultural conservation in order to create economic and recreational benefits, as well as to improve the welfare of local communities. It also promotes the simultaneous experience and appreciation of nature and culture (Quintana, 2020).

Previous research of the Sumberawan temple have looked into various aspects of its cultural heritage, including tangible and intangible elements (Titisari et al., 2016; Titisari, Antariksa, Dwi, et al., 2017), cosmological architecture (Titisari et al., 2018), activities and spatial usage (Titisari et al., 2019), and territorial identity (Titisari, 2021). That research gives detailed information on the Sumberawan temple's physical characteristics, conservation efforts, activities, and cultural legacy. Additional research backs up these results, with investigations on the quality of service in tourism activities (Nugroho et al., 2021), 3D virtual reality creation for travel promotion (Kholimi et al., 2022), legal aspects and the role of government in tourism development (Fadli et al., 2021), as well as the role of society (Firmansyah & Fadlilah, 2016). Others examine folklore, ritual activities, and local wisdom for tourism branding and ecological conservation (Rahmawati et al., 2021; Sukmawan et al., 2021; Sulistyo & Dewanti, 2021), as well as ecological aspects and water source utilization in the context of conservation and water resource management. Therefore, this research contributes to the development of the Sumberawan temple as a historical tourism destination based on the results of the Important Performance Analysis (IPA). The IPA is a strategic management tool that uses visitor perceptions to identify areas of strength and areas for improvement. IPA gives researchers the best opportunity to understand the innermost deliberation of the 'lived experiences' of research participants (Alase, 2017). This method has never been used in research regarding the development strategies for the Sumberawan Temple. In this research, the analysis is conducted in the context of sustainable development. The research question is about the strategy for developing the Sumberawan temple that integrates historical-cultural and ecological conservation evaluation aspects. The development strategy was prepared based on the performance of the site as a historical tourist destination.

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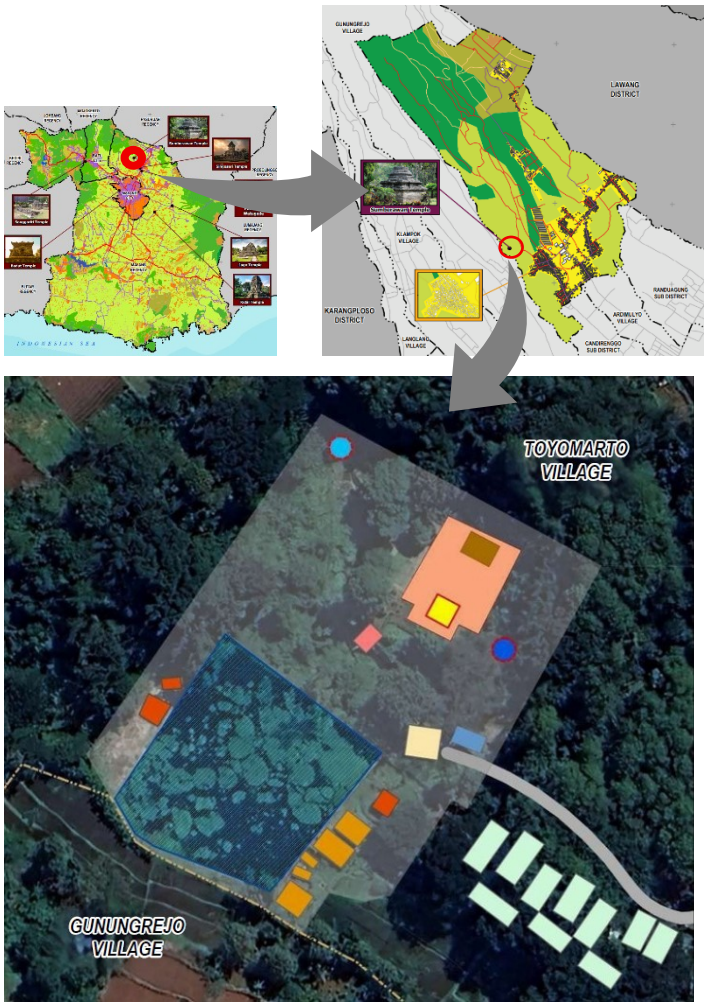


Figure 1. Map of the Sumberawan Site Location in Toyomarto Village, Singosari District, Malang Regency, East Java, Indonesia

LITERATURE REVIEW

Sustainable historical tourism aimed to preserve cultural and historical heritage while minimizing negative environmental impacts and improving people's welfare. This strategy integrated sustainable tourism concepts with historic site management (Blake, 2015; Buckley, 2011). The concerning impact of tourism was the environmental effect caused by the increasing number of visitors and the diversity of activities (Permatasari et al., 2020). These activities resulted in

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increased water use, land conversion, food production, and consumption, all of which have serious implications for gas emissions and clean water use (Gössling & Peeters, 2015). Several theories that deal with sustainable historical tourism include the following.

1. *The triple bottom line theory,* which focused on efforts to improve the sustainable economy for local communities. The theory also involved the participation and empowerment of communities and the preservation of culture and history.
2. Visitor management theory, which involved controlling the number and behavior of tourists to reduce negative impacts on historical site and the environment,
3. *Carrying capacity theory,* which determined the maximum limit on the number of tourists to avoid physical, social, and environmental damage (Sofield, 2003; Weaver, 2013).

The increase in tourist activities, attractions, research, and the development of facilities and infrastructure over the last 10 years indicated that the government and local communities aimed to develop the tourism potential of the Sumberawan temple (Firmansyah & Fadlilah, 2016; Titisari et al., 2019). Integrating ecological considerations into the development of sustainable historical tourism necessitated a holistic approach to maintain a balance between environmental conservation and tourism development. These included maintaining ecosystems, introducing environmentally friendly practices, managing natural resources wisely and sustainably, and increasing awareness of cultural and environmental preservation. Additionally, it involved educating and interpreting the environment to inform the ecological values of tourist areas (Buckley, 2011; Garrod & Fyall, 2000). An important aspect to examine was the level of tourist satisfaction with their experience and awareness of sustainable tourism practices and impacts. This included variables of service quality, tourist experience, price, accessibility, as well as the cleanliness and comfort of tourist facilities (Ivars-Baidal et al., 2023; Sharma & Sarkar, 2024).

RESEARCH METHODOLOGY

This research adopted a rationalistic strategy and a sustainable development framework to examine the relationship between historical tourism and ecological conservation (Pociovalişteanu & Niculescu, 2010; Quintana, 2020). The analysis was carried out in three stages, including (1) characterizing existing conditions, (2) performing the IPA analysis based on questionnaire results, and (3) developing strategies based on the results of the IPA analysis.

The descriptions of existing conditions were based on field observations and literature reviews. The focus was on tourist facilities, spatial zones and territory, landscape elements, infrastructure, and accessibility, with a focus on tourist facility maintenance, condition, and function, facility design relevant to tourism themes, as well as support for cultural and ecological conservation. To verify data reliability, statistics on the performance of the Sumberawan temple as a tourist destination were collected using a questionnaire distributed to 100 visitors aged 20-55. Visitor satisfaction was measured through their experiences, price suitability, and accessibility to the site.

The questionnaire was evaluated using the Important Performance Analysis (IPA) method (Kokkhangplu & Kaewnuch, 2021; Rašovská et al., 2021; Wu & Jimura, 2019). The performance level was measured based on conformity level and quadrant. The level of conformity/satisfaction (Tk_i) was calculated by comparing the performance and importance scores. The Tk_i was measured using a Likert scale ranging from dissatisfied to very satisfied for performance measurement, and from non-essential to important for interest measurement (1-5). The calculation of the Tk_i was carried out by determining the lower limit value of the interval based on the percentage of the respondents with the lowest and highest scores. This resulted in a lower limit of 20% and a value range of 16% (very low 20-36%, low 36.1-52%, medium 52.1-68%, high 68.1-84%, very high 84.1-100%). The level of satisfaction was calculated as the percentage of the performance assessment score (x_i) divided by the importance assessment score (y_i).

$$Tk_i = (x_i/y_i) \times 100\%$$

The results of each indicator/attribute assessment were shown in the Cartesian Diagram Quadrant and analyzed to identify attributes that needed improvement and strengthening. Quadrant I showed those variables needed to be maintained (*keep up the good work*), while quadrant II showed variables that were important and needed improvement (*concentrate here*). Quadrant III showed variables that were not important and had low performance (*low priority*), and quadrant IV showed variables with low importance but good performance (*possible overkill*). Finally, a strategy for sustainable historical tourism development was developed based on the results of this analysis and interpretation.

ANALYSIS AND DISCUSSION

The conservation area of the Sumberawan temple was administratively managed by the Cultural Heritage Preservation Center (BPCB) of East Java Province. The

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site was delineated by a wire fence and was located in a forest managed by the State Forestry Public Company (Perum Perhutani or Perhutani). The management of the site should be a collaborative effort involving Perhutani, BPCB, and the local community. The community was particularly concerned about the forest and water resources, as they considered the Sumberawan temple to be a sacred place and were responsible for total sustainability. (Rahmawati et al., 2021; Sukmawan et al., 2021; Titisari et al., 2018).



Figure 2. The temple area (a); Vesak Ceremony at Sumberawan Temple (b); Sacred pool inside the temple area (c dan d)
(Doc: Titiasari, 2024)

The Sumberawan temple served as a venue for various activities organized by different groups (Sulistyo & Dewanti, 2021; Titisari et al., 2019). The conservation area of the cultural heritage building was clearly defined, with a grassy field and a path encircling the temple, acting as a barrier for the core zone. Wire fences marked the territorial boundaries for the conservation buffer zone. Within the buffer zone, there were additional buildings such as a temple guard and conservator post, a warehouse, a worship studio, and two ponds for ritual ceremonies and meditation. The landscape was covered with grass, and decorative vegetation was planted along the paths. In front of the temple, there was a grassy field that was commonly used as a gathering place during religious ritual ceremonies, as shown in Figure 1. Approximately 10 meters in front of the temple, there were stone seats and offerings on a paved area, arranged as small

altars and seating. In the temple, some remnants of ancient plants, such as banyan, ketinggan, and bendha trees, still thrived and there was proper maintenance of other decorative plants and shrubs. At about 1.5 meters around the temple's base, there was a brick barrier covered with gravel, serving as a boundary to prevent damage to the temple during religious ceremonies or art performances and protect it from vandalism.

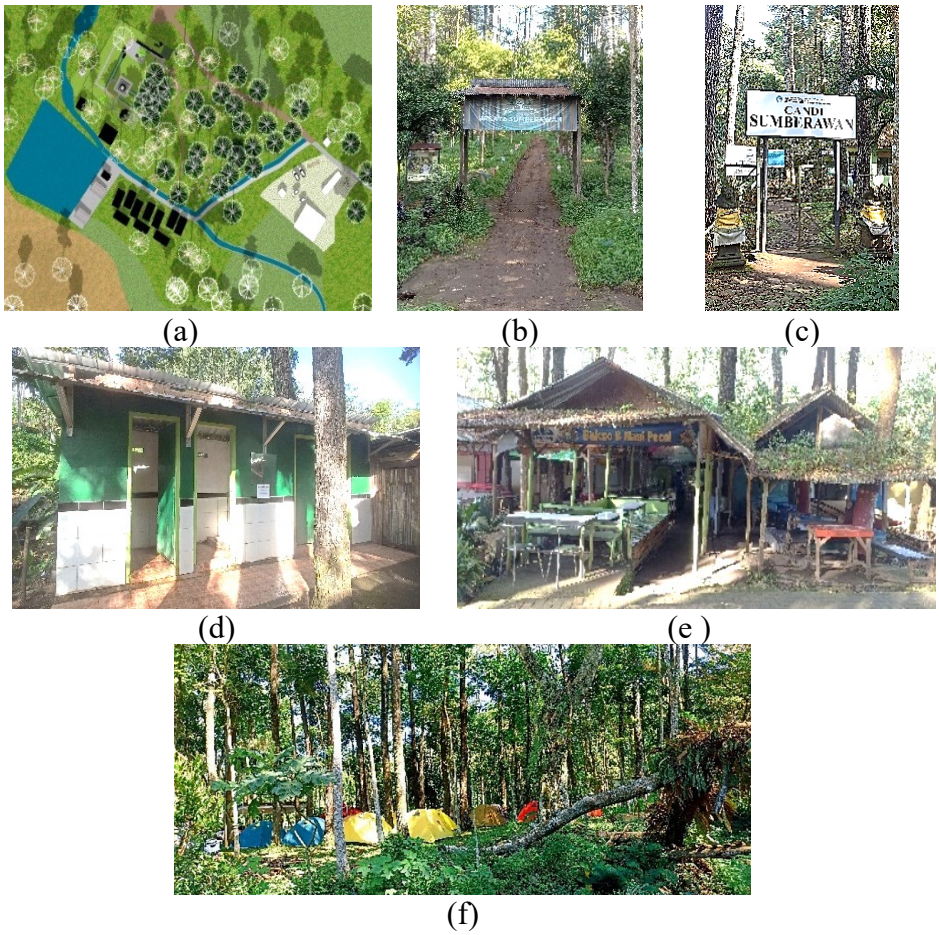


Figure 3. Sumberawan Temple area and pine forest (a); the gateway (b); gateway to the temple area (c); toilet (d); Food and drink stalls (e); camping ground (f)
(Doc: Titisari, 2024)

The forest area around the temple was used for several purposes, including housing a ticket box, camping grounds, outbound activities, tourist attractions, prayer rooms, pools, toilets, sacred tombs, and spots for taking selfies.

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It also served as a rest area or parking lot when visitors surge in during the Vesak ceremony, Tirta Amerta Sari, or special events and tourist attractions. Outside the temple grounds, there were food and drink stalls along the riverbank, inns, and shops selling religious ceremony tools as well as dance studios. Additionally, parking and some other facilities, which were owned by the private sector were available in this area, as shown in Figure 2.

The Sumberawan temple could be accessed through a 3-meter-wide concrete road, which restricted car access. Alternatively, there was a path along the riverbank and rice fields that led to the temple. The site contained well-planned and high-quality pathways, which were made of stone, paving stones, or gravel.

The attributes of the Sumberawan temple were determined based on satisfaction, importance, and performance using IPA. The results of the IPA analysis were shown in Table 2.

Table 1. Levels of Importance, Performance, and Satisfaction Comformity according to the results of Important Performance Analysis in early 2024

Code	Elements	Xi (performance)	Yi (importance)	Tki (Conformity Level)
a1	Number of parking spaces	2	4,3	47%
a2	Condition and Function of Parking Lot	1,9	3,9	49%
a3	Access to the parking lot	1,9	4,3	44%
a4	Number of toilets	3,5	4,1	85%
a5	Toilet conditions and functions	2,5	4,3	58%
a6	Access to toilets	2,7	4,0	68%
a7	The gateway supports the theme of eco-cultural/historical tourism	1,5	4,2	36%
a8	Availability of ticket box	2,5	2,9	86%
a9	Ticket box design supports eco-cultural/historical tourism themes	1,5	3,8	39%
a10	Availability of ecology and cultural heritage building information centers	2,1	4,8	44%
a11	Availability of tourist information (brochures, tour guides, information from the internet/online, posters, etc.)	2,4	4,6	52%
a12	Availability of banking facilities	1	2,9	34%
a13	Zoning and territory for conservation areas, ritual areas, and tourist areas	2,4	4,7	51%
a14	Availability of tourist attractions	1,8	4,7	38%
a15	Conditions of tourist attractions	1,5	4,8	31%
a16	Number of seats or rest area	2,2	4,3	51%
a17	Seating and rest area conditions	1,6	3,2	50%
a18	Adequacy of signage related to the conservation of cultural and ecological heritage buildings	2,7	4,2	64%

Code	Elements	Xi (performance)	Yi (importance)	Tki (Conformity Level)
a19	Representative and informative signage design and placement	1,5	4,6	33%
a20	Availability of pathways between facilities or tourist areas	3,2	4,1	78%
a21	Design and capacity of connecting paths between facilities or tourist areas	2,1	4,3	49%
a22	Availability of ritual facilities such as studios or places of worship	3,7	4,7	79%
a23	Condition of the studio or place of worship	2,9	4,6	63%
a24	Access to the studio or place of worship	3,3	4,0	83%
a25	Availability of natural tourism facilities	2,2	4,7	47%
a26	Garbage bin adequacy	2,5	4,2	60%
a27	Garbage bin condition	3	3,9	77%
a28	Easy access to bins	3	3,8	79%
a29	Number of food and beverage stalls	4,1	4,2	98%
a30	The condition of food and beverage stalls supports historical-ecological tourism	2,3	4,1	56%
a31	Access to food stalls	3,8	4,1	93%
a32	Number of souvenir shops, souvenirs, or ritual facility providers	2	3,7	54%
a33	The store design supports the tourism theme	3,1	3,3	94%
a34	Access to the store	3,2	3,3	97%
a35	Availability of prayer rooms	2,5	3,9	64%
a36	The design of the prayer room supports the tourism theme	2,9	3,5	83%
a37	Access to the prayer room	2,8	3,2	88%
a38	Availability of security facilities	2,8	4,6	70%
a39	Easy access to security facilities	2,5	4,5	56%
a40	Availability of security facilities against forest fires	1	3,8	26%
a41	Availability of clean water facilities and infrastructure	3,9	4,0	98%
a42	Quality of telecommunications network (signal)	3,9	4,0	98%
a43	Quality of the electricity network	3,7	4,3	86%
b1	The beauty and preservation of cultural heritage buildings (temples)	3,6	4,6	78%
b2	The beauty of the temple landscape and the surrounding nature	3,4	4,3	79%
b3	The beauty of attractions (landscape attributes for tourism, art performances, traditional rituals, outdoor activities, etc.)	4	4,5	89%
b4	Cool and fresh air conditions	4,1	4,7	87%

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Code	Elements	Xi (performance)	Yi (importance)	Tki (Conformity Level)
b5	Tranquility and comfort	4,3	4,8	90%
b6	The condition of vegetation in the landscape around the temple	3,2	4,7	68%
b7	Clean and cool water conditions and water sources	3,7	3,8	97%
c1	Entrance and parking ticket prices	3,7	3,9	95%
c2	Food and beverage prices	3,5	3,6	97%
c3	Food and beverage prices	2,8	4,2	67%
c4	Prices of souvenirs and tools for ritual ceremonies	3,8	3,9	97%
d1	Cost of transportation services	2,4	4,4	55%
d2	Ease of accessibility to the location	2,7	4,4	61%
d3	Road condition/access to the location	2,2	4,2	52%
d4	Easy access to public transportation and/or car rental	1,9	4,2	45%
	Total	**163,1**	**244,2**	**3973%**
	Average	**2,8**	**4,1**	**0,67**

The scientific analysis results showed a visitor satisfaction rate of 67%, which fell within the moderate range. The average performance level was 2.8, indicating a fair to good rating. This suggested that many average attributes in the Sumberawan temple needed improvement. The quadrant graph further showed that most attributes required improvement.

Attributes with very high-performance values included the freshness and coolness of the air, the beauty of natural attractions, traditional rituals, art attractions, comfort and tranquillity, as well as the availability of food and drink stalls. Conversely, attributes with low-performance ratings consisted of parking lots, gate and ticket box designs that did not support eco-cultural/historical tourism themes, and banking facilities. They also included the availability and condition of supporting facilities/tourist attractions, signage placement and design, availability and design of benches and areas for resting, availability of safety facilities from fire hazards, and ease of access to public transportation facilities.

Based on the results of a visitor satisfaction survey using a Cartesian diagram with four quadrants, it was evident that 25 attributes needed to improve their performance. These attributes were considered very important and fell under quadrant I on the diagram. They included ease of accessibility, availability of public transportation facilities, and design of tourist facilities, specifically gates, food stalls, ticket boxes, park benches, circulation lines, and signage that supported the theme of tourism activities. These attributes also consisted of ecological and cultural heritage buildings information centers, tourist information centers, signage placement, availability of information boards that supported

ecological and cultural conservation, improvement of security facilities, as well as improvement of the quality of ritual facilities.

When analyzing visitor satisfaction within the eco-cultural/historical tourism framework, several strategies for maintaining sustainable tourism were developed. The fundamental principle of sustainable historical tourism involved integrating the concept of sustainable tourism with historical area management. (Blake, 2015) Furthermore, the second zone of conservation areas, particularly those related to cultural heritage buildings and forests, should have clear boundaries and regulations for activities. It was also important to control the number of visitors to prevent potential damage to the forests and cultural heritage buildings. (Sofield, 2003; Weaver, 2013). The control and management of this site must be jointly conducted by Perhutani, BPCB, the local community, the private sector, the government, and other stakeholders. The collaboration should be guided by a vision of cultural and ecological preservation as well as adhere to the principles of sustainable development (Parris & Kates, 2003; Pociovalişteanu & Niculescu, 2010).

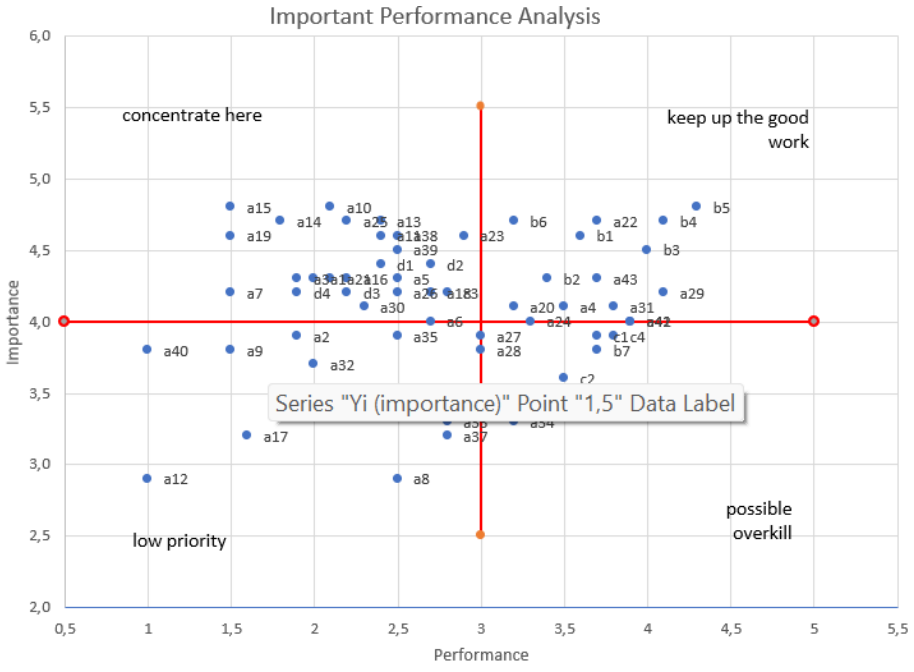


Figure 4. Importance Performance Analysis of Visitor Satisfaction and Conformity with Eco-Cultural and Historical Tourism Attributes in Sumberawan Temple Area

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In the case of the Sumberawan temple, it was essential to engage in dialogue and discussion with all stakeholders to ensure that the design of the site was integrated and similar to the appropriate theme. The design plan for the site included the temple conservation area, forests, water sources, and the surrounding environments. Additional facilities that should be provided comprised ecological and historical buildings information centers, tourist information centers, security facilities, hygiene facilities, signage and information boards supporting ecological and cultural conservation, tourist attractions, natural tourism facilities, and utility infrastructure.

A significant improvement in the condition or quality of various attributes was necessary for almost all facilities, such as the design of gates, ticket boxes, signage, toilets, landscapes or parks, arrangement of circulation lanes, zoning regulations, road widening, provision of public transportation, and expansion of parking lots. It was also important to have well-programmed and scheduled various tourist attractions and annual ritual activities in order to enhance tourist appeal, promote regional identities and sustainable tourism destinations, as well as be supported by accurate information dissemination. The in-depth analysis using the scientific method showed that attributes related to the visitor experience fell within quadrant II (keep the good work), while the pricing was categorized under quadrant III (possible overkill), signifying its adequacy.

CONCLUSION

In conclusion, this research has successfully examined all attributes related to the historical tourist area of the Sumberawan temple within the framework of eco-cultural/historical tourism, based on sustainable development principles. A total of 43 attributes of tourist facilities, including availability, condition, design, and accessibility, as well as 7 attributes of visitor experience, 4 attributes related to visitor pricing, and 4 attributes concerning accessibility to the site were identified.

An analysis of visitor satisfaction was conducted to prioritize areas for improvement, facilitating the preparation of an integrated and sustainable development strategy for the historical and ecological tourism areas. The results showed that there was a substantial need for enhancement and provision of tourist facilities, making it a concentration area and low priority. Attributes related to visitor experience were considered satisfactory and should be maintained. However, the pricing attributes were considered to be very adequate, possibly excessive.

The sustainable development strategy for the Sumberawan temple covered the aspect of improving the condition and quality of facilities and introducing tourist attractions that supported the conservation of cultural and ecological history. This development program was considered to be a collaborative effort including BPCB, Perhutani, local communities, the private

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sector, governments, and other stakeholders. The collaboration aimed to establish the Sumberawan temple as a collectively managed unit within the area. Further research should focus on planning, design, empowerment, community engagement, stakeholder participation, and interdisciplinary fields in sustainable tourism development.

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REFERENCES

Alase, A. (2017). The Interpretative Phenomenological Analysis (IPA): A Guide to a Good Qualitative Research Approach. *International Journal of Education and Literacy Studies*, *5*(2), 9. https://doi.org/10.7575/aiac.ijels.v.5n.2p.9

Blake, J. (2015). Cultural Heritage and the Environment. *International Cultural Heritage Law*, *70*(12), 114–149. https://doi.org/10.1093/acprof:oso/9780198723516.003.0004

Buckley, R. (2011). Tourism and environment. *Annual Review of Environment and Resources*, *36*, 397–416. https://doi.org/10.1146/annurev-environ-041210-132637

Fadli, M., Widiarto, A. E., Puspitawati, D., Maharani, D. P., Liemanto, A., Arifien, Z., & Supriyadi, R. F. (2021). The legal construction of spirituality, ethical and sustainable tourism of Temples in Malang raya, Indonesia. *Geo Journal of Tourism and Geosites*, *35*(2), 515–524.

Firmansyah, F., & Fadlilah, K. U. (2016). Improvement of Involvement Society in the Context of Smart Community for Cultural Heritage Preservation in Singosari. *Procedia - Social and Behavioral Sciences*, *227*(November 2015), 503–506. https://doi.org/10.1016/j.sbspro.2016.06.107

Garrod, B., & Fyall, A. (2000). Managing Heritage Tourism. *Annals of Tourism Research*, *27*(3), 682–708.

Gössling, S., & Peeters, P. (2015). Assessing Tourism's Global Environmental Impact 1900–2050. *Journal of Sustainable Tourism*, *23*(5), 639–659. https://doi.org/http://dx.doi.org/10.1080/09669582.2015.1008500

Hakim, L. (2008). Planning for Nature-Based Tourism in East Java: Recent Status of Biodiversity, Conservation, and Its Implication for Sustainable Tourism. *ASEAN Journal on Hospitality and Tourism*, *7*(2), 155.

 © 2025 by MIP

https://doi.org/10.5614/ajht.2008.7.2.02

Ivars-Baidal, J. A., Vera-Rebollo, J. F., Perles-Ribes, J., Femenia-Serra, F., & Celdrán-Bernabeu, M. A. (2023). Sustainable Tourism Indicators: What's New within The Smart City/Destination Approach? *Journal of Sustainable Tourism*, *31*(7), 1556–1582.

Kholimi, A. S., Kurniawan, A., Cahyono, E. B., & Husniah, L. (2022). 30 visualisation of historical site "Sumberawan temple" preservation utilizing virtual reality technology. *AIP Conference Proceedings*, *2453*(1).

Kokkhangplu, A., & Kaewnuch, K. (2021). Importance and performance analysis on tourism components in the south of Thailand. *Kasetsart Journal of Social Sciences*, *42*(2), 275–280.

Nugroho, I., Hanafie, R., Rahayu, Y. I., Sudiyono, Suprihana, Yuniar, H. R., Azizah, R., & Hasanah, R. (2021). Sustainable Hospitality and Revisit Intention in Tourism Services. *Journal of Physics: Conference Series*, *1908*(1). https://doi.org/10.1088/1742-6596/1908/1/012004

Orzech, C. (2015). The legend of the iron stupa. *Buddhism in Practice: Abridged Edition*, 232.

Parris, T. M., & Kates, R. W. (2003). Characterizing and measuring sustainable development. *Annual Review of Environment and Resources*, *28*(1), 559–586.

Permatasari, B. R., Ridjal, A. M., & Soekirno, A. (2020). Penerapan Konsep Permakultur dengan Pendekatan Sosio Ekologi dalam Membangun Desa Wisata. Studi Kasus: Desa Jengglung Harjo, Kabupaten Tulungagung. *Jurnal RUAS*, *12*(1), 91–100.

Pociovalişteanu, D.-M., & Niculescu, G. (2010). Sustainable Development Through Eco-Cultural Tourism. *European Research Studies*, *13*(2).

Quintana, V. M. (2020). *Eco-cultural Tourism: Sustainable Development and Promotion of Natural and Cultural Heritage*.

Rahmawati, F., Sukmawan, S., & Fitrahayunitisna, F. (2021). The Beauty of the Sumberawan Folklore in the Village of Toyomarto Indonesia as Tourism Branding. *Proceedings of the 1st International Seminar on Cultural Sciences, ISCS 2020, 4 November 2020, Malang, Indonesia*.

Rašovská, I., Kubickova, M., & Ryglová, K. (2021). Importance–performance analysis approach to destination management. *Tourism Economics*, *27*(4), 777–794.

Sharma, K., & Sarkar, P. (2024). A Study on The Impact of Environmental Awareness on the Economic and Sociocultural Dimensions of Sustainable Tourism. *International Journal of Multidisciplinary Research and Reviews*, *3*(1). https://doi.org/: 10.56815/IJMRR.V3.I1.2024/84-92

Snodgrass, A. (1992). *The Symbolism of the Stupa*. Motilal Banarsidass Publishe.

Sofield, T. H. B. (2003). *Empowerment for sustainable tourism development*. Emerald Group Publishing.

Sukmawan, S., Setiawati, E., & Putri, V. E. (2021). Folklore of Taman Kasurangganan and Tirta Amerta's an Attempt to Preserve the Environment. *Proceeding of International Seminar Enrichment of Career by Knowledge of Language and Literature*, *9*(01), 144–151.

Sulistyo, W. D., & Dewanti, M. A. (2021). "Sumberawan water site": History, sustainable preservation and use as a learning source. In *Development, Social Change and Environmental Sustainability* (pp. 34–38). Routledge.

Suwardono. (2003). *Stupa Sumberawan*.

Titisari, E. Y. (2021). Basic aspects of territorial identity (terraphilia) towards proportional tourism development. *IOP Conference Series: Earth and Environmental Science*, *780*(1). https://doi.org/10.1088/1755-1315/780/1/012069

Titisari, E. Y., Antariksa, A., Wulandari, L. D., & Surjono, S. (2017). Tinjauan Interdisipliner dalam Mengkaji Aspek Kosmologi dalam Arsitektur. *RUAS (Review of Urbanism and Architectural Studies)*, *15*(1), 67–74.

Titisari, E. Y., Antariksa, Dwi, L. W., & Surjono. (2017). Intangible Cultural Heritage Candi Sumberawan Dalam Perspekstif Kosmologi. *Seminar Nasional 2017 "Heritage: Tangible & Intangible Aspects". Cirebon 3-4 Mei.*, *Pangarsa 2006*, 1–6.

Titisari, E. Y., Antariksa, Wulandari, L. D., & Surjono. (2016). *Makna Kultural Situs Sumberawan : Masa Lalu , Masa Kini , dan Masa Depan*. 63–68.

Titisari, E. Y., Antariksa, Wulandari, L. D., & Surjono. (2018). Water Resource as Axis-Mundi: an Effort to Preserve Water Resource Sustainability. *IOP Conference Series: Earth and Environmental Science*, *213*(1), 12005. https://doi.org/10.1088/1755-1315/213/1/012005

Titisari, E. Y., Antariksa, Wulandari, L. D., & Surjono. (2019). Enhancement Aesthetic Technology the Tourism Activities and Environmental Setting in Sumberawan Temple: Managing Heritage Building According to the User's Needs and the Conservation's Goals. *International Journal of Civil Engineering and Technology (IJCIET)*, *10*(3), 2782–2789. http://www.iaeme.com/ijmet/issues.asp?JType=IJCIET&VType=10&IType=3http://www.iaeme.com/IJCIET/issues.asp?JType=IJCIET&VType=10&IType=3

Weaver, D. B. (2013). *Sustainable Tourism: Theory and Practice*. Routledge Taylor & Francis. https://api.pageplace.de/preview/DT0400.9781136360497_A23841231/preview-9781136360497_A23841231.pdf

Wu, H., & Jimura, T. (2019). Exploring an Importance–Performance Analysis approach to evaluate destination image. *Local Economy*, *34*(7), 699–717.

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RURAL TOURISM INDEX FRAMEWORK FOR SHAANXI PROVINCE, CHINA FROM THE PERSPECTIVE OF HIGH-QUALITY DEVELOPMENT

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Abstract

Rural tourism is often described as a vital tool in developing the tourism industry and it has the strong potential to accelerate social and economic development in rural areas. Accordingly, rural tourism has become a popular topic in both reality and academic areas in recent decades. With its economy developing rapidly, China has proposed new national policies and strategies to guide and support rural tourism development. The concept of "high-quality development" is one that regulates and advances the rural tourism development. To provide an efficient tool for grasping the current situation of high-quality rural tourism development, evaluation index systems show great importance. However, there has been little research constructing scientific, reasonable and comprehensive evaluation index systems of high-quality development reflecting the current situation of rural tourism in China to precisely respond to the requirements of this new era of high-quality development in all aspects. Therefore, this research will identify possible index system indicators for rural tourism development and construct an initial evaluation index framework based on high-quality development for further quantitative assessment work to reflect the situation of the rural tourism industry at a provincial level. By reviewing relevant literature, 38 potential indicators were selected and categorised under the criteria of five development concepts. Two rounds of Delphi method expert consultation were utilised, with 33 indicators selected for the rural tourism evaluation index framework for Shaanxi from the perspective of high-quality development.

Keywords: rural tourism, high-quality development, evaluation index framework, evaluation indicators

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INTRODUCTION

China's rural tourism development has reached at a stage of unprecedented development, driven by the increasing market demands and policy guidance (Jia et al., 2022). Rural tourism is often described nowadays as a vital tool in the development of tourism industry and has the strong potential to accelerate social and economic development as well as to revitalise the declining rural productivity in rural areas (Kortoci & Kortoci, 2017). As the rapidly developing economy and society face new challenges, China has proposed new national policies and strategies to provide guidance and support for developing rural tourism in China. The concept of "high-quality development" is one of those that could regulate and advance rural tourism development. More specifically, there are five sub-concepts under high-quality development: innovation, coordination, green, openness and sharing. These five sub-concepts are termed as "five development concepts" and cover five dimensions of high-quality development, widening the connotation and content of high-quality development.

Rich rural tourism resources can be found in Shaanxi province in terms of natural scenery, cultural heritages, festivals, traditional customs, local specialty, etc. (Xu et al., 2021). Therefore, Shaanxi province, one of the most historical and with various rural tourism resources, has been selected as the target to be discussed in this study. Although tourism is a pillar industry in Shaanxi province and has brought benefits for the entire development of the province, insufficiency issues and problems, such as homogenisation, environmental pollution, unbalanced income, lagging rural infrastructure and unscientific management, still exist in the industry and has dragged the development process (Qi et al., 2022).

To provide an efficient tool for grasping the current situation of high-quality rural tourism development, an evaluation index framework needs to be taken into serious consideration. According to Chu and Zhang (2022), researchers should focus on constructing scientific, reasonable and comprehensive evaluation index systems of high-quality development and identify the current situation of high-quality development in China to precisely respond to the requirements of this new era of high-quality development in all aspects. An effective rural tourism performance evaluation framework could comprehensively reveal the effect and outcome of rural tourism development, which is conducive to improving the quality of rural tourism development (Qi et al., 2022). However, less attention has been given to establishing more quantitative measurements for evaluating the efficiency and performance of rural tourism in China (Zhu et al., 2022), especially within the current trend of achieving high-quality development.

Therefore, it is crucial to identify possible indicators and then establish a corresponding evaluation index framework for the rural tourism industry to evaluate the industry performance and measure how policies and strategies are

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implemented in practice. Correspondingly, this study aims to identify possible index system indicators for rural tourism development with the criteria of five development concepts (innovation, coordination, green, openness and sharing) of high-quality development, and to construct a preliminary evaluation index framework to accurately illustrate the situation in the rural tourism industry at a provincial level for further quantitative assessment work.

LITERATURE REVIEW

Rural Tourism

The definition and scope of rural tourism vary across countries and regions. This study adopts Lane's (1994) widely recognised definition, which describes rural tourism as being "located in rural areas, functionally rural, set in rural scale, traditional in character, representing the complex pattern of rural environment, economy, history and location." This operational definition provides a comprehensive foundation for the current research as it is the one most adopted and covers a relatively wide range of the characteristics of rural tourism.

Although rural tourism has been widely examined, much of the literature has focused on tourism activities, rural industries, development challenges, and corresponding countermeasures (Xue et al., 2017). As the industry matures, scholars highlighted increasingly emerging issues such as environmental pollution, inefficient resource use, and lack of innovation (Butler, 2018). Key problems include product and service homogeneity and lack of distinctiveness (Shen et al., 2019); insufficient infrastructure and investment, inadequate scientific management, and shortage of qualified personnel (Deng & Pan, 2019); pronounced environmental impacts; and low levels of community participation, internal competition, disputes over benefit distribution, disorganised management, and inconsistent governance (Deng & Pan, 2019).

High-Quality Development Policy

The concept of high-quality development was first introduced at the 19th National Congress of the Communist Party of China in 2017, marking a policy shift from prioritising economic growth speed to focusing on qualitative improvement (Sun et al., 2021). Since then, it has become the central theme for economic and social development during the 14th Five-Year Plan period (2021–2025), with the ultimate aim of enhancing national welfare and improving residents' quality of life (He et al., 2021). With this policy direction, the notion of high-quality tourism development has also emerged. Existing research primarily follows two aspects: one focuses on using high-quality development principles to assess tourism at the regional level (Tang et al., 2021), while the other concentrates on evaluating the quality of specific tourism sectors or activities from a micro-level perspective (Pai et al., 2019).

Five Development Concepts

The five key concepts underpinning high-quality development—innovation, coordination, green, openness, and sharing—were put forward at the 19th CPC National Congress and serve as a strategic framework: (1) Innovation: emphasises scientific and technological advancement as a driver of competitiveness (Liu et al., 2021); (2) Coordination: seeks to promote social equity and justice by improving access to education, healthcare, elderly care, and other essential services (Qi et al., 2022); (3) Green: addresses environmental concerns, advocating for sustainable resource use and ecosystem protection in response to growing public expectations for a higher living standard (Li et al., 2018); (4) Openness: aims to deepen integration with the global economy, facilitating alignment between domestic and international development efforts (Wang & Ye, 2022); (5) Sharing: Sharing promotes inclusive development by reducing urban–rural disparities and ensuring that all citizens benefit from the the achievement and outcome of development to meet their new eagerness for a better life.

Evaluation Index Framework for Rural Tourism

Indicators play a crucial role in evaluating industry performance, providing objective measures to inform both theoretical analysis and policy design (Blancas et al., 2017). With the rapid development of rural tourism, scholars have increasingly underscored the sector's persistent challenges, including environmental degradation, inefficient resource use, and lack of innovation (Butler, 2018). Various frameworks have been developed to assess these issues. For example, Rui (2018) proposed evaluation criteria encompassing tourism resource attractiveness, infrastructure, location, and resource development, while Wei (2018) focused on resource factors, development conditions, and management practices.

Nonetheless, few existing frameworks explicitly align with the five development concepts, despite their growing relevance in the current policy landscape. To address this gap, the present study draws on an extensive review of literature published between 2018 and 2022, alongside a thorough analysis of the five development concepts, to construct a more comprehensive and policy-relevant evaluation index framework. The development process also builds upon prior work (Zheng et al., 2020; Zhao et al., 2023; Zhang & Wu, 2023). The resulting preliminary framework is designed to assess how effectively rural tourism development in Shaanxi Province meets the objectives of high-quality development. The detailed framework is presented in Table 1.

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Table 5: Preliminary High-quality Rural Tourism Evaluation Index Framework

Indicators		Citation
Innovation B1	C11 Proportion of R&D expenditure	Ming & Wang, 2022
	C12 Proportion of R&D personnel	Lin et al., 2022
	C13 Average expenditure on R&D of rural tourism enterprises	Xu,2018
	C14 Expenditure on education	Wang & Pan, 2022
	C15 Number of authorized patents applications	Xu, 2018; Wang & Pan, 2022
	C16 Rural tourism technical market turnover	Lin et al., 2022; Wang & Pan, 2022
Coordination B2	C21 Ratio of disposable income of urban and rural residents	Lin et al., 2022
	C22 Infrastructure construction network density	Ming & Wang, 2022
	C23 Number of tourist toilets	Zheng et al., 2021
	C24 Highway mileage	Ming & Wang, 2022; Wang & Pan, 2022
	C25 GDP per capita Gini coefficient	Lin et al., 2022
	C26 Proportion of rural tourism in the tertiary industry	Wang et al., 2022
	C27 Level of catering and accommodation facilities	Wang et al., 2022; Hui, 2019
Green B3	C 31 Green coverage rate in built-up areas	Lin et al., 2022
	C32 Water quality regular rate	Ming & Wang, 2022
	C33 Good air quality days	Zheng et al., 2021
	C34 Land utilization rate	Ming & Wang, 2022
	C35 Industrial pollution control investment	Lin et al., 2022
	C36 Local expenditure on environmental protection	Ming & Wang, 2022; Wang & Pan, 2022
	C37 Harmless treatment rate of domestic waste	Zheng et al., 2021; Wang & Pan, 2022
	C38 Ecological construction and protection investment	Zheng et al., 2021; Liu et al., 2018
Openness B4	C41 Proportion of foreign capital utilized	Lin et al., 2022
	C42 Number of international tourists received	Lin et al., 2022
	C43 International tourism income	Wang et al., 2022
	C44 Level of cultural propaganda	Ming & Wang, 2022
	C45 External investment and cooperation	Wang et al., 2022
	C46 E-commerce sales of rural tourism products	Wang et al., 2022
	C47 Foreign contracted project turnover	Wang et al., 2022

Indicators		Citation
Sharing B5	C51 Per capita disposable income of rural residents	Wang & Pan, 2022
	C52Residents' happiness level	Ming & Wang, 2022
	C53Number of rural tourism employment	Wang & Pan, 2022
	C54 Local expenditure on culture, sports and media	Wang & Pan, 2022
	C55 Engel coefficient ratio of urban and rural households	Ming & Wang, 2022
	C56 Urbanisation rate	Lin et al., 2022
	C57 Number of tourism agencies	Wang et al., 2022
	C58 Tourists' satisfaction level	Ming & Wang, 2022
	C59 Tourist revisit rate	Ming & Wang, 2022
	C510 Number of literary and artistic activities organized by mass cultural institutions	Wang et al., 2022

Source: Xu, 2018; Liu et al., 2018; Hui, 2019; Zheng et al, 2021; Lin et al., 2022; Ming & Wang, 2022; Wang & Pan, 2022; Wang et al., 2022

RESEARCH METHODOLOGY

Application of the Delphi Method

This study employed the Delphi method as the principal tool for refining the evaluation index framework for high-quality rural tourism in Shaanxi Province. The Delphi method is a well-established technique for integrating expert knowledge and building consensus on complex multidimensional issues (Donohoe & Needham, 2009; Mukherjee et al., 2015). It was considered particularly appropriate for this research objective, as it provides a systematic approach to expert consultation, ensuring methodological rigour. The initial phase involved a comprehensive literature review to identify an set of 38 potential indicators, organised according to five development concepts: innovation, coordination, green, openness, and sharing (Xu, 2018; Liu et al., 2018; Hui, 2019; Zheng, 2021). An expert panel of 15 members was assembled through purposive sampling. The selection criteria ensured that participants possessed advanced expertise in rural tourism and high-quality development, drawing from academia, government, and industry sectors (Chen et al., 2022; Zheng et al., 2020). All panel members were briefed in detail on the study's objectives and conceptual framework.

Questionnaire Design and Data Collection

The Delphi questionnaire was structured in two parts. The first section utilised a 5-point Likert scale, an approach widely employed in similar Delphi studies (Asmelash & Kumar, 2019; Zhao et al., 2023), to assess the perceived importance of each proposed indicator. The second section gathered demographic information and self-assessments of expertise and familiarity with the subject

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matter. This additional data enabled assessment of the authority and consistency of expert responses, thereby enhancing the methodological robustness of the process.

Expert Consultation Rounds and Data Analysis

In line with recommended Delphi practices (Zhang & Wu, 2023), the study conducted two rounds of expert consultation. Questionnaires were distributed to the panel both in person and via WeChat. In the first round, experts evaluated each indicator based on their professional judgment. The responses were analysed using SPSS and Excel to assess item reliability and overall framework coherence. Based on the first-round findings, indicators that failed to meet the predefined criteria were revised or removed. A second round of consultation was then conducted with the same expert panel to verify the stability of the framework and achieve final consensus. The result of this process was a rigorously validated, expert-informed evaluation index system for assessing high-quality rural tourism development in Shaanxi Province.

ANALYSIS AND DISCUSSION

Experts' profiles, Positive Coefficient and Degree of Expert Authority (Cr)

In this research, 15 experts with different background were recruited as the panel for the consultation. These experts all met the inclusion criteria to guarantee they all have the authority and knowledge to make consultation decisions. The summary of assembled experts' profiles for this research is collected and shown below in Table 2.

Table 2: Summary of the Basic Information of Experts

Variable	Category	Number of Experts	Frequency (%)
Gender	Male	7	46.7%
	Female	8	53.3%
Degree	Master	7	46.7%
	Ph.D.	8	53.3%
Working Years	10-15years	7	46.7%
	15-20 years	7	46.7%
	Above 20 years	1	6.6%
Job Sector	Academia	6	40.0%
	Government	2	13.3%
	Tourism industry sectors	7	46.7%
Position/Title	Associate professor and above	6	40.0%
	Section chief and above	5	33.3%
	Manager and above	4	26.7%

Source: Author's Calculation

The positive coefficient of experts is the degree of experts' interest and the effectiveness of their responses (Zheng et al., 2020). During the consultation

and scoring process, 15 questionnaires were distributed either via Wechat application or in person to 15 assembled experts in each round. All 15 experts responded with effective and valid feedback in each round, so that the positive coefficient in both the first round and second round is 100%, which is relatively acceptable.

The degree of expert authority (Cr) is calculated with two self-assessment scores collected in the questionnaire given by experts themselves in each round to reflect the reliability of experts' decisions. The formula is Cr=(Cs+Ca)/2, in which Cs represents the judgement basis of experts, while Ca is the experts' familiarity with the given content. Below in Table 3. is the summary of collected scores of experts' self-assessment of Cs and Ca. It can be calculated that the Cr of this research is 0.987, which is over 0.7. Therefore, the consultation result in this research is considered reliable.

Table 3. Quantitative Self-assessment Scores of Cs and Ca

Judgement Basis (Cs)	**Degree of influence of each of the sources in their criteria**					
	High		**Medium**		**Low**	
	Weight	**Expert**	**Weight**	**Expert**	**Weight**	**Expert**
Theoretical analysis	0.3	13	0.2	2	0.1	0
Practical experience	0.5	15	0.4	0	0.1	0
Referring to literature	0.1	7	0.1	8	0.1	0
Expert intuition	0.1	0	0.1	0	0.1	0

Familiarity (Ca)		**Weight**	**Expert**
	Very familiar	1	14
	Familiar	0.8	1
	General	0.5	0
	Not very familiar	0.2	0
	Unfamiliar	0	0

Source: Author's Calculation

Selection of Indicators in the First Round

In the first round of scoring, 38 indicators in total in the preliminary evaluation index framework were judged by experts. Scores given by the experts were processed with SPSS and Excel. According to the inclusion criteria, indicators met all the following criteria: (a) mean score (MS) >3.5 (Asmelash and Kumar, 2019); (b) coefficient of variation (CV) <0.25 (Zhang and Wu, 2023); (c) full score rate (FSR) >0.2 (Wang and Si, 2011) would be retained in the questionnaire until the second round, while indicators that meet neither of these criteria would be removed directly. Meanwhile, indicators that only met some of the above criteria were left pending and asked for extra focus from experts in the second round consultation. It can be seen in Table 4. that three indicators, including "C16 Rural tourism technical market turnover", "C25 GDP per capita Gini coefficient" and "C510 Number of literary and artistic activities organized by mass cultural institutions", did not meet any of the criteria and have been removed from the

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framework for next round. Indicators like "C15 Number of authorized patents applications", "C36 Local expenditure on environmental protection", "C38 Ecological construction and protection investment", "C41 Proportion of foreign capital utilized" and "C54 Local expenditure on culture, sports and media" did not reach experts' consensus on their importance, but were retained for further consideration in the next round. Other indicators have reached a consensus and have been retained in the framework. The result of the selection of indicators in the first round is illustrated below in Table 4.

Selection of Indicators in the Second Round

After the first round, new questionnaires with revised indicators were developed and distributed to the same 15 experts. The second round of expert consultation focused mainly on repeated scoring of the indicators' importance, especially with extra focus on those indicators retained from the first round for further consideration. Results can be identified in Table 4. below, in which two more indicators, "C36 Local expenditure on environmental protection" and "C54 Local expenditure on culture, sports and media", failed to meet the criteria and have been removed, while other indicators all reached a consensus among experts. Ultimately, 33 indicators have been proven to be important in constructing the framework when evaluating rural tourism from the perspective of high-quality development.

Table 4. The Result of Selection of Indicators in the First and Second Round

	First Round					Second Round			
	MS	CV	FSR	Result		MS	CV	FSR	Result
C11	5	0	100	Retain	C11	5	0	100	Retain
C12	4.4	0.17	53.3	Retain	C12	4.6	0.11	60	Retain
C13	4.27	0.14	33.3	Retain	C13	4.47	0.12	46.7	Retain
C14	3.73	0.24	26.7	Retain	C14	4.27	0.11	26.7	Retain
C15	3.53	0.26	26.7	Pending	C15	3.87	0.22	26.7	Retain
C16	2.47	0.3	0	Remove		C16 Removed			
C21	4.87	0.07	86.7	Retain	C21	4.87	0.07	86.7	Retain
C22	4.93	0.05	93.3	Retain	C22	4.87	0.07	86.7	Retain
C23	4.93	0.05	93.3	Retain	C23	4.87	0.07	86.7	Retain
C24	4	0.19	26.7	Retain	C24	4.27	0.11	26.7	Retain
C25	3.13	0.27	13.3	Remove		C25 Removed			
C26	3.73	0.24	26.7	Retain	C26	3.8	0.23	26.7	Retain
C27	3.93	0.22	33.3	Retain	C27	4	0.21	33.3	Retain
C31	5	0	100	Retain	C31	5	0	100	Retain
C32	4.4	0.12	40	Retain	C32	4.4	0.12	40	Retain
C33	4.47	0.12	46.7	Retain	C33	4.47	0.12	46.7	Retain
C34	4	0.23	40	Retain	C34	5	0	100	Retain
C35	3.73	0.24	26.7	Retain	C35	3.87	0.22	26.7	Retain
C36	3.67	0.27	33.3	Pending	C36	3.13	0.27	13.3	Remove
C37	4.07	0.22	40	Retain	C37	4.07	0.22	40	Retain
C38	3.67	0.27	33.3	Pending	C38	4.13	0.15	26.7	Retain

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	First Round					Second Round			
	MS	CV	FSR	Result		MS	CV	FSR	Result
C41	4.13	0.09	13.3	Pending	C41	4.27	0.11	26.7	Retain
C42	4.73	0.1	73.3	Retain	C42	4.67	0.1	66.7	Retain
C43	3.93	0.2	26.7	Retain	C43	4.27	0.11	26.7	Retain
C44	4.27	0.11	26.7	Retain	C44	4.27	0.11	26.7	Retain
C45	3.93	0.22	33.3	Retain	C45	4.33	0.11	33.3	Retain
C46	3.87	0.24	33.3	Retain	C46	4.33	0.11	33.3	Retain
C47	4.47	0.12	46.7	Retain	C47	4.47	0.12	46.7	Retain
C51	4.8	0.09	80	Retain	C51	4.8	0.09	80	Retain
C52	4.73	0.1	73.3	Retain	C52	4.73	0.1	73.3	Retain
C53	4.87	0.07	86.7	Retain	C53	4.87	0.07	86.7	Retain
C54	4	0.13	13.3	Pending	C54	3.13	0.27	13.3	Remove
C55	4.8	0.09	80	Retain	C55	4.8	0.09	80	Retain
C56	4.4	0.12	40	Retain	C56	4.33	0.11	33.3	Retain
C57	3.73	0.24	26.7	Retain	C57	4.27	0.11	26.7	Retain
C58	4.93	0.05	93.3	Retain	C58	5	0	100	Retain
C59	4.53	0.11	53.3	Retain	C59	4.53	0.11	53.3	Retain
C510	2.87	0.32	6.7	Remove		C510 Removed			

Source: Author's Calculation

Coordination Coefficient (W) Test

The coordination coefficient test (W), also called Kendall's coefficient of concordance test, is essential for assessing whether the results of the scoring by experts coordinate with each other. In other words, it is used to judge the consistency of indicators and degree of expert coordination. The value of W ranges from 0 to 1, with the higher value indicating the greater degree of expert coordination and the higher consistency of experts' decisions. At the meantime, P-value is considered statistically significant when it is smaller than 0.05. This study conducted a coordination coefficient test after each round's consultation, and the result of each round (Table 5.) passed the coordination test, indicating that two rounds of experts' consultations in this study were coordinated and consistent.

Table 5. The Result of Coordination Coefficient Test in the First and Second Round

First round		**Second round**	
W	**P-value**	**W**	**P-value**
0.481	0.000	0.426	0.000

Source: Author's Calculation

The Established Evaluation Index Framework

After two rounds of indicators selection using Delphi method, the ultimate evaluation index framework has been built on the basis of high-quality development to provide a tool for evaluating rural tourism in Shaanxi province. It can be used as a reference for rural tourism service providers to identify problems in innovation, coordination, green, openness and sharing. More

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importantly, it could help to assess whether the rural tourism industry has met the requirements of high-quality development, which is the current trend in China. The established evaluation index framework can be seen in Table 6.

Table 6. High-quality Rural Tourism Evaluation Index Framework for Shaanxi Province

Innovation B1	C11 Proportion of R&D expenditure
	C12 Proportion of R&D personnel
	C13 Average expenditure on R&D of rural tourism enterprises
	C14 Expenditure on education
	C15 Number of authorized patents applications
Coordination B2	C21 Ratio of disposable income of urban and rural residents
	C22 Infrastructure construction network
	C23 Number of tourists toilets
	C24 Highway mileage
	C26 Proportion of rural tourism in the tertiary industry
	C27 Level of catering and accommodation facilities
Green B3	C31 Green coverage rate in built-up areas
	C32 Water quality regular rate
	C33 Good air quality days
	C34 Land utilization rate
	C35 Industrial pollution control investment
	C37 Harmless treatment rate of domestic waste
	C38 Ecological construction and protection investment
Openness B4	C41 Proportion of foreign capital utilized
	C42 Number of international tourists received
	C43 International tourism income
	C44 Level of cultural propaganda
	C45 External investment and cooperation
	C46 E-commerce sales of rural tourism products
	C47 Foreign contracted project turnover
Sharing B5	C51 Per capita disposable income of rural residents
	C52 Residents' happiness level
	C53 Number of rural tourism employment
	C55 Engel coefficient ratio of urban and rural households
	C56 Urbanization rate
	C57 Number of tourism agencies
	C58 Tourists' satisfaction rate
	C59 Tourist revisit rate

Source: Author's Calculation

Compared to the preliminary framework (Table 1.), 5 indicators in total were removed. Indicator "C16 Rural tourism technical market turnover", representing how much benefit rural tourism brings to the innovation, was removed, possibly due to the experts considering the technical innovation development in rural Shaanxi as being generally weak. When the average status of this aspect is low, the significance of using this indicator to evaluate is

unnecessary. "C25 GDP per capita Gini coefficient" was considered for removal by experts most likely because of the practical circumstances in rural Shaanxi and also the low data availability when doing data collection in the future. The Gini coefficient is rarely calculated in rural administrative divisions in Shaanxi province. "C510 Number of literary and artistic activities organized by mass cultural institutions" was also removed considering its insignificant representation by experts when assessing the sharing outcome of high-quality development. Indicator of "C36 Local expenditure on environmental protection" was removed due to the repetition with indicator "C38 Ecological construction and protection investment", as C38 covers a wider range. Lastly, "C54 Local expenditure on culture, sports and media" seems less important than other indicators due to its narrow representation of the development potential of cultural industries rather than the status of sharing outcome. Assembled experts all reached a consensus on removing the above indicators from the preliminary framework and proved the low importance of these indicators when evaluating the development of rural tourism from the perspective of innovation, coordination, green, openness and sharing.

CONCLUSION

This research aimed to establish an evaluation index framework from the perspective of high-quality development for Shaanxi province, as few studies have been conducted on identifying proper and comprehensive indicators for rural tourism. This research adopted the Delphi method to identify and select potential indicators. After two rounds of the expert consultation, 33 relatively important indicators were selected from the 38 initial indicators by 15 experts and have reached consensus among them. These indicators contributed to realizing how high-quality development is actually implemented in terms of innovation, coordination, green, openness and sharing in the rural tourism industry. Moreover, this research has to some extent filled the research gap of a lack of comprehensive evaluation index framework on the basis of high-quality, and using the five development concepts as the criteria has provided practical reference when establishing assessment tools to measure the performance of rural tourism industry in practice. However, limitations still exist in this research, such as: (1) more potential indicators could be employed at the initial stage of building the framework so that they cover more aspects when evaluating the rural tourism development performance; (2) weighting for each indicator could be allocated so that the framework can transform into an evaluation index system for actual evaluation process rather than just a theoretical reference. Hopefully, scholars will consider this research's limitations and fill the research gaps in this field.

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REFERENCES

Asmelash, A. G., & Kumar, S. (2019). Assessing progress of tourism sustainability: Developing and validating sustainability indicators. *Tourism Management*, *71*, 67-83.

Blancas, F. J., Vega Vázquez, M., Ruiz Cardona, E., & Santana González, A. (2018). A dynamic sustainable tourism evaluation using multiple benchmarks. *Tourism Management*, *69*, 92–106.

Butler, R. (2018). Sustainable tourism in sensitive environments: A wolf in sheep's clothing? *Sustainability*, *10*(6), 1789. https://doi.org/10.3390/su10061789

Chen, Y., Zhu, M., Lu, J., Zhou, Q., & Ma, W. (2020). Evaluation of ecological city and analysis of obstacle factors under the background of high-quality development: Taking cities in the Yellow River Basin as examples. *Ecological Indicators*, *118*, 106771.

Chu, Y., & Zhang, D. (2022). High-quality development effectiveness of provincial regions in China: Data-driven evaluation and spatio-temporal characteristics. *International Journal of Current Science Research and Review*, *5*(8), 2806–2815. https://doi.org/10.47191/ijcsrr/v5-i8-02

Deng, A., & Pan, D. (2019). *Path selection and policy coordination of rural tourism poverty alleviation under the background of high-quality development*. Chinese Financial & Economic Publishing House. (in Chinese)

Donohoe, H., & Needham, R. (2009). Moving best practice forward: Delphi characteristics, advantages, potential problems, and solutions. *International Journal of Tourism Research*, *11*(5), 415-437.

He, L., Zha, J., & Loo, H. A. (2021). How to improve tourism energy efficiency to achieve sustainable tourism: Evidence from China. In *Current Issues in Asian Tourism: Volume II* (pp. 188–203). https://doi.org/10.4324/9781003133568-14

Hui, G. (2019). Study on the evaluation and development of Lianhuashan tourism resources in Baotou. *Journal of Baotou Vacation Technology College*, *20*(2), 78–82.

Jia, Z., Jiao, Y., Zhang, W., & Chen, Z. (2022). Rural tourism competitiveness and development mode, a case study from Chinese township scale using integrated multi-source data. *Sustainability*, *14*(7), 4147. https://doi.org/10.3390/su14074147

Kortoci, Y., & Kortoci (Kellezi), M. (2017). The assessment of the rural tourism development in the Valbona Valley National Park. *Tourism Economics*, *23*(8), 1662-1672.

Lane, B. (1994). What is rural tourism? *Journal of Sustainable Tourism*, *2*(1–2), 7–21. https://doi.org/10.1080/09669589409510680

Li, X., Du, J., & Long, H. (2018). A comparative study of Chinese and foreign green development from the perspective of mapping knowledge domains. *Sustainability*, *10*(12), 4357.

Lin, T., Wang, L., & Wu, J. (2022). Environmental regulations, green technology innovation, and high-quality economic development in China: Application of mediation and threshold effects. *Sustainability*, *14*(11), 6882. https://doi.org/10.3390/su14116882

Liu, C., Nie, F., & Ren, D. (2021). Temporal and spatial evolution of China's human development index and its determinants: An extended study based on five new development concepts. *Social Indicators Research*, *2021*(157), 247-282.

Liu, X. X., Cao, S. S., & Xu, L. K. (2018). Developing strategies of tourism resources in rural culture: A case study of Chongming Island. *Acta Agriculturae Shanghai*.

Ming, R., & Wang, Q. S. (2022). Research on the high-quality rural tourism development evaluation index system: A case study of Yubei District Chongqing City. *China Academic Journal Electronic Publishing House*, 31-34.

Mukherjee, N., Hugé, J., Sutherland, W., McNeill, J., Van Opstal, M., Dahdouh-Guebas, F., & Koedam, N. (2015). The Delphi technique in ecology and biological conservation: Applications and guidelines. *Methods in Ecology and Evolution*, *6*(9), 1097-1109.

Pai, C.-H., Ko, K.-M., & Santos, T. (2019). A study of the effect of service recovery on customer loyalty based on marketing word of mouth in tourism industry. *Revista De Cercetare Si Interventie Sociala*, *64*, 74–84. https://doi.org/10.33788/rcis.64.6

Qi, Y. L., Wang, L. L., Li, D., Liu, X. J., & Xiao, R. R. (2022). Spatial distribution and influencing factors of key rural tourism villages in China. *Resources Development Marketing*, *37*, 734–740.

Rui, H. (2018). Research on evaluation of rural tourism resources in Liu'an city based on analytic hierarchy process and philo model. *Journal of Chaohu College*, *20*(4), 61–67.

Shen, S., Wang, H., Quan, Q., & Xu, J. (2019). Rurality and rural tourism development in China. *Tourism Management Perspectives*, *30*, 98-106.

Sun, X., Sui, D., Chang, K., & Wang, G. (2021). Research on the influence of TFP on high-quality development in China. *Journal of Applied Mathematics and Computation*, *5*(3), 154-164.

Tang, Y., Zuo, X., & Wu, Z. (2021). Construction and empirical study on evaluation index system of high quality development of tourism economy taking Hunan province as an example. *Resource Development Marketing*, *37*(6), 641–647.

Wang, C. Z., & Si, Q. (2011). A study on data statistical processing method of Delphi method and its application. *China Academic Electronic Publishing House*, *9*(4), 92-96.

Wang, G., & Ye, L. (2022). Spatial-temporal pattern of mismatch degree of high-quality tourism development and its formation mechanism in Taihu Lake Basin, China. *Sustainability*, *14*(8), 4812. https://doi.org/10.3390/su14084812

Wang, S. X., & Pan, Y. (2022). Study on the construction of evaluation system of high-quality development of rural tourism—From the perspective of new development concepts. *Journal of Henan Institute of Science and Technology*, *42*(7), 9-17.

Wang, X., Wang, M., Lu, X., Guo, L., Zhao, R., & Ji, R. (2022). Spatio-temporal

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evolution and driving factors of the high-quality development of provincial tourism in China. *Chinese Geographical Science*, *32*(5), 896–914. https://doi.org/10.1007/s11769-022-1307-z

Wei, L. (2018). Fuzzy comprehensive evaluation-based tourism resource development assessment in Suizhou. *Tourism Overview*, *6*, 113–114.

Xu, J. (2018). Construction of the evaluation index system of "Five development concepts" based on R-type clustering and variation coefficient in Hunan Province. *IOP Conference Series: Materials Science and Engineering*, *490*, 062045. https://doi.org/10.1088/1757-899x/490/6/062045

Xu, J., Yang, M., Hou, C., Lu, Z., & Liu, D. (2021). Distribution of rural tourism development in geographical space: A case study of 323 traditional villages in Shaanxi, China. *European Journal of Remote Sensing*, *54*(sup2), 318-333.

Xue, L., Kerstetter, D., & Hunt, C. (2017). Tourism development and changing rural identity in China. *Annals of Tourism Resources*, *66*, 170-182.

Zhang, B. K., & Wu, R. C. (2023). Construction of equipment evaluation index system of emergency medical rescue based on Delphi method and analytic hierarchy process. *Ain Shanm Engineering Journal*, *14*(101870).

Zhao, P. P., Ali, Z. M., & Ahmad, Y. (2023). Developing indicators for sustainable urban regeneration in historic urban areas: Delphi method and analytic hierarchy process (AHP). *Sustainable Cities and Society*, *99*, 104990.

Zheng, H., Yin, Q., Li, X., & Jie, X. (2021). Construction of evaluation index system for the ecological civilization in rural tourism destinations. In *Proceedings of the Fourteenth International Conference on Management Science and Engineering Management* (pp. 200–214). https://doi.org/10.1007/978-3-030-49889-4_18

Zheng, J., Lou, L. G., Chen, S. Y., Li, J., Wei, J. M., & Feng, J. Y. (2020). Model construction of medical endoscope service evaluation system—Based on the analysis of Delphi method. *BMC Health Service Research*, *20*(629), 1-13.

Zhu, H., Liu, Y., Luo, Y., & Zhang, L. (2022). Dynamic technical performance measurement in rural tourism: An empirical study from China. *Journal of Global Information Management*, *30*(1). https://doi.org/10.4018/JGIM.310930

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TOURISM IN PALEMBANG CITY, SOUTH SUMATRA, INDONESIA: IS IT MANAGED IN AN ECONOMICALLY SUSTAINABLE MANNER?

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Abstract

Sustainable tourism management of Kemaro Island (KI), Palembang is crucial for the economic development and well-being of the local community. As a premier destination in Palembang, KI requires comprehensive and effective management. This study aimed to identify the factors that are contributing to the sustainable tourism management of KI from an economic perspective. Economic sustainability (ES) was evaluated through six variables: income enhancement and distribution (IED), employment opportunities (EO), supporting local businesses (SLB), infrastructure development (ID), economic diversification (ED), and community development (CD). The data for each variable was collected through field observations and interviews and analysed using qualitative descriptive methods. The findings highlighted the essential roles of stakeholders, including local communities, tourism managers, government organisations (GOs), and non-governmental organisations (NGOs) in advancing ES. Key aspects such as EO, IED, CD, and community participation significantly impact ES. The study also addressed the challenges and opportunities in achieving ES in KI, emphasising the importance of collaborative efforts, policy alignment, and community engagement. By understanding and implementing sustainable tourism practices, KI can continue to grow economically, while preserving its natural and cultural heritage for future generations.

Keywords: Economic Sustainability, Tourism, Management

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INTRODUCTION

Tourism development (TD) plays a pivotal role in economic, social, and environmental dimensions. Economically, the tourism sector contributes significantly to foreign exchange earnings from international visitors and the gross domestic product (Mudrikah et al., 2014; Hermawan, 2016; Moayedfar & Fatemi, 2021). The tourism industry fosters favourable conditions for the effective utilisation of a country's tourism and recreational potential within the context of balanced development, thereby enhancing the positive impacts on socio-economic development (Carvache-Franco et al., 2022; Dutta et al., 2021; Kyrylov et al., 2022). Tourism exerts a substantial impact on economic, social, cultural, and political aspects, which are interrelated (Waridin & Astawa, 2021; Ryan et al., 2011; Zielinski et al., 2021; Pérez et al., 2021; Salinas et al., 2018; Cavalheiro et al., 2020; Henderson, 2002; Bui et al., 2020; Williams & Gonzalez, 2017). Policymakers also play a crucial role in shaping the tourism landscape (Boukas, 2013; Brown, 2006; Allaberganov & Catterall, 2023; Duval & Smith, 2013; Kim et al., 2019; Weng et al., 2021). Tourism development (TD) strategies involve enhancing attractions that encompass natural, cultural, and artificial elements, which are integrated spatially to leverage global advantages and competitiveness, highlighting the importance of cultural heritage (Astina & Kurniawati, 2021; Costa & Carneiro, 2021; Andreyanova & Ivolga, 2018). The scale of TD impacts every country, region, city, or smaller territorial unit. Additionally, the relationship between tourism and regional development is marked by spatial differentiation (Hącia, 2019). Sustainable management of tourism must be supported by tourist satisfaction, which serves as a post-visit response (Rajesh, 2013). This satisfaction is a signal that objectives have been achieved. Satisfied tourists share positive experiences with others, providing free advertising that can promote consistent travel to attractions (Kozak & Rimmington, 2000).

The river tourism sector is a strategic tourism area that is being promoted by the Palembang City government. It encompasses attractions, infrastructure, general facilities, tourism amenities, and community empowerment (Nugroho, 2011; Ratman, 2016). Kemaro Island (KI), a premier tourist destination in Palembang, is recognised as a Category A Heritage City in Indonesia. The island is highly favoured by domestic tourists, with 17702 visitors being recorded in 2023, and attracts approximately 80500 international tourists annually, particularly during major Tri Dharma religious holidays. Visitors include local residents from various cities and districts within South Sumatra, neighbouring provinces such as Jambi, Bengkulu, Lampung, and Medan, as well as thousands of Chinese descendants from Singapore, Hong Kong, and China, who come to enjoy the island's beauty and perform religious rituals. Despite the influx of tourists during the Cap Go Meh celebration, KI suffers from a lack of

attractive features, inadequate facilities and infrastructure, and insufficient awareness among the community and tourism managers to enhance the island's appeal. This significantly impacts the ES management of KI as a tourist destination. The role of GOs in the management and development of the tourist area has been suboptimal. This study was aimed at analysing the ES aspects of KI in Palembang and was focused on identifying the key factors that contribute to the ES management of tourism on the island. The research is intended to provide insights into improving the attractiveness and infrastructure of KI to support its development as a sustainable tourist destination, thus, benefiting the local economy and community.

This research aimed to significantly enhance government and local community revenues both locally and nationally while boosting the creative economy sector of Palembang. Tourism development (TD) must have a direct impact on local communities as they play a crucial role in supporting the sustainability of tourism (Sumarmi et al, 2021; Astina et al., 2021; Sumarmi et al, 2020). The primary goal of this research was to align with the Sustainable Development Goals (SDGs) by promoting tourism that is economically, environmentally, socio-culturally, and institutionally beneficial. Emphasis was given to sustainable TD (Muis et al., 2016), particularly eco-cultural tourism, to ensure that the influx of tourists will not compromise the preservation of local cultural values. Local wisdom plays a vital role in environmental management as a sustainability measure (Marlina et al., 2020). Although numerous studies on tourism have been conducted, spatial perspectives on tourism, particularly in Palembang, remain underexplored. Therefore, it is essential to focus on the ES development of tourism in Palembang by improving the management of KI. This study addressed the need for sustainable tourism practices that do not disrupt the cultural fabric of local communities, ensuring long-term benefits and preservation. This study aimed to uncover the factors that play a crucial role in the sustainable tourism management of KI, with a particular emphasis on the economic perspective.

LITERATURE REVIEW

The ES of tourism management is a critical aspect for ensuring long-term benefits for local communities and economies. Kemaro Island (KI), a notable tourist destination in Palembang, Indonesia, has seen increasing visitor numbers, necessitating a sustainable approach to its tourism management. This literature review explores the theoretical framework of ES in tourism, examines previous studies on the economic impacts of tourism in similar regions, provides an overview of TD and policies in Palembang, and identifies research gaps and justifications for further investigation. Economic sustainability (ES) in tourism refers to the capacity of tourism activities to generate continuous economic

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benefits for local communities while preserving the environmental and cultural resources on which they depend. Elkington's (1997) triple-bottom-line framework, which emphasises economic, social, and environmental performance, is foundational to understanding sustainable tourism. This framework suggests that TD should not only focus on economic gains but also ensure social equity and environmental protection. Researchers such as Swarbrooke (1999) and Weaver and Lawton (2004) expanded on this by highlighting that sustainable tourism management must include fair income enhancement and distribution (IED), employment opportunities (EO), and supporting local businesses (SLB). These components are crucial for maintaining a balanced approach that benefits all stakeholders involved in tourism.

Studies on the economic impact of tourism in regions similar to KI provided valuable insights into best practices and potential challenges. Nicholas and Thapa (2010) examined the economic benefits of tourism in the Caribbean islands and discovered that equitable IED and community participation were key to ES outcomes. Similarly, Gursoy et al. (2007) found that in Southeast Asian destinations, tourism significantly contributes to EO and economic diversification (ED). In the context of island tourism, Razović (2013) and Wiwattanakantang and To-Im (2014) highlighted the importance of SLB and ensuring infrastructure development (ID) to enhance the tourism experience. These studies underscored the need for a holistic approach that integrates economic activities with community well-being and environmental stewardship.

Palembang, as the administrative centre of South Sumatra, has prioritised tourism as a strategic sector for regional development. The local government's tourism policies aim to enhance infrastructure, promote cultural heritage, and increase the city's attractiveness to tourists. According to the United Nations World Tourism Organization (UNWTO, 2013), these efforts are in line with global standards for sustainable TD. The city has implemented various initiatives to boost tourism, including the development of tourist facilities and the promotion of events such as cultural festivals. However, despite these efforts, the management of KI's tourism resources remains unbalanced, particularly in terms of infrastructure and community awareness (Pickel-Chevalier et al., 2021; Zhang & Chan, 2020). While there has been substantial research on the economic impacts of tourism, specific studies focusing on KI are limited. The existing research tends to generalise the findings from broader regions without addressing the unique challenges and opportunities of KI. This gap highlights the need for targeted research that explores the island's specific context and identifies tailored strategies for ES management. Furthermore, previous studies often emphasised the immediate economic benefits without adequately addressing long-term sustainability. There is a need for comprehensive research to examine the

interplay between economic activities and their social and environmental impacts over time.

RESEARCH METHODOLOGY

The study area was KI. The research presented a detailed account of the ES of tourism management, obtained through field observation and interviews. This research used qualitative methods and thematic analysis to assess the ES of tourism in KI, focusing on the Musi River area in Palembang. The ES aspects that were examined included the IED, EO, SLB, ID, ED, and community development (CD) (Elkington, 1997).

Table 1. The variables of ES.

No.	ES instrument	Variable	Indicator
1	Income Enhancement and Distribution (IED)	Increasing Regional Income Income Equalisation	Total revenue generated from tourism activities. Distribution of tourism revenue among local businesses and residents.
2	Employment Opportunities (EO)	Increased Job Creation Improved Quality of Work	Number of jobs created by tourism activities. Job satisfaction and tourism-related employment stability.
3	Supporting Local Businesses (SLB)	Supporting Local Businesses Building Capacity	Percentage of local businesses involved in the tourism supply chain. Training and development programmes for local businesses.
4	Infrastructure Development (ID)	Investing in Infrastructure Improving Infrastructure Accessibility and Quality	Amount of investment in tourism-related infrastructure. Quality and accessibility of tourism infrastructure (e.g., roads, facilities).
5	Economic Diversification (ED)	Diversifying Economic Activities Increasing Resilience to Economic Shocks	Variety of economic activities supported by tourism. The community's ability to withstand economic downturns.
6	Community Development (CD)	Reinvesting in the Community Improved Community's Living Standards	Amount of tourism revenue reinvested into community projects. Perceptions of improved living standards due to tourism.

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Table 2 lists the details of the interviews conducted at the KI's tourist attractions.

Table 2. Tourist Attraction Observation Methods

Kemaro Island (KI)	
Reasons for Observing the Tourist Attraction	Located on the banks of the Musi River, inhabited by ethnic communities, considered a prominent tourist attraction in Palembang City. Palembang is a Category A Heritage City in Indonesia.
Technical Observations	Secondary data collection and semi-structured interviews.
Observation Dates (Month/Year)	February-March 2024.
Interviewees and their Roles	1. Administrator/Caretaker of the Toa Pekong Kemaro Island Foundation, Mr Burhan (1 person) 2. Visitors/tourists (10 person) 3. Palembang City Tourism Officer, Mr Oki (Head of the Kemaro Island UPTD) (1 person)

The research location was KI in Palembang City, Indonesia, the details of which are shown in Figure 1.

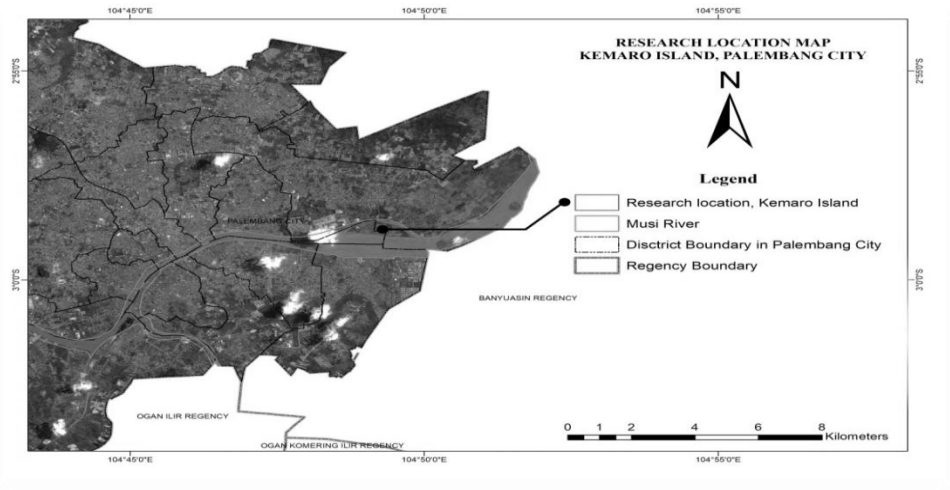


Figure 1. The research location: Kemaro Island, Palembang City, Indonesia.

ANALYSIS AND DISCUSSION

Tourism in KI is managed by a foundation in collaboration with the local government to ensure ES management. The results of the research interviews with the Management and Tourism Department of Palembang City can be seen in Table 3.

Table 3. The results of the analysis of the tourism management of KI from the ES aspects.

Theme	Code	No. of Respondents	Representative Responses
Income Enhancement and Distribution (IED)	Total income generated from tourism activities.	[R1, R2, R3, R4, R5, R6, R7, R8, R9 & R10]	*"Total income from domestic and international tourists reaches around 10 billion rupiah a year. Kemaro Island (KI) has other sources of sponsorship or funds from the Cap Go Meh festival, parking, and tour guide services."* [R8]
	Distribution of tourism income among local businesses and residents.	[R2, R3, R5, R7, R9, & R10]	"*Income from tourism on KI allocated through active partnerships with local entrepreneurs, namely restaurants, transportation providers, and creating EO for local residents in souvenir shops and drink and food shops. This approach not only improves the visitors' experiences but also ensures the growth of the local economy sustainable development.*" [R4] The economic activities on KI are depicted in Figure 2.  Figure 2. Economic activities on KI.

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Theme	Code	No. of Respondents	Representative Responses
Employment Opportunities (EO)	Number of jobs created by tourism activities.	[R1, R4, R5, R6, R7, R8, & R10]	"*Tourism on KI has created around 100 new jobs in the last year. The types of jobs available include tour guides, photography services, hotel and restaurant staff, to construction and infrastructure maintenance workers. There are also many local residents directly running small businesses, such as souvenir shops, boat rentals, and transportation service providers, and also indirectly.*" [R2]
	Job satisfaction and stability of tourism-related employment.	[R1, R2, R4, R5, R6, R8, R9, & R10]	"*We are quite satisfied with the quality and stability of the jobs created by tourism on KI. Most of the jobs are seasonal or short-term contracts but still provide important income for the community. The wages received are adequate, but there are not many opportunities for career development.*" [R10]
Supporting Local Businesses (SLB)	Percentage of local businesses involved in the tourism supply chain.	[R1, R3, R4, R5, R6, R7, R8, & R9]	"*Nearly all local businesses on KI, around 90%, are active in the tourism supply chain. They play an important role in maintaining the local cultural identity for better tourism experiences.*" [R1]
	Training and development programmes for local businesses.	[R1, R2, R3, R4, R5, R6, R7, R8, R9, & R10]	"*Provides a range of training programmes designed to SLB in the tourism sector. Currently, we are holding digital marketing workshops that help local entrepreneurs leverage modern technology to increase their competitiveness. We also provide special skills training for local craftsmen to improve the quality of their products.*" [R8]
Infrastructure Development (ID)	Amount of investment in tourism-	[R2, R4, R5, R6, R7, R8,	"*The Palembang City tourism office is investing in developing and improving tourism infrastructure on KI. This includes various projects,*

Theme	Code	No. of Respondents	Representative Responses
	related infrastructure.	R9, & R10]	*such as building access roads, renovating public facilities (toilets, parking areas, and rest areas), repairing docks and providing ships, adding cleaning facilities, as well as installing information signs and directional signs.*" [R5]
	Quality and accessibility of tourism infrastructure (e.g., roads, facilities).	[R1, R3, R4, R6, R8, R9, & R10]	"*The quality and accessibility of tourism infrastructure on KI has increased significantly in recent years. Public facilities, such as toilets, parking areas, and rest areas, have been renovated to ensure greater comfort and cleanliness for visitors.*" [R10]
Economic Diversification (ED)	The variety of economic activities supported by tourism.	[R1, R2, R3, R5, R6, R7, R8, R9, & R10]	"*As a positive impact of TD on KI, various new economic activities have emerged in our community. The souvenir industry is thriving with products, such as key chains and jade jewellery, which are highly sought after by tourists as mementos of their visit. Additionally, there has been an increase in the number of kiosks and food stalls offering Palembang specialties, such as pempek and tekwan, which are favourites among visitors. We see the importance of ID, such as tourist boats and cable cars, to optimise the economic potential of this tourism sector.*" [R7]
	The ability of the community to withstand economic downturns.	[R1, R2, R3, R4, R5, R6, R7, R8, R9, & R10]	"*We are confident that our community is resilient enough to face any possible economic downturns thanks to the diversification of the tourism activities on KI. This was accomplished by not only relying on tourism, but also by developing various training programmes, such*

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Theme	Code	No. of Respondents	Representative Responses
			as handicraft making, local culinary delights, tour guides, and homestay management. The goal is to maintain various sources of income that can support our economy in the long run." [R9]
Community Development (CD)	The amount of tourism revenue that is reinvested into community projects.	[R1, R2, R3, R4, R5, R6, R7, R8, R9, & R10]	"*We are committed to allocating around 20-25% of the total tourism revenue to community projects. This investment includes basic ID, environmental preservation, and supporting micro and small businesses to create a positive impact on the community.*" [R7]
	Perception of increased living standards due to tourism.	[R1, R2, R3, R4, R5, R6, R7, R8, R9, & R10]	"*Tourism here has a significantly positive impact on the community's standards of living. Through job creation and increased local income, our residents can develop their local businesses, such as food stalls and souvenir shops. Infrastructure and public services have also been improved, improving access to essential facilities such as clean water and roads.*" [R3]

The management of tourism in KI has a significant economic impact on local ES through various factors. Revenue from domestic and international tourists, contributions to the local GDP, equitable IED, SLB, ID, cultural and environmental conservation, community participation and engagement, stakeholder collaboration, and local ED are the key elements in promoting sustainable tourism management. Collaboration among various stakeholders and transparency in IED play crucial roles in ensuring that the benefits of tourism are experienced by all the community members, thereby supporting inclusive and ES growth. The research also revealed that equal and affordable access to attractions on KI, along with comprehensive support facilities, provide safe and enjoyable recreational opportunities for both locals and tourists. However, there are shortcomings in the provision of suggestion and complaint boxes, as well as visitors' knowledge of the preservation of local sites and culture, indicating areas for improvement (Williams, 2021). Government policies in the management and

development of KI's tourist attractions, in line with the vision and mission of Palembang City, demonstrate strong support for sustainability and the advancement of cultural tourism destinations. Active participation by the government and the community in strategic discussions and policy development reflects an inclusive and collaborative approach to TD (Liu & Brouder, 2020). On comparing and contrasting the practices on the island with international case studies, the findings of this research indicate that the development of tourism on KI results in sustainable tourism. Similar research on cultural tourism destinations in other countries demonstrates that integrating strategies for environmental preservation and local socio-economic development in TD can strengthen the cultural identity and enhance the well-being of local communities (Nguyen & Cheung, 2020). This discussion can deepen the understanding of the importance of a holistic and participatory approach to tourism management, by considering not only the economic aspects but also the social and environmental sustainability.

The preservation of cultural tourism resources relies heavily on the roles of managers and the local community. Managers and administrators are instrumental in upholding preservation efforts, not only of physical structures but also of cultural heritage, which is deemed invaluable and should be conserved as ancestral legacies. This commitment is evident in their efforts to organise events such as cultural festivals and artistic performances, which attract a significant number of tourists. The government, particularly the Tourism Office, plays a pivotal role in preserving the resources of KI's tourist attractions. Sustainable development is aimed at cultivating tourism areas that prioritise both natural resources and human needs (Pickel-Chevalier et al., 2021; Zhang & Chan, 2020). Institutionally, alignment and support are essential from local, regional, and national government policies related to the tourism sector to ensure sustainability and inclusivity. Active participation from both the government and local communities is crucial for the successful management of cultural tourism destinations through the planning process, decision-making, and implementation of tourism programmes, thereby creating more effective and sustainable strategies. Managers, communities, and institutions must collaborate to establish partnerships with various stakeholders, including local businesses, indigenous communities, educational institutions, and NGOs, to support the development and promotion of cultural tourism destinations. The ultimate vision is to position cultural tourism destinations in Palembang City as attractive, valuable, and ES destinations.

The findings of this study revealed that the economic impact of tourism on KI is substantial, corroborating the research of Carvache-Franco et al. (2022) and Dutta et al. (2021), which emphasised the significance of tourism in local economic development. The considerable revenue generated supports the

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argument that sustainable tourism can drive economic growth while fostering CD (Kyrylov et al., 2022). However, unlike some other studies, this research highlighted the critical roles of ID and community engagement, indicating that these factors are essential for the sustainable management of tourism.

CONCLUSION

The tourism sector of KI has significantly bolstered local economic growth, EO, and CD. This study identified the key factors that are essential for the sustainable management of tourism in KI from an economic perspective. These factors include IED, EO, SLB, ID, ED, and CD. The findings indicate that tourism activities have generated substantial revenue, thereby supporting various sectors such as hospitality, transportation, and local crafts. This economic impact highlights the critical need for ongoing efforts to address environmental challenges, improve infrastructure, and provide comprehensive training programmes for the community. Collaborative efforts among GOs, the community, and stakeholders are imperative for achieving a sustainable and inclusive TD. Such collaborations will ensure long-term benefits for the local community and help preserve the island's cultural and natural heritage. By fostering these partnerships and emphasising sustainable practices, KI can become a model for other tourist destinations seeking to balance economic growth with environmental preservation and cultural integrity. In summary, the sustainable management of KI's tourism sector necessitates a multifaceted approach that integrates economic, environmental, and socio-cultural dimensions. The key findings of this study offer a roadmap for stakeholders to enhance the sustainability of tourism on the island to ensure that it continues to benefit the local economy while preserving its unique cultural and natural assets for future generations.

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REFERENCES

A., & Catterall, P. (2023). Using social exchange theory to examine residents' responses to heritage tourism: Case studies of Samarqand and Bukhara in Uzbekistan. *Journal of Heritage Tourism*, *18*(6), 846–863. https://doi.org/10.1080/1743873X.2023.2232474

Andreyanova, S., & Ivolga, A. (2018). Tourism potential of the North Caucasus: The formation, characteristics and development prospects. *GeoJournal of Tourism*. http://gtg.webhost.uoradea.ro/PDF/GTG-2-2018/gtg.22206-293.pdf

Astina, I. K., & Kurniawati, E. (2021). Tourism in coastal areas: Its implication to improve economic and culture acculturation (Case study in Goa China Beach, Malang). In *Geo Journal of Tourism and …* gtg.webhost.uoradea.ro.

Astina, I. K., Sumarmi, Felicia, M. Y., & Kurniawati, E. (2021). The traditional ceremonies of Tengger tribe as a sustainable tourism object in Indonesia. *Geojournal of Tourism and Geosites*, *39*(4), 1371–1378. https://doi.org/10.30892/gtg.394spl07-780

Boukas, N. (2013). Youth visitors' satisfaction in Greek cultural heritage destinations: The case of Delphi. *Tourism Planning and Development*, *10*(3), 285–306. https://doi.org/10.1080/21568316.2012.747986

Brown, G. (2006). Mapping landscape values and. *Tourism*, *113*(November 2012), 101–113. https://doi.org/10.1002/jtr

Bui, H. T., Jones, T. E., Weaver, D. B., & Le, A. (2020). The adaptive resilience of living cultural heritage in a tourism destination. *Journal of Sustainable Tourism*, *28*(7), 1022–1040. https://doi.org/10.1080/09669582.2020.1717503

Carvache-Franco, M., Carvache-Franco, W., Carvache-Franco, O., & Borja-Morán, J. (2022). Motivations as a predictor of satisfaction and loyalty in ecotourism. *Journal of Outdoor Recreation and Tourism*, *37*, 100478. https://doi.org/10.1016/j.jort.2021.100478

Cavalheiro, M. B., Joia, L. A., & Cavalheiro, G. M. do C. (2020). Towards a smart tourism destination development model: Promoting environmental, economic, socio-cultural and political values. *Tourism Planning and Development*, *17*(3), 237–259. https://doi.org/10.1080/21568316.2019.1597763

Costa, M., & Carneiro, M. J. (2021). The influence of interpretation on learning about architectural heritage and on the perception of cultural significance. *Journal of Tourism and Cultural Change*, *19*(2), 230–249. https://doi.org/10.1080/14766825.2020.1737705

Dutta, A., Mishra, T., Uddin, G. S., & Yang, Y. (2021). Brexit uncertainty and volatility persistence in tourism demand. *Current Issues in Tourism*, *24*(16), 2225-2232. https://doi.org/10.1080/13683500.2020.1822300

Duval, M., & Smith, B. (2013). Rock art tourism in the uKhahlamba/Drakensberg World Heritage Site: Obstacles to the development of sustainable tourism. *Journal of Sustainable Tourism*, *21*(1), 134–153. https://doi.org/10.1080/09669582.2012.699060

Elkington, J. (1997). *Cannibals with forks: The triple bottom line of 21st century business*. Capstone Publishing.

Gursoy, D., Chi, C. G., & Dyer, P. (2007). An examination of locals' attitudes. *Annals of Tourism Research*, *34*(3), 730-760.

Hącia, E. (2019). The role of tourism in the development of the city. *Transportation Research Procedia*, *39*(2018), 104–111. https://doi.org/10.1016/j.trpro.2019.06.012

Henderson, J. C. (2002). Heritage attractions and tourism development in Asia: A comparative study of Hong Kong and Singapore. *International Journal of Tourism Research*, *4*(5), 337–344. https://doi.org/10.1002/jtr.389

Hermawan, H. (2016). Dampak pengembangan desa wisata Nglanggeran terhadap ekonomi masyarakat lokal. *Jurnal Pariwisata*, *3*(2), 105–117.

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Kim, S., Whitford, M., & Arcodia, C. (2019). Development of intangible cultural heritage as a sustainable tourism resource: The intangible cultural heritage practitioners' perspectives. *Journal of Heritage Tourism*, *14*(5–6), 422–435. https://doi.org/10.1080/1743873X.2018.1561703

Kozak, M., & Rimmington, M. (2000). Tourist satisfaction with Mallorca, Spain, as an offseason holiday destination. *Journal of Travel Research*, *38*, 260-269.

Kyrylov, Y., Hranovska, V., Krykunova, V., Krukovska, O., & Aleshchenko, L. (2022). Determinants of the strategy of tourism business development in the regional economic and social destination. *Geojournal of Tourism and Geosites*, *42*(2), 636–646. https://doi.org/10.30892/gtg.422spl01-872

Liu, Y., & Brouder, P. (2020). Sustainable tourism development: Lessons from longitudinal research. *Journal of Sustainable Tourism*, *28*(7), 1003-1023.

Marlina, Sumarmi, S., & Astina, I. (2020). Sustainable marine ecotourism management: A case of marine resource conservation based on local wisdom of Bajo Mola community in Wakatobi National Park. 32(4). https://doi.org/10.30892/gtg.3

Moayedfar, S., & Fatemi, M. (2021). Sustainable tourism development in historic cities of arid regions with the revival of Qanat (Yazd City). In *Geo Journal of Tourism and …* gtg.webhost.uoradea.ro.

Mudrikah, A., Sartika, D., Ismanto, R. Y., & Satia, A. B. (2014). Kontribusi sektor pariwisata terhadap GDP Indonesia tahun 2004 - 2009. *Economics Development Analysis Journal*, *3*(2), 362–371.

Muis, A., Sumarmi, S., & Astina, I. (2016). Strategi pengembangan ekowisata bahari sebagai sumber belajar geografi pariwisata. *Jurnal Pendidikan - Teori, Penelitian, Dan Pengembangan*, *1*(11), 2178–2188.

Nguyen, T. H., & Cheung, C. (2020). Community participation and tourism sustainability: A case study of a heritage destination in Vietnam. *Tourism Management Perspectives*, *33*, 100614.

Nicholas, L. N., & Thapa, B. (2010). Visitor perspectives on sustainable tourism development. *Journal of Sustainable Tourism*, *18*(5), 639-656.

Nugroho, I. (2011). *Ekowisata dan pembangunan berkelanjutan*. Pustaka Pelajar.

Pérez, N. Y. I., Carrascal, M. P., & Duarte, J. A. D. (2021). Preliminary diagnostic of the tourist potential of a heritage town in Colombia. *Tourism Planning and Development*, *18*(6), 595–613. https://doi.org/10.1080/21568316.2020.1837227

Pickel-Chevalier, S., Zhang, Y., & Chan, S. W. (2021). Promoting sustainable tourism development through a cultural heritage project in rural China. *Journal of Cleaner Production*, *263*, 121-133.

Rajesh, R. (2013). *Impact of tourist perceptions, destination image and tourist satisfaction on destination loyalty: A conceptual model* [Doctoral dissertation, Pondicherry University].

Ratman, R. D. (2016). *Äkselerasi pembangunan kepariwisataan dalam rangka pencapaian target 12 juta wisman dan 260 juta wisnus 2016*.

Razović, M. (2013). The role of tourism in sustainable development. *Tourism and Hospitality Management*, *19*(1), 67-83.

Ryan, C., Chaozhi, Z., & Zeng, D. (2011). The impacts of tourism at a UNESCO heritage site in China—A need for a meta-narrative? The case of the Kaiping diaolou. *Journal of Sustainable Tourism*, *19*(6), 747–765. https://doi.org/10.1080/09669582.2010.544742

Salinas, E., Mundet, L., & Salinas, E. (2018). Historical evolution and spatial development of tourism in Cuba, 1919–2017: What is next? *Tourism Planning and Development*, *15*(3), 216–238. https://doi.org/10.1080/21568316.2018.1427142

Sumarmi, S., Arinta, D., Suprianto, A., & Aliman, M. (2021). The development of ecotourism with Community-Based Tourism (CBT) in Clungup Mangrove Conservation (CMC) of Tiga Warna Beach for sustainable conservation. *Folia Geographica*, *63*(1), 123–142.

Sumarmi, Kurniawati, E., & Aliman, M. (2020). Community-Based Tourism (CBT) to establish blue economy and improve public welfare for fishing tourism development in Klatak Beach, Tulungagung, Indonesia. *GeoJournal of Tourism and Geosites*, *31*(3). https://doi.org/10.30892/gtg.31307-530

Swarbrooke, J. (1999). *Sustainable tourism management*. CABI.

UNWTO. (2013). *Sustainable tourism for development guidebook*. World Tourism Organization.

Waridin, & Astawa, I. P. (2021). Shifting of land use in sustainable tourism: A local cultural approach in Indonesia. *Geojournal of Tourism and Geosites*, *35*(2), 270–274. https://doi.org/10.30892/gtg.35201-647

Weng, L., Weng, S., & Luo, X. (2021). Development of petite bourgeoisie commercial landscapes in China's historic towns: A perspective from tourists' taste and distinction. *Journal of Tourism and Cultural Change*, *19*(1), 19–37. https://doi.org/10.1080/14766825.2020.1772272

Weaver, D., & Lawton, L. (2004). Visitor attitudes toward tourism development and product integration in an Australian urban-rural fringe. *Journal of Travel Research*, *42*(3), 286-296.

Williams, A. M. (2021). Understanding the relationships between heritage and sustainable tourism. *Tourism Management*, *47*(2), 179-190.

Williams, L. K., & Gonzalez, V. V. (2017). Indigeneity, sovereignty, sustainability and cultural tourism: Hosts and hostages at 'Iolani Palace, Hawai'i. *Journal of Sustainable Tourism*, *25*(5), 668–683. https://doi.org/10.1080/09669582.2016.1226850

Wiwattanakantang, Y., & To-Im, W. (2014). The impact of tourism on the local economy: A case study of Phuket, Thailand. *Asian Economic Journal*, *28*(2), 131-155.

Zhang, Y., & Chan, S. W. (2020). Promoting sustainable tourism development through a cultural heritage project in rural China. *Journal of Cleaner Production*, *263*, 121-133.

Zielinski, S., Jeong, Y., & Milanés, C. B. (2021). Factors that influence community-based tourism (CBT) in developing and developed countries. *Tourism Geographies*, *23*(5–6), 1040–1072. https://doi.org/10.1080/14616688.2020.1786156 in Sweden. *Planning Practice & Research,* *32*(4), 444–465. https://doi.org/10.1080/02697459.2017.1374706

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UNRAVELING TOURISTS' PERCEPTIONS TOWARDS CONSERVATION OF THE UNESCO-LISTED MOGAO CAVES IN DUNHUANG, CHINA: A NETWORK TEXT ANALYSIS

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Abstract

The Digital Dunhuang project aims to utilize digital technology to replicate and preserve the invaluable Dunhuang culture and art. Conservation of heritage becomes a consensus for conscious participation. Tourists' perceptions of heritage conservation at heritage sites strongly influence their travel experience. Understanding tourists' perceptions of the conservation of this digital platform is essential for its effective implementation. In the era of extensive growth in online tourism platforms, online posts and reviews have become crucial determinants of tourists' consumption choices. This study focuses on the analysis of online posts on Weibo related to Digital Dunhuang to explore tourists' perceptions of sustainable digitalization in cultural heritage tourism. This study employs network text analysis, word frequency analysis, semantic network analysis, and sentiment analysis of online travel posts and reviews using ROST CM6.0 to illustrate that Digital Dunhuang has markedly increased the visibility and appeal of Dunhuang, while also stimulating substantial interest in its cultural and digital initiatives. Furthermore, the limited mention of Digital Dunhuang in discussions related to conservation indicates a significant lack of awareness concerning the conservation efforts associated with Digital Dunhuang. The findings offer valuable insights into tourists' perceptions of Digital Dunhuang's alignment with successful conservation, contributing to methodological approaches to network analysis and sustainable cultural heritage tourism destination strategies.

Keywords: Tourist Perception, Heritage Conservation, Network Text Analysis

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INTRODUCTION

The deterioration and destruction of cultural heritage tourism attractions are regarded as among the most urgent concerns in the field of tourism(Bec et al., 2021). Ensuring harmonious coexistence between conservation efforts and tourism is of utmost importance, particularly for World Heritage Sites that aim to preserve their exceptional global significance(Zhang et al., 2023). Digital technologies, such as augmented reality and virtual reality, have emerged as captivating tools to prevent physical harm to heritage sites while enhancing visitor experiences (Cranmer et al., 2023; Ghosh et al., 2024). Given the benefits of digital conservation, numerous heritage tourism destinations are progressively exploring the use of digital tools. The Digital Dunhuang Project exemplifies this by employing digital technology to replicate and preserve Dunhuang caves and cultural artifacts, which is dedicated to ensuring the long-term protection and sustainable utilization of Dunhuang's cultural heritage (Digital Dunhuang, n.d.).

The preservation of people's knowledge and emotional connections to their traditions and localities is advantageous for initiatives aimed at conserving heritage(Pati & Husain, 2023). Tourists' perceptions of heritage conservation at heritage sites also strongly influence their travel experience. The value of a visually appealing and distinctive destination image is undeniable (Stepchenkova & Zhan, 2013). Although digital tools are increasingly being used in historic conservation, there is a lack of understanding regarding the influence of these initiatives on tourists' perceptions. Existing studies have primarily used traditional research methods, which have limitations in terms of scope and sample size. For instance, usability tests were conducted via information-seeking tasks and posttest interviews with 14 participants from the Mogao Cave Panorama Digital Library (Hu et al., 2017) and 16 individuals from e-Dunhuang (Hu,2018). These methods may not fully capture tourists' diverse experiences and perceptions. This gap in knowledge highlights the need to explore tourists' responses to digital conservation initiatives more comprehensively.

Web 2.0 applications have provided travelers with unprecedented opportunities to generate their own content about their travel experiences through media-sharing websites and social networks (Stepchenkova & Zhan, 2013). Although social media platforms have transformed the way travelers record and distribute their experiences, the valuable data produced on these platforms have not been thoroughly investigated. There are limitations to using social media big data for analyzing tourists' perceptions of digital heritage protection activities. This study aims to address this deficiency by utilizing social media data from Weibo (a leading social media platform in China) related to Digital Dunhuang to gain a thorough understanding of travelers' perspectives on sustainable digitization in cultural heritage tourism. By utilizing these data, this study offers a broader and more nuanced understanding of how tourists perceive digital

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conservation efforts. This study improves upon the methodological approaches used in network analysis to understand tourists' perceptions and contributes to the development of strategies that encourage sustainable practices in cultural heritage tourism destinations.

LITERATURE REVIEW

Digitalization for Cultural Heritage Conservation

Due to the unique qualities of cultural heritage tourism, achieving a balance between conservation and tourism is crucial. Conservation is a frequently discussed concept in the context of historic tourist activities and management(Shafiee Roodposhti & Esmaeelbeigi, 2024). The utilization of digital technology in heritage tourism has sparked intense discussions around digitization and the preservation of cultural assets. Several researchers have suggested that the process of digitalization could benefit sites from physical damage caused by tourists. For instance, Cranmer et al. (2023) revealed how augmented reality might serve as a cutting-edge and captivating tool to enhance the sustainability of heritage tourism sites. Vileikis et al. (2023) presented the World Heritage Digital Documentation Platform for the Arab Region. The platform serves as an educational tool for the public as well as a resource for experts, scholars and governments in their research and conservation efforts. Ghosh et al. (2024) claimed that the application of digital technologies, particularly virtual reality, is crucial for safeguarding and spreading cultural heritage at cave art sites. Digitalization provides innovative methods that improve the documenting, conservation, and interpretation of cultural heritage.

Several studies have examined the correlation between digitalization and cultural heritage tourists. Tourists' satisfaction derived from their cultural heritage experience is impacted by the quality and efficacy of digital applications. Chung et al. (2015) conducted a study to examine the influence of interactive techniques on tourists' level of pleasure and their inclination to continue utilizing digital museum tours. Digital applications function as educational tools that enhance tourists' knowledge of the importance of conserving cultural heritage. For instance, Manglis et al., (2021) stated that augmented reality and other techniques have the potential to enhance tourists' engagement in underwater cultural tourism and increase tourists' understanding of and support for the conservation of natural heritage. The advent of digital tourism has led to a significant increase in the number of tourists, serving as a catalyst for the spread of local culture and fostering tourists' desire to conserve cultural heritage(Li et al., 2024). Digital technology has the potential to promote tourists' active engagement with cultural heritage and foster a sense of belonging and social responsibility among individuals(Koukopoulos & Koukopoulos, 2018).

Although there is an increasing focus on the significance of heritage preservation and its incorporation into tourism destination strategies, there is a lack of understanding regarding how these conservation initiatives impact tourists' impressions. Previous studies have employed traditional approaches such as interviews and case studies to comprehend the attitudes of tourists. For instance, Hu et al., (2017) performed a user evaluation test with a series of information-seeking tasks to assess the usability of the Mogao Cave Panorama Digital Library for 14 participants, followed by posttest interviews. Hu (2018) modified the tasks designed by Hu et al., (2017) into nine tasks and performed usability testing with 16 individuals. The findings indicated that e-Dunhuang, developed by the Digital Dunhuang project, exhibited significant enhancements in terms of visual aesthetics, content quality, and interactive capabilities. Nevertheless, both studies rely on rather small sample sizes, which means that the range of users they represent is limited. These approaches may not comprehensively encompass the wide range and profound nature of tourists' perspectives, particularly within the framework of digital preservation efforts.

Network Text Analysis in Tourism

The growth of new media and communication technologies in recent years has led to an increasing recognition of user-generated content (UGC) on the internet as an effective method of word-of-mouth. In the digital age, user-generated content refers to information or content produced by the populace and distributed online(Daugherty et al., 2008). Social networks and online UGC platforms have introduced a new aspect to destination management and promotion, which is the utilization of UGC information. The quantity and positivity of UGC have an impact on travelers' opinions of a place and can effectively counter information spread by destination agents who are trying to promote the destination(Stepchenkova & Zhan, 2013).

Several recent studies have utilized network text analysis by employing different text mining approaches. Stepchenkova & Zhan (2013) compared images of Peru obtained from the official Peru tourism website and from Flickr, a photo-sharing website, to identify significant differences in the projected and perceived images of Peru. This was achieved by creating maps that represented the combined projected and perceived images of Peru, as well as maps showing the geographical distribution of these images. Hardt & Glückstad (2024) employed natural language processing methodologies for reviewing more than one million Reddit postings on subreddits related to travel. They utilize social media data to examine disparities in the preferences and attitudes of tourism consumers both before and during the pandemic. Their study illustrates the capacity of theory-based natural language processing analysis of social media data to categorize travel consumers based on their values (Hardt & Glückstad, 2024). Kirilenko et

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al. (2019) applied network analysis, spatial analysis, and geo-visualizations to examine TripAdvisor reviews of Florida attractions. The goal is to understand how travelers perceive a destination by discovering clusters of attractions that cater to specific tourist interests. Some studies focus on tourists' perceptions and impacts. Orea-Giner et al. (2022) investigated the correlation between customers' feelings and sentiments generated by their interactions with robots in hotels and the potential impact on hotel ratings. To achieve this objective, text mining techniques were applied to TripAdvisor reviews via Python 3.9.4(Orea-Giner et al., 2022).

RESEARCH METHODOLOGY

Introduction of Mogao Caves and the Digital Dunhuang Project

In 1987, China submitted its initial selection of six sites for inclusion in the UNESCO World Heritage List. One of these notable sites was the Mogao Caves, also referred to as the Dunhuang Caves, located in Dunhuang in the Gansu Province of far northwestern China (Nevilleeagnew & Jinshi, n.d.). The location of Mogao Caves is shown in Figure 1.

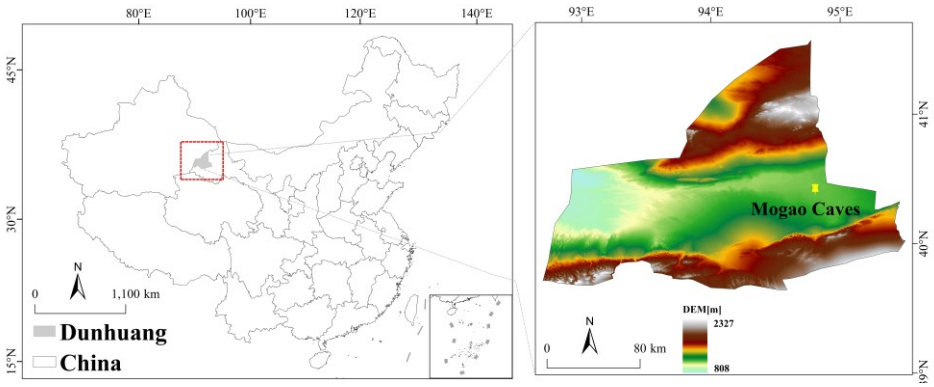


Figure 1: Research Location Map
Source: Obtained from Map World and Geospatial Data Cloud, organized by the author using ArcGIS 10.8

The fact that this place was chosen highlights its national significance. It is the most abundantly endowed and oldest repository of Buddhist art in the world. The construction of this monument dates back to 366 AD and serves as a remarkable testament to the artistic prowess of Buddhism. Prior to the conclusion of 2004, the selection of World Heritage sites was based on six cultural criteria and four natural criteria. To be listed on the World Heritage List, places must possess exceptional global importance and satisfy at least one of the ten selection criteria (Mogao Caves, n.d.). The Mogao Caves, designated as a World Heritage Site, satisfy all six cultural criteria. The Digital Dunhuang project, launched by

the Dunhuang Research Academy, aims to utilize digital technology to replicate and preserve invaluable Dunhuang caves and artifacts. The goal is to achieve long-term conservation and sustainable utilization of the UNESCO-listed Mogao Caves (Digital Dunhuang, n.d.).

METHODOLOGY

Data Source

To address the identified gaps, this study utilizes social media big data, specifically from Weibo, to obtain greater diversity of tourists' perceptions. Weibo is a prominent social media platform in China that enables anyone to generate, distribute, and explore online information. It integrates real-time public self-expression with a robust platform for social interaction, content aggregation, and content dissemination (Weibo, n.d.). Weibo, established in 2009, is the dominant player in the market and has a large number of users(Wang et al., 2022). In December 2023, the Weibo Corporation announced that it had 598 million monthly active users, which was an increase of 11 million compared to the same quarter in the previous year (Thomala,2024). Considering its user size, active user activity and social significance, this research utilizes online posts from Weibo as the primary data source for network text analysis.

Data Collection and Processing

The tremendous progress in computer and data science has facilitated the utilization of sophisticated big data analytics to gather, retain, examine, and present social media data(Chen et al., 2021). This research applies the web scraping software Octoparse to extract online posts made by Weibo users regarding the key words Digital Dunhuang. The data collection period spanned from January 2022 to March 2024, which produced a total of 1503 posts. There are 627 in 2022, 764 in 2023, and 112 from January 2024 to March 2024.

The initial phase involved exporting the data gathered by Octoparse to Excel for the purpose of assessing and processing it. Subsequently, the data in the specified scenarios, including illegible posts with ambiguous language, posts unrelated to Digital Dunhuang, duplicated reposts, uncivilized language descriptions, extraneous and insignificant high-frequency terms, and malevolent remarks that deviated from the actual circumstances, were eliminated. For instance, several hash tags including "Digital Dunhuang" are actually promotional content for cultural books and will be removed. After processing, a total of 1,489 posts, amounting to 590,000 words, were acquired. Ultimately, all textual data were stored in a .txt document to facilitate subsequent analysis of the content.

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Data Cleaning

This study utilizes ROST CM6.0 software to process the initial textual data and performs word frequency analysis, social network analysis, and semantic network analysis. Since the software has a limited segmentation database, it is incapable of recognizing common terms such as place names and scenic location names. Hence, throughout the text organization process, frequently used nouns, verbs, and adjectives are first identified and incorporated into the custom segmentation database to prevent them from being unrecognized or filtered. Examples of such terms include "Dunhuang Research Academy", "Mogao Caves", "Digital Dunhuang", "Dunhuang Caves", and "Gansu Dunhuang". Subsequently, inconsequential and unrelated terms identified in the initial segmentation outcome are incorporated into the system's filtering thesaurus for the second segmentation process. For instance, words such as "always" and "some" are included in the filtering vocabulary.

To emphasize the main terms, similar phrases in the text were merged, such as "Digital Dunhuang" and "The Digital Dunhuang Project", which were merged into "Digital Dunhuang", or the keywords were incorrectly divided and then recombined, such as "Dunhuang Mogao Grottoes" and "Dunhuang Mogao Caves", which were merged into "Mogao Caves". Finally, the modified .txt file is loaded into the ROST CM6.0 software, where it undergoes semantic network analysis, high-frequency feature word analysis, and emotional analysis in a sequence of steps. Network text analysis surpasses the constraints of traditional approaches by utilizing the abundance and variety of user-generated content on social media, offering an expanded awareness of how tourists perceive and react to digital conservation initiatives such as Digital Dunhuang.

ANALYSIS AND DISCUSSION

High-Frequency Feature Word Analysis

Word frequency analysis is employed to identify the fundamental terms in the text using both the system's default vocabulary and vocabulary provided by the user and to calculate the frequencies of words. Word frequency analysis is employed to gather word frequency statistics, and the resulting documents are arranged in descending order based on word frequency. By analyzing the content shared by tourists on Weibo regarding Digital Dunhuang, it is possible to gain an initial understanding of their opinions. Table 1 displays the initial 40 words with the highest frequency, while Figure 2 shows their corresponding word clouds.

No.	Characteristic Words	Frequency	No.	Characteristic Words	Frequency
1	Dunhuang	5356	21	Platform	525
2	Culture	3347	22	Civilization	486
3	Digitalization	2056	23	Digital Library Cave	442
4	Digital Dunhuang	2033	24	Resource	425
5	China	1861	25	Experience	416
6	Cultural Relic	1731	26	Tradition	405
7	Conservation	1688	27	Internet	381
8	Mogao Caves	1537	28	Global	376
9	Technology	1451	29	Centre	374
10	Dunhuang Research Academy	1163	30	Millennium	358
11	Mural painting	959	31	Inherit	357
12	Research	949	32	Disseminate	339
13	Development	948	33	Immerse	319
14	Build	896	34	Realize	312
15	Country	805	35	Spirit	307
16	Innovation	970	36	Archaeology	305
17	Cave	716	37	Virtual	294
18	Fan Jinshi	686	38	Society	279
19	Museum	558	39	Unite	273
20	Cultural Heritage	549	40	The Silk Road	270

Table 1: Frequent Word Statistics of Digital Dunhuang
Source: Obtained from ROST CM6.0 and organized by the author



Figure 2: Frequent Word Statistics of Digital Dunhuang Word Clouds
Source: Obtained from ROST CM6.0 and organized by the author

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Based on an investigation of the top 10 feature terms, "Dunhuang" emerged as the most referenced term, followed by "culture", "digitalization", and subsequently "Digital Dunhuang". The Mogao Grottoes are located in Dunhuang city. The implementation of Digital Dunhuang has dramatically increased the city's popularity and attracted greater attention. The inclusion of Digital Dunhuang in discussions about culture indicates a genuine concern about the cultural implications and values associated with the Mogao Caves, as demonstrated by Digital Dunhuang. The combination of the third and ninth most frequently used terms indicates that tourists were also impressed by the cutting-edge technology and creative approaches implemented at Digital Dunhuang.

By considering the 5th and 10th most highly mentioned words, it is noticeable that people recognize the significance that the government places on Digital Dunhuang and the endeavors of the authority Dunhuang Research Academy who initiated the Digital Dunhuang project. "Cultural Relic", "Conservation", and "Mogao Caves" ranked sixth, seventh, and ninth, respectively. An analysis of these phrases revealed that people associate Digital Dunhuang with the preservation of Mogao Caves and recognize the significance of Digital Dunhuang in the conservation efforts of fragile cultural heritage relics.

Notably, in terms of ranking, tourists' perception of the role of digital Dunhuang's cultural value exceeds that of its heritage protection. This shows that the role of Digital Dunhuang in the conservation of Dunhuang heritage needs to be further publicized and disseminated to enhance understanding and recognition in the public mind.

Semantic Network Analysis

Semantic network analysis involves extracting frequently occurring key terms from a text and using a co-occurrence matrix to create a network structure diagram. This function provides a direct measure of the correlation between different feature words. This study examines the semantic network of Weibo posts related to Digital Dunhuang. The semantic network diagram of Digital Dunhuang, which contains 26 feature words, is shown in Figure 3.

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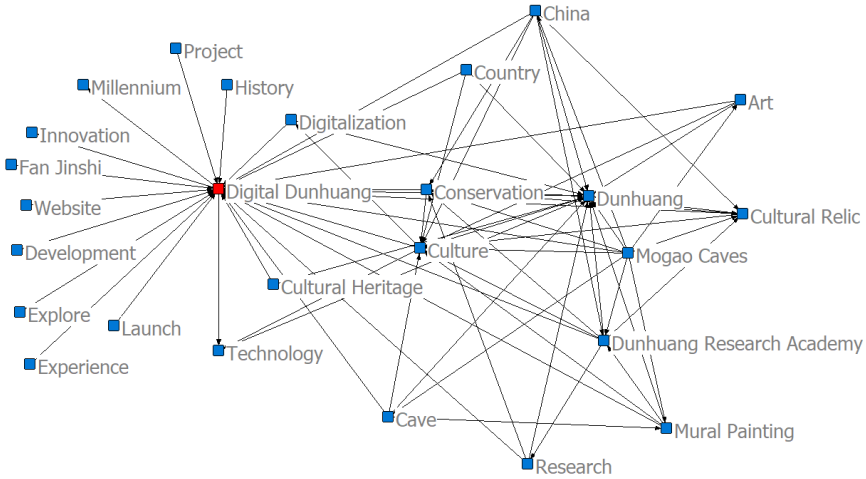


Figure 3: Semantic Network Diagram of Digital Dunhuang
Source: Obtained from ROST CM6.0 by the author

The feature words are summarized and divided into four categories: (1) Digital Dunhuang Project, which includes Digital Dunhuang, Project, Technology, Launch, Experience, Website, Development, Explore, Digitalization, and Innovation; (2) The feature and value of Dunhuang Mogao Caves, which include Cultural Relic, Art, Mogao Caves, Cave, Mural Painting, Cultural Heritage, Millennium, and History; (3) National Institutions, Organizations and Individuals Related to Digital Dunhuang to Digital Dunhuang, which includes Country, China, Dunhuang, Dunhuang Research Academy, and Fan Jinshi; and (4) The impact of Digital Dunhuang, which includes Conservation, Research, Culture.

Typically, most diagrams representing the structure of semantic networks consist of active elements. The primary feature terms strongly associated with Digital Dunhuang are Experience, Explore, Innovation, Culture, Technology, and Conservation. Visitors are inclined to engage in discussions regarding the project's technological aspects, its cultural and innovative experiences, and its cultural education and preservation value in relation to cultural assets.

The social network semantic analysis functions of ROST CM6.0 rely on shared characteristics. This paper employs the analysis function to filter out data that are not related to the substance of the analysis. It then selects the top 20 groups of high-frequency co-occurring words, which are presented in Table 2. The objective is to enhance the methodological approaches used in network text analysis to better comprehend tourists' perceptions of sustainable digitization in cultural heritage tourism through the utilization of social media big data.

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Table 2: The Top 20 Groups of High-frequency Co-occurring Words

Sequence	Words	Characteristic Words	Co-occurrence Frequency
1	Digital Dunhuang	Dunhuang	900
2	Digital Dunhuang	Culture	593
3	Digital Dunhuang	Mogao Caves	551
4	Digital Dunhuang	Dunhuang Research Academy	508
5	Dunhuang	Mogao Caves	492
6	Dunhuang	Culture	470
7	Digital Dunhuang	China	782
8	Digital Dunhuang	Digitalization	444
9	Dunhuang	Dunhuang Research Academy	435
10	Digital Dunhuang	Cultural Relic	432
11	Digital Dunhuang	Mural Painting	430
12	Dunhuang	Mural Painting	384
13	Digital Dunhuang	Conservation	378
14	Dunhuang	Cultural Relic	355
15	Dunhuang	China	337
16	Dunhuang	Conservation	329
17	Digital Dunhuang	Research	326
18	Dunhuang Research Academy	Culture	304
19	Dunhuang	Digitalization	300
20	Digital Dunhuang	Cave	298

Source: Obtained from ROST CM6.0 and organized by the author

By conducting co-occurrence analysis, we determined that the term "Digital Dunhuang" is the main word in this text. Specifically, we identified 10 distinctive words that frequently appear alongside "Digital Dunhuang", making up 50% of the cooccurrences. According to the distribution of cooccurring words, the cooccurrences of Digital Dunhuang and culture, Mogao caves, digitization, cultural relics, and murals were 593, 551, 444, 432, and 430, respectively. There were 378 instances where the phrases "Digital Dunhuang" and "Conservation" appeared together. These instances indicated that there was some discussion regarding the significance of digital Dunhuang in preserving the cultural heritage of Dunhuang. However, there was no significant relationship between the two variables.

Sentiment Analysis

Tourists convey their emotional attitudes regarding a particular topic by using descriptive words and sentences in their Weibo online posts. This paper utilizes sentiment analysis in ROST CM6.0 to categorize and examine online posts on Weibo that are related to Digital Dunhuang. It then derives statistical data on the distribution of emotions and subsequently determines the sentiment of tourists towards Digital Dunhuang and its conservation. According to Table 3, tourists exhibit the highest percentage of good feelings, amounting to 83.03%. Negative

emotions made up 10.65% of their emotions, while neutral emotions accounted for 6.32%. The distribution of positive emotion intensity showed that 49.83% of the variance was attributed to general positive emotion, followed by normal positive emotion and medium positive emotion. Similarly, in the distribution of negative emotion intensity, the highest proportion, 4.72%, was accounted for by general negative emotions, followed by normal negative emotions and medium negative emotions.

Based on the analysis of emotional light distribution, it is evident that tourists' satisfaction with Digital Dunhuang primarily stems from positive emotions, with only a minimal occurrence of highly negative emotions. In general, tourists had a favorable view of the tourism experience provided by digital Dunhuang and its contribution to culture, research, and heritage preservation. Positive emotional perceptions outweighed negative ones, and the digital Dunhuang project successfully spread its image, confirming the results of the previous analysis of frequently used words. For example, “The digital Dunhuang project has obtained data from approximately 290 caves, and these images can accurately record the occurrence of diseases in different parts of the cave. It is also possible to simulate the effects of wind and humidity in caves to inform the development of conservation programs. In the dissemination of Dunhuang culture, people can visit the Digital Dunhuang website for a virtual tour", “This represents a new advancement in the fusion and advancement of science, technology, and culture. It also serves as a modern approach to showcasing and spreading the cultural significance of the Dunhuang Caves. This approach aims to foster new ways of thinking that contribute to the research, conservation, and promotion of Dunhuang culture and its legacy”.

Nevertheless, the detrimental assessment of tourists also offers a specific point of reference for the advancement of the Digital Dunhuang project. It is imperative to acknowledge and efficiently handle the aspects that lead to tourists' unfavorable feelings, as these unpleasant emotions displayed by visitors can be traced to the influence of their experience. By considering the substance of the visitor evaluation text, it may be inferred that negative feelings primarily stem from real experiences. Some individuals believe that the digital immersion experience is inadequate and that it is essential to physically visit the area and personally encounter it. They argue that merely viewing Dunhuang digitally cannot elicit the same level of excitement and emotional response as physically being present at the site. Some individuals found the digital presentation slightly intimidating. The text describes “a panoramic virtual reality experience where a distorted fisheye lens highlights an empty grotto”, “Across the street, there is a large statue of Buddha without a face. The walls of the grotto are adorned with intricate and diverse decorations. Even though the experience can only be seen on a computer screen, it evokes an indescribable feeling of oppression”.

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Table 3: Sentiment Analysis Statistics Results

Emotion Type	Proportion	Emotion Segmentation	Proportion
Positive	83.03%	Normal (0 - 10)	17.30%
		Medium (10 - 20)	15.90%
		High (above 20)	49.83%
Neutral	6.32%	null	null
Negative	10.65%	Normal (-10 - 0)	4.72%
		Medium (-20 - 10)	1.00%
		High (under -20)	0.27%
Total	**100%**	**null**	**null**

Source: Obtained from ROST CM6.0 and organized by the author

CONCLUSION

This study examines online posts on Weibo, a prominent social media site in China, about Digital Dunhuang. The goal is to investigate travelers' perspectives on sustainable digitalization in cultural heritage tourism. This study contributes to the literature by addressing the aforementioned gaps through a novel methodological approach. Through the application of network text analysis, social media data from Weibo relating to Digital Dunhuang were examined.

High-frequency feature word analysis revealed that the term "Dunhuang" is the most frequently discussed term, followed by "culture," "digitalization," and then "Digital Dunhuang." The installation of Digital Dunhuang has significantly increased the city's attractiveness and garnered wider attention. The use of Digital Dunhuang in conversations regarding culture demonstrates a sincere interest in the cultural ramifications and principles linked to the Mogao Caves. Nevertheless, tourists are more aware of the cultural value of Digital Dunhuang than are those who are aware of its heritage conservation. This demonstrates the necessity of promoting and spreading awareness about the significance of Digital Dunhuang in preserving the Dunhuang heritage. The author conducted Semantic Network Analysis and discovered that the frequency of co-occurrence between "Digital Dunhuang" and "Conservation" was lower than that of other key phrases such as culture and digitalization. These occurrences suggested that there were deliberations on the importance of digital Dunhuang in safeguarding the cultural legacy of Dunhuang. Nevertheless, there was no substantial correlation between the two variables. The results of the sentiment analysis indicate that travelers had a positive perception of the tourism experience offered by Digital Dunhuang, as well as its significant role in promoting culture, facilitating study, and preserving heritage. This criticism arises from the inherent limitation of the virtual experience since it fails to fully replace an in-person visit, and the digital presentation can be quite daunting.

The findings offer valuable insights into tourists' perspectives on the successful conservation of Digital Dunhuang alignment, thereby contributing to

the development of strategies that enhance sustainable practices in cultural heritage tourism destinations.

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REFERENCES

Bec, A., Moyle, B., Schaffer, V., & Timms, K. (2021). Virtual reality and mixed reality for second chance tourism. *Tourism Management*, *83*, 104256. https://doi.org/10.1016/j.tourman.2020.104256

Chen, J., Becken, S., & Stantic, B. (2021). Using Weibo to track global mobility of Chinese visitors. *Annals of Tourism Research*, *89*. https://doi.org/10.1016/j.annals.2020.103078

Chung, N., Han, H., & Joun, Y. (2015). Tourists' intention to visit a destination: The role of augmented reality (AR) application for a heritage site. *Computers in Human Behavior*, *50*, 588–599. https://doi.org/10.1016/j.chb.2015.02.068

Cranmer, E. E., tom Dieck, M. C., & Jung, T. (2023). The role of augmented reality for sustainable development: Evidence from cultural heritage tourism. *Tourism Management Perspectives*, *49*. https://doi.org/10.1016/j.tmp.2023.101196

Daugherty, T., Eastin, M. S., & Bright, L. (2008). Exploring Consumer Motivations for Creating User-Generated Content. *Journal of Interactive Advertising*, *8*(2), 16–25. https://doi.org/10.1080/15252019.2008.10722139

Digital Dunhuang. (n.d.). Retrieved from https://www.e-dunhuang.com/index.htm

Ghosh, B., Singh, R., & Sawant, M. (2024). Digital Technology: A Step to Protect Cave Art of Indian Subcontinent as National Heritage – A Review. *Preservation, Digital Technology & Culture*, *53*(1), 15–28. https://doi.org/10.1515/pdtc-2023-0047

Hardt, D., & Glückstad, F. K. (2024). A social media analysis of travel preferences and attitudes, before and during Covid-19. *Tourism Management*, *100*. https://doi.org/10.1016/j.tourman.2023.104821

Hu, X. (2018). Usability Evaluation of E-Dunhuang Cultural Heritage Digital Library. *Data and Information Management*, *2*(2), 57–69. https://doi.org/10.2478/dim-2018-0008

Hu, X., Ho, E. M. Y., & Qiao, C. (2017). Digitizing Dunhuang Cultural Heritage: A User Evaluation of Mogao Cave Panorama Digital Library. *Journal of Data and Information Science*, *2*(3), 49–67. https://doi.org/10.1515/jdis-2017-0014

Kirilenko, A. P., Stepchenkova, S. O., & Hernandez, J. M. (2019). Comparative clustering of destination attractions for different origin markets with network and spatial analyses of online reviews. *Tourism Management*, *72*, 400–410. https://doi.org/10.1016/j.tourman.2019.01.001

Koukopoulos, Z., & Koukopoulos, D. (2018). Evaluating the Usability and the Personal and Social Acceptance of a Participatory Digital Platform for Cultural Heritage. *Heritage*, *2*(1), 1–26. https://doi.org/10.3390/heritage2010001

Li, J., Peng, X., Liu, X., Tang, H., & Li, W. (2024). A study on shaping tourists' conservational

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intentions towards cultural heritage in the digital era: exploring the effects of authenticity, cultural experience, and place attachment. *Journal of Asian Architecture and Building Engineering*, 1–20. https://doi.org/10.1080/13467581.2024.2321999

Manglis, A., Fourkiotou, A., & Papadopoulou, D. (2021). A Roadmap for the Sustainable Valorization of Accessible Underwater Cultural Heritage Sites. *Heritage*, *4*(4), 4700–4715. https://doi.org/10.3390/heritage4040259

Mogao Caves. (n.d.). *UNESCO World Heritage Centre*. Retrieved from https://whc.unesco.org/en/list/440/

Nevilleeagnew, M., & Jinshi, F. (n.d.). *SPRINGER BRIEFS IN ARCHAEOLOGY ARCHAEOLOGICAL HERITAGE MANAGEMENT Strategies for Sustainable Tourism at the Mogao Grottoes of Dunhuang, China*. http://www.springer.com/series/10186

Orea-Giner, A., Fuentes-Moraleda, L., Villacé-Molinero, T., Muñoz-Mazón, A., & Calero-Sanz, J. (2022). Does the Implementation of Robots in Hotels Influence the Overall TripAdvisor Rating? A Text Mining Analysis from the Industry 5.0 Approach. In *Tourism Management* (Vol. 93). Elsevier Ltd. https://doi.org/10.1016/j.tourman.2022.104586

Pati, A., & Husain, M. (2023). People's perspectives on heritage conservation and tourism development: a case study of Varanasi. *Built Heritage*, *7*(1), 17. https://doi.org/10.1186/s43238-023-00098-w

Shafiee Roodposhti, M., & Esmaeelbeigi, F. (2024). Viewpoints on AR and VR in heritage tourism. *Digital Applications in Archaeology and Cultural Heritage*, *33*. https://doi.org/10.1016/j.daach.2024.e00333

Stepchenkova, S., & Zhan, F. (2013). Visual destination images of Peru: Comparative content analysis of DMO and user-generated photography. *Tourism Management*, *36*, 590–601. https://doi.org/10.1016/j.tourman.2012.08.006

Thomala, L. L. (2024). *Weibo corporation: Maus 2023*. Retrieved from https://www.statista.com/statistics/795303/china-mau-of-sina-weibo/

Vileikis, O., Rigauts, T., Rouhani, B., Ziane Bouziane, M., & Santana Quintero, M. (2023). DIVE INTO HERITAGE: A DIGITAL DOCUMENTATION PLATFORM OF WORLD HERITAGE PROPERTIES IN THE ARAB STATES REGION. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, *XLVIII-M-2–2023*, 1613–1620. https://doi.org/10.5194/isprs-archives-XLVIII-M-2-2023-1613-2023

Wang, Z., Huang, W. J., & Liu-Lastres, B. (2022). Impact of user-generated travel posts on travel decisions: A comparative study on Weibo and Xiaohongshu. *Annals of Tourism Research Empirical Insights*, *3*(2). https://doi.org/10.1016/j.annale.2022.100064

Weibo. (n.d.). *Weibo group business overview*. Retrieved from http://ir.weibo.com/corporate-profile

Zhang, H., Xiong, K., Fei, G., Jin, A., & Zhang, S. (2023). Factors Influencing the Conservation Intentions of Visitors to a World Heritage Site: A Case Study of Libo Karst. *Sustainability (Switzerland), 15*(6). https://doi.org/10.3390/su15065370

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STUDY ON THE COUPLED AND COORDINATED DEVELOPMENT OF TOURISM ECONOMY AND ECOLOGICAL ENVIRONMENT IN CHENGDU CITY，CHINA

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Abstract

The sustained growth of Chengdu's urban tourism economy has brought the relationship between tourism and ecological environment into sharp focus, becoming a key issue in both scholarly research and public policy discourse. In order to promote the positive interaction between the two, this study constructs a set of index system to evaluate the coupled and coordinated development of tourism economy and ecological environment based on the theory of ecological economics, coupled and coordinated theory and sustainable development theory, and based on the actual development background of Chengdu city. This study employed the entropy weighting approach to quantitatively measure the development status of the tourism economy and ecological environment in Chengdu during the period from 2013 to 2022. Subsequently, a coupling coordination model was utilized to examine their interrelationship and the level of coordinated development. The findings indicate that Chengdu's tourism economy and ecological environment have experienced continuous improvement in their comprehensive benefit index over the past decade. This development trajectory can be categorized into three distinct phases: a period of rapid growth, a phase of fluctuation and adjustment, and a stage of relative stability. The observed coupling and coordination levels between the tourism sector and ecological environment demonstrate clear phase characteristics, underscoring the presence of a tightly interwoven and interactive relationship. Specifically, economic indicators such as tourism value-added exert a positive influence on the ecological environment, whereas certain ecological indicators impose constraints on the further enhancement of the coupling and coordination level. These findings offer theoretical support and policy-oriented recommendations for advancing the integrated development of Chengdu's tourism economy and ecological environment.

***Keywords**:* Tourism Economy, Ecological Environment, Coupled and Coordinated Development

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INTRODUCTION

Tourism is one of the most visible and rapidly growing sectors of the global economy and plays a crucial role in boosting national economies (Streimikiene et al., 2021;Manzoor et al., 2019). However, while tourism positively contributes to economic growth, it also significantly pollutes the environment (Koçak et al., 2020). The rapid development of tourism in China has significantly boosted the economy but has also led to environmental pollution and degradation, particularly in some tourist cities (Zeng et al., 2021). In popular tourist cities in China, such as Beijing, Chengdu, and Hangzhou, the operation of large hotels consumes substantial electricity and water resources and generates considerable wastewater and exhaust gases, putting significant pressure on the local environment (Rauf et al., 2021). As the impact of urban tourism on the ecological environment intensifies, exploring the coupling relationship between urban tourism and ecological environmental protection has become a hot topic in academic research. Chengdu, an important tourist city in Southwest China, has experienced increasingly prominent conflicts between rapid tourism industry development and the ecological environment (Wang et al., 2022;Weng et al., 2023). The development of the tourism economy relies on a robust ecological environment, but tourism activities can also consume and even severely damage ecological resources. Once the intrinsic carrying capacity threshold of the ecological environment is breached, the blocking effect on the ecological environment is strengthened, adversely affecting the healthy development of tourism (Pimonenko., 2021;Xu et al., 2022). The concept of "synergistic symbiosis" aptly describes the interrelationship between the tourism economy and the ecological environment(Zhu.,2023). Therefore, it is insufficient to emphasize either tourism economic development or ecological environment protection alone. Instead, it is imperative to study the boundary range of the coupling and coordination between the two and explore the healthy and sustainable growth of Chengdu's tourism economy under the premise of the ecological environment's sustainable development. This will remain a critical concern for the future development of tourism in Chengdu.

LITERATURE REVIEW

Scholars have increasingly focused on the dynamic interplay between tourism development and ecological sustainability. For instance, Zhu et al. (2021) incorporated a decoupling analysis model to design a set of integrated indicators evaluating the interdependence between tourism and the environment in the Yangtze River Basin during the period 2000 to 2019. They analysed the spatial and temporal characteristics of tourism economic development and ecological environment pressure using the tourism economic development index, the ecological environment pressure index, and the dynamic change index, exploring

the relationship between the tourism economy and ecological environment. Based on panel data covering 31 Chinese provinces from 2003 to 2017, Lai et al.,(2020) constructed a comprehensive evaluation system integrating indicators related to the ecological environment, economic development, and tourism. They used the entropy method to calculate weights and the coupling coordination model to analyse the coupling and coordination relationship of the three subsystems in the 31 provinces .WANG Zhao-feng, (2019) measured the tourism eco-efficiency of 11 provincial-level regions in the Yangtze River Economic Belt from 2007 to 2016 by adopting the unintended output Super-SBM model. The VAR model was also used to explore the interactive response relationship between tourism eco-efficiency and the level of tourism economic development . J. Wang et al. (2020)focused on the top nine tourist cities in China, using the system dynamics (SD) method to establish a dynamic carrying capacity model and optimize the concept and assessment of the tourism carrying capacity (TCC) .Lee & Chen. (2021) utilized panel data from the top nine tourist cities in China between 1992 and 2016, employing quantile regression methods to explore the effects of economic, tourism, and country risk ratings on the environmental Kuznets curve (EKC) hypothesis. They used the Ecological Footprint (EF) as an indicator of international environmental degradation to explain distributional heterogeneity across countries and possible asymmetric relationships between variables.

This paper constructs an evaluation index system for the coupled and coordinated development of the tourism economy and ecological environment based on the principles of scientific rigor and systematicity. It then analyses the changes and characteristics of Chengdu's tourism economy and ecological environment from 2013 to 2023 using the entropy value method to determine indicator weights. Finally, based on the results of the coupling degree of coordination, this paper proposes targeted sustainable development suggestions for the development of tourism in Chengdu.

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Figure 1: The map of Chengdu
Source: Author's own drawing

Construction of the indicator system and methodology

To explore the coupling relationship between the tourism economy and ecological environment in Chengdu, an evaluation index system was established based on specific criteria (Xu et al., 2022b;Niemeijer & de Groot, 2008). Initially, the range method was used to preprocess the data. Then, the weight method and benefit index calculation were introduced in detail, leading to the initial establishment of the coupling coordination system for the tourism economy and ecological environment. The system construction utilized the coupling and coordination development evaluation method. Through this method, the data were preprocessed using the range method, and the weight method and benefit index calculation were applied comprehensively, resulting in the preliminary establishment of the coupling coordination system for Chengdu's tourism economy and ecological environment.

Construction of the indicator system

In constructing the indicator system, each indicator plays an irreplaceable key role, making indicator selection crucial to the system's development (Sdoukopoulos et al., 2019). This study follows six principles—systematicity, typicality, dynamism, scientificity, comparability, and operability—to ensure the reliability and accuracy of the selected indicators.

Range method preprocessed data

Due to the differing values and units of the selected indices, direct calculation is not feasible. Therefore, data preprocessing is necessary, and the range method is used for dimensionless processing to ensure the comparability of the selected indicators.

The standardized formula is shown below. X_{ij} is the value of the （ j=1,2,3··n） year in the i（i=1，2,3··m） index of ecological environment system, and y_{ij} is the value of the j (x，y positive numbers; m, n natural numbers).

$$\text{Forward indicator: } x_{ij} = \frac{X_{ij}}{K_{max}} \quad (3\text{-}1)$$

$$\text{Negative indicator: } x_{ij} = \frac{K_{min}}{X_{ij}} \quad (3\text{-}2)$$

X_{ij} is the original data, x_{ij} is the standard value after processing,k_{max} and k_{min} are the maximum and minimum values, respectively. The processing method for tourism economic indicators follows the same approach.

Establishment of indicator weights

The value of the indicator weights is crucial for the accuracy of the research results [18]. Therefore, when assigning weights to indicators, it is essential to ensure objectivity and avoid the influence of subjective factors. In this paper, the entropy value method is used to calculate the weights. The specific steps are as follows:

$$P_{ij} = \frac{x_{ij}}{\sum_{j=1}^{n} x_{ij}} \quad (3\text{-}3)$$

P_{ij} is the share of the value of year j in indicator i for that indicator i, and x_{ij} is the preprocessed data.

$$e_{i=} - k * \sum_{j=1}^{n} P_{ij} \log(P_{ij}) \quad (3\text{-}4)$$

$e_i$is the entropy value, $e_i \geq 0$, k > 0. Generally, let k = $k = \frac{1}{\ln m}$then have 0 ≤ e

$$H_i = \frac{f_i}{\sum_{i=1}^{m} f_i} \quad (3\text{-}5)$$

$f_i = 1 - e_i$, H_i is the weight of each indicator in the system, $0 \leq H_i \leq 1$.

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Calculation of benefit indices

Let x_1、x_2、…、x_i、x_n are n indicators describing the economic characteristics of tourism, y_1、y_2、…、y_j、y_m are m indicators describing the ecological environment (x_i、 y_j are positive numbers; n,m are natural numbers), Here x_i、 y_j take the dimensionless values:

$$f_{(y)} = \sum_{j=1}^{m} b_j y_j \qquad (3\text{-}6)$$

$$f_{(x)} = \sum_{i=1}^{n} a_i x_i$$

In formula (3-6), $f_{(x)}$,$f_{(y)}$ are tourism economic benefit index and ecological environment benefit index, respectively. a_i,b_j represent the weight of the selected indicator.

Coupling evaluation model of tourism economy and ecological environment

Coupling coordination degree model

The tourism economy and ecological environment are constantly changing, and the coupling and coordination relationship between them is also dynamic. As mentioned earlier, the coupling degree model is a static analysis model, and its measurement accuracy for dynamic coupling relationships is insufficient. Therefore, according to the theory of coupling coordination degree, this paper introduces the coupling coordination degree model to accurately assess the state of dynamic interaction and coordination between the two.

The specific calculation steps are as follows:

$$C = \left[\frac{f_{(X)} \times f_{(y)}}{\left|(f_{(x)} + f_{(y)}) \div 2\right|^2}\right]^k \qquad (3\text{-}7)$$

k is the correction index (k=2); C is the coupling degree (coordination degree) (0<C<1), the greater the c value, the higher the coupling degree. This paper divides the coordination degree of the two systems into five categories, as shown in Table1.

Table1: Coupling coordination degree classification

Coupling coordination degree	Class	Coupling coordination degree	Class
0-0.09	Hyperdysregulation	0.5-0.59	Forced coordination
0.1-0.19	Severe disorder.	0.6-0.69	Primary coordination
0.2-0.29	Moderate dysregulation	0.7-0.79	Moderate coordination
0.3-0.39	Mild disorder	0.8-0.89	Good coordination
0.4-0.49	Borderline disorder	0.9-1	Quality coordination

Source: Deng et al., (2022)

Construction of evaluation method for coupled and coordinated development

The coupling degree alone cannot fully reflect the level of coordination between the tourism economy and the ecological environment. Therefore, the coupling coordination degree (D value) is introduced as a comprehensive index. By establishing a coupling coordination development model, we can more accurately analyse the relationship between these two systems:

$$D = \sqrt{C * T} \quad (3\text{-}8)$$

$$T = \alpha f_{(x)} + \beta f_{(y)} \quad (3\text{-}9)$$

D is the coupling coordination degree (coordination development degree); T is the comprehensive evaluation index; α、β are undetermined coefficients and $\alpha + \beta = 1$. A large number of literatures show that most scholars believe that tourism economy and ecological environment are equally important, so $\alpha = \beta = 0.5$.

Based on Table 2.1, according to the contrast relationship between the benefit index f(x) and f(y), each category can be divided into three basic types: tourism economy lagging, tourism economy synchronizing with ecological environment, and ecological environment lagging. Based on this, the paper makes a quantitative evaluation of the coordinated development of tourism economy and ecological environment.

Table 2: Coordinated development type of tourism economy and ecological environment based on benefit index

Contrast between f(x) and f(y)	Type
F(x）> f(y）	Tourism economy lags behind
F(x）= f(y）	Tourism economy and ecological environment synchronous type
f（x）< f（y）	Ecological environment lag type

Source: Deng et al., (2022)

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An empirical analysis on the construction of coupling coordination model between tourism economy and ecological environment in Chengdu

The Chengdu Municipal government initially achieved commendable results in environmental protection. However, over the past five years, there has been a continuous increase in tourism waste discharge. If this upward trend is not promptly addressed, it could severely impact the ecological environment of Chengdu in the future.

Preliminary construction of the indicator system

Because coupling development involves a complex, dynamic system, the situation of the entire system cannot be adequately measured using just a few simple indicators. Therefore, it is essential to comprehensively consider multiple perspectives when constructing an indicator system that reflects the overall development level(Xing et al., 2019).

Based on the complexity of the entire system and following the principles of index selection, this paper relies on authoritative statistical data publicly released by sources such as the "Chengdu Statistical Yearbook (2013-2023)", "Chengdu Tourism Yearbook (2013-2023)", and "Chengdu Water Resources Bulletin (2012-2022)", among other government statistical departments. Reflecting the specific characteristics and actual situation of Chengdu City, a four-level progressive structure is initially constructed, comprising one target layer, two system layers, six factor layers, and sixteen index layers, utilizing high-frequency indicators.

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Table 3: Evaluation index system for coupling tourism economy and ecosystem in Chengdu city, China

Target level	System level	Factor layer	Indicator layer
Coupled evaluation of tourism economy and ecosystem	Ecological environment	Ecological conditions	Per capita water resources（X1）
			Forest coverage rate (X2)
		Environmental protection	Green area of parks (X3)
			Area covered by greener (X4)
			Industrial solid waste utilization rate (X5)
		Environmental pressure	Total industrial wastewater discharge（X6）
			Total sulfur dioxide emissions（X7）
			Total industrial solid waste emissions (X8)
	Tourism economy	Tourism industry	Number of star-rated hotels (Y1)
			Cumulative number of people received during the National Day Golden Week (Y2)
		Tourism scale	Domestic tourist arrivals (Y3)
			Inbound tourist arrivals (Y4)
			Total tourist arrivals (Y5)
		Tourism efficiency	Foreign exchange earnings from international tourism (Y6)
			Gross tourism receipts (Y7)
			Gross tourism receipts as a share of GDP (Y8)

Source: "Chengdu Statistical Yearbook (2013-2023)", "Chengdu Tourism Yearbook (2013-2023)", and "Chengdu Water Resources Bulletin (2012-2022)",

This section discusses the outcomes derived from the surface pressure measurement study. The effects of angle of attack, Reynolds number, and leading-edge bluntness are examined in subsequent subsections.

The weights of each index layer in the two systems were calculated using a specific formula. It was found that the tourism economic foundation and ecological environment pressure exert the highest weights in their respective subsystems, signifying their significant impact on the overall index system. An analysis of the tables reveals that sulfur dioxide emissions dominate the ecological environment system in terms of weight proportion, while the forest coverage rate exhibits the lowest weight. In contrast, inbound tourist numbers hold the highest weight in the tourism economy system, while the number of star-rated hotels shows the smallest weight.

Although the weights vary across indices, the differences are not substantial, suggesting that each index plays a similarly crucial role in the overall system and requires comprehensive consideration. Notably, total industrial wastewater discharge, sulfur dioxide discharge, and industrial solid waste discharge are identified as reverse indicators among the indicators, while the remaining 13 indicators are positive indicators.

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Data processing and inspection

Results of entropy weighting of the index system

In this study, the entropy method was employed for weight assignment of indicators. Initially, the data underwent preprocessing using formulas (3-1) and (3-2) based on the range method to standardize the values, considering the information content of each index's actual values. Subsequently, the statistical software Stata 15.0 was utilized to process the values of each index in Chengdu. This process yielded the final weights, which were then analysed to provide comprehensive insights into the coupling and coordination development of the tourism economy and ecological environment in Chengdu. As shown in Table 4

Table 4: Evaluation index system and weight of coordinated development of tourism economy and ecological environment in Chengdu, China

System level	Element level	Index level	Indicator plus or minus	Weight
Ecological environment	Ecological condition	X1	+	0.12299
		X2	+	0.12192
	Environmental protection	X3	+	0.12357
		X4	+	0.12360
		X5	+	0.12212
	Environment stress	X6	-	0.12216
		X7	-	0.14077
		X8	-	0.12287
Tourist economy	Tourist industry	Y1	+	0.12086
		Y2	+	0.12991
	Tourism size	Y3	+	0.12117
		Y4	+	0.13432
		Y5	+	0.12133
	Tourism efficiency	Y6	+	0.12646
		Y7	+	0.12360
		Y8	+	0.12235

Source: "Chengdu Statistical Yearbook (2013-2023)"&Author's Calculation

This section discusses the results obtained from the surface pressure measurement study. The effects of angle of attack, Reynolds number and leading edge bluntness are discussed in the next sub section.

The weights of each index layer in the two systems are calculated by the formula, and it is found that the tourism economic foundation and ecological environment pressure are the most weighted in their respective subsystems,

which have a greater impact on the whole index system. It can be seen from the table that, from the perspective of weight proportion, sulfur dioxide emissions in the ecological environment system are the largest, and forest coverage rate is the lowest; In the tourism economy system, the number of inbound tourists is the largest and the number of star-rated hotels is the smallest. Although the weights of each index are different, the difference between them is not significant, indicating that the importance of each index to the system is similar, and comprehensive consideration is needed. Among the indicators, three indicators of total industrial wastewater discharge, sulfur dioxide discharge and industrial solid waste discharge are reverse indicators, and the remaining 13 indicators are positive indicators.

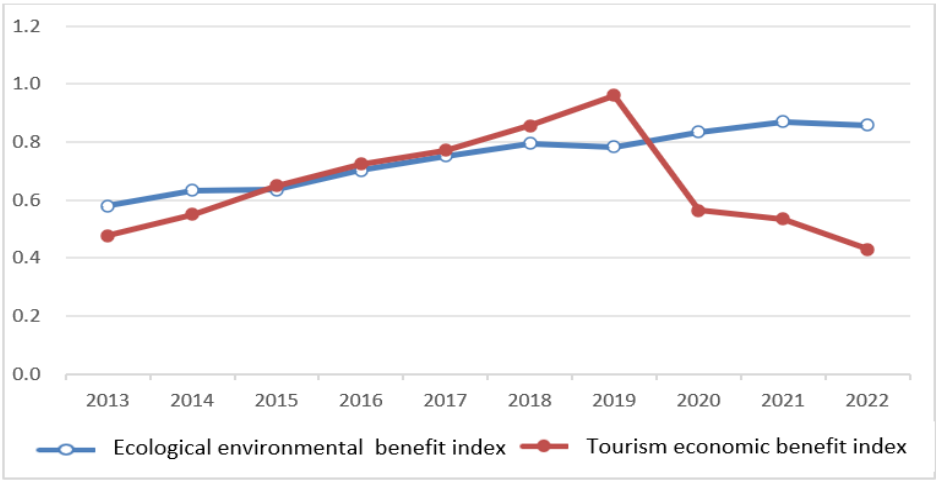


Figure 2: Change chart of tourism economic benefit and eco-environmental benefit index in Chengdu from 2013 to 2022

Source: "Chengdu Tourism Yearbook (2013-2022)", & Author's Calculation (2024)

As depicted in the figure2, the tourism economic benefit index exhibited a steady increase from 2013 to 2019, rising from 0.4779 to its peak at 0.9607. This trend reflects the robust development of Chengdu's tourism economy over the past seven years. However, following the onset of the COVID-19 pandemic in 2020, there was a sharp decline, and by 2022, the index had even dropped below the level recorded ten years earlier.

Conversely, the ecological and environmental benefit index showed a generally upward trend with fluctuations, experiencing only slight declines in 2015, 2019, and 2022. The increase in the ecological and environmental benefit index over the past decade indicates continuous positive development in

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Chengdu's ecological environment from the end of the "Twelfth Five-Year Plan" to the early stages of the "Fourteenth Five-Year Plan".

Path analysis to improve the coupling and coordinated development of Chengdu's tourism economy and ecological environment

Coupling analysis of high quality development of tourism economy and ecological environment in Chengdu

The relationship among the three comprehensive development indicators in the research evaluation index system is shown in Figure2 below:

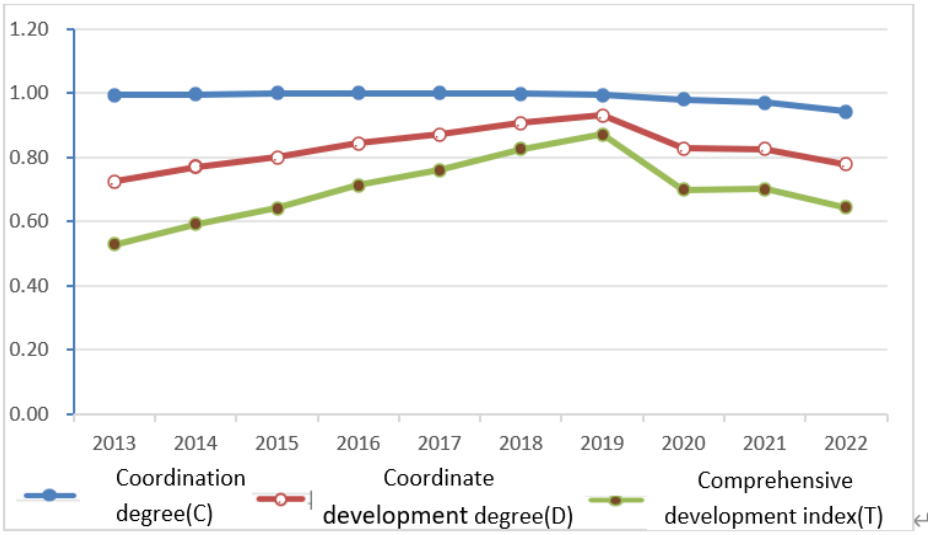


Figure 3: Indicators of coordinated development of tourism economy and ecological environment in Chengdu from 2013 to 2022
Source: "Chengdu Tourism Yearbook (2013-2022)", & Author's Calculation (2024)

According to Figure 3, the coordination degree between the two systems exhibited a gradual decline from 2013 to 2022. Initially, the coordination development degree and the comprehensive development index of both systems showed a slow and balanced increase from 2013 to 2019, with the comprehensive development index increasing more rapidly. However, from 2020 to 2022, there was a downturn in both the coordinated development degree and the comprehensive development index, with the rate of decline slowing down or halting.

Based on the above observations and discrimination criteria, the types of coordinated development between the tourism economy and ecological environment in Chengdu from 2013 to 2022 can be categorized as follows:

Table 5: Coordinated development types of tourism economy and ecological environment in Chengdu from 2013 to 2022

Year	Coordinated development degree(D)	Contrast between f(x) and f(y)	Coordinated development type
2013	0.7256	f（x）> f（y）	Moderate coordinated development type Tourism economy lag type
2014	0.7684	f（x）> f（y）	Moderate coordinated development type Tourism economy lag type
2015	0.8017	f（x）< f（y）	Good coordinated development type Ecological environment lag type
2016	0.8443	f（x）< f（y）	Good coordinated development type Ecological environment lag type
2017	0.8726	f（x）< f（y）	Good coordinated development type Ecological environment lag type
2018	0.9085	f（x）< f（y）	High-quality coordinated development type Ecological environment lag type
2019	0.9312	f（x）< f（y）	High-quality coordinated development type Ecological environment lag type
2020	0.8284	f（x）> f（y）	Good coordinated development type Tourism economy lag type
2021	0.8259	f（x）> f（y）	Good coordinated development type Tourism economy lag type
2022	0.7789	f（x）> f（y）	Moderate coordinated development type Tourism economy lag type

Source: "Chengdu Tourism Yearbook (2013-2022)", & Author's Calculation (2024)

From the table5, it is evident that the dynamics of the relationship between the benefit indexes of the two systems can be characterized as follows: f (x) > f (y) from 2013 to 2014. During this period, the tourism economy in Chengdu was relatively underdeveloped and urgently required rapid growth. f（x）< f（y）from 2015 to 2019, indicating that the ecological environment development in Chengdu lagged behind during this phase, necessitating a focus on environmental protection in development planning. From 2020 to 2022, the COVID-19 pandemic significantly impacted the tourism economy, resulting in f (x) > f (y), highlighting a severe setback in tourism economic development.

In terms of the coordinated development degree, Chengdu's tourism economy and ecological environment achieved a high level over the past decade, showing an initial increase followed by a subsequent decrease in the coordinated development degree. Starting from 2019, the coupling coordination degree steadily improved for seven years, reaching a peak D value of 0.9312 in 2019, indicating a high-quality coordination level favoring ecological environment development. However, in the subsequent two years, there was a rapid decline,

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reflecting a regression to moderate coordinated development with tourism economic lag tendencies, characterized by a D value of 0.7256 in 2014, the lowest observed during this period.

Improvement suggestions based on coupling coordination degree

This illustrates that during the "Twelfth Five-Year Plan" and "Thirteenth Five-Year Plan" periods, the coordinated development situation remained stable and showed improvement. However, from the end of the "Thirteenth Five-Year Plan" to the early stages of the "Fourteenth Five-Year Plan", the novel coronavirus epidemic dealt repeated severe blows to the tourism industry. As a result, the development of the tourism economy lagged behind, necessitating policy support for recovery and future development.

CONCLUSION

This study establishes an evaluation index system for Chengdu's urban tourism economy and ecological environment, focusing on their developmental trajectories. Initially, data undergoes preprocessing using the range method, followed by entropy weight calculation to determine the significance of each index. Subsequently, a coupled coordination model assesses the system's coordinated development level, delineating yearly development types. The findings reveal the following insights:

From 2013 to 2019, Chengdu's tourism economic benefit index exhibited robust growth, soaring from 0.4779 in 2013 to 0.9607 in 2019. Concurrently, the ecological and environmental benefit index displayed a fluctuating upward trend, climbing from 0.5800 to 0.7829. Despite strides in ecological protection, a notable disparity between the two indices persisted, emphasizing the ongoing need for ecological conservation.

The pivotal year of 2020 marked a downturn as Chengdu's tourism economic benefit index plummeted sharply from 0.9607 in 2020 to 0.4290 in 2022. This decline underscored significant obstacles to the tourism sector's development. In contrast, the ecological and environmental benefit index continued a slower growth trajectory, reaching 0.8581 in 2022. This slower pace suggests a stall in ecological progress, with the ecological index surpassing that of tourism economy, necessitating future efforts to bolster tourism recovery while advancing ecological resilience.

During 2013-2019, the coordination degree between the two systems remained consistently high, fluctuating marginally above 0.99. However, from 2020 onwards, this coordination declined, hitting a low of 0.9428 in 2022. This decline primarily resulted from the rapid downturn in Chengdu's tourism economic benefit index due to the novel coronavirus pandemic, compounded by stagnation in the growth of the ecological and environmental benefit index.

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The period from 2013 to 2019 witnessed significant improvements in both the coordinated development degree and comprehensive development index, peaking at 0.8718 and 0.9312, respectively. This period highlighted optimized coupled and coordinated development, characterized by high-quality ecological environment lag-type coordination.

Conversely, during 2020-2022, the coordinated development degree declined to 0.7789 by 2022, while the comprehensive development index dropped to 0.6436. Chengdu transitioned to medium coordinated development, indicating deteriorating coupling and coordinated development between tourism economy and ecological environment. Urgent measures are imperative to rejuvenate tourism sector growth and advance ecological restoration, underscoring the need for enhanced coordination between these sectors. This analysis underscores the dynamic interplay and evolving challenges facing Chengdu's tourism economy and ecological environment. Strategic interventions are crucial to navigate current setbacks and guide Chengdu towards sustainable and balanced development in the future.

REFERENCES

Deng, M., Chen, J., Tao, F., Zhu, J., & Wang, M. (2022). On the Coupling and Coordination Development between Environment and Economy: A Case Study in the Yangtze River Delta of China. *International Journal of Environmental Research and Public Health*, *19*(1). https://doi.org/10.3390/ijerph19010586

Koçak, E., Ulucak, R., & Ulucak, Z. Ş. (2020). The impact of tourism developments on CO2 emissions: An advanced panel data estimation. *Tourism Management Perspectives*, *33*, 100611. https://doi.org/10.1016/j.tmp.2019.100611

Lai, Z., Ge, D., Xia, H., Yue, Y., & Wang, Z. (2020). Coupling coordination between environment, economy and tourism: A case study of China. *PLOS ONE*, *15*(2), e0228426. https://doi.org/10.1371/journal.pone.0228426

Lee, C. C., & Chen, M. P. (2021). Ecological footprint, tourism development, and country risk: International evidence. *Journal of Cleaner Production*, *279*, 123671. https://doi.org/10.1016/j.jclepro.2020.123671

Manzoor, F., Wei, L., Asif, M., Ul Haq, M. Z., & Ur Rehman, H. (2019). The contribution of sustainable tourism to economic growth and employment in Pakistan. *International Journal of Environmental Research and Public Health*, *16*(19). https://doi.org/10.3390/ijerph16193785

Niemeijer, D., & de Groot, R. S. (2008). A conceptual framework for selecting environmental indicator sets. *Ecological Indicators*, *8*(1), 14–25. https://doi.org/10.1016/j.ecolind.2006.11.012

Pimonenko, T. (2021). *Cointegration between Economic , Ecological and Tourism Development*. *12*(23), 169–180. https://doi.org/10.29036/jots.v12i23.293

Rauf, A., Ozturk, I., Ahmad, F., Shehzad, K., Chandiao, A. A., Irfan, M., Abid, S., & Jinkai, L. (2021). Do tourism development, energy consumption and transportation demolish sustainable environments? Evidence from Chinese provinces. *Sustainability (Switzerland)*, *13*(22), 1–23. https://doi.org/10.3390/su132212361

© 2025 by MIP

Sdoukopoulos, A., Pitsiava-Latinopoulou, M., Basbas, S., & Papaioannou, P. (2019). Measuring progress towards transport sustainability through indicators: Analysis and metrics of the main indicator initiatives. *Transportation Research Part D: Transport and Environment*, *67*, 316–333. https://doi.org/10.1016/j.trd.2018.11.020

Streimikiene, D., Svagzdiene, B., Jasinskas, E., & Simanavicius, A. (2021). Sustainable tourism development and competitiveness: The systematic literature review. *Sustainable Development*, *29*(1), 259–271. https://doi.org/10.1002/sd.2133

Wang, J., Huang, X., Gong, Z., & Cao, K. (2020). Dynamic assessment of tourism carrying capacity and its impacts on tourism economic growth in urban tourism destinations in China. *Journal of Destination Marketing & Management*, *15*, 100383. https://doi.org/10.1016/j.jdmm.2019.100383

Wang, W., Qi, S., Ye, W., Li, S., & Feng, C. (2022). Assessing the sustainability and competitiveness of tourism economies in China ' s Chengdu - Chongqing metropolitan area. *Environmental Science and Pollution Research*, 66960–66978. https://doi.org/10.1007/s11356-022-20436-2

WANG Zhao-feng, L. Q. (2019). *The spatio-temporal evolution of tourism eco-efficiency in the Yangtze River Economic Belt and its interactive response with tourism economy*. *34*(9), 1945–1961.

Weng, G., Li, H., & Li, Y. (2023). The temporal and spatial distribution characteristics and influencing factors of tourist attractions in Chengdu - Chongqing economic circle. *Environment, Development and Sustainability*, *25*(8), 8677–8698. https://doi.org/10.1007/s10668-022-02418-z

Xing, L., Xue, M., & Hu, M. (2019). Dynamic simulation and assessment of the coupling coordination degree of the economy–resource–environment system: Case of Wuhan City in China. *Journal of Environmental Management*, *230*, 474–487. https://doi.org/10.1016/j.jenvman.2018.09.065

Xu, A., Wang, C., Tang, D., & Ye, W. (2022a). Tourism circular economy: Identification and measurement of tourism industry ecologization. *Ecological Indicators*, *144*(June), 109476. https://doi.org/10.1016/j.ecolind.2022.109476

Xu, A., Wang, C., Tang, D., & Ye, W. (2022b). Tourism circular economy: Identification and measurement of tourism industry ecologization. *Ecological Indicators*, *144*, 109476. https://doi.org/10.1016/j.ecolind.2022.109476

Zeng, J., Wen, Y., Bi, C., & Feiock, R. (2021). Effect of tourism development on urban air pollution in China: The moderating role of tourism infrastructure. *Journal of Cleaner Production*, *280*, 124397. https://doi.org/10.1016/j.jclepro.2020.124397

Zhu, K. (2023). *Regional sustainability : Pressures and responses of tourism economy and ecological environment in the Yangtze River basin , China*. *February*, 1–22. https://doi.org/10.3389/fevo.2023.1148868

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IDENTIFYING THE KEY FACTORS INFLUENCING THE SPORTS TOURISM DESTINATION COMPETITIVENESS: A CASE STUDY OF THE GREATER BAY AREA, CHINA

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Abstract

Sports tourism has grown significantly in recent times. Despite the increasing number of tourists, companies and destinations involved in sports tourism, there is very limited knowledge of the key factors influencing the sports tourism destination competitiveness (STDC). Destinations should be aware of how to achieve competitive advantage by grasping the key competitiveness factors. This paper aims to identify the critical factors that influence the STDC of urban agglomeration of Guangdong–Hong Kong–Macao Greater Bay Area (GBA). In this research, the literature analysis method and the fuzzy Delphi method were employed. Firstly, the authors conducted a literature review to summarize the factors identified in current literature. Then investigated 5 industrial experts and 5 academic experts to determine the essential factors (using fuzzy Delphi method). The findings showed that STDC is not only affected by the general factors influencing tourism competitiveness but also by sport-specific factors. This study identified 14 key factors including sports event, natural sports resources, cultural sports resources, tourism infrastructure, sports infrastructure, quality of service, destination marketing, policy and planning, climate, human resource, technology, sports tourism activities, accessibility, security and safety that influence STDC of the GBA. Sports tourism stakeholders especially government and managers in the GBA may benefit from the findings since accurately grasping the key competitive factors is helpful to appropriately match available resources and management strategies and enhance the overall level of sports tourism competitiveness.

Keywords: Sports Tourism, destination competitiveness, influencing factors, Greater Bay Area

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INTRODUCTION

The tourism sector has experienced remarkable growth over the past few years. Tourism plays a significant role in stimulating economic growth, especially for developing countries, as it serves as a catalyst for expansion, generates foreign revenue, and contributes to the diversification of exports (Goffi et al., 2019). Sports tourism is now widely acknowledged as a dynamic and diverse specialization area in the tourism industry (Higham & Hinch, 2018). In addition to stimulating economic development, sports tourism contributes to sustaining the destination by fostering cultural exchanges between tourists and the locals, expanding tourism offerings through interaction with various types of tourism and diversifying tourist activities year-round (Mesci et al., 2021).

Destinations should recognize the implications of being competitive by comprehending the factors that determine competitiveness (Cronjé & Du Plessis, 2020). Therefore, it is important for tourism stakeholders to identify factors determining the destination's tourism competitiveness in order to effectively match available resources and development strategies, maximally creating value for tourists (Michael et al., 2019).

Destinations' competitiveness is affected by various factors, however, it is improbable that all of these factors carry equal weight or impact in determining the competitiveness of destinations in general or of individual destinations in specific tourism niche market (Ritchie & Crouch, 2011). In consideration of the distinct characteristics of sports tourism sector as well as the uniqueness of each destination (Cronjé & Du Plessis, 2020), it is essential to conduct destination-specific research on the influencing factors of STDC.

GBA boasts a remarkable advantage for sports tourism development with superior economic fundamentals, rich sports tourism resources, extensive facilities and strong supporting policy. However, there is still great room for improving STDC in the GBA. Therefore, this study takes GBA as a study area, aiming to identify the key factors affecting the STDC in GBA. This enables practitioners and policymakers concentrate on the identified key factors to improve the implementation strategy of STDC in the long term.

LITERATURE REVIEW

Models of tourism destination competitiveness (TDC)

Various models of TDC have been developed in previous studies (Crouch & Ritchie, 1999; Heath, 2002; Dwyer & Kim, 2003). For instance, Ritchie and Crouch (1999) developed a conceptual model of TDC and further refined it in 2003. They identified 36 major destination competitiveness factors and clustered them into five main groups: (1) core resources and attractors; (2) supporting factors and resource; (3) destination management; (4) destination policy, planning and development; (5) qualifying and amplifying determinants.

Moreover, Dwyer and Kim (2003) developed an Integrated Model (IM) of TDC. The IM contains many of the factors and category headings identified by Crouch and Ritchie (1999), but makes some adjustments, incorporating some additional determinants of TDC. The model identifies 25 factors and classifies these factors into five major groups: (1) endowed and created resources; (2) supporting factors; (3) destination management; (4) demand conditions; (5) situational condition.

In addition, Heath (2002) proposed a model which is depicted as a house, where the "foundation" establishes the base of competitiveness, the "cement" connects the competitive dimensions, the "building blocks" pillars are fundamental to tourism development of a destination and the "roof" is responsible for defining the "people" of the destination.

The aforementioned models are the best-known works aiming at identifying and explaining the factors that drive destination competitiveness (Andrades & Dimanche, 2017). For this study, these models provide a reference for identifying the major factors perceived as being important in determining the STDC.

Factors of STDC

Researchers have attempted to find answers to the question of "What factors influence STDC?". On the one hand, it should be highlighted that not all factors that affect the competitiveness of a destination in terms of sport are unique to sports tourism. The knowledge from literature shows that general factors such as tourism infrastructure (Woyo & Slabbert, 2021), safety and security (Andrades and Dimanche, 2017) are very important for sports tourism destination, but they do not differ from other types of destination. On the other hand, it's important to note that there are indeed factors specific to sport such as sports infrastructure (Liberato, 2021), sports event (Bazzanella et al., 2023), quality of sports tourism service (Rahmati et al., 2020) and so on.

The study identified sports-specific factors and general factors for STDC based on a previous literature review. Thus, a total of 22 potential factors were determined for initial FDM analysis, as presented in Table 1.

Table 1: Description of influencing factors identified in previous researches

	Influencing factors	**Description**
Sports-specific factors	Sports event	Sports event covers any organized competition where athletes or teams compete against each other, from local sports competitions to the Olympic Games (Chappelet & Parent, 2017).
	Natural sports resources	Refer to the natural scenic spots endowed by various natural resources including canyons, mountains, cliffs, the sea, rivers, snowfields, the sky, etc. These natural spaces constitute the base for the practice of nature sports activities (Melo, 2020).
	Cultural sports resources	Refer to specific cultural resources related to sports tourism such as sport heritage, national traditional sports such as dragon boat

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	Influencing factors	Description
		race, martial art etc (Ramshaw & Gammon, 2017; Li & Huang, 2021).
	Sports infrastructure	Refers to physical facilities used for sports activities such as training, competition, fitness and leisure, which may include stadiums, arenas, training facilities (Nassr & Al-Neaimi, 2021).
	Sports tourism activities	Sports tourism activities can range from recreational activities such as golf tournaments, cycling to adventure sports activities like rock climbing or surfing (KIRÁĽOVÁ & HAMARNEH, 2017).
	Sports tourism service	Sports tourism service involves the service of sports events as well as the travel agent, accommodation, transportation, and other related services required to enhance the sports tourists' experience (Higham & Hinch, 2018).
General factors	Climate	Climate is defined as the prevailing weather condition observed as a long-term average in a certain region (Werndl, 2016).
	Entertainment	Entertainment can be found in many forms, encompassing tourist assumes a passive "spectator" role such as watching wrestling or night show, as well as an active "participant" role such as gambling (Luo et al., 2020).
	Shopping	Including the availability of shopping facilities such as shopping center, the affordability of shopping items (Choi et al., 2018).
	Accessibility	Destination accessibility depends on the availability, efficiency and service quality of various transport modes (road, air, rail, sea), visa requirements, airport facilities, and carrier competition (Morrison et al., 2024).
	Residents' support	Residents' hospitable behavior and wholehearted participation (Chang et al., 2022).
	Tourism infrastructure	Including accommodation, food services, transportation systems, themed attractions, rental services, and convention facilities. (Dwyer & Kim, 2003).
	Technology	There are numerous applications of technology in sports tourism such as smart stadiums and arenas, online booking platforms, social media marketing, virtual sports tourism (Achilleos et al., 2021).
	Innovation	Innovation is the process of transforming knowledge into value creation. In the sports tourism context, this manifests through three primary dimensions: service optimization, marketing innovation, and the creation of novel sports-related offerings (Selim et al., 2021).
	Human resource	Refers to implementing education and training programs to cultivate professionals to meet the specific needs of the tourism and hospitality industries (Andrades & Dimanche, 2019).
	Destination marketing	Refer to implementing series of activities to conduct destination positioning, build destination brand, create destination image, and finally gain market share (Sotiriadis, 2020).
	Policy and planning	Refer to the guideline and system designed to work in concert to achieve the overall competitiveness and sustainability goals (Dredge & Jamal, 2015).

	Influencing factors	Description
	Sustainability	Sustainability of sports tourism refers to strategically addressing current stakeholder needs while systematically conserving resources to safeguard future development potential (Mousavi et al., 2022).
	Location	Refers to the proximity to other destinations, distance or travel time from major origin markets (Dwyer & Kim, 2003).
	Safety and security	Refers to strategies and protocols designed to safeguard tourists from injury, loss, or risk (Szabolcs et al., 2022).
	Price competitiveness	Depend on respective prices of the goods and services that cater to tourists needs as well as exchange rate, taxes etc (Forsyth & Dwyer, 2009).
	Vision and leadership	Vision and leadership in destination development require stakeholder consensus on an ideal future state and committed cross-sector leadership to achieve it. (Dwyer & Kim, 2003).

Area of study

The study was carried out in Greater Bay Area (GBA), encompassing Hong Kong, Macao and nine Pearl River Delta cities, that is, Shenzhen, Guangzhou, Zhuhai, Dongguan, Foshan, Huizhou, Zhaoqing, Zhongshan and Jiangmen. The region spans approximately 56,000 square kilometers, boasting a population exceeding 86 million as of 2020, with a per capita GDP of around $20,000. GBA possesses favourable geographical features, including well-developed port clusters and extensive coasts. Furthermore, GBA is rich in abundant sports and tourism resources, hosting large-scale sports events such as the Hong Kong International Marathon, Guangzhou Asian Games and the World Men's Golf Championship. Additionally, a number of world-class sports venues have been constructed such as the Guangzhou Tianhe Sports Center, Shenzhen Universiade Sports Center, and Hong Kong Kai Tak Sports Park, laying a good foundation for sports tourism development in the GBA.

RESEARCH METHODOLOGY

This study identifies key factors influencing STDC in GBA. Using the fuzzy Delphi method (FDM), the importance of the factors identified in the literature review was debated. Microsoft Excel software can be used to deal with experts' views and analyze the result (Mohamed Yusoff et al., 2021).

Fuzzy Delphi Method (FDM)

The Fuzzy Delphi Method (FDM) was developed by Murray et al. (1985), and it integrates fuzzy theory with the Delphi method to achieve consensus by addressing the vagueness and ambiguity of expert opinions. By employing fuzzy set theory, it enhances the efficiency of the traditional Delphi method, particularly in scenarios where expert judgments cannot be precisely described. (Saffie et al., 2016). In other words, the advantage of FDM is that it incorporates and integrates

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all expert opinions to achieve consensus, and offers the additional benefits of shorter survey times and lower decision-making costs (Lee et al., 2018).

The process of FDM in this study consists of three main stages: input arrangement, expert survey, and FDM analysis. The research method is demonstrated in figure 1.

Stage 1: Input arrangement

Input arrangement consists of literature review, questionnaire design, pre-test. Firstly, a literature review was conducted to identify the potential factors and design the initial questionnaires. And then 2 experts (they are the 2 professors from the 5 academic experts, one of them possesses extensive research experience in sports tourism and event management, while the other specializes in tourism destination competitiveness) were invited to review check the questionnaire for content validity and question clarity.

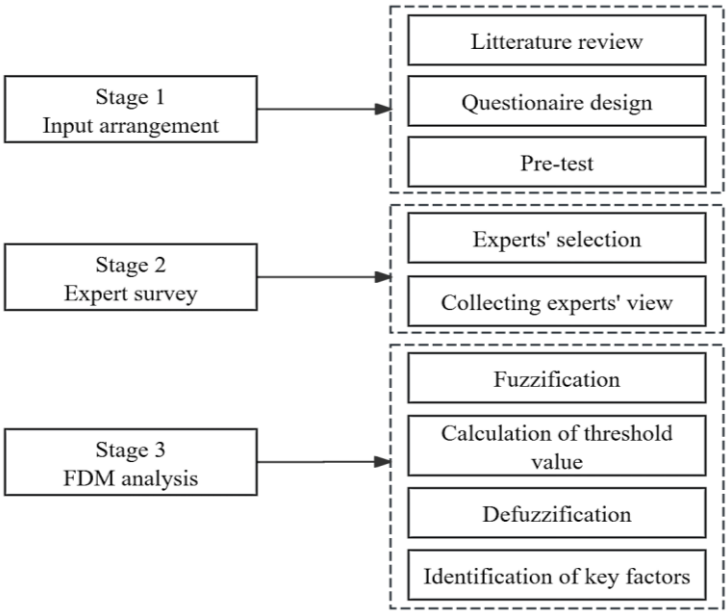


Figure 1: Process of FDM
Source: Author

Stage 2: Expert survey

Experts play a crucial role in qualitative research. Therefore, it was decided to select them based on a set of predefined criteria (educational background, field of expertise, accumulated experience, willingness to participate in the research) to ensure the integrity. According to previous researches (Novakowski & Wellar,

2008), a sample size of 10 experts was considered appropriate for this research. Specifically, the experts consisted of 5 academic experts (expertise in tourism destination competitiveness and sports tourism) and 5 industrial experts (General Manager of travel company and sports tourism company that engage in sports tourism business). The experts' profiles are listed in table 2 and Table 3.

Table 2: List of academic experts

Academic Experts	Field of Expertise	Title	Work experience
Expert 1	Sports tourism and event management	Professor	25 years
Expert 2	Tourism destination competitiveness	Professor	26 years
Expert 3	Tourism destination competitiveness	Associate Professor	22years
Expert 4	Tourism destination competitiveness	Lecturer	7 years
Expert 5	Sports tourism	Lecturer	8 years

Table 3: List of industrial experts

Industrial Experts	Sector of Industry	Position	Work experience
Expert 6	International Travel Service	General manager	25 years
Expert 7	International Travel Service	General manager	15 years
Expert 8	International Travel Service	General manager	12 years
Expert 9	Sport tourism company	Founder & General manage	11 years
Expert 10	Tourism and hospitality company	Co-founder & Deputy General manager	17 years

The next step was collecting qualitative data from experts, where readability-test questionnaires were distributed to experts, requiring them to rate every potential factor using the Likert scale. This process should be repeated until the experts' consensus is equal or higher than 75%.

Stage 3: FDM analysis

There are three requirements that must be fulfilled in the FDM analysis, which are the threshold value (d) ≤ 0.2, and the fuzzy score (A) ≥ 0.5, the experts' consensus $\geq 75\%$. This stage consisted of the following three primary steps (Marlina et al., 2022).

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a. Conversion of the Likert score into fuzzy numbers

Experts scored each item in a Likert scale, then transformed into three fuzzy numbers to form a Triangular Fuzzy Number (TFN), which is called a fuzzification process. Fuzzy number, an extension of regular real numbers, does not represent a single value but a set of connected possible values. Each potential value ranges between 0 and 1 (Anand & Bharatraj, 2017). Table 4 illustrates the conversion of the Likert scale into fuzzy numbers.

Table 4: The conversion between the five-point in Likert scale and fuzzy scale

Likert Scale	Linguistic Terms	Fuzzy Scale (n_1, n_2, n_3)
5	Very important	0.6,0.8,1.0
4	Important	0.4,0.6,0.8
3	Neutral	0.2,0.4,0.6
2	Low importance	0.0,0.2,0.4
1	Not important at all	0.0,0.0,0.2

b. Compute the threshold value (d)

The threshold value (d) for determining the level of consensus among experts of specific item should be no greater than 0.2. The formula used to compute threshold value (d) is shown below (Manakandan et al., 2017):

$$d(\tilde{m},\tilde{n}) = \sqrt{\frac{1}{3}[(m_1-n_1)^2+(m_2-n_2)^2+(m_3-n_3)^2]}$$

c. Defuzzification process

The defuzzification process aims to determine the value of the fuzzy score (A). This process helps determine whether an item should be retained or discarded using the following formula:

$$A = \frac{1}{3} \times (m_1 + m_2 + m_3)$$

where m_1, m_2, and m_3 represents the average fuzzy number for each item. If the fuzzy score (A) is greater than or equal to 0.5, the item can be retained.

ANALYSIS AND DISCUSSION

The first and second rounds identified a total of 14 key factors, receiving unanimous agreement from all the experts. The other 8 factors did not meet the requirements and failed to obtain expert's consent. The results are presented in Table 5. The 8 discarded factors are: entertainment, shopping, resident's support, information, innovation, location, price competitiveness, vision and leadership,

sustainability. This does not mean that the rejected factors are irrelevant, but given the uniqueness of GBA, they had a lower priority for the interviewed experts compared to other factors.

Table 5: Results of experts' consensus on the influencing factors

Factor	Threshold value (d) ≤ 0.2	Percentage of expert consensus (%) ≥ 75%	Fuzzy score (A) ≥ 0.5	Result
Natural sports resources	0.036	80%	0.78	Accepted
Cultural sports resources	0.072	90%	0.76	Accepted
Sports event	0.036	100%	0.8	Accepted
Sports tourism activities	0.064	80%	0.56	Accepted
Climate	0.04	80%	0.6	Accepted
Tourism Infrastructure	0.064	80%	0.76	Accepted
Sports infrastructure	0.036	90%	0.78	Accepted
Quality of service	0.064	80%	0.76	Accepted
Accessibility	0.064	80%	0.56	Accepted
Human resource	0.04	80%	0.6	Accepted
Destination marketing	0.096	80%	0.74	Accepted
Policy and Planning	0.072	80%	0.62	Accepted
Technology	0.04	80%	0.6	Accepted
Security and safety	0.096	80%	0.54	Accepted
Innovation	0.124	50%	0.46	Rejected
Entertainment	0.14	50%	0.46	Rejected
Shopping	0.084	70%	0.34	Rejected
Resident's support	0.2	50%	0.4	Rejected
Location	0.072	70%	0.38	Rejected
Price competitiveness	0.08	60%	0.4	Rejected
Vision and leadership	0.084	70%	0.34	Rejected
Sustainability	0.096	60%	0.44	Rejected

Sports event

Sports event was considered as the most critical factor, gaining the highest fuzzy score of 0.8. The result was in accordance with previous studies which claimed that destinations can not only provide their tourists with distinctive experiences (Jeong et al., 2019) but also attract new tourist groups by hosting sports events (Pedauga et al., 2022). Various famous sports events are held in GBA, which accumulate extensive experience and good reputation for GBA. Therefore, GBA should further promote sports tourism and boost its reputation by hosting high-end international sports events.

Natural sports resources

Limited researches (Adabi Firouzjah, 2009; Safdel, 2014) had been found that discussed the effect of natural sports resources on sports tourism development. However, natural sports resources achieved the second highest fuzzy score of

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0.78, where the consulted expert agreed that it was a critical factor driving sports tourism development for GBA. GBA is well endowed with natural resources such as mountains, rivers, streams and long coastlines. These spaces are natural venues for the practice of sports activities including paragliding, sailing, surfing, cycling, riding, rock-climbing, etc. GBA should deeply develop sports tourism resources and create high-quality sports tourism products to enhance sports tourism competitiveness.

Infrastructure

For sports tourism, infrastructure includes sports infrastructure and tourism infrastructure, which ranked second and third respectively. According to Jovanoviä and Ivana (2016), tourism infrastructure forms the foundation of tourism growth and improves the distribution of services. Sports infrastructure, particularly commercial sports facilities, can stimulate the sports industry, boost tourism, and improve the positive destination image of a city (Xue & Mason, 2019). GBA has a good foundation of tourism infrastructure as well as sports infrastructure. It should further strengthen the investment and construction of sports tourism infrastructure, focusing on attracting leading enterprises and sports tourism projects, thus stimulating the transformation and upgrading of urban infrastructure, accelerating the sports tourism development of the region.

Cultural sports resources

Cultural sports resources ranked third and had fuzzy score of 0.76 in the experts' questionnaire, which agreed with Li & Huang (2021), who stated that cultural sports resources can boost a sports tourism destination's degree of competitiveness. GBA has abundant sports folk cultural resources such as dragon boat races, martial arts and lion dance, which are adored by locals and tourists. In recent years, GBA has paid attention to tapping into the cultural resources and has built a series of unique branded sports projects, such as the Lion King Championship, Dragon Boat Race, and Martial Arts Elite Competition.

Quality of sports tourism service

Quality of sports tourism service also got the third highest fuzzy score with 0.76. This is because the sports tourism sector is part of service industry, and the experiences of sports tourists are greatly affected by the quality of services provided. Rahmati et al. (2020) identify service factors as the most influential factors in the development of sport tourism. To improve the sports tourism service quality of GBA, efforts should be focused on four aspects: basic service (e.g. quality of scenic spots and sports facilities), information service (e.g. information of sports events), entertainment service (e.g. sports entertainment), and supportable service (e.g. protect service during the experience).

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Destination marketing
Just like in other works (Sotiriadis, 2020; Arasli et al., 2021), the result indicated that destination marketing is among the most important factors with a fuzzy score of 0.74. Arasli et al. (2021) stated that social media has become a popular and effective tool for destination marketing. Therefore, the sports tourism industry should build a multi-dimensional social media marketing and promotion system to enhance the popularity of sports tourism in GBA.

Policy and planning
Policy and planning got a relatively high fuzzy score of 0.64, which was in line with the opinion that supporting policy and scientific planning are promoting factors of sports tourism competitiveness (Tian et al., 2023). Currently, a number of supporting policies and planning have been issued, which can raise resource allocations, build infrastructure, and remove restrictions that limit development, thus promoting the development of sports tourism in the GBA.

Climate
As a notable factor of STDC, climate was generally discussed in prior studies (Cronjé & du Plessis, 2020; Steiger & Abegg, 2018), and got a fuzzy score of 0.6 in the expert survey. GBA is a typical climate vulnerable area, which is greatly affected by typhoon, rainstorm, lightning, wind, high temperature and other climatic disasters. Therefore, climate is undoubtedly a critical factor influencing the STDC of GBA. The sports tourism industry in GBA should strengthen climate disaster monitoring and early warning, establish and improve tourism risk emergency management mechanism, and better ensure the safety of tourists.

Human resource
Human resource is a factor that has been not well studied in STDC, however, the consulted experts determined it an essential factor with a fuzzy score of 0.6. Sports tourism, as an intersecting industry, urgently requires multifaceted professionals equipped with a combination of knowledge and skills in both sports management and tourism management. As a result, GBA must ensure continuous education development and training programmes to address the shortage of professionals in the field of the sports tourism industry.

Technology
Technology was also considered important with a fuzzy score of 0.6, corresponding to Liao and Nong (2021), who recognized that information technology is essential for a sports tourism destination to compete globally. Moreover, the technology related factors such as new media technology and internet popularity can offer the necessary platforms to enhance the competitiveness of sports tourism destinations. GBA is now at the forefront of

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technology and information services in China, with various high technologies converging here. GBA should accelerate applications of technology in sports tourism such as smart stadiums and arenas, virtual sports tourism and E-sports tourism to promote the construction of a smart sports tourism destination.

Accessibility

The accessibility of a destination significantly impacts tourist satisfaction, making it a critical factor to consider (Malik et al., 2020). Nevertheless, it got a relatively low fuzzy score of 0.56 in the accepted factors. This is because the overall transportation network in GBA has already reached to a mature stage. However, accessibility (including airline, rail, highway) is uneven between core developed cities and less developed cities in GBA (Chen et al., 2020). Furthermore, in consideration of the GBA covering 11 cities operating under different political systems, the accessibility is also likely to be affected by the visa requirements and border security checks. Thus, increasing accessibility of GBA is not easy work and needs scientific planning and coordination.

Sports tourism activities

The available sports activities are driving forces in attracting visitors to a sports tourism destination (Ugi Nugraha et al., 2020), and this factor was accepted with a fuzzy score of 0.54. The sports tourism industry can make full use of the rich sports tourism resources to develop various sports activities and create brand to enhance the attractiveness and competitiveness of GBA.

Security and safety

Security and safety were also accepted with a fuzzy score of 0.54. Tourists' perceptions of a destination's safety and security plays a vital role in their decision (Andrades & Dimanche, 2017). Tourists will face risk when they participate in sports tourism, especially the competitive sports and adventure sports (Li et al., 2023). Hence, the security system in GBA must have a well-defined plan and procedure for handling emergencies as well as crises and must provide tourist-friendly security services. Creating a favorable perception of security amongst locals, tourists, and stakeholders will contribute to enhancing STDC of GBA.

CONCLUSIONS

This study attempts to identify key factors influencing STDC in GBA, the FDM was employed and 14 key factors were identified. Theoretically, it helps researchers better understand the factors affecting the improvement of STDC in GBA and consider their relative importance. What's more, this study fills the research gap of destination competitiveness and sports tourism literature by

increasing the empirical study at an urban agglomeration level. Practically, sports tourism stakeholders especially government and managers in GBA may benefit from the findings since focusing on the identified key STDC factors will enable them to organize their priorities better and match their development strategies appropriately to enhance their destinations' competitiveness, and provide tourists with more high-quality, innovative sports tourism attractions and services.

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REFERENCES

Achilleos, A., Makrominas, M., Markides, C., Alexandrou, R., Konstantinidis, A., Papacosta, E., & Tselepos, L. (2021). Promoting active sports tourism through technology and evaluating its economic impact: Experiences from Cyprus. *Journal of Sport & Tourism*, *25*(4), 297-315.

Adabi Firouzjah, J., Kouzehchian, H., & Ehsani, M. (2009). A study of the effect of natural sport attractions on developing sport tourism in Iran from the viewpoint of the sport and tourism experts. *Sport Management Journal*, *1*(1), 67-81.

Anand, M. C. J., & Bharatraj, J. (2017). Theory of triangular fuzzy number. In *Proceedings of NCATM* (Vol. 80, pp. 80-83).

Andrades, L., & Dimanche, F. (2017). Destination competitiveness and tourism development in Russia: Issues and challenges. *Tourism Management*, *62*, 360-376.

Andrades, L., & Dimanche, F. (2019). Destination competitiveness in Russia: Tourism professionals' skills and competences. *International Journal of Contemporary Hospitality Management*, *31*(2), 910-930.

Arasli, H., Abdullahi, M., & Gunay, T. (2021). Social media as a destination marketing tool for a sustainable heritage festival in Nigeria: A moderated mediation study. *Sustainability*, *13*(11), 6191.

Bazzanella, F., Schnitzer, M., Peters, M., & Bichler, B. F. (2023). The role of sports events in developing tourism destinations: A systematized review and future research agenda. *Journal of Sport & Tourism*, *27*(2), 77-109.

Chappelet, J. L., & Parent, M. M. (2017). The (wide) world of sports events. In *Routledge handbook of sports event management* (pp. 1-17). Routledge.

Chang, M. X., Choong, Y. O., Ng, L. P., & Seow, A. N. (2022). The importance of support for sport tourism development among local residents: The mediating role of the perceived impacts of sport tourism. *Leisure Studies*, *41*(3), 420-436.

Chen, Z., Li, Y., & Wang, P. (2020). Transportation accessibility and regional growth in the Greater Bay Area of China. *Transportation Research Part D: Transport and Environment*, *86*, 102453.

Choi, M., Lee, J. S., & Seo, A. J. (2018). Shopping destination competitiveness: Scale development and validation. *Journal of Travel & Tourism Marketing*, *35*(8), 1087-1103.

Cronjé, D. F., & du Plessis, E. (2020). A review on tourism destination competitiveness. *Journal of Hospitality and Tourism Management*, *45*, 256-265.

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Crouch, G. I., & Ritchie, J. B. (1999). Tourism, competitiveness, and societal prosperity. *Journal of Business Research*, *44*(3), 137-152.

Dredge, D., & Jamal, T. (2015). Progress in tourism planning and policy: A post-structural perspective on knowledge production. *Tourism Management*, *51*, 285-297.

Dwyer, L., & Kim, C. (2003). Destination competitiveness: A model and determinants. *Current Issues in Tourism*, *6*(5), 369-414.

Forsyth, P., & Dwyer, L. (2009). Tourism price competitiveness. In *The travel & tourism competitiveness report 2009* (pp. 77-90).

Goffi, G., Cucculelli, M., & Masiero, L. (2019). Fostering tourism destination competitiveness in developing countries: The role of sustainability. *Journal of Cleaner Production*, *209*, 101-115.

Heath, E. (2002). Towards a model to enhance Africa's sustainable tourism competitiveness. *Journal of Public Administration*, *37*(si-1), 327-353.

Higham, J., & Hinch, T. (2018). *Sport tourism development* (Vol. 84). Channel View Publications.

Jeong, Y., Yu, A., & Kim, S. K. (2019). The antecedents of tourists' behavioral intentions at sporting events: The case of South Korea. *Sustainability*, *12*(1), 333.

Jovanović, S., & Ilić, I. (2016). Infrastructure as important determinant of tourism development in the countries of Southeast Europe. *Ecoforum Journal*, *5*(1).

Kiráľová, A., & Hamarneh, I. (2017). Sports tourism activities as a driver of destination development. In *2017 Conference Proceedings on 20th International Colloquium on Regional Sciences Kurdějov, June* (pp. 14-16).

Lee, C. H., Wu, K. J., & Tseng, M. L. (2018). Resource management practice through eco-innovation toward sustainable development using qualitative information and quantitative data. *Journal of Cleaner Production*, *202*, 120-129.

Li, G., Cheng, Y., & Cai, J. (2023). Study of risk perception consumption behavior of sports tourism in China. *PLOS ONE*, *18*(7), e0288735.

Li, P., & Huang, J. (2021). Review of the research on ethnic sports tourism in China. In *E3S Web of Conferences* (Vol. 251, p. 03015). EDP Sciences.

Liao, C., & Nong, L. (2021). *WITHDRAWN: Smart city sports tourism integration based on 5G network and Internet of Things*.

Liberato, D., Liberato, P., & Moreira, C. (2021). The role of sports tourism infrastructures and sports events in destinations competitiveness. In *Culture and tourism in a smart, globalized, and sustainable world* (pp. 127-144). Springer.

Luo, J. M., Lam, C. F., & Fan, D. X. (2020). The development of measurement scale for entertainment tourism experience: A case study in Macau. *Current Issues in Tourism*, *23*(7), 852-866.

Malik, M., Al-Salahmi, S. M. K., Al-Kamiyani, N. K. N., & Al-Habsi, G. H. H. (2020). Tourist satisfaction with heritage site attributes in the Sultanate of Oman. *Enlightening Tourism: A Pathmaking Journal*, *10*(1), 28-57.

Manakandan, S. K., Ismai, R., Jamil, M. R. M., & Ragunath, P. (2017). Pesticide applicators questionnaire content validation: A fuzzy Delphi method. *Medical Journal of Malaysia*, *72*, 228–235.

Marlina, E., Hidayanto, A. N., & Purwandari, B. (2022). Towards a model of research data management readiness in Indonesian context: An investigation of factors and

indicators through the fuzzy Delphi method. *Library & Information Science Research*, *44*(1), 101141.

Melo, R., Van Rheenen, D., & Gammon, S. J. (2020). Part I: Nature sports: A unifying concept. *Annals of Leisure Research*, *23*(1), 1-18.

Mesci, M., Pekerşen, Y., & Mesci, Z. (2021). An overall assessment of sports tourism articles. *Journal of Hospitality and Tourism Insights*, *4*(5), 676-707.

Michael, N., Reisinger, Y., & Hayes, J. P. (2019). The UAE's tourism competitiveness: A business perspective. *Tourism Management Perspectives*, *30*, 53-64.

Mohamed Yusoff, A. F., Hashim, A., Muhamad, N., & Wan Hamat, W. N. (2021). Application of fuzzy Delphi technique to identify the elements for designing and developing the e-PBM PI-Poli module. *Asian Journal of University Education* (*AJUE*), *7*(1), 292-304.

Morrison, A. M., Cheah, J. H., & Kumar, R. (2024). A destination performance measurement framework: Exploring the relationships among performance criteria and revisit intentions. *Current Issues in Tourism*, 1-19.

Mousavi, R., Najafabadi, M. O., Mirdamadi, S. M., & Hosseini, S. J. F. (2022). Rural sports and local games: Missing link between sports tourism development and sustainability. *Journal of Sport & Tourism*, *26*(3), 201-223.

Murray, T. J., Pipino, L. L., & Van Gigch, J. P. (1985). A pilot study of fuzzy set modification of Delphi. *Human Systems Management*, *5*(1), 76-80.

Nassr, E. H., & Al-Neaimi, K. G. (2021). The importance of sports infrastructure for residential neighbourhoods' centres. In *IOP Conference Series: Earth and Environmental Science* (Vol. 754, No. 1, p. 012010). IOP Publishing.

Novakowski, N., & Wellar, B. (2008). Using the Delphi technique in normative planning research: Methodological design considerations. *Environment and Planning A*, *40*(6), 1485-1500.

Pedauga, L. E., Pardo-Fanjul, A., Redondo, J. C., & Izquierdo, J. M. (2022). Assessing the economic contribution of sports tourism events: A regional social accounting matrix analysis approach. *Tourism Economics*, *28*(3), 599-620.

Rahmati, M., Sadr, A. H., & Toorani, A. (2020). Explaining factors influencing sport tourism development case study: Minudasht County, Iran Mansour. *Revista Turismo Estudos e Práticas-RTEP/UERN*, (3), 1-14.

Ramshaw, G., & Gammon, S. J. (2017). Towards a critical sport heritage: Implications for sport tourism. *Journal of Sport & Tourism*, *21*(2), 115-131.

Ritchie, J. B., & Crouch, G. I. (2011). *A model of destination competitiveness and sustainability*.

Safdel, H., Yektayar, M., Mohammadi, S., & Molazem, T. (2014). Effective factors on sports tourism: Emphasizing development in sports natural attractions. *Annals of Applied Sport Science*, *2*(4), 67-74.

Saffie, N. A. M., & Rasmani, K. A. (2016). Fuzzy Delphi method: Issues and challenges. In *2016 International Conference on Logistics, Informatics and Service Sciences (LISS)* (pp. 1-7).

Selim, M. A., Abdel-Fattah, N. A., & Hegazi, Y. S. (2021). A composite index to measure smartness and competitiveness of heritage tourism destination and historic building. *Sustainability*, *13*(23), 13135.

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Sotiriadis, M. (2020). Tourism destination marketing: Academic knowledge. *Encyclopedia*, *1*(1), 42-56.

Steiger, R., & Abegg, B. (2018). Ski areas' competitiveness in the light of climate change: Comparative analysis in the Eastern Alps. In *Tourism in transitions: Recovering decline, managing change* (pp. 187-199).

Szabolcs, M., Nagy-Tóth, N. Á., Dávid, L. D., Gogo, A. F. C., & Bujdosó, Z. (2022). The role of sports policing and tourism safety at the summer Olympics. *Sustainability*, *14*(10), 5928.

Tian, J., Deng, W., & Yuan, J. (2023). Evaluation of sports tourism competitiveness of urban agglomerations in Guangdong-Hong Kong-Macao Greater Bay Area. *Heliyon*, *9*(12).

Nugraha, U. U., Ilham, I., Ali, M. M., Iqroni, D. D., Humaid, H. H., & Humaid, F. H. (2020). The development of sports tourism in the Lake Sipin region of Jambi City. *Journal of Critical Reviews*, *7*(12), 608-612.

Werndl, C. (2016). On defining climate and climate change. *The British Journal for the Philosophy of Science*.

Woyo, E., & Slabbert, E. (2021). Tourism destination competitiveness: A view from suppliers operating in a country with political challenges. *South African Journal of Economic and Management Sciences*, *24*(1), 3717.

Xue, H., & Mason, D. S. (2019). Stadium games in entrepreneurial cities in China: A state project. *Journal of Global Sport Management*, *4*(2), 185-209.

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EXPLORING CULTURAL DEVELOPMENT BARRIERS TO SUSTAINABLE RURAL TOURISM IN GUILIN, CHINA: INSIGHTS FROM THE STAKEHOLDER PERSPECTIVE

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Abstract

Rural tourism in Guilin, China, is currently transitioning from rapid growth to high-quality and sustainable development. However, several obstacles must be overcome to effectively preserve and incorporate local culture. These obstacles include the underdevelopment of local cultural resources; the commercialization of traditional culture; limited cultural exchange between tourists and locals; and a lack of awareness of local customs. This study uses a qualitative methodology to examine three tourist-oriented villages in Guilin. This includes semi-structured interviews with local authorities, communities, tourism operators, and tourists, as well as open-ended interviews with experts. Thematic analysis is employed to synthesize data and gain insights into obstacles from different stakeholder perspectives. The results emphasize the importance of balancing modern tourism demands with the conservation of traditional cultural integrity. Moreover, it is crucial to implement policy reforms focusing on improving the discovery and use of cultural resources; promoting interactions between tourists and local communities; strengthening community involvement; and providing cultural sensitivity training for professionals in the tourism industry. These measures will facilitate inclusive and sustainable development, improve rural tourism planning, and enhance the attractiveness and competitiveness of tourist destinations.

Keywords: Sustainable Rural Tourism, Preservation of Cultural Heritage, Development Barriers, Stakeholder Perspectives, Planning Reform

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INTRODUCTION

Sustainable rural tourism is a framework established in rural areas that aims to positively impact social, economic, and environmental factors, ensuring long-term viability and ecological integrity (Roberts & Hall, 2001). Sustainable rural tourism strategies are crucial to protecting the environment and increasing socioeconomic benefits for local communities, ensuring the long-term viability of tourism products. This form of tourism highlights the unique natural scenery, cultural heritage, and traditional lifestyles of rural areas. It emphasizes the importance of responsible travel practices to preserve these valuable resources. In essence, the future viability and growth of the rural tourism industry depend on the implementation and promotion of sustainable practices.

Guilin, located in the Guangxi Zhuang autonomous region in southwest China, is widely recognized for its rich ecological resources and the distinctive landscape of the Li River. The famous poet Wang Zhenggong praised Guilin in 1201 as having the "finest landscapes under heaven," thus promoting Guilin's scenic beauty. In 2014, the karst formations along the Li River were gazetted as a World Natural Heritage site. As a multiethnic region with distinct traditions and customs, its folk villages are also valuable resources for tourism. Guilin, one of the pioneering tourist destinations in China in terms of accessibility to international visitors, has gained significant recognition both domestically and internationally. By the end of 2020, Guilin had established itself as an international tourist destination. From 2015 to 2020, the total number of tourists in Guilin increased from 44.6995 million to 102 million, with an average annual growth rate of 18.03%. Total tourism expenditure increased from 51.733 billion yuan to 1233.54 billion yuan, with an average annual growth rate of 18.98% (Guilin.gov.cn, 2021).

The "Fourteenth Five-Year Plan" for tourism development in China, issued and implemented by the State Council on December 22, 2021, emphasizes the decision to promote Guilin as a world-class tourist city, highlighting its pivotal role in China's tourism industry. In the Guilin Municipal Government 2020 Work Report, Mayor Qin Chuncheng proposed the construction of key villages for national rural tourism and ethnic characteristic villages. In 2023, the Guilin Municipal Government released the "Fourteenth Five-Year Plan for Cultural and Tourism Development in Guilin (2021-2025)", clearly outlining the initiative to promote Guilin as a globally recognized rural tourism hotspot. Guilin's rural tourism sector is transitioning from rapid expansion to a phase focused more on quality and sustainability. However, there remains a significant gap between the objectives of the rural tourism development goals and the current reality. The study aims to identify and analyse cultural barriers in Guilin, focusing on sustainable rural tourism strategies that benefit the local economy, while protecting the cultural ecosystem.

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LITERATURE REVIEW

Cultural Heritage in Sustainable Rural Tourism

The World Tourism Organization (UNWTO) defines sustainable rural tourism as a type of tourism that considers economic, social, and environmental impacts to meet the needs of tourists, industry, the environment, and local communities alike. Rural tourism involves three main characteristics: the natural ecological environment of a rural area, the local folk culture, and its functions. It uses distinctive natural and cultural landscape resources to satisfy the needs of tourists. Rosalina et al. (2021) emphasize the importance of sustainability in rural tourism strategies for environmental protection and socio-economic benefits.

Cultural heritage has historically been a vital component of rural tourism. This incorporates both tangible and intangible aspects of a community's identity, such as customs, traditions, history, and architecture (Song et al., 2020). Lin and Rasoolimanesh (2023) have defined cultural heritage as a collection of buildings, artifacts, and art that helps tourists understand the destination's history, traditions, and values. Moreover, it is crucial for sustainable rural tourism, as it preserves unique traditions, customs, and historical assets, providing visitors with an authentic experience and contributing to rural economic and social development (Randelli & Martellozzo, 2019; Ling et.al., 2013; Wijijayanti et al., 2023).

The literature suggests that strategies focusing on strengthening and protecting local culture are more effective than merely utilizing cultural elements to create tourism products. Cerquetti et al. (2022) study on Italy's "Marche food and wine memories" project demonstrates that the use of local intangible cultural heritage, including cuisine, wine, and traditions, can promote sustainable economic, social, cultural, and environmental development. Randelli and Martellozzo (2019) highlighted that damaging rural natural landscapes and cultural characteristics can diminish their attractiveness. Saleem and Umar (2023) found that tourists value authentic cultural heritage experiences, particularly when engaging with local traditions, arts, cuisine, and crafts. Kim et al. (2021) further described the promotion of sustainable development through the interaction between intangible cultural heritage (ICH) and tourism, while also noting that commodification poses a threat to the authenticity of ICH. Song et al. (2020) have asserted that the success of heritage tourism depends on community recognition of cultural assets and motivation to preserve them. Similarly, Brooks et al. (2023) found that host community participation is essential in heritage tourism governance and decision-making processes.

Barriers to Cultural Development

Cultural development is crucial to preserving the authenticity and appeal of rural tourism destinations. However, various obstacles can hinder its sustainability. The

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main obstacle is the insufficient development of local cultural resources due to the inadequate allocation and infrastructure of financial resources (Yang & Wall, 2022). Hence, integrating tourism development with the exploration and innovation of local cultural heritage is crucial to attracting tourists and maintaining sociocultural values (Widiastini *et al.,* 2020).

The commercialization of traditional culture is another barrier to the cultural sustainability of tourism. Overdevelopment and commercialization can compromise the appeal and essence of rural areas as ideal tourist destinations (Kim et al., 2021; Mansor et al., 2021). Seyfi *et al.* (2020) emphasize that improper management and commercialization pressures can lead to superficial cultural tourism experiences. Their study explores six factors influencing meaningful cultural tourism experiences: prior perceived significance, authenticity, engagement, cultural exchange, culinary attraction, and service quality. Moreover, Guo and Jordan (2022) and Yang and Wall's (2022) studies suggest that excessive commercialization can lead to dissatisfaction and damage local traditions.

Insufficient interaction between tourists and locals is a third significant barrier to cultural tourism. Cultural tourists want to actively participate in creating their travel experiences, and suppliers should focus on close interaction with consumers to collectively produce high-quality experiences. Similarly, Seyfi et al. (2020) and Kastenholz and Gronau (2022) have highlighted that tourists are increasingly seeking authentic experiences, highlighting the importance of host-guest interaction in tourism experiences. Khanom et al. (2019) further argue that interactive projects can enhance the authenticity of cultural exchanges and provide tourists with a deeper understanding of local ways of life.

Lastly, a lack of awareness of local traditions can lead to misunderstandings and disrespect for local culture (Nwankwo & Itanyi, 2019), hindering the effective use of cultural resources. Viken et al. (2021) emphasize the importance of relational tourism processes, and have proposed a framework for developing tourism services and products that enhance recognition, respect, and reciprocity towards other cultures, in Arctic tourism and beyond. Insensitivity to cultural and ethnic differences also hinders meaningful local participation.

RESEARCH METHODOLOGY

This study adopts a constructivist perspective and employs a comprehensive qualitative methodology to explore barriers to cultural development that affect the sustainability of rural tourism in Guilin, China. As stated by Creswell and Creswell (2017), qualitative research is a suitable approach to exploring complex phenomena within their specific contexts, particularly when seeking a deep understanding of relatively unfamiliar situations. Following Stake's (1995) recommendations, this study utilizes multiple case study approaches to improve the external validity and reliability of the research findings.

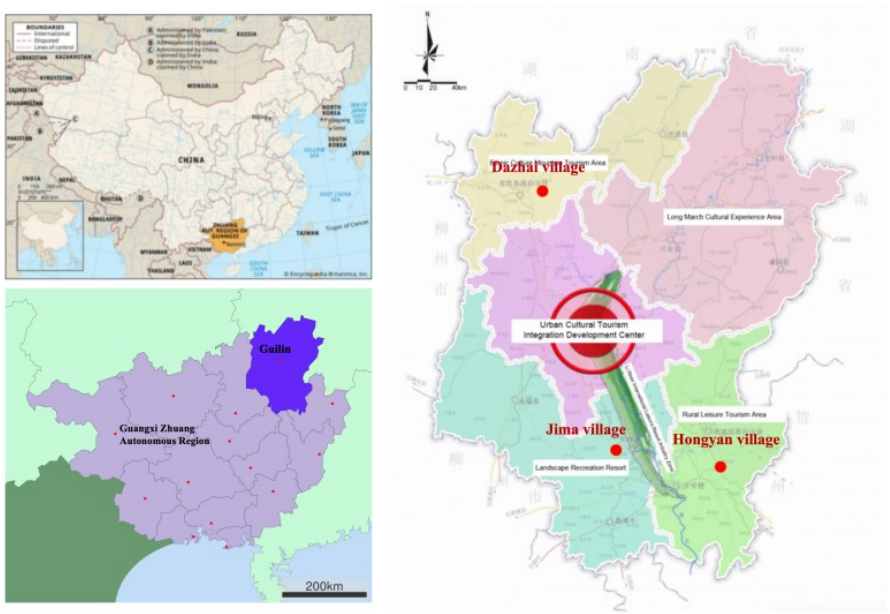


Figure 1: Guilin's Location Map in China and Study Site in Guilin
Source: "14th Five-Year Plan for Cultural and Tourism Development of Guilin City" (2021-2025)



Figure 2: Guilin's Ecological and Cultural Resources
Source: Google Images

The current study focuses on Guilin, a popular tourist destination in China, and which is in a mature transition phase of tourism development. The study encompasses three key Guilin villages, namely Dazhai, Hongyan, and Jima, as subjects for the case study. These villages showcase Guilin's cultural and natural heritage while demonstrating a shift in rural tourism from rapid growth to high-quality and sustainable development. The analysis aims to provide

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information on how rural tourism can promote the protection of cultural heritage and sustainable development in Guilin.

The study included semi-structured interviews with multiple stakeholders involved in rural tourism in Guilin, including local authorities, local communities, business operators, and tourists, to elicit the dynamics of rural tourism in Guilin. Stakeholders were selected through purposive sampling based on their direct involvement, experience, and expertise relevant to rural tourism development. The interviews began on 1 May 2023 and continued until 18 September 2023 with 30 interviewees (**Table 1**). Respondents among local authorities had leadership roles within the village committee or related governmental bodies; direct involvement in rural tourism planning, policy formulation, or development; and at least a few years of experience working within the village or related areas. Business operators in a village had participated in tourism-related businesses; have at least three years of experience in the rural tourism industry; were natives or had lived and worked in the village for at least three years; and demonstrated a sustained commitment to local tourism. Local communities included residents of the village; those involved in or affected by rural tourism activities; those actively participating in local tourism through homestay operations, cultural performances, or other tourism-related businesses; and those who engage in local collective activities and had a direct understanding of the socio-cultural impacts of tourism in their village. Business operators in a village had participated in tourism-related businesses; had at least three years of experience in the rural tourism industry; were natives or had lived and worked in the village for at least three years; and demonstrated a sustained commitment to local tourism. Tourists included recent visitors, a mix of local, domestic, and international tourists, and individuals or groups with varying durations of stay to provide a comprehensive understanding of tourist experiences. Shorter stays provide insights into initial impressions and immediate needs, while longer stays offer detailed feedback on a wider range of experiences. Additionally, open-ended interviews were conducted with six experts and government officials involved in rural tourism planning and policy making. Experts had a deep understanding and expertise in rural tourism planning, policy formulation, and sustainable development, as well as expertise in infrastructure planning and design within the rural tourism sector (**Table 2**).

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Table 1: Key attributes for respondents in Semi-Structured Interviews with Stakeholders

Representation	No. of Participants	General Profile	Village(s) Involved
Local Authorities	4 (R1–R4)	All male; aged 36–55; village natives or assigned by county; involved in leadership or committee roles; some also run local businesses	Dazhai, Hongyan, Jima
Local Communities	8 (R5–R12)	Mix of age (20s to 70s); includes homestay operators, cultural performers, and part-time workers; mix of native residents and long-term outsiders	Dazhai, Hongyan, Jima
Business Operators	7 (R13–R19)	Mostly male, aged 30s–50s; includes locals and outsiders; manage homestays, cafes, training schools, or restaurants; experienced in rural tourism	Dazhai, Hongyan, Jima
Tourists	11 (R20–R30)	Diverse demographic; solo, group, family, or institutional visitors; from nearby areas, cities, or abroad; durations range from day trips to 3 weeks	All villages (esp. Dazhai)

Table 2: Key attributes for respondents in an open-ended interview with an expert

ID	Interview method	Qualifications and job titles	Areas of expertise and strengths
E1	Telephone	Head of a specific department in the Guilin Municipal Bureau of Culture, Radio, Television, and Tourism	The government leader responsible for Guilin's rural tourism planning and policy-making, resource development, and tourism brand creation
E2	In-person	Deputy Director of a Research Department at Municipal Government Work	The government staff involved in Guilin's rural tourism planning and policy recommendations, focusing on policy and folk culture promotion
E3	Tencent meetings	Professor of Environmental Design at a public university in China	Specialized in rural tourism infrastructure planning and design, with extensive experience in research, teaching, and practical project implementation
E4	In-person	Professor at a public university in China with a background in tourism management	Having a comprehensive understanding of Guilin's cultural and historical background and its integration into the tourism industry

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ID	Interview method	Qualifications and job titles	Areas of expertise and strengths
E5	Tencent meetings	Professor at a public university in China with a background in tourism management	Having a comprehensive understanding of Guilin's cultural and historical contexts and its integration into the tourism industry
E6	Tencent meetings	Professor in the Department of Environmental Art Design at a specific fine arts academy in China	Focused on sustainable development, conservation, and rural development, with a focus on rural construction

The interviews used a flexible guide questionnaire to allow participants to introduce new topics during the conversations, enriching the research data. The participants were informed of the purpose of the research and consented to it, with privacy and anonymity strictly protected throughout the process. Thematic analysis was used to process the interviews, ensuring the veracity of the research findings. This involved systematically identifying, analysing, organizing, and reporting topics within textual data, ensuring the clarity, intuitiveness, and reliability of the research. The researchers maintained a rigorous analytical position to ensure that the codes and themes extracted accurately reflected the opinions of the interviewees and remained relevant to the research objectives. This method systematically derived themes from the rich interview data, revealing the multifaceted cultural challenges in the development of rural tourism in Guilin. Thematic analysis not only helped researchers better understand the perspectives of stakeholders, but also provided insights into potential impacts on policies and practices, enhancing the theoretical and practical contributions of the research.

ANALYSIS AND DISCUSSION

Underdevelopment of Local Cultural Resources

Rural tourism in Guilin faces a significant challenge due to the inadequate development of local cultural resources, which directly impacts the attractiveness of tourism and the authenticity of culture. The community's intention to preserve and use traditional culture is influenced by immediate infrastructure needs, such as *"...a health clinic that is only staffed by one person every Tuesday..."* (R1). This lack of infrastructure leads to insufficient investment and attention to cultural preservation and heritage. This situation necessitates a development strategy involving enhanced investment transmission and rural infrastructure development, focusing on public services like healthcare, education, and transportation for cultural transmission and development.

Village committees and tourists in Guilin are concerned about the superficial nature of cultural activities, as the need for distinct local cultural characteristics hinders their appeal. From a local management perspective, R4

noted: *"The development of cultural tourism may still be a lack of local cultural characteristics. We have the 'Eternal Love' performance here and so does Hangzhou. The locals do not even manage these cultural activities"*. Experts emphasize that the development of cultural tourism in the area is not very deep, and there may still be a lack of local cultural characteristics. It is important to develop unique local cultures to attract tourists, such as ancient architecture, rural culture, and local customs, such as the 9 September Festival of Respect for the Elders. Tourists seek experiences beyond superficial sightseeing and truly reflect local culture. The R22 discussion highlights the tourist desire for a deeper cultural engagement: *"In addition to sightseeing, I am quite interested in the local customs here"*.

Experts also highlight the problems with Guilin rural tourism due to inadequate excavation and integration of local cultural resources. The expert explains: *"This area rich is in cultural resources, such as ancient bridges from the Yuan, Ming, and Qing dynasties, but the villages are not aware of these resources, indicating that these resources are underutilized. Achieving cultural diversity of different customs every ten miles in the rural areas of Guilin is very challenging due to the serious homogenization issue"* (E2). Similarly, Experts E4 and E3 highlight the insufficient integration of cultures into rural tourism, with activities mainly limited to routine activities. They argue that there is a lack of special local cultural experiences, such as the Yao people's culture and intangible cultural heritage, which are not adequately represented in rural tourist spots. This underutilization of cultural resources not only homogenizes tourist experiences, but also diminishes the uniqueness of each location, reducing the likelihood of repeat visits.

Moreover, traditional local cultures, including languages and clothing from ethnic minorities, are being replaced by modern lifestyles, causing the loss of valuable traditional cultural resources. The discussions reveal this transformation: *"Our area is a mixed settlement of Han and Zhuang ethnicities... Zhuang people rarely speak their language and rarely ever wear their traditional clothing"* (R4); *"Yao ethnic clothing is expensive and time-consuming to produce. The younger generation is no longer skilled in these crafts"* (R6). The decline in traditional culture in China impacts authenticity and the community's ability to maintain and showcase its culture.

To address these issues, rural tourism development strategies should focus on improving the unique cultural aspects of each village, fostering the in-depth development of specific cultures. This involves *"focusing on a culture, specializing, and refining it to achieve sustainability"* (E2). *"For example, a village with a unique story of the long march of the Red Army crossing the Xiang River can become a core cultural resource, showcasing its uniqueness, and enhancing tourism appeal"* (E3).

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Stakeholders recommend organizing specialized teams to conduct extensive excavation and research, innovate, and develop unique cultural tourism products. A systematic mechanism for managing and developing cultural resources should be established through cooperation between governments and communities, in order to promote the diversity of cultural displays and the deep transmission of heritage and ensure the sustainable development of rural tourism.

Commercialization of Traditional Culture

Commercialization in the context of globalization and modernization has a dualistic impact on traditional cultures. While it allows some cultures to survive and propagate, excessive commercialization can lead to the loss of cultural essence, particularly when cultural displays are transformed into tourist attractions. Stakeholder interviews have revealed that commercialization can increase local economic income by providing cultural festivals that attract large numbers of tourists, leading to a spike in demand. The discussion confirms this opinion: *"The Clothes Drying Festival on the sixth day of the sixth lunar month creates a significant buzz. During these two days, it is nearly impossible to find accommodation in Dazhai Village"* (R1); *"Here, the Persimmon Festival is held annually... Normally, few guests stay here, but during the event, homestays are almost always fully booked"* (R2); *"Many rafts are arranged to form the shape of a dragon, an event held annually ... much liked by tourists"* (R4). However, preserving local culture is often overlooked, revealing that stakeholders prioritize economic gains over an authentic and deep cultural representation of these events.

Second, although commercialization enhances traditional cultures' visibility and economic value, it can also lead to the loss of cultural essence, especially when culture is presented as a tourist product. The interviews show that some traditional cultural activities have shifted from community interactions to commercial events, marginalizing their traditional significance and social functions in the community. *"Previously, 6 June (Red Yao Clothes Drying Festival) was more ceremonious than New Year, with many relatives visiting each other and sharing communal meals...Now, these activities are organized to attract tourists, serving as marketing gimmicks"* (R6). Commercialization can alter or modify traditional cultural activities, leading to a superficial treatment of culture and posing a significant negative impact. R13 and R15 noted that while tourism preserves superficial symbols of traditional culture, such as attire and hair customs, it does not penetrate the core of the culture: *"We wear turbans as required, tie our hair as needed, and wear ethnic clothing..."* (R13); *"Only during certain events, when hosting guests, do we need to wear distinctive Yao attire and hats"* (R15). Similarly, the commercialization of culture can lead to a neglect of the depth and essence of the culture, as traditional knowledge and skills are lost, and cultural elements are no longer seen to be a part of everyday life.

Balancing commercialization benefits with maintaining cultural authenticity is a complex but crucial issue in rural tourism and cultural preservation. *"The transformation of some traditional festivals and cultural elements into partially commercialized events is still positive from a tourism perspective... During these transformations, it is essential to clearly explain to tourists the traditional significance and correct practices of these activities to ensure that the authenticity of cultural events is not misunderstood or simplified"* (E5). This expert further emphasizes: *"Core cultural elements that should not be changed must be preserved. We can increase promotion and visitors can come during the appropriate seasons"*. Therefore, policymakers and cultural planners must create an environment that meets commercial demands, while also respecting and protecting cultural heritage to ensure the authenticity of core cultural activities.

Furthermore, Expert E6 proposes a *"performative residency"* concept, which allows natives to sustain themselves through traditional activities such as cooking, working, and smoking, while offering tourists an authentic cultural experience. Although these activities may not completely reflect the daily lives of natives, they offer a way for tourists to experience and learn about traditional cultures. By involving natives in these performances, the culture displayed will remain authentic and accurate, rather than being simplified or misunderstood.

Similarly, Expert E4 suggests that local elders discussing the history and development of terraced fields can enhance cultural authenticity and stimulate residents' pride and awareness of their culture. Finally, expert E3 highlights the importance of protecting the authenticity of rural areas and proposes a proper mechanism: *"Our rural communities or the rural agriculture department of the government should propose some laws and regulations to protect the authenticity of rural areas."*

Overall, commercialization positively enhances cultural visibility and economic benefits, but its potential impact on the essence of culture must be managed through effective strategies and policies. This includes maintaining the integrity of traditional cultures through education, community involvement, and cultural preservation measures. By implementing such measures, rural tourism can be used effectively to promote cultural heritage rather than just for economic growth.

Limited Cultural Exchange between Tourists and Locals

The lack of interaction between tourists and locals is another barrier that significantly reduces the potential for cultural education and deep experiential learning in rural tourism. The interviews indicate that rural tourism sites often promote various activities, including festivals and traditional handicraft displays, allowing tourists to engage with local culture. The R13 business operator

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emphasizes: *"In our tourist area, different villages host different seasonal festivals...the Long Hair Festival in Huangluo Yao Village on March 3, the Ancient Zhuang Village Plowing Festival around May Day, and the Su Yang Festival in Pingnan in early June..."*. These festivals showcase cultural diversity and highlight the unique aspects of the local culture. *"The Long Hair Festival in Huangluo Yao village showcases the village's long hair and Yao culture, which has been recognized by the Guinness World Records"* (R13). However, these festivals often need in-depth explanations of their cultural background and significance; otherwise, they remain a superficial tourist experience.

As tourists note *"...there is still a lack of cultural depth in rural tourism, as tourists often need to look up culture online. The traditional clothing worn by the older generation is quite charming, but rented clothes are not handmade..."* (R24). While tourists engage with traditional elements through photo opportunities, they must fully understand local lives and traditions to fully appreciate the educational value and cultural depth of the experience. This obstacle challenges the authenticity of cultural transmission.

Similarly, Tourist R30 and Tourist R21 experienced a local villagers-run fashion show in Dazhai village, showcasing Yao women's hair and agricultural tools. However, the show left a superficial impression, suggesting that while these activities increase interactivity and visibility, they need to be strengthened to convey deep cultural values. Language barriers and inadequate cultural explanations also limit the depth of cultural exchange. Tourist R21 from Japan found that they could not understand the event's meanings due to the language barrier and a lack of explanatory context. Therefore, more optimization, such as multilingual interpretation services, is needed to enhance the understanding and appreciation of these cultural performances among tourists from diverse backgrounds.

The natural beauty of Yangshuo's Jima village is largely attributed to its landscapes, but there is a need for effective integration of cultural elements into the tourism experience. The business operator suggests *"...hiring professionals to plan cultural activities and enhance interactions between tourists and locals..."* (R18). The respondent also recommends that professional planners should promote joint participation and experiences between tourists and the local community.

Experts suggest that enhancing the interaction between tourists and locals is crucial to improving cultural understanding and appreciation. Expert E1 emphasizes the importance of deeply showcasing everyday culture, such as traditional attire and dietary habits, and integrating these elements into tourism activities to attract tourists, particularly younger ones. He advocates for *"participatory activities like handicraft making and agricultural experiences to give tourists a deeper understanding of local culture."* Furthermore, experts E2

and E4 suggest enhancing cultural activities through storytelling, emphasizing local narratives about history and culture. In rural tourism in Zhejiang, residents express pride and passion through sharing their village's development stories. This emotional conveyance enhanced the tour experience, making cultural transmission more natural and effective for tourists.

Similarly, experts E4 and E5 state that cultural activities can be improved by incorporating emotive presentations and strengthening tourist-community interactions. They suggest inviting local elders to narrate the history of terraced fields, which conveys cultural information. These expert recommendations emphasize the need for strengthening tourist-community interactions to improve tourists' understanding and appreciation of local culture. Furthermore, E5 proposes *"using innovative festival activities to increase cultural interaction opportunities, emphasizing clear communication of cultural background and significance"*.

Therefore, it is crucial to transform traditional sightseeing activities into deeper cultural interaction experiences to improve the cultural exchange and educational value of rural tourism. This requires collaboration between tourism planners, members of the local community, and government agencies. Strategies including educational outreach, storytelling, and innovative experience design can foster connections between tourists and local cultures, enhance tourist experiences, and promote sustainable development and cultural protection.

Lack of Awareness about Local Traditions

Despite a rich cultural heritage and unique traditions in Guilin and other rural areas, there is generally a need for more awareness and commitment to preserve these traditions. The interview with R11 highlights the neglect or destruction of cultural activities and facilities in a village due to a lack of community involvement and adequate decision-making support. The village committee members demolished a house used for colourful folk singing without the village's consent, demonstrating an inefficient attitude toward preserving cultural heritage. This highlights significant shortcomings in managing traditional cultural preservation.

Furthermore, modernization and commercialization have led to a gradual decline in traditional culture, particularly among the younger generation. Interviews reveal that *"as living standards improve, families send their children to cities for education, and the ethnic language has gradually disappeared. Yao embroidery and red Yao clothing are now considered intangible cultural heritage, with older people still practicing these crafts, but younger people hardly"* (R1); *"Cultural elements are rare; for example, the Zhuang people rarely speak their dialect, and Zhuang attire is no longer worn, with modern fashion prevailing instead"* (R4). These descriptions reveal that traditional

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languages and crafts are declining due to modern lifestyles and educational backgrounds. This lack of traditional consciousness not only affects cultural transmission, but also harms the cultural confidence and identity of the community. The decline of traditional elements and the shift to modern fashion further highlight the importance of preserving cultural heritage.

Despite these challenges, some business operators and community leaders recognize the importance of improving traditional cultural awareness in tourism development. In an interview, R13 emphasized the importance of promoting culture through practical activities and special events, such as wearing traditional clothing and performing traditional skills during festivals. He believes that tourism can improve tourist experiences and provide a deeper understanding of local culture. R13 also states that *"tourism serves as an excellent tool to protect and preserve traditional culture, especially in scenic areas where local customs are declining…this place still acts as a living museum for the ethnic groups Zhuang and Yao. We often tell them that they are amphibious farmers who pick up a pole to farm and put it down to participate in tourism. We encourage residents to wear turbans, tie their hair, wear ethnic clothing, and carry baskets to work in the fields when needed..."*. The interviewee suggests that tourism can effectively preserve traditional culture through activities such as traditional attire and hairstyles, preserving its authenticity. He also proposes the *"amphibious farmer"* model, which allows villagers to combine tourism, agriculture, and daily life while maintaining the authenticity of community culture as much as possible.

Similarly, R3 highlights the impact of tourism on traditional culture in villages. During peak tourist seasons, some villagers wear Yao clothing, enhancing their identification and participation in traditional culture. However, modern lifestyles have diluted cultural traditions. R3 hopes that *"tourism development will motivate more villagers to wear ethnically distinctive clothing, not only for economic benefits but also to maintain and showcase our rich ethnic culture..."*. This approach demonstrates the dual value of tourism in cultural preservation, economic development, and strengthening cultural identity. Tourists often find the presentation of local culture lacking depth, despite their interest in traditional attire and long hair. The history and significance of these garments are often tailored to satisfy tourists' desires for photo opportunities, and hair styling is no longer popular among young people.

The experience of understanding the meaning and background of these traditions is often superficial, lacking a comprehensive understanding of their deeper meanings and historical contexts. This superficial cultural experience fails to meet tourist desires for deeper engagement. Despite the attraction of traditional cultural elements to tourists, the younger generation's regard for these traditions is gradually decreasing, making cultural integration and transmission in modern society challenging.

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However, to preserve and transmit culture effectively, systematic integration, education, and community participation are crucial to fostering cultural pride and responsibility among residents. Expert 2 emphasizes the importance of boosting cultural confidence by training locals to become narrators of their culture through storytelling. This strengthens cultural transmission, and education and improves the identity and responsibility of tourism professionals towards local culture. He argues that *"the primary responsibility of the works of rural tourism must be a passion, strong cultural identity, and cultural responsibility to truly integrate with local culture"*.

Similarly, he proposes the exploration and integration of rural cultural resources to preserve cultural stories and traditions, particularly in regions lacking mechanisms for cultural transmission, such as Guilin. *"As times change and modern culture encroaches, much has already been lost. We are at a critical stage where it needs to be excavated and protected. There is no team to integrate this; we require the government to establish one"* (E2). Modern culture has led to a significant loss of local culture, necessitating the establishment of a government team to protect and excavate it. This will require a deep understanding of local culture and the transmission of knowledge. The government and relevant organizations should support the excavation and integration of cultural resources. Additionally, E3 suggests guiding *"villagers and locals to preserve the authenticity of the cultural resources, necessitating the establishment of a proper mechanism"*.

CONCLUSION

This study examines the sustainability of rural tourism in Guilin, China, focusing on cultural development barriers. Key challenges include the underdevelopment of local cultural resources, commercialization of traditional culture, limited cultural exchanges, and lack of awareness about local traditions. These challenges highlight the conflict between the economic benefits of the tourism industry and the preservation of cultural integrity. To achieve the sustainable development of rural tourism, the study proposes several strategies such as improving cultural resource management, promoting local education and community participation, developing tourism products aligned with sustainable practices and cultural preservation, strengthening stakeholder collaboration, and formulating cultural heritage protection laws and policies. These strategies emphasize a holistic approach towards promoting sustainable rural tourism that balances economic growth and the transmission of cultural heritage. The study also emphasizes the need for policymakers and tourism planners to incorporate cultural heritage protection into tourism development strategies, strategically allocating resources, and promoting cultural sensitivity and sustainable tourism practices through educational programs. Future rural tourism planning should balance economic,

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cultural, and social integration to ensure sustainable development and cultural diversity preservation.

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REFERENCES

Brooks, C., Waterton, E., Saul, H., & Renzaho, A. (2023). Exploring the relationships between heritage tourism, sustainable community development and host communities' health and wellbeing: A systematic review. *PLoS One*, *18*(3), e0282319.

Cerquetti, M., Ferrara, C., Romagnoli, A., & Vagnarelli, G. (2022). Enhancing intangible cultural heritage for sustainable tourism development in rural areas: The case of the "Marche food and wine memories" project (Italy). *Sustainability*, *14*(24), 16893.

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.

Guilin.gov.cn. (2021). *The foundation of an international tourist destination has been essentially established, and new strides have been made in the integrated development of culture and tourism—Guilin's "13th Five-Year Plan" for cultural tourism has achieved significant results (in Chinese)*. Retrieved Retrieved 15 March 2023 from https://www.guilin.gov.cn/ywdt/bmdt/202103/t20210318_2008838.shtml

Guo, H., & Jordan, E. J. (2022). Social exclusion and conflict in a rural tourism community: A case study from Likeng Village, China. *Tourist Studies*, *22*(1), 42-60.

Jovicic, D. (2016). Cultural tourism in the context of relations between mass and alternative tourism. *Current Issues in Tourism*, *19*(6), 605-612.

Kastenholz, E., & Gronau, W. (2022). Enhancing competences for co-creating appealing and meaningful cultural heritage experiences in tourism. *Journal of Hospitality & Tourism Research*, *46*(8), 1519-1544.

Khanom, S., Moyle, B., Scott, N., & Kennelly, M. (2019). Host–guest authentication of intangible cultural heritage: A literature review and conceptual model. *Journal of Heritage Tourism*, *14*(5-6), 396-408.

Kim, S., Whitford, M., & Arcodia, C. (2021). Development of intangible cultural heritage as a sustainable tourism resource: The intangible cultural heritage practitioners' perspectives. In *Authenticity and Authentication of Heritage* (pp. 34-47). Routledge.

Lin, Z., & Rasoolimanesh, S. M. (2023). Influencing factors on the intention of sharing heritage tourism experience in social media. *Journal of Hospitality and Tourism Technology*, *14*(4), 675-700.

Ling, S.M., Ramachandran, S., Shuib, A., Afandi, SHM. (2013). Scoping the Potentials and Pitfalls of Rural Tourism Policies: Constructivism as a Theoretical Lens. *Pertanika 36* (S) 157 - 172.

Mansor, N. A., Rusli, S. A., Abd Razak, N. F., Ibrahim, M., Simpong, D. B., Othman, N. A., & Ridzuan, N. A. (2021). Over-development in rural tourism: Tourism impact, local community satisfaction and dissatisfaction. *Rigeo*, *11*(10).

Nwankwo, E. A., & Itanyi, E. I. (2019). Heritage studies and challenges: implications on research results from Igboland, Nigeria. *Heliyon*, *5*(12).

Randelli, F., & Martellozzo, F. (2019). Is rural tourism-induced built-up growth a threat for the sustainability of rural areas? The case study of Tuscany. *Land use policy*, *86*, 387-398.

Roberts, L., & Hall, D. (2001). *Rural tourism and recreation: Principles to practice*. Cabi.

Rosalina, P. D., Dupre, K., & Wang, Y. (2021). Rural tourism: A systematic literature review on definitions and challenges. *Journal of Hospitality and Tourism Management*, *47*, 134-149.

Saleem, S., & Umar, R. M. (2023). A Netnography Study on Memorable Cultural Tourism Experiences: Insights from Asian Cultural Heritage Site Tourists. *Journal of Promotion Management*, *29*(2), 280-303.

Seyfi, S., Hall, C. M., & Rasoolimanesh, S. M. (2020). Exploring memorable cultural tourism experiences. *Journal of Heritage Tourism*, *15*(3), 341-357.

Song, X., Cheong, K.-C., Wang, Q., & Li, Y. (2020). Developmental sustainability through heritage preservation: two chinese case studies. *Sustainability*, *12*(9), 3705.

Stake, R. E. (1995). *The art of case study research*. sage.

Viken, A., Höckert, E., & Grimwood, B. S. (2021). Cultural sensitivity: Engaging difference in tourism. *Annals of tourism research*, *89*, 103223.

Widiastini, N. M. A., Prayudi, M. A., & Rahmawati, P. I. (2020). Preparing Sidatapa Village as a Bali Aga Tourist Attraction in Buleleng Regency. 5th International Conference on Tourism, Economics, Accounting, Management and Social Science (TEAMS 2020),

Wijijayanti, T., Salleh, N. H. M., Hashim, N. A., Mohd Saukani, M. N., & Abu Bakar, N. (2023). The feasibility of rural tourism in fostering real sustainable development in host communities. *GeoJournal of Tourism and Geosites*, *46*(1), 336-345.

Yang, L., & Wall, G. (2022). Heritage tourism in a historic town in China: Opportunities and challenges. *Journal of China Tourism Research*, *18*(5), 1073-1098.

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THE ASSOCIATION BETWEEN NEIGHBOURHOOD BLUE SPACE AND HEALTH RESPONSES: A PILOT STUDY OF OLDER ADULTS

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Abstract

The positive impact of the natural environment on human health has been confirmed by related theories and practices. Blue space, as an important part of the natural environment, is often undervalued in nature and health research. This study selected neighbourhood blue spaces, the most likely to be visited frequently, to further explore their impact on the health of adults over 45 years of age. Three neighbourhoods with outdoor blue space in Xi'an, China, were initially identified by the field investigation method. A total of 92 adults who used blue space were investigated by a questionnaire survey. Preliminary findings found that older adults who visit the neighbourhood blue space mainly participate in activities that are indirectly in contact with water bodies, such as chatting, walking, sunbathing, and physical exercise. In addition, residents who frequently (at least once a week) visit blue space are more likely to report good health. Specifically, there was a lower proportion of bad general health outcomes (4.8%) and a higher probability of high wellbeing (p=0.003). The results suggested that regular exposure to blue space could positively affect older adults' health and wellbeing. In the context of population aging, actively exploring the beneficial impact of urban blue space on the health of the elderly will provide scientific reference for healthy aging and healthy city construction.

Keywords: Blue Space, Neighborhood, General Health, Older Adults

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INTRODUCTION

Population aging is a major problem facing many countries, especially developing countries. According to the World Health Organization, 22% of people on World will be older than 60 by 2050, and four in five (80%) of the elderly will live in non-high income countries (Chen et al., 2022). In addition, the rapid growth of the urban population, by 2050, which is predicted to comprise approximately two-thirds of the world population (Smith et al., 2021), has given rise to a series of environmental problems such as urban noise, the heat island effect, and air pollution (Britton et al., 2020), and poses great challenges to the health of people living in urban areas, especially the elderly.

With the growing concern for health, it is recognized that contact with the nature can improve human health. Urban green spaces have the potential to positively impact human health by stimulating physical exercise, encouraging social connection, and reducing mental stress. Based on previous evidence, the health benefits of urban blue spaces are anticipated to be similar to those of urban green spaces (McDougall et al., 2022). Water in the natural environment refers to the "blue space," which accurately describes the visible surface water in the human living environment, whether natural or artificial. Blue space has often been an intrinsic part of green space in previous studies, while the health-promoting potential of blue space has received less attention in natural health studies (Smith et al., 2021).

The natural environment of a neighbourhood can influence the health and social behaviour of older people in the short and long term (Ellen et al., 2001). As the most accessible and frequently used urban blue space for the elderly, the health effects of neighbourhood blue space on older people needs to be further discussed. Understanding the health impact of neighbourhood blue space can facilitate the implementation of healthy aging in urban planning, thus providing space for realizing the benefits of the healthy city.

LITERATURE REVIEW

Blue space

A growing number of scholars pay attention to the ability of blue space to promote human health. Living in a house with a view of the ocean can reduce symptoms of psychological distress and improve mental health (Dempsey et al., 2018). It has been shown that proximity to and contact with blue space is related to reduced antidepressant use (McDougall et al., 2021). Furthermore, residents in areas with higher availability of blue space was more likely to report positive health outcomes (Chen et al., 2022). In general, previous findings suggest that blue spaces could promote human health.

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Potential pathways

The beneficial effects of the natural environment on health are well known. Research has shown that nature can stimulate the senses of people and create a sense of detachment from the hustle and bustle of city life, resulting in a general sense of wellbeing (Hermanski et al., 2022). Nature also has the potential to improve physical health by increasing physical activity (Gascon et al., 2017). To date, in the existing literature, blue space has been demonstrated to promote human health through pathways likely similar to those of green space (Table 1), including encouraging physical exercise and social contact, as well as reducing mental stress (Markevych et al., 2017).

Table 1: Potential pathways of blue space and health

Pathways	Health benefits
Harm reduction	Regulate microclimates, reduce noise, and mitigate air pollution
Capacity building	Increase physical activity and social interaction
Capacity restoration	Reduce stress, promote recovery, and improve relaxation

Source: Author's Summary

Health outcomes

The World Health Organization defines health as 'a state of complete physical, mental, and social wellbeing and not merely the absence of disease or infirmity' (WHO, 1948), which is the most widely used definition in existing studies. Based on a screening of blue space and health (Table 2), there is growing evidence that blue space, including coastal and freshwater (such as lakes and rivers) blue space, can have a positive impact on human health (Georgiou et al., 2021). Studying the effects of specific types of natural environments on healthy living can alleviate the problem of overburden on public health care systems (McDougall et al., 2022).

Table 2: The effects of blue space on health

Human health	Blue space and health
General health	Self-reported general health (Garrett et al., 2019; Völker et al., 2018)
Physical health	Obesity (Halonen et al., 2014); Mortality rate (Vert et al., 2020); Cardiovascular health (Gascon et al., 2017)
Mental health	Lower psychological distress (Dempsey et al., 2018; Nutsford et al., 2016) Better restoration (Amoly et al., 2014; Pasanen et al., 2019)

Source: Author's Summary

RESEARCH METHODOLOGY

This paper conducted a preliminary survey of 3 neighbourhoods in Xi'an, China, in December 2023 to understand the access of adults over 45 years of age to neighbourhood blue space. The pilot study compared the features of neighbourhood blue space, which including natural and artificial, single and multiple (e.g. pools, fountains, etc.) water forms, and the visits of older residents

to analyse the potential beneficial impact of blue space on the elderly's health. Different features of neighbourhood blue space increase the diversity of outdoor blue space forms.

Furthermore, participants' demographic information was used as a covariate to examine the impact of blue space on health at the individual level (Garrett et al., 2019). The main data for this study were obtained through a field survey and a face-to-face questionnaire survey in the neighbourhood of Xi'an. The association between blue space and health is explored by comparing and analysing the features of blue space and visits to different neighbourhoods. b

RESULTS

According to the results of the field investigation and questionnaire interview, a total of 92 people in the three neighbourhoods participated in the survey. The geographical location and blue space of the selected neighbourhood are shown in the figure (Figure 1 and Figure 2). The design forms of the blue space are diverse, including natural forms and regular forms, and water elements enrich the outdoor landscape of the neighbourhood.

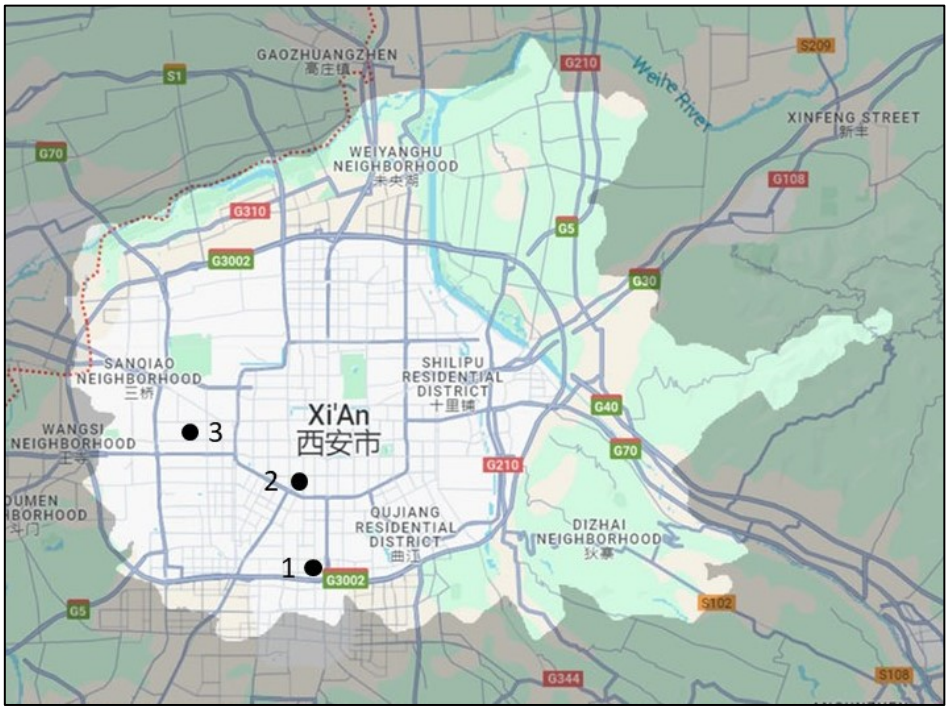


Figure 1: The location of the selected neighbourhoods
Source: Map from Google

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Figure 2: The blue space of the selected neighbourhoods
Source: Map from Baidu map and Photos taken by the author

The results showed that most sample (86%) mainly engaged in chatting, walking, sunbathing, physical exercise and other activities, while a small number of residents engaged in activities directly related to water bodies, such as fishing, splashing, feeding ducks, and enjoying the waterscape. In addition, four-fifths (80%) of the sample reported incidental or intentional visits to neighbourhood blue spaces in daily life, such as initiative visits or commutes through blue spaces.

Further, the results of the study found that the majority of the sample (93.5%) stayed no longer than 2 hours while visiting the blue space. In addition,

respondents who participated in this survey indicated that their overall health was better (Table 3). Residents who visit blue spaces frequently (at least once a week) were more likely to report good health (Tables 4-5).

Table 3: Proportion of people with different general health in each neighbourhood

Neighbourhood. No.	Very bad	Bad	Fair	Good	Very good
1	2.8%	5.6%	30.6%	61.1%	0.0%
2	0.0%	3.2%	54.8%	32.3%	9.7%
3	0.0%	8.0%	56.0%	32.0%	4.0%

Source: Author's Calculation

Table 4: Proportion of general health outcomes at different blue space visits frequencies

Frequency of visit	(Very) Bad	Fair	(Very) Good
Less than once a week	10.3%	37.9%	51.7%
At least once a week	4.8%	49.2%	46.0%

Source: Author's Calculation

Table 5: Probability of high wellbeing at different blue space visits frequencies

Frequency of visit	Probability of high wellbeing	Chi-square	P
Less than once a week	61.9%	8.543	0.003
At least once a week	88.0%		

Source: Author's Calculation

ANALYSIS AND DISCUSSION

According to the survey findings, although the sample evaluated the blue space good overall (mean =3.24), further interviews found that participants suggested that the quality of existing blue spaces should be improved. A small sample (3.3%) did not visit a blue space once in the past month, while more than half of the respondents (54%) said they visited the blue space frequently. The results suggested that neighbourhood blue spaces are likely to become the important place for seniors to participate in outdoor leisure activities. In addition, the majority of participants reported health outcomes as fair (46.7%) or good (40.2%) and further analysis found that the sample with high frequency of contact with blue spaces were more possibly report better health.

Furthermore, respondents are most concerned about the hygiene and safety of neighbourhood blue space. On the one hand, respondents mentioned that there is natural (such as fallen leaves, dead branches) or man-made (such as waste paper, plastic bags) garbage in the water body and its surrounding environment, which influences the visual effect of the water landscape. On the other hand, the respondents are concerned about the safety of the blue space environment. The elderly are willing to carry out recreational and physical activities around the blue

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space, but the lack of safety facilities or lighting facilities will affect their willingness to use.

CONCLUSION

This study focuses on the relationship between the neighbourhood blue space and the health of older people, preliminary investigates the use of the neighbourhood blue space, and further analyses the impact on the health of the elderly. The findings confirm that older adults who frequently visit neighbourhood blue spaces are more likely to report good health.

In general, as a natural part of the residential environment, blue space can not only enrich the visual landscape but also improve the quality of the natural environment of the neighbourhood. The neighbourhood's blue space creates a place for residents to communicate outdoors. A good blue space environment can encourage residents to engage in physical activities and participate in social interactions, thus affecting their physical and mental health. In general, the questionnaire used in the pilot study is currently being refined and revised to include additional factors considered important in this study. It is intended that the research findings can provide a scientific guide for healthy aging and healthy city construction.

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ETHICAL STATEMENT

This study obtained informed consent from all participants and was conducted in strict confidence. The authors declare that there are no conflicts of interest and confirm that the study is original, unpublished, and not under consideration elsewhere.

REFERENCES

Amoly, E., Dadvand, P., Forns, J., López-Vicente, M., Basagaña, X., Julvez, J., Alvarez-Pedrerol, M., Nieuwenhuijsen, M. J., & Sunyer, J. (2014). Green and blue spaces and behavioral development in Barcelona schoolchildren: The BREATHE Project. *Environmental Health Perspectives*, *122*(12), 1351–1358. https://doi.org/10.1289/ehp.1408215

Britton, E., Kindermann, G., Domegan, C., & Carlin, C. (2020). Blue care: A systematic review of blue space interventions for health and wellbeing. *Health Promotion International*, *35*(1), 50–69. https://doi.org/10.1093/heapro/day103

Chen, Y., Yuan, Y., & Zhou, Y. (2022). Exploring the association between neighborhood blue space and self-rated health among elderly adults: Evidence from Guangzhou,

China. *International Journal of Environmental Research and Public Health*, *19*(23), 16342.

Dempsey, S., Devine, M. T., Gillespie, T., Lyons, S., & Nolan, A. (2018). Coastal blue space and depression in older adults. *Health & Place*, *54*, 110–117. https://doi.org/10.1016/j.healthplace.2018.09.002

Ellen, I. G., Mijanovich, T., & Dillman, K.-N. (2001). Neighborhood effects on health: Exploring the links and assessing the evidence. *Journal of Urban Affairs*, *23*(3–4), 391–408. https://doi.org/10.1111/0735-2166.00096

Garrett, J. K., White, M. P., Huang, J., Ng, S., Hui, Z., Leung, C., Tse, L. A., Fung, F., Elliott, L. R., Depledge, M. H., & Wong, M. C. S. (2019). Urban blue space and health and wellbeing in Hong Kong: Results from a survey of older adults. *Health & Place*, *55*, 100–110. https://doi.org/10.1016/j.healthplace.2018.11.003

Gascon, M., Zijlema, W., Vert, C., White, M. P., & Nieuwenhuijsen, M. J. (2017). Outdoor blue spaces, human health and well-being: A systematic review of quantitative studies. *International Journal of Hygiene and Environmental Health*, *220*(8), 1207–1221. https://doi.org/10.1016/j.ijheh.2017.08.004

Georgiou, M., Morison, G., Smith, N., Tieges, Z., & Chastin, S. (2021). Mechanisms of impact of blue spaces on human health: A systematic literature review and meta-analysis. *International Journal of Environmental Research and Public Health*, *18*(5), 2486. https://doi.org/10.3390/ijerph18052486

Halonen, J. I., Kivimäki, M., Pentti, J., Stenholm, S., Kawachi, I., Subramanian, S. V., & Vahtera, J. (2014). Green and blue areas as predictors of overweight and obesity in an 8-year follow-up study. *Obesity*, *22*(8), 1910–1917. https://doi.org/10.1002/oby.20772

Hermanski, A., McClelland, J., Pearce-Walker, J., Ruiz, J., & Verhougstraete, M. (2022). The effects of blue spaces on mental health and associated biomarkers. *International Journal of Mental Health*, *51*(3), 203–217. https://doi.org/10.1080/00207411.2021.1910173

Markevych, I., Schoierer, J., Hartig, T., Chudnovsky, A., Hystad, P., Dzhambov, A. M., De Vries, S., Triguero-Mas, M., Brauer, M., Nieuwenhuijsen, M. J., Lupp, G., Richardson, E. A., Astell-Burt, T., Dimitrova, D., Feng, X., Sadeh, M., Standl, M., Heinrich, J., & Fuertes, E. (2017). Exploring pathways linking greenspace to health: Theoretical and methodological guidance. *Environmental Research*, *158*, 301–317. https://doi.org/10.1016/j.envres.2017.06.028

McDougall, C. W., Hanley, N., Quilliam, R. S., Bartie, P. J., Robertson, T., Griffiths, M., & Oliver, D. M. (2021). Neighbourhood blue space and mental health: A nationwide ecological study of antidepressant medication prescribed to older adults. *Landscape and Urban Planning*, *214*, 104132.

McDougall, C. W., Hanley, N., Quilliam, R. S., & Oliver, D. M. (2022). Blue space exposure, health and well-being: Does freshwater type matter? *Landscape and Urban Planning*, *224*, 104446. https://doi.org/10.1016/j.landurbplan.2022.104446

Nutsford, D., Pearson, A. L., Kingham, S., & Reitsma, F. (2016). Residential exposure to visible blue space (but not green space) associated with lower psychological distress in a capital city. *Health & Place*, *39*, 70–78. Pasanen, T. P., White, M. P., Wheeler, B. W., Garrett, J. K., & Elliott, L. R. (2019). Neighbourhood blue space, health and wellbeing: The mediating role of different

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types of physical activity. *Environment International*, *131*, 105016. https://doi.org/10.1016/j.envint.2019.105016

Smith, N., Georgiou, M., King, A. C., Tieges, Z., Webb, S., & Chastin, S. (2021). Urban blue spaces and human health: A systematic review and meta-analysis of quantitative studies. *Cities*, *119*, 103413. https://doi.org/10.1016/j.cities.2021.103413

Triguero-Mas, M., Dadvand, P., Cirach, M., Martínez, D., Medina, A., Mompart, A., Basagaña, X., Gražulevičienė, R., & Nieuwenhuijsen, M. J. (2015). Natural outdoor environments and mental and physical health: Relationships and mechanisms. *Environment International*, *77*, 35–41. https://doi.org/10.1016/j.envint.2015.01.012

Vert, C., Gascon, M., Ranzani, O., Márquez, S., Triguero-Mas, M., Carrasco-Turigas, G., Arjona, L., Koch, S., Llopis, M., Donaire-Gonzalez, D., Elliott, L. R., & Nieuwenhuijsen, M. (2020). Physical and mental health effects of repeated short walks in a blue space environment: A randomised crossover study. *Environmental Research*, *188*, 109812. https://doi.org/10.1016/j.envres.2020.109812

Völker, S., Heiler, A., Pollmann, T., Claßen, T., Hornberg, C., & Kistemann, T. (2018). Do perceived walking distance to and use of urban blue spaces affect self-reported physical and mental health? *Urban Forestry & Urban Greening*, *29*, 1–9. https://doi.org/10.1016/j.ufug.2017.10.014

Wheeler, B. W., White, M., Stahl-Timmins, W., & Depledge, M. H. (2012). Does living by the coast improve health and wellbeing? *Health & Place*, *18*(5), 1198–1201. https://doi.org/10.1016/j.healthplace.2012.06.015

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IMPORTANT PARK CHARACTERISTICS THAT PROMOTE SOCIAL INTERACTIONS OF OLDER ADULTS IN ANYANG CITY, HAINAN PROVINCE, CHINA

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Abstract

Urban parks play a crucial role in promoting social interactions among older adults, thereby supporting active, healthy aging. Although the benefits of urban parks are well acknowledged, studies on their efficacy in this regard are limited, particularly in Asia. The question of what role park characteristics play in encouraging social interactions of older adults has remained largely unexplored. This study investigates the influence of perceived park characteristics on the social interactions of older adults in two urban parks in Anyang City, China. Data from 589 participants aged 50 and above were collected through on-site and online distribution methods and analyzed using linear regression models. The findings revealed that park features, conditions, and accessibility significantly affect older adults' social interactions. This evidence lays a scientific groundwork for improving these interactions in urban parks, emphasizing the aspects that should be prioritized in park planning and design to better fulfill their social needs.

Keywords: Social Interactions, Urban Parks, Healthy Aging, Older Adults

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INTRODUCTION

The phenomenon of global population aging is becoming more prominent. It is characterized by both the expanding proportion and rapid surge in the absolute number of older adults. According to the World Health Organization, by 2030, one in six people globally will be older adults aged 60 or above, increasing from 1 billion in 2020 to 1.4 billion, and by 2050, it will double to 2.1 billion (World Health Organization, 2022). There are notable variations in aging issues and their implications for social policy across different regions worldwide. For instance, by 2050, it is projected that 26.1% of the population in Europe and North America, 23.7% in East and Southeast Asia, and 22.9% in Australia and New Zealand will be aged 65 years or older. (United Nations, 2019).

Among these, China, one of the fastest aging countries, is expected to see 28% of its population aged 60 years or older by 2040 (World Health Organization, 2016). These demographic shifts pose several challenges, including an increase in chronic non-communicable diseases, changes in traditional ways of aging, and the intensification of the empty nest syndrome (Langenbrunner et al., 2011; Hu & Peng, 2015; Feng & Phillips, 2024). In response to these challenges, the international community, particularly China, has embraced the World Health Organization's "Healthy Ageing" initiative, aiming to enhance the health and well-being of older adults and ensure a better quality of life through the development of age-friendly cities and communities.

However, there are still many pressing issues that need to be addressed in the face of the challenges posed by aging, especially mental health. The 2018 White Paper on the Mental Health of older adults in China indicates that over 63% of older adults frequently feel lonely, and more than 25% of those aged 60 and over have experienced suicidal thoughts. This loneliness is primarily attributed to social isolation, with research suggesting a significantly increased risk of mortality over the following three years among older adults who lack social connections (Sugisawa et al., 1994). Regular socialization not only strengthens emotional bonds among older adults but also markedly improves their mental and physical health, slows cognitive decline, and prevents various chronic diseases (Zagic et al., 2022). Despite the acknowledged importance of social interaction, the planning and design of urban green spaces often fail to address the social needs of older adults (Zhang et al., 2022). Therefore, this study aims to identify crucial park features that encourage social interaction of older adults, thereby improving their quality of life and social engagement.

LITERATURE REVIEW

Importance of Urban Parks for Social Interactions of Older Adults

Urban parks, which are critical urban green spaces, significantly improve the quality of life and well-being of residents (Bedimo-Rung et al., 2005). Studies

have shown that these green spaces not only promote physical activity, enhance physical fitness and immunity, and prevent geriatric diseases among older adults but also reduce psychological stress and alleviate loneliness and depression, thereby improving their well-being and life satisfaction (Wang et al., 2024; Zhai et al., 2020; Chiesura, 2004). Particularly for older adults experiencing a reduction in social networks post-retirement, parks serve not only as venues for physical exercise but also as vital social spaces for emotional and spiritual support. Quality park design is crucial for the overall well-being of older adults, providing areas rich in social activities and fostering interpersonal interactions that meet their social needs and improve their social interactions (Duque & Panagopoulos, 2010; Kaźmierczak, 2013).

Furthermore, urban parks are critical venues for social activities, enhancing social interaction and cohesion within the community. These parks offer residents a safe, inclusive public space that boosts community satisfaction and fosters a sense of belonging (Jang et al., 2024). Such social interactions are vital for developing social networks and enhancing social capital. For instance, studies have shown that older adults actively seek social connections in parks (Home et al., 2012). These parks allow not only for physical activity to take place but also as crucial 'encounter spaces' that mitigate social isolation and promote social health (Enssle & Kabisch, 2020).

Urban parks provide older adults with ample opportunities for social interaction, leisure activities, and encounters with nature, playing a pivotal role in their social lives (J. Jacobs, 1961; A. Jacobs & Appleyard, 1987; Gehl, 2011). By participating in park activities, older adults can increase physical activity (Sallis et al., 2016), boost mental health (Beyer et al., 2014; Nutsford et al., 2013), and alleviate loneliness through social interaction (Bone et al., 2022), thus enhancing their overall well-being. Consequently, optimizing the design and functionality of urban parks to meet specific needs is a fundamental strategy for promoting healthy aging and improving urban life quality.

However, despite their significant potential to foster social interactions of older adults, existing research and urban policies often overlook the full utilization of these spaces to meet their needs (Moulay et al., 2017; Azmi & Karim, 2012). Additionally, many studies focus on the impact of park environments on physical activity, with less emphasis on their influence on social interactions, especially for older populations (Sheng et al., 2021; Cao & Kang, 2019). Research has shown that perceived physical environment characteristics in urban parks have a crucial impact on older adults' social interactions (Wan et al., 2021). These park characteristics not only shape their park experience but also directly affect their social health and well-being. Therefore, it is crucial to explore methods to improve park design in order to better meet the social interaction

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requirements of older individuals, thereby enhancing their quality of life and promoting social engagement.

The Relationship between Park Characteristics and Social Interactions

The physical environment of parks includes diverse characteristics such as features, conditions, accessibility, aesthetics, safety, and policy management, which collectively influence park use and public health impacts (Bedimo-Rung et al., 2005). For instance, park accessibility and safety are crucial determinants of whether older adults are willing and able to visit parks, directly influencing their opportunities for social interaction (Tinsley et al., 2002). Additionally, positive correlations between park characteristics such as amenities and maintenance and social interactions directly impact the attractiveness and potential for socialization within parks (Coley et al., 1997; Rasidi et al., 2012).

Numerous studies highlight the pivotal role of amenities in enhancing park participation and social interaction. Features such as playgrounds, cafes, restrooms, benches, and sports and recreational equipment significantly boost park visitation (Cohen et al., 2007; Bedimo-Rung et al., 2005; Halkos et al., 2021). Comfortable and inviting green spaces attract more visitors, thereby fostering social interaction opportunities. For example, Veitch et al. (2022) demonstrate that providing older adults with shaded, serene environments and convenient walking paths is essential for encouraging physical activity and social interactions. Moreover, perceived safety is a critical factor in encouraging park use and promoting social interactions among older adults, particularly those with physical and psychological limitations (Hong et al., 2018; Liu et al., 2020; Elfartas, 2022). Some studies highlighted that environmental barriers and potential safety concerns significantly impact older adults, notably regarding accessibility, mobility, and safety, making them especially sensitive to park safety, natural beauty, and aesthetics (Wen et al., 2018).

Although there is a general consensus on the influence of physical environment features on social interactions, academic debate persists regarding which specific features are most closely associated with social interactions in urban parks (Chen et al., 2024; Sheng et al., 2021). Furthermore, empirical research directly examining the role of public green spaces in older adults' social interactions is limited (Zhong et al., 2022; Sugiyama et al., 2023). This reveals the urgent need for further studies to explore how park characteristics influence these interactions in urban parks.

Social Interactions

Social interactions are defined as any verbal or non-verbal contact between people, and such exchanges can lead to rich social experiences (Dempsey et al., 2012). Social interactions are not limited to scheduled events; they can be

triggered any time people come together, whether it is a purposeful gathering or a simple exchange of words that stumbles into another person's line of sight (Easthope & McNamara, 2013). Furthermore, urban parks promote such interactions by providing accessible environments that foster social connections. These connections are acknowledged as potential links between green spaces and health (Maas et al., 2009). Research indicates that such social connections are a low-cost strategy for enhancing public health and are essential for achieving effective active aging (Mao & Zhao, 2012; Yuqi Liu et al., 2020).

The frequency of social interactions is a crucial indicator of social engagement, typically assessed by the number of interactions, participants, or the interaction frequency (Kaźmierczak, 2013; Luo et al., 2020). Studies have consistently shown that frequent social interactions correlate strongly with improved mental health, reduced loneliness, and greater life satisfaction (Powdthavee, 2008; Luo et al., 2020). This motivated the study to measure the social interaction frequency of older adults in urban parks.

RESEARCH METHODOLOGY

This study was conducted in Anyang, located in the north of Henan province, China (Figure 1). According to the 2022 census, the resident population of Anyang was approximately 5.41 million, with an urbanization rate of 54.69%. Notably, 34.14% of the population, or about 1.849 million people, were aged 50 years and above, reflecting the current state of population aging in the city. The survey sites included two comprehensive urban parks in the Wenfeng and Beiguan districts, namely Shangwu Park and Renmin Park. These parks are favoured by residents for their convenient and free access, as well as their abundant green spaces and facilities.

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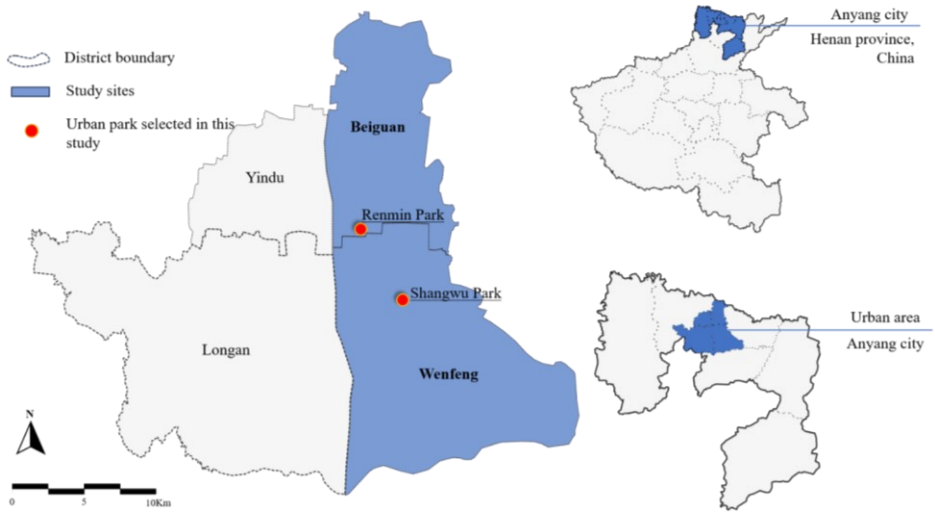


Figure 1: Location of this study

Data collection occurred from June to September 2023, utilizing both on-site and online distribution methods, with a total of 589 completed questionnaires. The survey specifically targeted older adults aged 50 and above, excluding those in long-term care facilities. Participants signed an anonymous informed consent form before completing the questionnaire. Questionnaires were distributed using a simple random sampling method, and respondents who did not have enough time to complete the questionnaire on-site were provided with a QR code so they could complete it at an appropriate time. The online questionnaire was distributed through on-site links and promoted in social media groups (e.g., WeChat) targeting older adults living near the park, thereby expanding the sample's reach. The survey was conducted on weekdays and weekends during favorable weather.

This study used a closed-ended questionnaire to assess how park environmental characteristics affect older adults' social interactions. The questionnaire was divided into three sections: the first section assessed the perceived park characteristics, which were adapted from Bedimo-Rung et al. (2005), including park features, conditions, aesthetics, safety, and accessibility. Each dimension contained several items, totaling 30 questions, using a 5-point Likert scale (from 1= strongly disagree to 5= strongly agree). The Cronbach's alpha for this section of the questionnaire was 0.914, indicating high reliability. The second part measured the social interactions of older adults in the parks, adapted from Jenny Veitch (2022), Moulay (2017), and Lubben's Social Networking Scale (LSNS). It comprised four questions on a five-point scale (from 1=never to 5=always) regarding their interactions with both known and

unknown individuals. This section had a Cronbach's alpha of 0.878, confirming good reliability. The third part gathered socio-demographic information, including gender, age, income, and health status.

Statistical analyses were conducted using SPSS 27.0. The initial descriptive analysis assessed the basic data characteristics, showing that skewness and kurtosis for all variables were within the ±3 range (as shown in Table 2), meeting the criteria for normal distribution as defined by Hair et al. (2010). Additionally, to ensure variable independence, tolerance, and variance inflation factor (VIF) values were calculated. Following O'Brien's (2007) recommendations, all predictor variables demonstrated tolerance values above 0.30 and VIF values below 4.0, indicating no significant multicollinearity in the analytical model.

Subsequent analysis utilized Pearson correlation analyses to explore relationships between variables. Based on these results, multiple linear regression models were constructed to evaluate the effects of independent variables on the dependent variable. In this analysis, socio-demographic characteristics were incorporated as control variables, park characteristics as independent variables, and social interactions as the dependent variables. This methodology offers insights into the impact of independent variables on the dependent variables, aiming to identify key park characteristics that predict social interactions of older adults.

ANALYSIS AND DISCUSSION

Descriptive Statistics

Table 1 presents an overview of the statistical data pertaining to the population sample. The study includes 589 participants, comprising 45.8% males and 54.2% females, showing a higher proportion of females. The majority of participants are aged between 50 and 65, with only 5.4% over 65, indicating that younger older adults are predominantly active in park usage. Regarding monthly income (CNY), 54.7% of participants earn between 1,500 and 3,000, while 21.1% earn between 3,000 and 4,500. In terms of health status, 53.4% of older adults are reported to be relatively or very healthy, 40.7% are reported to have fair health, and 10.3% are reported to be in poor health.

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Table 1: Demographic Information of Respondents （n=589）

Demographic Characteristics	Category	Frequency	Percentage（%）
Gender	Male	270	45.8%
	Female	319	54.2%
Age	50–55 y	266	45.2%
	56–60 y	226	38.4%
	61–65 y	65	11.0%
	65 y above	32	5.4%
Income (CNY/month)	1500 below	54	9.2%
	1500–3000	322	54.7%
	3000–4500	124	21.1%
	4500 above	89	15.1%
Health status	Very poor	13	2.2%
	Relatively poor	48	8.1%
	Fair	214	36.3%
	Relatively healthy	239	40.7%
	Very healthy	75	12.7%

Table 2 presents the results of the subjective perceptions of park features and social interactions among the 589 older adults surveyed. The condition receives the highest score (M=3.71, SD=1.022), followed by the feature (M=3.60, SD=0.955) and accessibility (M=3.56, SD=0.947). The aesthetics scores are slightly lower, with a mean of 3.44 (SD=0.996), and safety receives the lowest score (M=3.04, SD=1.107). Additionally, the social interactions of older participants had a mean of 2.99 with a standard deviation of 1.151.

Table 2: Descriptive Statistics of Park Characteristics and Social Interactions (n=589）

Variables	No. of items	Means	Std. Deviation	Skewness	Kurtosis
Social interactions	4	2.99	1.151	0.043	-1.564
Features	7	3.60	0.955	-1.046	-0.382
Conditions	6	3.71	1.022	-1.299	0.375
Aesthetics	6	3.44	0.996	-0.785	-0.898
Safety	5	3.04	1.107	-0.035	-1.649
Accessibility	6	3.56	0.947	-1.026	-0.402

Correlation Analysis between Variables

Table 3 presents the results of the variable correlation analysis. Social interaction frequency was positively correlated with park features ($r=0.382$, $p<0.01$), condition ($r=0.312$, $p<0.01$), aesthetics ($r=0.2$, $p<0.01$), safety ($r=0.193$, $p<0.01$), and accessibility ($r=0.245$, $p<0.01$). These significant positive correlations indicate that the mentioned park characteristics positively influence the social interactions of older adults. Therefore, these characteristics were selected as independent variables for subsequent multiple-regression analyses.

Table 3: Correlation analysis

Variables	Social interactions
Features	0.382**
Conditions	0.312**
Aesthetics	0.200**
Safety	0.193**
Accessibility	0.245**

** Correlation is significant at the 0.01 level (2-tailed).

Multiple Regression Analysis Results

Table 4 shows that the multiple regression analysis results indicate a strong relationship between park characteristics and social interactions among older adults in urban parks. Specifically, features (β=0.202, p<0.001), conditions (β=0.145, p<0.001), and accessibility (β=0.113, p<0.01) show statistically significant positive correlations with the social interactions. These coefficients indicate that an increase of one unit in features, conditions, and accessibility leads to respective increases in the social interactions by 0.202, 0.145, and 0.113 units, respectively, while controlling for other variables. Collectively, these factors account for 25.2% of the variance in social interactions. Notably, other park characteristics, such as aesthetics and safety, do not demonstrate significant effects.

Table 4: Multiple linear regression model

	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.	Collinearity Statistics	
	B	Std. Error				Tolerance	VIF
(Constant)	-0.492	0.327		-1.505	0.133		
Features	0.243	0.052	0.202	4.723	**0.000**	0.708	1.412
Conditions	0.164	0.047	0.145	3.488	**0.001**	0.745	1.343
Aesthetics	0.02	0.047	0.017	0.427	0.670	0.787	1.271
Safety	0.061	0.041	0.058	1.477	0.140	0.830	1.206
Accessibility	0.137	0.048	0.113	2.866	**0.004**	0.835	1.198
R	0.502						
R Square	0.252						
Adjusted R Square	0.240						
F	21.623***						

Dependent variable: social interactions.

DISCUSSION

This study aimed to identify key park characteristics that encourage older adults' social interactions in urban parks. The results showed significant positive impacts of park features, conditions, and accessibility on their social interactions.

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Notably, park features had the most substantial effect. This is likely due to their role in creating a welcoming environment that encourages older adults to stay and engage. For instance, amenities like seating and shade offer spaces for rest and socialization, while fitness equipment enables light physical activities, serving as catalysts for social interactions. These findings align with previous research indicating that park amenities and green features such as seating, restrooms, fitness equipment, shaded areas, and lush vegetation are crucial for fostering social interactions of older adults (Moulay et al., 2017; Rasidi et al., 2012; Veitch et al., 2022). Additionally, trees and grassy areas are believed to foster informal social interactions by promoting greater engagement (Coley et al., 1997). A study focused on the motivations of older Australians visiting parks highlighted that amenities like trees and lawns fulfill older adults' needs for autonomy, encouraging repeated visits for participation and socialization (Gibson, 2018).

This study also assessed park conditions, including maintenance, noise levels, and uncivilized behavior. Previous findings have shown that these factors directly affect older adults' use of parks and their activities. Hughey et al. (2016) noted that poor maintenance and uncivilized behavior not only degrade a park's image but can also deter usage by raising safety concerns. Moreover, Wan et al. (2021) emphasized that well-maintained parks not only improve safety perceptions but also enhance the environment's attractiveness, which is crucial for increasing participation and facilitating social interactions. The reason may be that proper maintenance and environmental management may directly improve older adults' psychological well-being and reduce fall risks, thereby encouraging more social interactions. Furthermore, a low-noise, orderly environment provides a serene, enjoyable social space for older adults.

Park accessibility was identified as a critical factor in facilitating social interactions of older adults. While proximity affects visitor choices, internal accessibility is paramount for enabling social interactions. Scott et al. (2007) suggested that abundant leisure activities in popular parks might diminish the perceived impact of distance. Conversely, parks with fewer activities might highlight the importance of proximity. For older adults seeking social engagement, efficient internal accessibility facilitates easier participation in a variety of social activities. This access allows older adults to easily navigate all areas of the park, thereby increasing their opportunities to engage in activities and interact with others. This reduction in physical barriers makes older adults more willing to participate in and enjoy the social opportunities available in the park.

Although numerous studies have emphasized the beneficial influence of aesthetics and safety on park utilization, the current research did not identify a significant correlation between these parameters and social interactions. This discrepancy may arise from differences in research methodologies, geographic

climates, target populations, and cultural backgrounds. Surprisingly, aesthetics did not predict social interactions in this study. This aligns with Onose et al.'s (2020) findings, which pointed out the shortcomings of urban parks in terms of specialized planning or facilities for older adults compared to aesthetic features and the problems older adults face when interacting with other age groups. The study emphasizes that beyond aesthetic factors, the social function of parks is critical for older adults (Onose et al., 2020).

Similarly, although no significant correlation between safety and social interaction was found, this does not diminish its importance. Descriptive statistical analysis revealed that safety had the lowest mean score, suggesting that park safety did not meet older adults' expectations. While not statistically significant, the low score may reflect the fact that respondents' basic expectations of the park environment were already low, or they may have taken self-regulatory measures, such as choosing to visit the park during daytime or crowded hours, in order to avoid situations perceived as unsafe. Issues like poor nighttime lighting might deter older adults due to concerns about falls and safety, discouraging their participation during less illuminated hours. Moreover, fears about crime and injuries, particularly in poorly lit or overgrown areas, may prevail among older adults (Loukaitou-Sideris et al., 2016). Consequently, even if park designs and amenities are conducive to socializing, such as plazas, benches, and shaded areas, older adults might avoid these spaces if they perceive them as unsafe, thus limiting their social engagement.

CONCLUSION

This study highlights the key role of park design in promoting healthy aging through a questionnaire survey. The results demonstrate that park features, conditions, and accessibility significantly influence older adults' social interactions. These findings highlight the potential of park characteristics to foster social interactions of older adults and offer practical insights for urban planners and park managers on enhancing park functions as social spaces. Appropriate design improvements can make parks active centers for physical exercise, social interaction, and cultural exchange for older adults, effectively reducing loneliness and enhancing quality of life. This research emphasizes the need to create inclusive urban parks that promote frequent outdoor social interaction and contribute to healthy aging. Future studies should further explore optimizing these park characteristics to address the challenges of an aging population.

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ETHICAL STATEMENT

This study involved anonymous questionnaires with no collection of personally identifiable information. Informed consent was obtained from all subjects involved in the study.

REFERENCES

Azmi, D. I., & Karim, H. A. (2012). Implications of walkability towards promoting sustainable urban neighbourhood. *Procedia-Social and Behavioral Sciences*, *50*, 204–213.

Bedimo-Rung, A. L., Mowen, A. J., & Cohen, D. A. (2005). The significance of parks to physical activity and public health: a conceptual model. *American Journal of Preventive Medicine*, *28*(2), 159–168. https://doi.org/10.1016/j.amepre.2004.10.024

Beyer, K. M. M., Kaltenbach, A., Szabo, A., Bogar, S., Nieto, F. J., & Malecki, K. M. (2014). Exposure to neighborhood green space and mental health: evidence from the survey of the health of Wisconsin. *International Journal of Environmental Research and Public Health*, *11*(3), 3453–3472.

Bone, J. K., Bu, F., Fluharty, M. E., Paul, E., Sonke, J. K., & Fancourt, D. (2022). Engagement in leisure activities and depression in older adults in the United States: Longitudinal evidence from the Health and Retirement Study. *Social Science & Medicine*, *294*, 114703.

Cao, J., & Kang, J. (2019). Social relationships and patterns of use in urban public spaces in China and the United Kingdom. *Cities*, *93*(October), 188–196. https://doi.org/10.1016/j.cities.2019.05.003

Chen, S., Sleipness, O., Christensen, K., Yang, B., Park, K., Knowles, R., Yang, Z., & Wang, H. (2024). Exploring associations between social interaction and urban park attributes: Design guideline for both overall and separate park quality enhancement. *Cities*, *145*(October 2021), 104714. https://doi.org/10.1016/j.cities.2023.104714

Chiesura, A. (2004). The role of urban parks for the sustainable city. *Landscape and Urban Planning*, *68*(1), 129–138.

Cohen, D. A., McKenzie, T. L., Sehgal, A., Williamson, S., Golinelli, D., & Lurie, N. (2007). Contribution of public parks to physical activity. *American Journal of Public Health*, *97*(3), 509–514.

Coley, R. L., Sullivan, W. C., & Kuo, F. E. (1997). Where does community grow? The social context created by nature in urban public housing. *Environment and Behavior*, *29*(4), 468–494.

Dempsey, N., Brown, C., & Bramley, G. (2012). The key to sustainable urban development in UK cities? The influence of density on social sustainability. *Progress in Planning*, *77*(3), 89–141.

Duque, J. A. G., & Panagopoulos, T. (2010). Urban planning throughout environmental quality and human well-being. *Spat Organ Dyn-Discuss Pap*, *4*, 7–20.

Easthope, H., & McNamara, N. (2013). Measuring social interaction and social cohesion in a high density urban renewal area: the case of Green Square. *City Futures Research Centre, University of New South Wales*, *January 2013*, 1–17. http://www.soacconference.com.au/wp-content/uploads/2013/12/Easthope-Social.pdf

Elfartas, H. O. (2022). *CONTEXTUAL PREDICTORS OF URBAN PARK UTILISATION AMONG International Transaction Journal of Engineering, Management, & Applied Sciences & Technologies CONTEXTUAL PREDICTORS OF URBAN PARK UTILISATION*. *July*. https://doi.org/10.14456/ITJEMAST.2018.1x

Enssle, F., & Kabisch, N. (2020). Urban green spaces for the social interaction, health and well-being of older people— An integrated view of urban ecosystem services and socio-environmental justice. *Environmental Science and Policy*, *109*(September 2019), 36–44. https://doi.org/10.1016/j.envsci.2020.04.008

Feng, Z., & Phillips, D. R. (2024). Social exclusion and health outcomes among empty nest and non-empty nest older people in China. *Ageing & Society*, *44*(2), 429–456.

Gehl, J. (2011). *Life between buildings.*

Gibson, S. C. (2018). "Let's go to the park." An investigation of older adults in Australia and their motivations for park visitation. *Landscape and Urban Planning*, *180*(August), 234–246. https://doi.org/10.1016/j.landurbplan.2018.08.019

Hair, J., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. (2010). Multivariate data analysis upper saddle river: pearson prentice hall. *Links*.

Halkos, G., Leonti, A., & Sardianou, E. (2021). Activities, motivations and satisfaction of urban parks visitors: A structural equation modeling analysis. *Economic Analysis and Policy*, *70*, 502–513. https://doi.org/10.1016/j.eap.2021.04.005

Home, R., Hunziker, M., & Bauer, N. (2012). Psychosocial outcomes as motivations for visiting nearby urban green spaces. *Leisure Sciences*, *34*(4), 350–365.

Hong, A., Sallis, J. F., King, A. C., Conway, T. L., Saelens, B., Cain, K. L., Fox, E. H., & Frank, L. D. (2018). Linking green space to neighborhood social capital in older adults: The role of perceived safety. *Social Science and Medicine*, *207*(April), 38–45. https://doi.org/10.1016/j.socscimed.2018.04.051

Hu, Z., & Peng, X. (2015). Household changes in contemporary China: An analysis based on the four recent censuses. *The Journal of Chinese Sociology*, *2*, 1–20.

Hughey, S. M., Walsemann, K. M., Child, S., Powers, A., Reed, J. A., & Kaczynski, A. T. (2016). Using an environmental justice approach to examine the relationships between park availability and quality indicators, neighborhood disadvantage, and racial/ethnic composition. *Landscape and Urban Planning*, *148*, 159–169. https://doi.org/10.1016/j.landurbplan.2015.12.016

Jacobs, A., & Appleyard, D. (1987). Toward an urban design manifesto. *Journal of the American Planning Association*, *53*(1), 112–120.

Jacobs, J. (1961). *The Death and Life of the Great American Cities (London: Jonathan Cape)*.

Jang, E., Choi, H. B., & Kim, M. (2024). The Restorative Effects of Urban Parks on Stress Control Ability and Community Attachment. *Sustainability*, *16*(5), 2113.

Kaźmierczak, A. (2013). The contribution of local parks to neighbourhood social ties. *Landscape and Urban Planning*, *109*(1), 31–44.

Langenbrunner, J. C., Marquez, P. V, & Wang, S. (2011). *Toward a healthy and harmonious life in China: stemming the rising tide of non-communicable diseases*. The World Bank.

Liu, Y., Wang, R., Lu, Y., Li, Z., Chen, H., Cao, M., Zhang, Y., & Song, Y. (2020). Natural outdoor environment, neighbourhood social cohesion and mental health: Using multilevel structural equation modelling, streetscape and remote-sensing metrics.

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Urban Forestry and Urban Greening, *48*. https://doi.org/10.1016/j.ufug.2019.126576

Loukaitou-Sideris, A., Levy-Storms, L., Chen, L., & Brozen, M. (2016). Parks for an aging population: Needs and preferences of low-income seniors in Los Angeles. *Journal of the American Planning Association*, *82*(3), 236–251. https://doi.org/10.1080/01944363.2016.1163238

Luo, M., Ding, D., Bauman, A., Negin, J., & Phongsavan, P. (2020). Social engagement pattern, health behaviors and subjective well-being of older adults: an international perspective using WHO-SAGE survey data. *BMC Public Health*, *20*, 1–10.

Maas, J., Van Dillen, S. M. E., Verheij, R. A., & Groenewegen, P. P. (2009). Social contacts as a possible mechanism behind the relation between green space and health. *Health & Place*, *15*(2), 586–595.

Mao, Z., & Zhao, X. (2012). The effects of social connections on self-rated physical and mental health among internal migrant and local adolescents in Shanghai, China. *BMC Public Health*, *12*, 1–9.

Moulay, A., Ujang, N., & Said, I. (2017). Legibility of neighborhood parks as a predicator for enhanced social interaction towards social sustainability. *Cities*, *61*, 58–64. https://doi.org/10.1016/j.cities.2016.11.007

Nations, U. (2019). World Population Prospects 2019. In *United Nations: Vol. II*. https://doi.org/10.18356/cd7acf62-en

Nutsford, D., Pearson, A. L., & Kingham, S. (2013). An ecological study investigating the association between access to urban green space and mental health. *Public Health*, *127*(11), 1005–1011.

O'brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quality & Quantity*, *41*, 673–690.

Onose, D. A., Iojă, I. C., Niță, M. R., Vânău, G. O., & Popa, A. M. (2020). Too old for recreation? How friendly are urban parks for elderly people? *Sustainability*, *12*(3), 790.

Powdthavee, N. (2008). Putting a price tag on friends, relatives, and neighbours: Using surveys of life satisfaction to value social relationships. *The Journal of Socio-Economics*, *37*(4), 1459–1480.

Rasidi, M. H., Jamirsah, N., & Said, I. (2012). Urban green space design affects urban residents' social interaction. *Procedia-Social and Behavioral Sciences*, *68*(November), 464–480. https://doi.org/10.1016/j.sbspro.2012.12.242

Sallis, J. F., Cerin, E., Conway, T. L., Adams, M. A., Frank, L. D., Pratt, M., Salvo, D., Schipperijn, J., Smith, G., & Cain, K. L. (2016). Physical activity in relation to urban environments in 14 cities worldwide: a cross-sectional study. *The Lancet*, *387*(10034), 2207–2217.

Scott, M. M., Evenson, K. R., Cohen, D. A., & Cox, C. E. (2007). Comparing perceived and objectively measured access to recreational facilities as predictors of physical activity in adolescent girls. *Journal of Urban Health*, *84*, 346–359.

Sheng, Q., Wan, D., & Yu, B. (2021). Effect of space configurational attributes on social interactions in urban parks. *Sustainability (Switzerland)*, *13*(14). https://doi.org/10.3390/su13147805

Sugisawa, H., Liang, J., & Liu, X. (1994). Social networks, social support, and mortality among older people in Japan. *Journal of Gerontology*, *49*(1), S3–S13.

Sugiyama, M., Chau, H.-W. W., Abe, T., Kato, Y., Jamei, E., Veeroja, P., Mori, K., & Sugiyama, T. (2023). Third Places for Older Adults' Social Engagement: A Scoping Review and Research Agenda. *The Gerontologist*, *63*(7), 1149–1161. https://doi.org/10.1093/geront/gnac180

Tinsley, H. E. A. A., Tinsley, D. J., & Croskeys, C. E. (2002). Park usage, social milieu, and psychosocial benefits of park use reported by older urban park users from four ethnic groups. *Leisure Sciences*, *24*(2), 199–218. https://doi.org/10.1080/01490400252900158

Veitch, J., Ball, K., Rivera, E., Loh, V., Deforche, B., Best, K., & Timperio, A. (2022). What entices older adults to parks? Identification of park features that encourage park visitation, physical activity, and social interaction. *Landscape and Urban Planning*, *217*(February 2021), 104254. https://doi.org/10.1016/j.landurbplan.2021.104254

Wan, C., Shen, G. Q., & Choi, S. (2021). Underlying relationships between public urban green spaces and social cohesion: A systematic literature review. *City, Culture and Society*, *24*, 100383. https://doi.org/10.1016/j.ccs.2021.100383

Wang, R., Song, Y., Yang, L., & Browning, M. H. E. M. (2024). Neighbourhood green space and loneliness in middle-aged and older adults: Evidence from WHO Study on Global Ageing and Adult Health in China. *Urban Forestry & Urban Greening*, *95*, 128324.

Wen, C., Albert, C., & Von Haaren, C. (2018). The elderly in green spaces: Exploring requirements and preferences concerning nature-based recreation. *Sustainable Cities and Society*, *38*(January), 582–593. https://doi.org/10.1016/j.scs.2018.01.023

World Health Organization, (2016). *Aging and Health in China*. https://www.who.int/china/zh/health-topics/ageing

World Health Organization, (2022). *Ageing and health*. https://www.who.int/zh/news-room/fact-sheets/detail/ageing-and-health

Zagic, D., Wuthrich, V. M., Rapee, R. M., & Wolters, N. (2022). Interventions to improve social connections: a systematic review and meta-analysis. *Social Psychiatry and Psychiatric Epidemiology*, 1–22.

Zhai, Y., Li, D., Wang, D., & Shi, C. (2020). Seniors' physical activity in neighborhood parks and park design characteristics. *Frontiers in Public Health*, *8*, 322.

Zhang, Y., Chen, G., He, Y., Jiang, X., & Xue, C. (2022). Social interaction in public spaces and well-being among elderly women: towards age-friendly urban environments. *International Journal of Environmental Research and Public Health*, *19*(2), 746. https://doi.org/10.3390/ijerph19020746

Zhong, S., Lee, C., & Lee, H. (2022). The role of community environments in older adults' intergenerational and peer social interactions. *Cities*, *129*(May), 103785. https://doi.org/10.1016/j.cities.2022.103785

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SENSE OF PLACE IMPACT ON MIGRATION PATTERN OF BUMI SEMERU DAMAI RESETTLEMENT SURVIVOR, INDONESIA

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Abstract

The completion of building facilities and economic empowerment activities in Bumi Semeru Damai (BSD), a settlement developed to accommodate survivors of the 2021 Mount Semeru eruption, failed to curb the return of former Semeru residents to their original dwelling site in the high-risk zone. By 2024, many of the houses in BSD were left uninhabited, as the owners had abandoned them, and returned to their native land. According to the findings from previous studies, the effectiveness of a relocation exercise is determined by the affected population's sense of place (SP). As such, this investigation delves into the influence of SP, on the decision-making process of Mount Semeru eruption survivors, in terms of remaining in BSD, or migrating. Hermeneutic phenomenology research methods involve the gathering of data through census and semi-structured interviews, with four key figures. According to the results derived, in the context of the migration pattern (MP), 326 households were involved in either a short-term-domestic migration (after two days, a week, or a month, from BSD to their land of origin), or a long-term- external migration (after about a year, from BSD to another urban location). The factors influencing the MP of these households include their risk perception (RP), their socio-economic capital (SEC), the socio-ecological system (SES) of BSD, their place identity (PI), their place dependence (PD), their societal bonds (SBs), and their place attachment (PA). The findings derived through this undertaking, can be harnessed, for resettlement efforts that support the sustainable livelihood of the affected population.

***Keywords*:** Bumi Semeru Damai, Indonesia, migration pattern, sense of place, The Semeru eruption 2021

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INTRODUCTION

Relocation is considered upon the destruction of a residential area, brought about by a major disaster. In Indonesia, among the post-disaster settlement relocation processes deemed successful, in terms of development pace and inclusiveness of supporting infrastructure, is the Bumi Semeru Damai (BSD) permanent residence, a relocation area for residents affected by the 2021 eruption of Mount Semeru in Lumajang, East Java. The difficulties frequently encountered, by disaster survivors in relocation areas, include livelihood issues, the inability to adapt to a new environment, and a variety of socio-economic as well as demographic problems (Setyonugroho & Maki, 2024). Additionally, the development of the supporting physical infrastructure, needs to take the environmental, social, cultural, economic and sustainability aspects into consideration (Sina et al., 2019), while bridging the social gap between the migrant villagers and the resident villagers, at the relocation site (Daly et al., 2023).

Swapan and Sadeque (2021) opined, that the sense of place (SP) influences the migration patterns (MPs), of those in disaster areas. SP can be separated into two categories: place-based attachment, and psychologically-based attachment. Those experiencing the occurrence of sudden and frequent natural disasters, endure recurring economic losses, a situation which renders migration more acceptable. From a psychological standpoint, an individual would welcome the security and safety offered by a new environment, in place of the risks and uncertainties, posed by his/her natural disaster-prone area of origin (AOO) (Swapan & Sadeque, 2021). The research conducted by Depari and Lindell (2023), focusing on volcanology, revealed that while people are not against moving from their AOO to a new and safer location, they would prefer that the new location be close to their AOO.

Our initial surveillance of BSD revealed a substantial number of unoccupied residences. According to residents in the area, among the reasons for the departure of the house-owners, is their yearning to return to their homes in their AOO. In view of this situation, this study investigates the issues associated with the migrated residents of BSD, based on the following research questions. (1) How well did the BSD migrated residents cope, with life in a new environment? (2) How does PA influence the MP of BSD residents? And (3), why do the majority of migrated BSD residents eventually return to their AOO?

The mount Semeru eruption tragedy prompted the development of the BSD resettlement scheme, which is aimed at providing the affected residents with a safe and sustainable way of life.

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LITERATURE REVIEW

Bumi Semeru Damai (BSD) as a Resettlement Area for the 2021 Mount Semeru Eruption's Survivors

The people of Lumajang Regency, in the East Java province of Indonesia, live under the constant threat of volcanic eruptions. Located in the vicinity of their homes, at 3676 meters above sea level, is Mount Semeru, the highest and most active type of stratovolcano on the island of Java (Solikhin et al., 2012). Its eruption on the 4th of December, 2021, resulted in 51 deaths, and the displacement of residents across 410 evacuation centres in Pasirian District (n=1746), Candipuro District (n=4645) and Pronojiwo District (n=1077). The rapid flow of hot clouds (containing a combination heated lava chunks, pumice, ash and volcanic gas), down the southeast slope, extended as far as 20 kilometres, sweeping away 2 square kilometres of settlements and agricultural land in Besuk Kobokan (Realita et al., 2022). The heavy rainfall at the top of Mount Semeru, shortly after the eruption, exacerbated the situation, by triggering a devastating flood of lava flow (Gomez et al., 2018). According to Bachri (2023), scenario modelling for the next ten years, ending 2032, suggests that the development of built land, unaccompanied by responsible land use and regional planning, significantly raises the disaster risk potential (Bachri et al., 2024; Irawan et al., 2024; Sumarmi et al., 2020). The BSD Permanent Residence was developed on 90.98 hectares of land in Sumbermujur Village, Candipuro District, in response to the 2021 Mount Semeru volcanic eruption disaster. The map of the Semeru disaster prone area (KRB), places BSD precisely on the eastern slope of Mount Semeru. In the decree of the Regent of Lumajang Number 1 in 2022, concerning the implementation of temporary housing for the natural disaster victims of the Mount Semeru eruption, it is stated that all victims who had lost their homes are entitled to housing assistance in BSD. Residents located in the Kamar Kajang Hamlet, Kebondeli Utara Hamlet, Kajar Kuning Hamlet in Sumberuwluh Village, Curah Kobokan Hamlet, Sumbersari Hamlet, and Gumuk Mas Hamlet in Supiturang Village, whose houses remained intact, were also relocated to BDS, as these locations are considered part of the disaster prone red zone.

Correlation between Sense of Place (SP) and Migration Patterns (MP)

Sense of place (SP) refers to human bonds with a location, in terms of experiences associated with family and friends, traditions, and the accumulation of memories over time (Binoy, 2022). The factors influencing SP include PA, place identity (PI), place dependence (PD) (Wartmann and Purves, 2018), societal bonds (SBs), socio-economic capital (SEC), and the socio-ecological system (SES) (Swapan and Sadeque, 2021). PA is associated with affective attitudes, PI is associated with cognitive attitudes, while PD is associated with conative attitudes (Svensson, 2019). According to Scannell and Gifford (2010), PA research involves three main aspects: people, places and processes (Lewicka, 2011).

The findings derived through research focusing on SP, can be harnessed for the development of disaster management strategies (Baldwin et al., 2017). This can be attributed to the influence of SP, on the decision-making process of individuals, enduring the after-effects of a natural disaster. Swapan (2020) separated the relationship between SP and the MP into two categories: communities which migrate easily and communities which migrate with difficulty, with each category influenced by place-based attachment and psychologically-based attachment, respectively. Furthermore, the decision-making process of an individual, with regards to migration, is influenced by his/her risk perception (RP), in terms of the potential dangers existing in an unfamiliar location. An individual's decision-making process, with regards to migration, may be influenced by issues related to security, adverse situations, and apprehension (Peng et al., 2017). Whether the disaster occurs suddenly or gradually, also determines whether it is easier or more difficult for an individual to migrate (Chumky, Basu, Onitsuka, & Hoshino, 2022; Chumky, Basu, Onitsuka, Parvin, et al., 2022).

RESEARCH METHODOLOGY

Study Area

In the map defining the disaster-prone areas of Semeru Southeast Sector, BSD is located in the KRB II zone. This implies that this area is susceptible to hot clouds, lava flows, and incandescent rock avalanches. The occurrence of accelerated lava dome growth, and more intensive eruptions, will prompt the extension of this disaster-prone area, through the establishment of KRB III. KRB II is labelled high risk for settlements and human activities, as the occurrence of natural disasters in this area can lead to casualties, infrastructure damage, and property loss. Figure 1 depicts the location of BSD, with the distribution of buildings in its landscape.

The visual appearance of the houses, dispensed to surviving victims of the Mount Semeru eruption, is portrayed in Figure 2. Of the 1951 housing units constructed, 1920 are currently occupied by migrated residents. The housing unit received by each household is termed a 'healthy, simple, and instant house' (RISHA). The assembly of a RISHA involves the employment of modular construction technology, which is not only trouble-free and quick, but also free of construction residues (Opabola et al., 2023). The RISHA concept represents a swift response to the housing needs of natural disaster victims (Lines et al., 2022). Each RISHA comes with a building area of $36m^2$ (6m by 6m), a land area of 10m by 14m, one living room, two bedrooms, one toilet, a front terrace, a garbage can, electrical installations, clean water supply, and an integrated waste disposal system.

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Figure 1. The Studied Area
Source: Author, 2024



Figure 2. An Example of a RISHA in the Studied Area
Source: On-site Observation, 2024

Bumi Semeru Damai (BSD) Home Occupancy Data

A census was conducted in March, 2024, to ascertain the number of residents occupying the units allotted to them. This census is based on data regarding the list of houses constructed and owned by the Lumajang Regency Regional Disaster Management Agency. The 1,951 housing units involved in this undertaking were grouped under three categories: (1) houses inhabited by recipients, (2) houses unoccupied/abandoned by recipients, and (3) houses inhabited by owners who have migrated. The census was carried out by residents, following a brief training session conducted by the researchers.

Selection of Key Informants for Semi-Structured Interviews

The technique of selecting key informants in semi-structured interviews with a quota sampling strategy was carried out by considering the role, organization, experience, and AOO. To fulfill these eligibilities, the author found four BSD residents (Table 1) as key informants, who have information about the migration phenomenon carried out by some BSD residents.

Table 1. The Characteristics of the Key Informants

Initial	Age	Sex	AOO	Role in the Community	Occupation
T	39	Female	Kebondeli Utara	Women Religious Organisation	Self-employed
L	64	Male	Kamar Kajang	Security	Private Sector
S	29	Female	Sumbersari	Citizen	Housewife
N	47	Male	Curah Kobokan	Resettlement Coordinator	Food Trader

Source: Author, 2024

Hermeneutic Phenomenology with Van Manen Analysis

For this study, we employed the hermeneutic phenomenology method to examine the experiences and emotions of the migrated residents of BSD, and the Van Manen's technique for the analysis of our findings. Interview transcripts were categorised thematically rather than chronologically, to place emphasis on the fundamental themes of the migration phenomena (Depari & Lindell, 2023).

Table 2. The Questions in the Semi-Structured Interview That Were Based on the Conceptual Framework of the Correlation between SP-MP

Domains		Questions	Source
Risk Perception (RP)	RP1	Do you know which disaster-prone zone BSD is located in?	(Bachri et al., 2015, 2023, 2024; Peng et al., 2017)
	RP2	Is BSD safer than your AOO?	
	RP3	In the next 10 years, could another Mount Semeru eruption affect BSD?	
	RP4	Would the impact of another Mount Semeru eruption be greater on BSD or your AOO?	
	RP5	Were you scared when Mount Semeru erupted?	
	RP6	Are you afraid that another Mount Semeru eruption and lava floods could affect BSD?	
Socio-economic Capital (SEC)	SEC1	Do you still have economic assets in your AOO after the 2021 Mount Semeru eruption?	(Islam & Walkerden, 2014)
	SEC2	Do you have residential assets in another area?	
	SEC3	Do you have family that can provide you with long-term accommodation in another area?	
Socio-Ecological System (SES) of BSD	SES1	Does the BSD have agricultural infrastructure to support residents who were originally farmers?	(Mallick, 2019)
	SES2	Does the BSD have livestock infrastructure to support residents who were originally farmers?	
	SES3	Does the BSD have related infrastructure to support residents who were originally sand miners?	
Place Identity (PI)	PI1	Is BSD located in a more strategic location than your AOO?	(Roosli et al., 2022)
	PI2	Is BSD easier to access than your AOO?	
	PI3	Is BSD more comfortable than your AOO?	
	PI4	Are the facilities in BSD more complete than in your AOO?	
	PI5	Is BSD equipped with safer facilities than your AOO?	
Place Dependence (PD)	PD1	Does BSD provide a better life than your AOO?	(Zheng et al., 2019)
	PD2	Is BSD more suitable for Mount Semeru survivors?	
	PD3	Are you satisfied with life in BSD?	
Societal Bonds (SB)	SB1	Was it easy to leave your AOO?	(Peng et al., 2017)
	SB2	Do you want to be separated from your AOO and its local residents?	
	SB3	What does your AOO have that BSD does not have?	
Place Attachment (PA)	PA1	Do you feel proud to live in your AOO?	(Peng et al., 2017)
	PA2	Is your love for your AOO greater than your love for BSD?	

Source: Author, 2024

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Van Manen's analysis was performed in four stages: (1) the phenomena listed in the transcripts of each interview was categorised under a specific theme, (2) the common themes in the experiences of the respondents were identified, (3) phenomenological texts were developed based on the themes identified through the literature reviews, and (4) the significance of the identified themes was interpreted (Lindseth & Norberg, 2004).

ANALYSIS AND DISCUSSION

Home Occupancy Rate in Bumi Semeru Damai (BSD)

According to the census findings, more than half of the houses in BSD are occupied by the Mount Semeru disaster survivors. Of the 1951 homes, 1920, or 59% (n=1122) had been handed over to the natural disaster survivors, with 42% (n=799) occupied permanently, and 17% (n=326) inhabited by homeowners who periodically migrated. The remaining 41% of the units (n=795) are either unoccupied, or left abandoned by their homeowners.

Data derived through the census reveals that BSD is inhabited by survivors from 17 hamlets, in seven villages, located in the districts of Pronojiwo and Candipuro. The sole village in the Pronojiwo district is Supiturang Village, which accommodates the hamlets Curah Kobokan, Gumukmas, Supiturang and Sumbersari. The villages and hamlets in the Candipuro District are: (1) Sumberwuluh Village, which accommodates the hamlets Kamar Kajang, Kajar Kuning, Kebondeli Utara, Kebondeli Selatan, Sumberwuluh, Kebonagung, and Kampung Baru, (2) Jugosari Village, which accommodates the hamlets Karang Wage and Sumber Kajar, (3) Krajan Village, which accommodates the hamlet Krajan, (4) Sumber Rejo Village, which accommodates the hamlet Sumber Rejo, (5) Sumbermujur Village, which accommodates the hamlet Sumbermujur, and (6) Penanggal Village, which accommodates the hamlet Wonosari. The majority of BSD residents originate from the Curah Kobokan hamlet, as this hamlet is closest to the peak of Mount Semeru, rendering it worst affected by the 2021 Mount Semeru volcanic eruption. This is in agreement with the findings from previous studies, which report that the location of a dwelling in relation to the disaster source, influences an individual's decision-making process with regards to migration (Mallick, 2019).

The data derived through the census also revealed that the unoccupied housing units belong to homeowners who: (1) had returned to their AOO, (2) have residential assets elsewhere, (3) had passed away, (4) are elderly individuals who had moved to live with their children in other locations, and (5) are orphaned teenagers who had moved to live with siblings in other locations. It is assumed that the increasing number of family cards (KK) being issued, is attributed to the deliberate breaking up of households, for the purpose of spreading out the claims for housing assistance.

> *N: "The housing assistance given to each family [in BSD] eventually led to many household splits. Prior to the eruption, more than one KK could live in one house, but after the housing assistance, each KK got a house."*

Respondents *N* and *T* described the gathering of data from housing assistance recipients as a chaotic process. According to *T*, the data of relocated survivors is deemed unverified, until all stages of the house handover process are fulfilled. As this delay hampered the implementation of the block arrangement, the separation from previous neighbours and familiar faces, made it difficult for the migrated residents to adapt to life in the BSD. In view of this circumstance, the relocation process should include the creation of a housing assistance recipient database, aimed at supporting and retaining the essence of community life (Khusna et al., 2023).

Impact of Sense of Place (SP) on Migration Patterns (MP): To Remain in the Area of Origin (AOO) or to Move to an Area That is Not Truly Safe?

The review of relevant literature indicates that following a disaster, a victim's MP is influenced by his/her SP (Swapan & Sadeque, 2021). A migration behaviour, whether the move from the AOO to another region, or the move from another region back to the AOO, can be influenced by place-based and/or psychologically-based attachments. In the context of the settlement relocation following the 2021 eruption, survivors from 17 hamlets were relocated to BSD. It should be noted that BSD was initially deemed a risky area, due to its location in the KRB II zone, a region affected by the Mount Semeru eruption.

The community's decision, to move from their AOO to BSD, was based on several considerations. For *N* and his neighbours, almost all their houses were severely damaged by hot clouds, and their valuables buried in sand. While *N* is aware that BSD is located in the KRB II zone, he is not overly concerned about another eruption, as his understanding of volcanic morphology places BSD on a safer, though not entirely safe slope of Mount Semeru, and away from the risk of a lava flood landslide. Consequently, based on the premise that BSD is a safer option, *N*'s community group was among the four, that made the decision to embark on the permanent move, from their AOO to BSD. N and the other three census participants share the same RP. All four are of the opinion that although BSD is not entirely risk-free, in comparison to their AOO, BSD is less likely to be affected by another eruption. Thus, a positive RP promotes the SB of the community to the place. Slightly different from *N* (who originates from the hamlet closest to the danger source), *S* (who originates from a hamlet farther from the danger source) is of the opinion that the decision of his community group, to permanently move from their AOO to BSD, is based on the assumption that in comparison to their AOO, BSD has a better PI.

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> *S: "In my opinion, life in BSD is more comfortable. The houses are neatly arranged, the roads are good, and the distance to the centre of the sub-district is closer. It is also has an integrated health centre, schools, and other public facilities".*

Place identity (PI) is defined as the correlation between humans and the surrounding environment (Tourneau, 2022; Zhao, 2023). Although the survivors of the Mount Semeru eruption migrated to BSD only two years ago, they are impressed by the amiable, safe and comfortable environment the housing area offers. The positive PI demonstrated by BSD, promotes the migration tendency of the disaster victims to this resettlement location (Swapan & Sadeque, 2021).

The results, derived through the semi-structured interviews, also revealed, that the survivors' inclination to accept life in BSD, is attributable to their PD. According to *L*, the majority of BSD residents are family members or neighbours from the same AOO. As such, although the house block arrangement is not according to their AOO, the residents easily adapted to the new social environment, realising that as survivors of the Mount Semeru disaster, they share the same fate. Thus, an individual's PD, in relation to both family members and neighbours, influences his/her migration decision-making process (Peng et al., 2017).

All four census participants are in agreement that a positive RP of BSD, directly or indirectly influences aspects of SP (SB, PI, PD and PA). This finding is in line with the results derived through a previous study conducted by Peng Li (2017), who reported that SP influences the migration decisions of disaster survivors.

Temporal-Spatial Migration: A Path of Survivorship from Homelessness and an Age of Economic Distress

According to our census data, 326 families living in BSD had migrated. In this context, migration is defined as the act of moving from their BSD home to another area periodically, but eventually returning to their main residence in BSD. This form of migration was exhibited by residents living in three villages (Supiturang Village, Sumberwuluh Village, and Jugosari Village), and two sub-districts (Pronojiwo District and Candipuro District).

As shown in Table 2, the MPs of BSD residents come in spatial and temporal dimensions. In terms of the temporal dimension, the MP performed by the BSD residents can be separated into 11 categories: (a) once every two days, (b) once a week, (c) once every two weeks, (d) once every three weeks, (e) once every month, (f) once every two months, (g) once every three months, (h) once every four months, (i) once every five months, (j) once every six months, and (k) once a year. These 11 MPs can be further separated into two types: short-term migrations (days, weeks or months), and long-term migrations (annual) (Fussel

et al., 2014). As for the spatial dimension, the most frequent MP demonstrated by the BSD residents is the domestic migration, which is from one village to another. External migration was performed annually by 326 families, with the migration destination area located beyond Lumajang City, but within one province of East Java. A total of 22 families migrated to the cities of Surabaya and Madura, returning to BSD once a year during the holiday period. The MP also includes short-term domestic migration, which is explained as migration from BSD to the AOO, then back to BSD, within two days, one week, three weeks, one month, two months, three months, and six months.

Table 3. The MP According to Time and AOO

Village	AOO	Migration Type Based on Time											∑
		a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	
Supiturang	Curah Kobokan	0	8	2	0	6	4	0	1	1	1	14	37
	Gumukmas	1	0	0	0	7	0	0	0	0	0	1	9
	Sumbersari	2	6	14	0	17	11	5	1	2	0	2	60
Sumberwuluh	Kamar Kajang	0	18	8	1	18	7	7	5	2	2	3	71
	Kajar Kuning	0	6	1	1	3	0	0	0	0	0	1	12
	Kebondeli Utara	3	24	19	2	38	10	4	1	4	0	1	106
	Kebondeli Selatan	0	16	1	0	5	1	2	1	1	0	0	27
	Kebonagung	0	1	0	0	0	0	0	0	0	0	0	1
Jugosari	Karang Wage	0	1	0	0	0	0	0	0	0	0	0	1
	Sumber Kajar	0	1	0	0	1	0	0	0	0	0	0	2
Total Migration		**6**	**81**	**45**	**4**	**95**	**33**	**18**	**9**	**10**	**3**	**22**	**326**

Sense of place (SP) correlates with the community MP in disaster areas. According to Chumky (2022), the MP triggered by the occurrence of a rapid onset disaster, comes in the form of a hasty migration from village to city. Migrations prompted by slow onset disasters are mainly associated with negative economic conditions (including debts, unemployment and low income), and adverse agricultural situations (such as loss of crop seeds, and cultivation land degradation). It is notable that migration stemming from sudden, unforeseen disasters, is frequently associated with physical issues such as damage to houses, public infrastructures, and public institutions (Chumky, Basu, Onitsuka, Parvin, et al., 2022; Daly et al., 2023; Mbaye, 2017; Mukherjee & Fransen, 2024). The type of migration associated with the BSD residents, can be deemed unique, in comparison to those covered through previous studies. In terms of the temporal dimension, the Mount Semeru eruption can be considered a high intensity rapid onset disaster. Interestingly, however, in addition to the adverse effects of the Mount Semeru eruption, the residents who relocated to BSD are also faced with the slow onset disaster threat of floods. This combination of rapid and slow onset

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disaster hazards, has given rise to adaptive migration behaviours, based on economic, physical and institutional infrastructures.

The theme 'Temporal-Spatial Migration: A Path of Survivorship from Homelessness and an Age of Economic Distress' is intended as a survival strategy for homelessness and economic hardship. This theme was derived from the synthesis incorporating a literature review, census data analysis, and semi-structured interview results analysis. The literature review implies that the SEC of migrants, and the SES of BSD, affect the decisions of residents with regards to the issue of migration (Islam & Walkerden, 2014; Mallick, 2019).

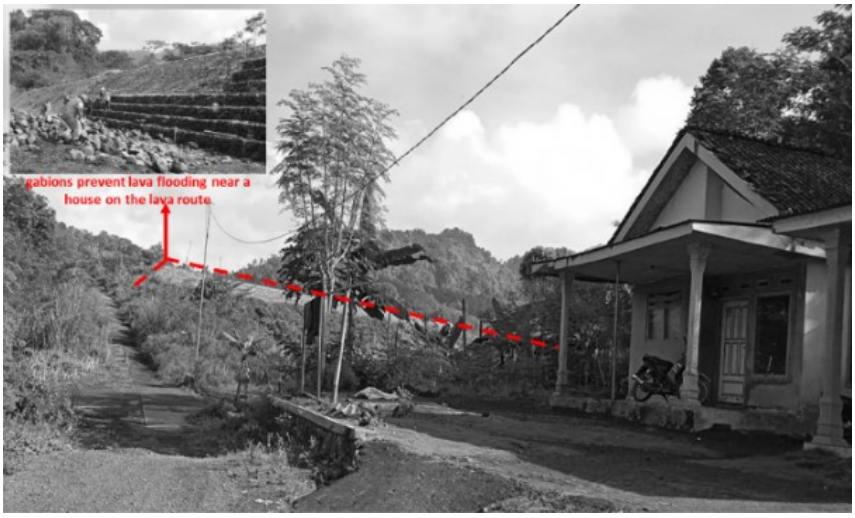


Figure 3. A House in Kebondeli Utara, which is the Destination of the Periodic Migration of BSD Residents
Source: On-site Observation, 2024

In this study, the issue of homelessness is portrayed in two different perspectives: (1) loss of homes and land assets in the AOO, and (2) loss of housing allotment in BSD. Disaster victim migration from the AOO to BSD, is prompted by property damage (severe, moderate or mild), as well as the delineation of red zones through government policies. Thus, inevitably, in order for disaster survivors to receive housing allotments, these government policies need to be adhered to. Residents, whose houses in the AOO were completely damaged, tend to settle in BSD; but for residents whose houses in the AOO remained liveable, whose livelihood assets in the AOO are still manageable, and whose AOO is verified remote from the disaster source; tend to migrate temporally, from BSD to homes in their AOO. For these BSD residents, periodic migrations to their AOO is essential, to maintain the condition of their houses, and its surroundings (Figure 3).

Other than the economic elements in the AOO, other issues, which prompted the migration of residents from BSD, include those associated with the SES. The Decree of the Regent of Lumajang Number 188.45/191/427.12/2022 concerning the Master Plan for Relocation for Victims of the Mount Semeru Eruption Natural Disaster, states that the BSD resettlement scheme is to include plantation areas, integrated cage areas, and trade facilities that support the economic activities of its residents. At the commencement of this research, the completed infrastructures were limited to the integrated cages. The economic assistance efforts were also not in agreement with the occupation of the residents in their AOO. For instance, residents who formerly worked as sand miners, found it difficult to adjust to economic assistance, which required them to perform as farm animal breeders. As such, these residents opted to return to their AOO, and their job, as sand miners. The findings derived through this study, regarding the perception of residents towards the SEC and SES of BSD, are in agreement with the results derived through the study conducted by Mallick (2019), which reported that 'residents who migrate periodically, return to their AOO as a form of survival strategy for homelessness, and to survive economic squeezes'.

CONCLUSION

The findings derived through the three research questions reveal that in BSD, among the 1920 heads of families receiving housing assistance, 42% (n=799) lived in the housing allotments, 41% (n=795) did not live in the housing allotments, and 17% (n=326) lived in the housing allotments, but migrated periodically to their AOO, and some beyond their AOO. The spatial-temporally migration practiced by BSD residents comes in two forms: (1) short-term migrations to their AOO, and (2) long-term migrations to other cities within the province of East Java. While short-term migration is differentiated based on the number of days, weeks or months, long-term migration is differentiated by year. The shortest migration duration is bi-daily, and the longest a year. The decision to migrate, or stay, is significantly influenced by the SP, both in BSD as well as the AOO. In the context of BSD, SP is influenced by SB, PI, PD, PA, SEC, and SES, as well as the direct and indirect RP of the residents. Basically, the driving force, propelling the migration of BSD residents, is the need to deflect the threat of housing loss, and the difficulties stemming from an unfavourable economic situation.

The findings derived through this undertaking, provide empirical verification of the SP-migration-disaster correlation. It is our recommendation, that the Lumajang regency government authorities take these findings into consideration, to better manage the relocation of the Mount Semeru eruption survivors, as well as to retain and improve the community assistance programme, for their quick and progressive economic recovery. The main shortcoming, in terms of the census conducted through this study, is the dearth of investigations

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into the experiences of the periodic migrating residents of BSD themselves. As for future studies in this area, we propose more explorations into the motives driving the migration of BSD residents and the precise identification of their economic and social recovery requirements.

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DISCLOSURE STATEMENT

The authors declare that this research is free from any conflicts of interest. All data and research findings presented in this paper are solely for academic and scientific purposes.

REFERENCES

Bachri, S., Fathoni, M. N., Sumarmi, Masruroh, H., Wibowo, N. A., Khusna, N., Billah, E. N., & Yudha, L. (2023). Geomorphological mapping and landform characterization of Semeru volcano after the eruption in 2021. *IOP Conference Series: Earth and Environmental Science*, *1180*(1). https://doi.org/10.1088/1755-1315/1180/1/012004

Bachri, S., Shrestha, R. P., Sumarmi, Irawan, L. Y., Masruroh, H., Prastiwi, M. R. H., Billah, E. N., Putri, N. R. C., Hakiki, A. R. R., & Hidiyah, T. M. (2024). Land use change simulation model using a land change modeler in anticipation of the impact of the Semeru volcano eruption disaster in Indonesia. *Environmental Challenges*, *14*(December 2023), 100862. https://doi.org/10.1016/j.envc.2024.100862

Bachri, S., Stötter, J., Monreal, M., & Sartohadi, J. (2015). The calamity of eruptions, or an eruption of benefits? Mt. Bromo human–volcano system a case study of an open-risk perception. *Natural Hazards and Earth System Sciences*, *15*(2), 277–290. https://doi.org/10.5194/nhess-15-277-2015

Chumky, T., Basu, M., Onitsuka, K., & Hoshino, S. (2022). The current research landscape of disaster-induced migration: A systematic review and bibliometric analysis. *International Journal of Disaster Risk Reduction*, *74*, 102931. https://doi.org/https://doi.org/10.1016/j.ijdrr.2022.102931

Chumky, T., Basu, M., Onitsuka, K., Parvin, G. A., & Hoshino, S. (2022). Disaster-induced migration types and patterns, drivers, and impact: A union-level study in Bangladesh. *World Development Sustainability*, *1*(May), 100013. https://doi.org/10.1016/j.wds.2022.100013

Daly, P., Mahdi, S., Mundir, I., McCaughey, J., Amalia, C. S., Jannah, R., & Horton, B. (2023). Social capital and community integration in post-disaster relocation settlements after the 2004 Indian Ocean Tsunami in Indonesia. *International Journal of Disaster Risk Reduction*, *95*(November 2022), 103861. https://doi.org/10.1016/j.ijdrr.2023.103861

Depari, C. D. A., & Lindell, M. K. (2023). "Moving or not?": Factors affecting

community responses to environmental disruption. *International Journal of Disaster Risk Reduction*, *95*(July), 103898. https://doi.org/10.1016/j.ijdrr.2023.103898

Gomez, C., Lavigne, F., Sri Hadmoko, D., & Wassmer, P. (2018). Insights into lahar deposition processes in the Curah Lengkong (Semeru Volcano, Indonesia) using photogrammetry-based geospatial analysis, near-surface geophysics and CFD modelling. *Journal of Volcanology and Geothermal Research*, *353*, 102–113. https://doi.org/10.1016/j.jvolgeores.2018.01.021

Irawan, L. Y., Farihah, S. N., Prasetyo, W. E., Azizah, V., Hartono, R., Masruroh, H., & Mapa, M. T. (2024). The effectivity of community-based early warning system on reducing Semeru eruption impact post-eruption 2021. *IOP Conference Series: Earth and Environmental Science*, *1314*(1). https://doi.org/10.1088/1755-1315/1314/1/012037

Islam, R., & Walkerden, G. (2014). How bonding and bridging networks contribute to disaster resilience and recovery on the Bangladeshi coast. *International Journal of Disaster Risk Reduction*, *10*(PA), 281–291. https://doi.org/10.1016/j.ijdrr.2014.09.016

Khusna, N. I., Sumarmi, Bachri, S., Astina, I. K., Susilo, S., & Idris. (2023). Social resilience and disaster resilience: A strategy in disaster management efforts based on big data analysis in Indonesian's twitter users. *Heliyon*, *9*(9), e19669. https://doi.org/10.1016/j.heliyon.2023.e19669

Lewicka, M. (2011). Place attachment: How far have we come in the last 40 years? *Journal of Environmental Psychology*, *31*(3), 207–230. https://doi.org/10.1016/J.JENVP.2010.10.001

Lindseth, A., & Norberg, A. (2004). A phenomenological hermeneutical method for researching lived experience. *Scandinavian Journal of Caring Sciences*, *18*(2), 145–153. https://doi.org/10.1111/j.1471-6712.2004.00258.x

Mallick, B. (2019). The nexus between socio-ecological system, livelihood resilience, and migration decisions: Empirical evidence from Bangladesh. *Sustainability (Switzerland)*, *11*(12). https://doi.org/10.3390/su11123332

Mbaye, L. (2017). Climate change, natural disasters, and migration. *IZA World of Labor*, *March*, 1–10. https://doi.org/10.15185/izawol.346

Mukherjee, M., & Fransen, S. (2024). Exploring migration decision-making and agricultural adaptation in the context of climate change: A systematic review. *World Development*, *179*, 106600. https://doi.org/https://doi.org/10.1016/j.worlddev.2024.106600

Peng, L., Lin, L., Liu, S., & Xu, D. De. (2017). Interaction between risk perception and sense of place in disaster-prone mountain areas: a case study in China's Three Gorges Reservoir Area. *Natural Hazards*, *85*(2), 777–792. https://doi.org/10.1007/s11069-016-2604-6

Realita, A., Fahmi, M. N., Prastowo, T., & Madlazim, M. (2022). Detection of Lahar Flow Direction from Semeru Eruption on 4 December 2021 using Gravity Method. *JPSE (Journal of Physical Science and Engineering)*, *7*(2), 75–85. https://doi.org/10.17977/um024v7i22022p075

Roosli, R., Isa, M. I., Mohamad, D., & Othman, A. G. (2022). Criteria and Attributes for the 20-Minute City Concept (Kp20M) in Balik Pulau, Pulau Pinang. *Planning*

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Malaysia, *20*(4), 235–247. https://doi.org/10.21837/pm.v20i24.1200

Setyonugroho, G. A., & Maki, N. (2024). Policy implementation model review of the post-disaster housing reconstruction in Indonesia case study: Aceh, Yogyakarta, and Lombok. *International Journal of Disaster Risk Reduction*, *100*(December 2022), 104181. https://doi.org/10.1016/j.ijdrr.2023.104181

Sina, D., Chang-Richards, A. Y., Wilkinson, S., & Potangaroa, R. (2019). A conceptual framework for measuring livelihood resilience: Relocation experience from Aceh, Indonesia. *World Development*, *117*, 253–265. https://doi.org/10.1016/j.worlddev.2019.01.003

Solikhin, A., Thouret, J. C., Gupta, A., Harris, A. J. L., & Liew, S. C. (2012). Geology, tectonics, and the 2002-2003 eruption of the Semeru volcano, Indonesia: Interpreted from high-spatial resolution satellite imagery. *Geomorphology*, *138*(1), 364–379. https://doi.org/10.1016/j.geomorph.2011.10.001

Sumarmi, Bachri, S., Irawan, L. Y., Putra, D. B. P., Risnani, & Aliman, M. (2020). The effect of experiential learning models on high school students learning scores and disaster countermeasures education abilities. *Journal for the Education of Gifted Young Scientists*, *8*(1), 61–85. https://doi.org/10.17478/jegys.635632

Svensson, D. P. H. (2019). *The Patterns of Sense of Place A Post-Structural Human Geography Case Study in HafenCity, Hamburg*.

Swapan, M. S. H., & Sadeque, S. (2021). Place attachment in natural hazard-prone areas and decision to relocate: Research review and agenda for developing countries. *International Journal of Disaster Risk Reduction*, *52*(October), 101937. https://doi.org/10.1016/j.ijdrr.2020.101937

Tourneau, F. M. Le. (2022). "It's Not for Everybody": Life in Arizona's Sparsely Populated Areas. *Annals of the American Association of Geographers*, *112*(6), 1794–1811. https://doi.org/10.1080/24694452.2022.2035208

Zhao, H. (2023). Understanding Shiminhua in Chinese Greater Bay Area: Internalizing urban identity and negotiating place attachment. *Regional Science Policy & Practice*, *15*(9), 1956–1979. https://doi.org/https://doi.org/10.1111/rsp3.12730

Zheng, C., Zhang, J., Guo, Y., Zhang, Y., & Qian, L. (2019). Disruption and reestablishment of place attachment after large-scale disasters: The role of perceived risk, negative emotions, and coping. *International Journal of Disaster Risk Reduction*, *40*(July), 101273. https://doi.org/10.1016/j.ijdrr.2019.101273

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SOCIAL IMPACT ASSESSMENT MONITORING MECHANISM IN DEVELOPMENT PROJECTS : A REVIEW ON MALAYSIAN PRACTICES

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Abstract

This paper examines the effectiveness of Social Impact Assessment (SIA) monitoring mechanisms in development projects in Malaysia, with a focus on state-level practices. SIA is a crucial tool for ensuring that development initiatives aligned with sustainable development goals by balancing social, environmental, and economic factors. However, the implementation and monitoring of Social Impact Management Plans (SIMPs) are often inconsistent, leading to gaps in the process of SIA in Malaysia. These gaps include unclear stakeholder roles, insufficient timelines for monitoring activities, and inadequate mechanisms for assessing and mitigating impacts. Through literature review and analysis of Malaysia's existing SIA processes, this study identifies several areas that need a drastic improvement. A key recommendation is the establishment of clearer, more detailed guidelines for stakeholders to ensure better accountability and coordination across the different levels of government, project developers, and affected communities. Effective community engagement is also emphasized, as it ensures that the voices of local communities are heard and that their concerns are addressed throughout the project lifecycle. By strengthening the roles of stakeholders and enhancing the monitoring framework, this paper proposes a more comprehensive and integrated approach that not only improves SIA practices but also ensures that development projects contribute positively to the well-being of local communities.

Keywords: Social Impact Assessment, Monitoring, Social Impact Mitigation Plans

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INTRODUCTION

Social Impact Assessment (SIA) plays an increasingly vital role in the planning and execution of development projects worldwide. Its primary objective is to assess the potential social impacts of proposed development initiatives, ensuring that these projects contribute positively to communities and do not disproportionately harm vulnerable populations. The focus of SIA extends beyond merely identifying potential social consequences; it also emphasizes managing and mitigating adverse effects while enhancing beneficial outcomes for affected communities. This process helps ensure that economic growth does not come at the expense of social well-being or environmental sustainability (Vanclay, 2003).

The International Association for Impact Assessment (IAIA) has been a pivotal organization in defining and advancing the principles and practices of Social Impact Assessment (SIA). As per Vanclay (2003), SIA is understood as a process for managing both intended and unintended social consequences of development projects, policies, and plans. IAIA has consistently emphasized integrating SIA into broader impact assessment frameworks, advocating for adaptive management and active stakeholder participation throughout project lifecycles.

SIA serves as a mechanism for identifying and evaluating the social consequences of development projects—both positive and negative—on local populations, including their livelihoods, cultural practices, social structures, and quality of life. It is particularly concerned with potential changes to the way people live, work, interact, and relate to their environment as a result of a proposed development (Vanclay, 2003). Moreover, SIA is designed to address social equity issues, ensuring that vulnerable groups are not disproportionately impacted by large-scale projects.

In recent years, Malaysia has witnessed rapid urbanization and economic expansion, driven by large-scale infrastructure projects, urban development, and resource extraction activities. As the country strives to meet its development goals and align with the United Nations Sustainable Development Goals (SDGs), ensuring that such projects are socially responsible has become critical. The introduction of the Town and Country Planning Act 1976 (Amendment 2017) [Act A1522] represents a significant milestone in Malaysia's regulatory framework, mandating that certain large-scale and high-impact development projects undergo a Social Impact Assessment. This legislation aims to align national development projects with broader sustainability goals, ensuring that projects are economically viable while minimizing negative social repercussions on communities (Hassan, 2018).

Among these is the issue of monitoring. Although SIAs identify and propose mitigation strategies for potential social impacts, the processes for enforcing and monitoring these mitigation measures, known as Social Impact

Mitigation Plans (SIMPs), are often insufficiently prioritized. As a result, mitigation measures that are outlined in SIA reports may not be properly implemented, monitored, or adjusted over the course of the project lifecycle, leading to unanticipated social consequences for affected communities (PLANMalaysia, 2023).

The Problem of Monitoring in SIA Practices

Monitoring the implementation of mitigation strategies is a critical part of the SIA process. It ensures that the social impacts predicted during the assessment phase are appropriately addressed and that any unforeseen consequences can be mitigated in a timely manner. However, in Malaysia, there is a significant gap in the monitoring mechanisms embedded within the SIA framework. The current guidelines are often vague, lacking specific timelines, detailed responsibilities, and clear procedures for enforcing the monitoring of SIMPs throughout the project lifecycle (Rossouw & van der Merwe, 2024).

For instance, PLANMalaysia, the main regulatory body overseeing SIA implementation, has provided guidelines for preparing and submitting SIA reports, but the agency has not specified detailed procedures for ensuring that the proposed mitigation measures are effectively monitored. The Social Impact Assessment Preparation Guidelines (PPSIA) 2023 acknowledged the importance of monitoring but fail to establish comprehensive mechanisms for real-time or ongoing evaluations of SIMP implementation. Without clear monitoring systems in place, there is little accountability for ensuring that social impacts are continually assessed and mitigated (PLANMalaysia, 2023).

This lack of systematic monitoring is further exacerbated by the decentralized nature of SIA enforcement in Malaysia. While the federal government mandates the submission of SIA reports, it is often up to state and local authorities to oversee their implementation process. Different states exhibit varying levels of commitment and capacity to enforce SIA provisions, leading to inconsistent practices across the country. This creates disparities in how SIMPs are enforced and monitored, with some projects receiving rigorous scrutiny while others proceed with minimal oversight (Suaree et al., 2022).

Challenges in Stakeholder Engagement and Participation for Monitoring

A key principle of effective SIA is the involvement of local communities in both the assessment and monitoring phases. Stakeholder engagement is critical to ensuring that the concerns and needs of affected communities are accurately reflected in the mitigation strategies. However, in Malaysia, public participation in SIA processes, particularly in the monitoring of SIMPs, is often minimal. Communities are frequently excluded from the decision-making processes, and their input is seldom sought after the initial assessment phase (Hassan, 2018). This lack of community involvement can lead to the implementation of mitigation

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measures that are misaligned with the actual needs and preferences of the people they are intended to benefit. Monitoring efforts may include revisiting local communities and conducting surveys to address concerns raised in the SIMP, facilitating the assessment of proposed KPIs and the evaluation of the resulting social impacts.

This issue is further exacerbated by the absence of clear communication channels to convey community concerns to project developers and government agencies. Consequently, the social impacts of development projects are often assessed without meaningful involvement from the affected communities. This disconnect undermines the alignment between the mitigation strategies proposed in SIMPs and the actual conditions on the ground (Franks & Vanclay, 2013).

In every Social Impact Assessment (SIA), a key requirement is the establishment of a Social Impact Monitoring Committee (SIMC) tasked with overseeing the assessment of anticipated social impacts and the implementation of mitigation measures. This committee typically includes representatives from relevant technical departments, government agencies, and community leaders from the affected areas. However, while the inclusion of these stakeholders is essential for the monitoring process, their roles and effectiveness have yet to be proven in practice. A significant gap identified in the existing monitoring frameworks is the lack of clear guidelines to assess the effectiveness of community engagement and the roles of local leaders (Franks & Vanclay, 2023).

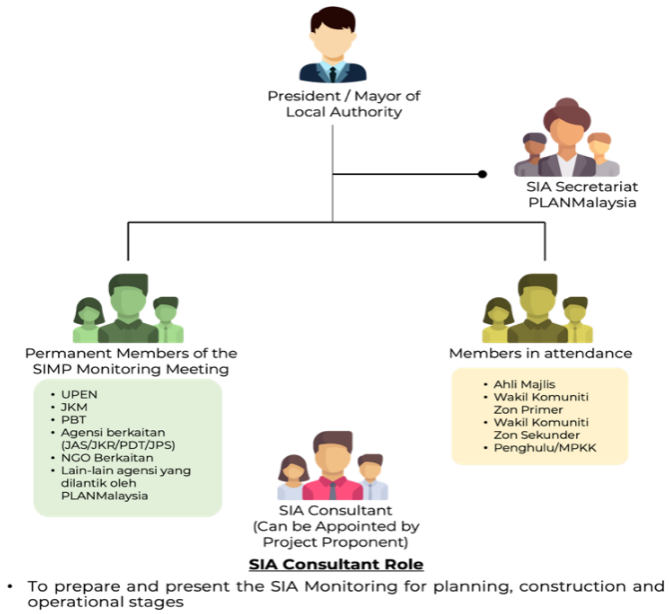


Figure 1: The Proposed of Social Impact Monitoring Committee
Source: German Technology Park SIA Report, 2024

Without structured mechanisms to measure community involvement, it is challenging to ensure that the voices of local populations are genuinely considered, limiting the ability of stakeholders to effectively manage social impacts during development projects (Hassan, 2022). The involvement of community leaders and representatives is critical, as they act as intermediaries between the project proponent and the affected community. However, studies have shown that, without sufficient capacity-building and proper guidelines, the contributions of these stakeholders can remain superficial and fail to influence decision-making (See et al., 2024). This highlights the need for more robust stakeholder engagement practices, with clear roles and accountability measures for community leaders and affected populations. Additionally, the project proponent plays a crucial role in monitoring SIA during the development phase. It is the responsibility of the proponent to ensure that social impact mitigation measures are not only planned but also implemented effectively and continuously monitored. Without the proponent's active involvement in monitoring, the SIA process risks becoming a static document rather than a dynamic tool for addressing social issues as they arise (Zeshan et al., 2021). Therefore, it is essential that the proponent, together with other stakeholders, works collaboratively to track progress, address concerns in real-time, and adapt mitigation strategies as necessary.

LITERATURE REVIEW

The Concept of Social Impact Assessment (SIA)

Social Impact Assessment (SIA) has evolved as a critical component in ensuring that development projects align with sustainable development objectives. SIA assesses the potential social impacts, both positive and negative of proposed development projects on affected communities. The International Association for Impact Assessment (IAIA) defines SIA as the process of identifying, analyzing, and managing the intended and unintended social consequences of interventions, including policies, plans, and projects (Vanclay, 2003). This ensures that projects contribute to sustainable and equitable development, taking into consideration the well-being of individuals, families, and communities.

Globally, SIA has been embraced as part of the broader environmental and social governance (ESG) framework in various industries such as mining, infrastructure development, and urban planning. Esteves et al. (2012) argue that SIA is crucial for promoting community engagement, stakeholder participation, and transparency in decision-making processes. In many cases, SIA has become a statutory requirement, with governments mandating its use for large-scale development projects. The process allows developers, policymakers, and communities to better understand the social changes a project may cause, such as impacts on livelihoods, health, social cohesion, and access to resources.

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Global Context and Best Practices

Globally, many countries have integrated SIA monitoring as part of a broader framework for managing environmental, social, and governance (ESG) concerns in development projects. For example, in Australia and South Africa, SIA is part of an adaptive management framework that includes continuous monitoring of social impacts throughout the project lifecycle, from pre-construction to post-completion. These countries have implemented rigorous standards for tracking and reporting on social impacts, often requiring developers to regularly update their SIMPs based on ongoing community feedback and real-time data (Franks & Vanclay, 2013).

Advanced technologies such as Geographic Information Systems (GIS) and big data analytics are increasingly used to enhance the effectiveness of SIA monitoring globally. GIS, for instance, allows for real-time tracking of social and environmental changes, enabling stakeholders to respond quickly to any negative impacts (Chamaki et al., 2018). Big data analytics can also help identify patterns and trends in social impacts that may not be immediately visible through traditional monitoring techniques. However, the adoption of these technologies in Malaysia remains limited due to financial and technical constraints.

Legal and Policy Framework of SIA in Malaysia

In Malaysia, the regulatory framework for SIA has been formalized through the Town and Country Planning Act 1976, particularly following its amendment in 2017. The amendment mandates the preparation of SIA reports for large-scale projects or those deemed to have significant social impacts, thus making SIA an essential part of the development approval process. The purpose of these reports is to ensure that proposed development projects do not cause disproportionate harm to local communities and that mitigation strategies are planned to offset any negative social consequences (Hassan, 2018).

The Act specifically emphasizes that SIA must be conducted before planning permissions are granted for projects that could have a major social impact. This amendment marked a significant shift in how social consequences are considered in the planning and approval processes of development projects. However, as several scholars (Suaree et al., 2022; PLANMalaysia, 2023) have pointed out, the lack of clear guidelines on how mitigation measures are to be monitored post-approval remains a significant gap. While federal guidelines exist, the enforcement and interpretation of these guidelines are inconsistent at the state and local levels.

Monitoring Mechanisms in Social Impact Assessment

Monitoring the implementation of Social Impact Management Plans (SIMPs) is an essential, yet often neglected, component of the SIA process. According to Rossouw and van der Merwe (2024), the lack of effective monitoring

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mechanisms can result in mitigation measures being ignored or poorly executed, particularly after the initial project approval stages. Monitoring ensures that the planned social mitigation strategies are executed, assessed for effectiveness, and adjusted as necessary to accommodate ongoing or unforeseen social changes.

Globally, effective SIA monitoring has been associated with continuous evaluation and adaptive management strategies. For instance, in Australia and Canada, SIAs are integrated into the broader framework of Environmental Impact Assessments (EIAs), with monitoring mechanisms that cover both the environmental and social impacts throughout the project lifecycle (Esteves et al., 2012). These frameworks emphasize the importance of ongoing monitoring to ensure compliance with mitigation plans and to track whether predicted social impacts materialize as expected.

In Malaysia, however, monitoring is often a weak link in the SIA process. The existing guidelines for SIA monitoring, as outlined by PLANMalaysia in 2023, provide limited specifics regarding timelines, stakeholder roles, and appropriate methodologies for monitoring the effectiveness of mitigation strategies. This has resulted in inconsistent application across different states and sectors. For instance, studies have shown that there is a significant variation in how SIMPs are monitored, with some states conducting robust evaluations, while others provide minimal oversight (Hassan, 2018).

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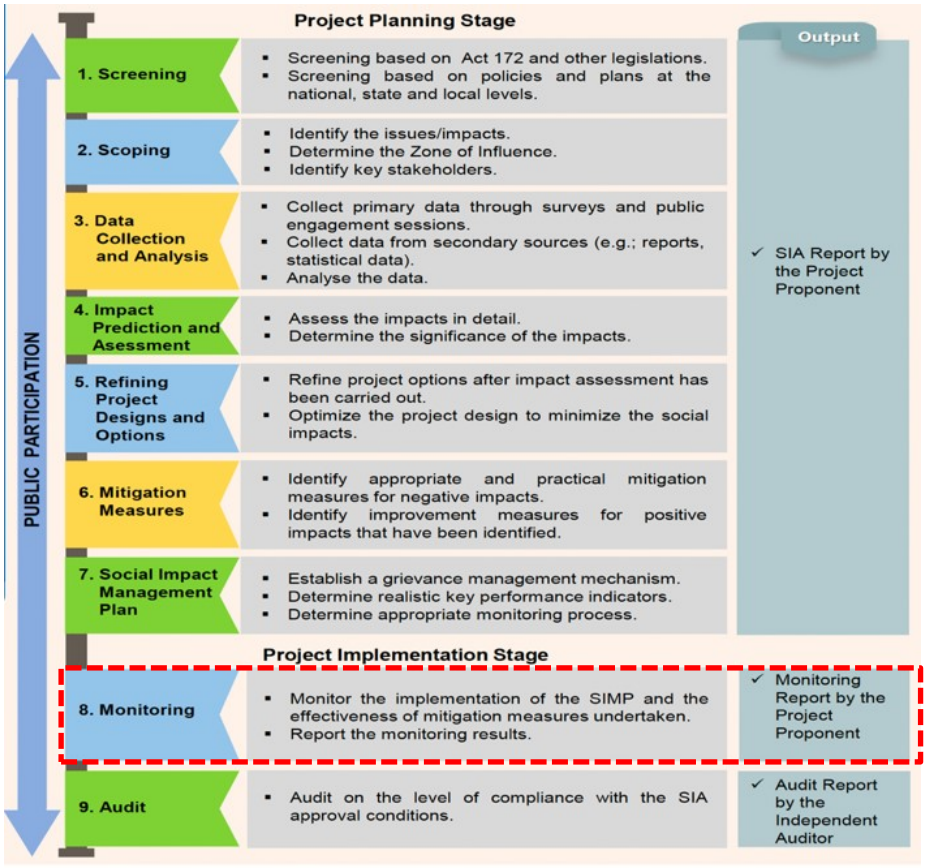


Figure 2: The Process of Social Impact Assessment (SIA)
Source: PPSIA, PLANMalaysia, 2024

Stakeholder Roles in SIA Monitoring

The success of SIA monitoring depends heavily on the roles played by various stakeholders, including government agencies, developers, local communities, and civil society organizations. According to Franks and Vanclay (2013), stakeholder participation is crucial in ensuring that monitoring processes are transparent, accountable, and reflective of the needs of affected communities. However, in Malaysia, the roles and responsibilities of these stakeholders are not always clearly defined, particularly in terms of post-approval monitoring.

The lack of clarity in stakeholder roles often leads to confusion about who is responsible for monitoring social impacts during and after project implementation. This gap can result in poor enforcement of mitigation measures and an inability to address social issues as they arise. Strengthening stakeholder roles, particularly the involvement of local communities in the monitoring

process, is essential for ensuring the long-term social sustainability of development projects (Sairinen et al., 2011).

Technological Integration in SIA Monitoring

The integration of advanced technologies such as Geographic Information Systems (GIS), remote sensing, and big data analytics has the potential to significantly enhance the monitoring of social impacts in development projects. These technologies provide real-time data and allow for more accurate tracking of social changes, enabling stakeholders to monitor and adjust mitigation measures promptly. GIS, for instance, has been widely used to map social impacts and monitor changes in land use and community dynamics over time. Such technologies not only help in identifying negative impacts but also in optimizing positive contributions from development projects by facilitating better decision-making and adaptive management (Parra, 2022; See et al., 2024).

However, the adoption of these technologies in Malaysia's Social Impact Assessment (SIA) monitoring framework remains limited due to challenges such as a lack of technical expertise, financial constraints, and insufficient infrastructure (Zeshan et al., 2021). Despite these barriers, integrating technologies like GIS, remote sensing, and big data could substantially improve the effectiveness of monitoring efforts by providing more detailed, real-time insights into social and environmental dynamics. This would ensure that mitigation measures are not only implemented but also adapted based on continuous monitoring. Furthermore, integrating these tools could help achieve the United Nations Sustainable Development Goals by enhancing the monitoring of community well-being, land use, and the socio-economic impact of projects (Parra, 2022; See et al., 2024). As such, future research should explore practical solutions for overcoming these technological and infrastructural challenges to facilitate the broader adoption of these technologies in Malaysia's SIA practices.

METHODOLOGY

Research Design

The research design for this study adopts a qualitative research design to explore the effectiveness of Social Impact Assessment (SIA) monitoring mechanisms in Malaysia. The research focuses on understanding how current practices are applied, identifying gaps in monitoring processes, and proposing improvements for the Social Impact Mitigation Plans (SIMPs) in development projects. A qualitative approach was chosen because it allows for an in-depth analysis of stakeholder perspectives, existing policies, and contextual challenges in the implementation of SIA monitoring mechanisms. Data was collected through a review of existing SIA reports, policy documents, and academic literature. The analysis focuses on identifying the key challenges in the current monitoring processes and proposing a framework to improve these practices.

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Data Collection Method

The study relies heavily on document analysis as a primary method of data collection. Data sources include official reports from PLANMalaysia, academic publications, and case studies of development projects that required SIA. The document analysis provides insights into the content of SIMPs, the guidelines for monitoring social impacts, and the legal requirements for enforcing these plans. Additionally, it helps identify inconsistencies in how SIA monitoring is implemented across different states.

Interviews with key stakeholders, such as SIA report providers, developers, and government officials, were also conducted to gain insights into the practical challenges of implementing and monitoring SIMPs. The interviews focused on understanding the challenges faced in implementing and monitoring SIMPs, stakeholder roles in the process, and the adequacy of current guidelines and tools for monitoring. These interviews provided qualitative data on the practical aspects of SIA implementation and monitoring, highlighting both successes and areas for improvement.

Three case studies of large-scale development projects in Malaysia were selected to provide a deeper understanding of how SIMPs are monitored in practice as of table 1. These case studies focus on projects that have had significant social impacts, such as infrastructure development or resource extraction projects in urban and rural areas. The case studies involve an analysis of the SIA reports for these projects, as well as interviews with stakeholders involved in monitoring the social impacts.

Data Analysis

Thematic analysis was used to analyze the qualitative data collected from documents, interviews, and case studies. Data was coded and categorized into themes, allowing for the identification of patterns and relationships between different aspects of the monitoring process. The findings from the analysis were then used to propose a comprehensive framework for improving SIA monitoring practices in Malaysia.

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Table 1 : Social Impact Assessment (SIA) Report Submission for Planning Permission Applications as for 2024

States	Applications
State of Selangor	102
State of Pahang	5
State of Melaka	35
State of Negeri Sembilan	20
State of Terengganu	23
State of Pulau Pinang	67
State of Kedah	-
State of Perak	8

Source: PLANMalaysia, August, 2024

Validation of Findings

To ensure the reliability and validity of the findings, triangulation was employed by cross-referencing data from multiple sources, including document analysis, interviews, and case studies. This helped to verify the consistency of findings across different contexts and stakeholder perspectives.

RESULTS

Current SIA Practices in Malaysia

The analysis of existing SIA practices reveals that while SIA reports are legally required for certain development projects, the monitoring of Social Impact Mitigation Plans (SIMPs) is inconsistent. Many SIA reports lack detailed provisions for ongoing monitoring, leaving gaps in enforcement once the project has received approval. This is particularly evident at the state level, where local authorities often lack the resources and technical expertise needed to monitor social impacts effectively.

As of 2024, **Selangor** has contributed **39.5%** of the total SIA reports, while states like **Kedah** have submitted none at all, leading to disparities in how social impacts are managed across regions. This inconsistency in SIA application reflects broader regulatory and enforcement gaps, which undermine social accountability. Research also shows that **70%** of developers and SIA report providers face difficulties in preparing the required **Monitoring Reports** due to the absence of clear procedural guidelines (Hassan, 2018). Although the **Social Impact Assessment Preparation Guidelines (PPSIA) 2023** offers some direction on monitoring, it lacks specific methodologies for implementing the monitoring process (Suaree et al., 2022).

Stakeholder Engagement and Monitoring

Interviews with key stakeholders revealed that the roles of government agencies, developers, and local communities in the SIA monitoring process are not clearly defined. This lack of clarity often leads to delays in the enforcement of mitigation

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measures, with some projects proceeding without adequate social impact monitoring. Stakeholders also highlighted the need for better coordination between government agencies at the federal, state, and local levels.

The absence of a structured, systematic framework for continuous monitoring renders the implementation of SIMPs less effective, creating a gap between policy and practice (Esteves et al., 2012). This is particularly evident in the lack of clarity surrounding **stakeholder roles. 75%** of government agencies and technical departments involved in monitoring SIMPs are unclear about their specific responsibilities, with **60%** of them citing insufficient resources to engage effectively in the monitoring process (Franks & Vanclay, 2013). This confusion hinders the ability to enforce mitigation measures, ultimately leaving communities vulnerable to unaddressed social impacts.

Technological Gaps

The integration of technologies such as GIS and big data analytics into the monitoring process of Social Impact Assessments (SIA) remains limited in Malaysia. While these tools hold great potential to provide real-time insights into the social impacts of development projects, their adoption has been slow due to a lack of technical expertise, financial resources, and insufficient infrastructure (Zeshan et al., 2021; Parra, 2022). However, the application of these technologies in SIA remains in its infancy, and further investment and expertise are required to leverage these tools effectively for social impact monitoring (Digital News Asia, 2022).

By enhancing the capacity of local agencies and providing more resources for technical training, Malaysia could significantly improve its ability to monitor social impacts and implement timely mitigation strategies. This would help close the gap in effective governance and ensure that development projects are more socially responsible and sustainable in the long run.

DISCUSSION

Impacts to the Community

If the Social Impact Assessment (SIA) Monitoring Report is not prepared, it can have severe repercussions on the affected communities. One significant impact is the potential for unmitigated adverse effects, such as loss of livelihoods, social cohesion, and access to essential resources. These effects disproportionately affect vulnerable groups, including low-income households and indigenous communities, exacerbating inequalities and social exclusion (IUCN, 2024). Moreover, without monitoring, mitigation measures proposed during the SIA process are unlikely to be implemented effectively, leaving communities exposed to ongoing or worsening conditions, such as displacement or inadequate compensation mechanisms (World Bank, 2024).

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Effective monitoring is crucial for addressing unforeseen challenges and adapting project plans to local needs, fostering inclusivity and social sustainability. Without this, projects risk alienating affected populations and failing to meet both local development and international sustainability goals, such as the United Nations Sustainable Development Goals (Social Impact Assessment Hub, 2024). This lack of accountability and feedback mechanisms can also result in legal disputes or community protests, further delaying or derailing the project.

Enhancing Monitoring Mechanisms

To address the identified gaps in monitoring, this study proposes a framework that emphasizes clear guidelines for monitoring SIMPs throughout a project's lifecycle. This includes defining specific roles and responsibilities for all stakeholders involved, from government agencies to developers and local communities. The framework also recommends setting clear timelines for the monitoring process, ensuring that social impacts are tracked at regular intervals.

Stakeholders Role

Stakeholders play a crucial role in the effective implementation of the SIA monitoring report, especially in ensuring that the identified social impacts are managed throughout the project lifecycle. Key stakeholders, including government agencies, local communities, project developers, and civil society organizations, must actively participate in both the assessment and monitoring processes. Government agencies are typically responsible for enforcing regulations and ensuring compliance with SIA guidelines, while developers are tasked with preparing the SIA report and implementing mitigation measures. Local communities, particularly those directly affected by the project, must be engaged throughout the process to ensure that their concerns are addressed and that the mitigation strategies align with their needs. This collaboration helps to foster transparency, build trust, and ensure that the benefits of the project are maximized while minimizing negative social impacts (IUCN, 2024; Social Impact Assessment Hub, 2024).

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NO	IDENTIFIED SOCIAL IMPACTS	SEVERITY LEVEL	*OUTCOME*	MITIGATION MEASURES	KPI	IMPLEMENTING PARTY	MONITORING PERIOD	ENFORCEMENT AGENCIES
KESIHATAN DAN KESEJAHTERAAN SOSIAL								
1d	Health and Social Well-being **(QUESTIONNAIRE & FGD)**	Significant Negative Impact (Low Priority)	To increase trust and community acceptance	• Making transparent and open announcements through mass media and electronic media • Conducting consultations with local residents, explaining the benefits they will gain, such as job opportunities and other related advantages • Developing an industrial area based on the Manage Industrial Park (MIP) concept, integrating industrial activities with the community	• An 80% increase in community acceptance • Two consultation sessions with local residents within the first 6 months of the project. • Distributing mass media and electronic press releases annually regarding the progress and benefits of the project. • A 50% reduction in public complaints about the project.	Project Proponent	**During Planning Permission**	i. Local Authority ii. State Invest Company

Figure 3: Social Impact Management Plan and role of stakeholders
Source: German Technology Park SIA Report, 2024

The success of the SIA monitoring report largely depends on continuous stakeholder engagement and adaptive management. Once the monitoring report is implemented, ongoing feedback from stakeholders is essential for assessing the effectiveness of the mitigation measures and making necessary adjustments. This process involves collecting data through various methods such as community surveys, focus group discussions, and participatory monitoring. The monitoring team should ensure that the voices of vulnerable groups are heard and that their social and cultural needs are prioritized. By integrating these perspectives, stakeholders can contribute to better project outcomes and a more socially responsible development process. Failure to adequately involve stakeholders in the monitoring process can result in unaddressed social issues, which can lead to project delays, increased conflicts, or even abandonment (Social Impact Assessment, 2024; State Development, Infrastructure and Planning, 2024).

Leveraging Technology for Improved Monitoring

The integration of advanced technologies such as Geographic Information Systems (GIS) and big data analytics into the Social Impact Assessment (SIA) process offers a promising solution to the challenges identified in this study. These tools provide real-time data that enable stakeholders to actively monitor and assess social impacts throughout the project lifecycle. GIS, for example, allows for spatial analysis, enabling better visualization of how development projects affect local communities, infrastructure, and land use over time (Zeshan et al., 2021). By using satellite imagery and mapping tools, it is possible to track changes in land use, monitor displacement, and assess the effects of construction activities on local ecosystems. Furthermore, the use of big data analytics allows for the processing of large volumes of social, economic, and environmental data,

which can be leveraged to predict potential social impacts and help tailor mitigation measures more effectively (Parra, 2022; See et al., 2024).

Strengthening Stakeholder Engagement

Clearer definitions of stakeholder roles are crucial for improving the implementation of Social Impact Mitigation Plans (SIMPs) and ensuring that the monitoring process is both effective and inclusive. Research suggests that well-defined roles for stakeholders—ranging from government agencies to local communities and project developers—are essential to prevent overlapping responsibilities and gaps in accountability (Franks & Vanclay, 2023). For instance, government agencies must ensure that developers comply with the monitoring guidelines, while developers should actively engage with local communities, providing them with transparent information about the project's progress and impact. This collaborative approach ensures that all parties are aligned in their goals of minimizing negative impacts and optimizing positive outcomes (See et al., 2024).

Moreover, the role of community engagement in SIA monitoring cannot be overstated. Effective community involvement ensures that local populations have a voice in both the assessment and monitoring processes, which helps align the mitigation measures with the real needs of those affected by the project (Hassan, 2022). This involvement not only promotes social equity but also improves the legitimacy of the project within the community, reducing the risk of resistance or social unrest. Stakeholders must prioritize continuous engagement through transparent communication, regular updates, and active participation in decision-making. By doing so, the monitoring process becomes more dynamic, adaptive, and capable of responding to unforeseen social impacts in real time (Zeshan et al., 2021; Parra, 2022). Ultimately, strengthening stakeholder roles and community engagement will significantly enhance the effectiveness of SIMP implementation, contributing to the long-term success and sustainability of development projects.

CONCLUSION

This study has highlighted significant gaps in the current practices for monitoring Social Impact Mitigation Plans (SIMPs) in Malaysia. While Social Impact Assessment (SIA) is an essential tool for ensuring sustainable development, its effectiveness is often undermined by the lack of clear monitoring mechanisms, poorly defined stakeholder roles, and limited integration of technological solutions. The absence of specific, enforceable guidelines and the failure to adequately define stakeholder responsibilities have resulted in inconsistencies across various development projects. Moreover, the limited use of modern technologies, such as Geographic Information Systems (GIS) and real-time data

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analytics, reduces the ability to monitor and adjust mitigation strategies effectively as the project evolves (Social Impact Assessment Hub, 2024).

To address these issues, this study proposes a comprehensive framework for improving SIA monitoring, including clearer guidelines, enhanced stakeholder engagement, and the adoption of advanced technologies. Implementing these recommendations will help ensure that the benefits of development projects are maximized while minimizing negative social impacts, thus making them more sustainable and socially responsible (State Development, Infrastructure and Planning, 2024). Furthermore, future research should focus on the practical implementation of this framework, exploring how emerging technologies can be incorporated into the SIA monitoring process to improve real-time tracking and responsiveness. A structured investigation into the current regulatory gaps and inconsistencies in SIMP monitoring across different jurisdictions is crucial to ensure uniformity and accountability. By developing standardized procedures and incorporating advanced data analytics tools, Malaysia can achieve more effective monitoring, providing a stronger foundation for sustainable development and mitigating social impacts more efficiently (Social Impact Assessment, 2024).

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REFERENCES

Chamaki, P., Franks, D. M., & Vanclay, F. (2018). GIS for monitoring social impacts. *Environmental Impact Review*.
Digital News Asia. (2022). Big data: Malaysia takes ‘small but significant’ first step. *Digital News Asia*.
Esteves, A. M., Franks, D. M., & Vanclay, F. (2012). Social impact assessment: The state of the art. *Impact Assessment and Project Appraisal*, *30*(1), 34–42.
Franks, D. M., & Vanclay, F. (2013). Social impact management plans: Innovation in corporate and public policy. *Environmental Impact Assessment Review*, *43*, 40–48.
Franks, D. M., & Vanclay, F. (2023). Stakeholder roles and social impact management in large-scale development projects. *Impact Assessment and Project Appraisal*.
Hassan, M. M. (2018). Social impact assessment (SIA): A review of SIA procedure in Malaysia. *The International Journal of Social Sciences and Humanities Invention*, *5*, 4550–4557.
Hassan, M. M. (2022). Community engagement in the social impact assessment process: Lessons from Malaysia. *Social Impact Journal*.
IUCN. (2024). *Social Impact Assessment Guidelines*.
Parra, L. (2022). *Remote sensing and GIS in environmental monitoring*. MDPI.
PLANMalaysia. (2023). *Social Impact Assessment Implementation Guidelines*.
Rossouw, N., & van der Merwe, J. (2024). Adaptive management in SIA monitoring. *Impact Assessment and Project Appraisal*, *30*(1), 45–50.

See, L., Lesiv, M., & Schepaschenko, D. (2024). *Integrating remote sensing and geospatial big data for land use mapping and monitoring*. MDPI.

Social Impact Assessment. (2024). *Guidance for assessing and managing social impacts*.

Social Impact Assessment Hub. (2024). *Principles of SIA*.

State Development, Infrastructure and Planning. (2024). *Social Impact Assessment*.

Suaree, M. N. A. S., Syed Abdul Kader, S. Z., Mohamed Osman, M., & Abdul Manaf, Z. I. (2022). The development of policy and legal framework for social impact assessment in Malaysia. *Planning Malaysia*, *20*(22). Town and Country Planning Department@PLANMalaysia. (2022). Implementation of social impact assessment for development projects in Malaysia. Presented at the *International Symposium on Social Impact Assessment in East Asia and The Pacific*.

Vanclay, F. (2003). International principles for social impact assessment. *Impact Assessment and Project Appraisal*, *21*(1), 5–11.

Vanclay, F. (2012). The potential application of social impact assessment in integrated coastal zone management. *Ocean & Coastal Management*, *68*, 149–156.

Vanclay, F. (2014). *Developments in social impact assessment*. Edward Elgar.

Vanclay, F. (2024). International principles for social impact assessment. *Social Impact Journal*, *52*(1), 25–30.

Vanclay, F., & Esteves, A. M. (2011). *New directions in social impact assessment: Conceptual and methodological advances*. Edward Elgar Publishing.

World Bank. (2024). *Social Impact Analysis Case Studies*. Zeshan, M. T., Mustafa, M. R. U., & Baig, M. F. (2021). *Monitoring land use changes and their future prospects using GIS and ANN-CA for Perak River Basin, Malaysia*. MDPI.

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EVALUATION OF CLIMATE DISASTER RESILIENCE INDEX IN YAN DISTRICT'S LOCAL PLAN IN KEDAH, MALAYSIA

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Abstract

Assessing the resilience of urban areas is crucial for effective disaster planning and management. The Climate Disaster Resilience Index (CDRI) is a widely recognized tool used globally to evaluate the current and future risks faced by cities and guide policy development. This research focuses on the application of the CDRI in Yan, Kedah to assess the district's resilience in the context of Local Plan preparation. A comprehensive evaluation was conducted across various components, including physical, social, economic, institutional, and environmental aspects. A total of 97 respondents from agencies and communities participated in the survey through online and face-to-face methods. The physical component in Yan District exhibited the highest resilience to disasters, with all aspects receiving resilience scores ranging from 3 (moderately satisfactory) to 4 (satisfactory). However, the economic component had the lowest CDRI score of 2.99 compared to the other components, indicating a need to focus on economic development to enhance disaster resilience in the district. The overall CDRI performance of the district suggests that local stakeholders are prepared to effectively manage disasters. The findings from the CDRI assessment can guide future planning efforts to promote more resilient development in Yan District.

Keywords: Resilience, Disaster, Index, Climate Change, Environment

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INTRODUCTION

Urbanization often results in increased disaster risk due to the rapid growth of urban populations globally (Lu et al., 2020). Natural disasters have a significant impact on the physical development and safety of communities worldwide. These disasters disrupt society in various ways, including psychological, sociodemographic, socioeconomic, and sociopolitical disruptions that require careful management (Chong, Kamarudin, and Abd Wahid, 2017). Disasters, whether natural or human-caused, have significant impacts on both people and the environment. Srinivas and Nakagawa (2008) noted that environmental factors can exacerbate the impacts of disasters, and disasters can also have global environmental consequences. As a result, Malaysia is taking steps to address the increasing risks of climate-related hazards in its current five-year national development plan, the 12th Malaysia Plan (2021-2025). The plan focuses on mitigating the effects of climate change as Malaysia recognizes the growing threats it poses. Chong, Kamarudin, and Abd. Wahid (2017) emphasized that disasters have physical impacts such as human casualties and damage to properties and infrastructure, affecting the community's well-being, quality, and safety. Therefore, involving stakeholders in disaster management is essential for efficiently and effectively handling these situations.

In Malaysia, the National Disaster Management Agency (NADMA) is responsible for overseeing all aspects of disaster risk management in the country (Center for Excellence in Disaster Management and Humanitarian Assistance, 2022; Chong and Kamarudin, 2018). NADMA, operating under the Prime Minister's Department (JPM), serves as the central authority for disaster management. The agency consistently undertakes initiatives to mitigate disaster risks and enhance preparedness. It operates through a Disaster Management and Relief Committee (DMRC) system to lead and coordinate disaster management activities (Ramli et al., 2021). Before the establishment of NADMA, the country's initial official effort in disaster management and relief was Directive No. 20 (National Policy and Mechanism on Management Relief Framework) under the National Security Council (NSC). While floods are the most common natural disaster in Malaysia, the country has also experienced earthquakes, landslides, tsunamis, and sinkholes over the years. NADMA was established to address and manage more complex and multiple disasters. The roles and directives of NADMA are depicted in Figure 1.

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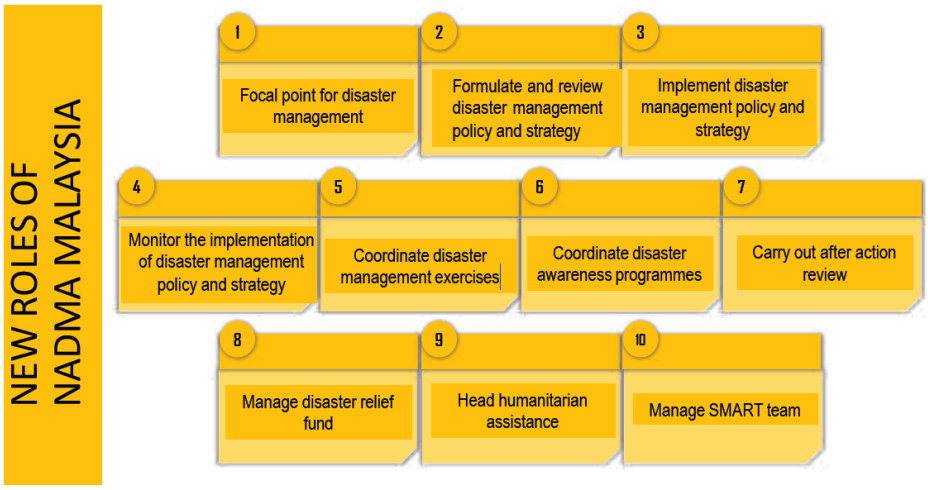


Figure 1: NADMA roles and directives
Source: Center for Excellence in Disaster Management and Humanitarian Assistance (2022)

Since the establishment of NADMA and the restructuring of federal government entities in 2015, a proactive strategy for disaster risk and response has been implemented. In the context of land use planning, the threat of natural hazards in urban areas is typically addressed through land use zoning, development strategies, and building regulations. The impact of climate change necessitates urban planners to devise comprehensive measures to adapt to more frequent and intense hazards. Integrating disaster management into local planning is crucial to ensure preparedness is considered in Malaysia's overall land use planning system. However, according to Wan Mohd Rani, Kamarudin, Razak, Che Hasan, and Mohamad (2018), Malaysia faces challenges in assessing and mapping the degree of urban resilience as it requires cooperation and dedication from multiple stakeholders.

In this regard, this paper advocates for integrating disaster resilience into local development plans as a key adaptive strategy. It evaluates how well the local development planning system in Malaysia addresses the vulnerability and resilience needs of communities in response to climate change impacts. The study, based on a CDRI survey in Yan District, assesses the level of disaster resilience inclusion in the local plan of Yan District. The paper emphasizes the importance of enhancing participatory planning and development capacity of local authorities and communities to effectively integrate disaster resilience into local development plans.

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LITERATURE REVIEW

Resilience in Urban Planning

The concept of 'resilience' has been widely used in various research disciplines and fields, including environmental studies and geographical analysis. Resilience can be classified into five spatial scales: household/individual, local, regional, national, and global society (Wilson, 2011; Berkes and Ross, 2013). The concept of resilience has expanded beyond its ecological origins to encompass disciplines like psychology, policy, and urban planning in the context of climate change (Rezaie et al., 2021; Giang et al., 2024). Resilience plays a crucial role in urban planning by helping cities withstand, adapt to, and recover from various impacts, ensuring their continued functionality in the face of challenges. Additionally, Imani et al. (2022) noted a growing trend of integrating climate change resilience into development planning and resource allocation.

Different levels of planning require the implementation of suitable natural disaster management strategies that align with the hierarchy of Malaysian development plans, such as the Structure Plan or Local Plan. Disaster resilience primarily involves disaster risk management, which should ideally be in line with Malaysia's sustainable development policy. The 12th Malaysia Plan (2021-2025) emphasizes both structural and non-structural approaches to managing disaster risks. Effective disaster management in the context of climate change involves addressing hidden risk factors and allocating significant resources to mitigate environmental instability, poverty, and urbanization-related issues.

Disaster Management in the Malaysian Planning System

Given Malaysia's vulnerability to disasters, especially flooding, the importance of disaster resilience has become a key focus in the Malaysian planning system. Currently, the Town and Country Planning Act 1976 (Act 172) establishes a three-tier administration system. At the federal level, Malaysia follows a three-tier governmental structure consisting of federal, state, and local administrations, in addition to the National Physical Plan (NPP).

PLANMalaysia introduced the 'Planning Guidelines for Disaster-Resilient Cities in Malaysia, 2019' as a specific framework for disaster management in the country. This guideline serves as a reference for State Governments and Local Planning Authorities (LPA) to evaluate urban resilience in their respective areas. The guidelines address five types of natural disasters: floods, landslides, coastal erosion, sea-level rise, and tsunamis/earthquakes. In 2022, PLANMalaysia's Director-General issued a circular on integrating disaster risk management into the development of District Local Plans (DLP). This circular, endorsed at the Central Disaster Management Committee Meeting on September 13, 2021, outlines the process of integrating disaster risk management elements into DLP preparation. As a result, all development plans must include a

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section on disaster and risk management, incorporating analysis and recommendations related to disaster management.

Climate Disaster Resilience Index (CDRI)

The Climate Disaster Resilience Index (CDRI) evaluates climate disaster resilience across five dimensions: physical, social, economic, institutional, and environmental (The World Bank, 2015). Developed by Kyoto University's Climate and Disaster Resilience Initiative (Imani, et al., 2021), the CDRI serves as a planning tool. Disaster management and risk reduction require the involvement of various stakeholders, administrators, and comprehensive urban system planning. The CDRI aims to increase awareness among policymakers and practitioners about current and future climate-related disaster risks, facilitating improved planning and management to safeguard the environment and communities. By enhancing and restructuring disaster management agencies, they can better align with the country's current disaster landscape. Efforts to integrate disaster risk reduction into urban planning and development should be conducted regularly based on hazard and risk levels, taking a holistic approach. The current sectoral approach to disaster risk is inadequate for mitigating risks in multi-disaster zones. Therefore, by bridging the gap between science and policy in program implementation, it is possible to reduce disaster risks and their impacts.

Various organizations have developed tools and services to assess and enhance resilience to climate risks (Cai et al., 2018). These resources are primarily used by governments, NGOs, academia, and the private sector to aid decision-making in complex and uncertain situations (Laurien et al., 2022). According to scholars like Joerin and Shaw (2011) and Surjan, Sharma, and Shaw (2011), the CDRI aims to increase awareness of future risks faced by cities. The assessment outcomes are expected to inform the development of comprehensive disaster and climate management plans to tackle challenges related to climate change. The CDRI is crucial for promoting sustainable development, particularly in the face of escalating climate risks. It plays a vital role in fostering climate-smart, inclusive, and disaster-resilient development pathways. By ensuring that development is both sustainable and adaptable to global climate challenges, the CDRI significantly contributes to enhancing long-term resilience. In the realm of urban planning, the CDRI is essential as it assists in evaluating and improving a city or community's capacity to withstand and recover from climate-related disasters.

RESEARCH METHODOLOGY

The study utilized a CDRI questionnaire survey, which adhered to the standard format outlined in the Sendai Framework but was adjusted slightly to align with the specific characteristics of Yan District. The CDRI assesses climate disaster

resilience through five components: physical, social, economic, institutional, and environment, as outlined in Table 1. The comprehensive analysis of the CDRI is derived from the results obtained from the sub-components and parameters examined within each sector.

Table1: List of parameters considered in CDRI's five components.

Component	Sub-components
Physical	Electricity; Water supply; Sanitation and solid waste disposal; Accessibility of road; Housing and land use
Social	Population; Health; Education & awareness; Social capital; Community preparedness
Economy	Income; Employment; Household asset; Finance and savings; Budget and subsidies
Institutional	Mainstreaming of DRR and CCA; Effectiveness of city's crisis management; Effectiveness of a city's institution to respond to a disaster; Institutional collaboration with other organizations and stakeholders; Good Governance
Environment	Intensity/ Severity of natural hazards; Frequency of natural hazards; Ecosystem services; Land use; Environmental security and food security

Source: Shaw et al. (2010)

Each component is made up of five parameters, and each sub-component is made up of five indicators, totalling 125 questions in the CDRI questionnaire (Table 2). Participants are required to assign weights to variables and parameters to indicate city priorities and indicator importance. Scores for each parameter and dimension were calculated using the Weighted Mean Index (WMI) method based on survey data.

Table 2: Components, Sub-Components and Indicators in the CDRI Survey

Dimension	Parameters
Component	5
Sub-component	25
Indicator	125

Source: GP Resilience Cities in Malaysia, 2019

An initial assessment of Yan District's resilience level was carried out through a series of survey questions. The CDRI survey questions offer five response options, ranging from 1 for very low to 5 for strong. Higher CDRI values

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indicate a higher level of readiness for climate change and disasters. These findings offer broad policy recommendations based on the quality of the survey data, revealing both the strengths and weaknesses in each area.

This scale will assess all indications and provide a score for each sub-component's parameters. The average score for each major component of the CDRI will be calculated based on the average score of all parameters within the sub-component. The CDRI survey for Yan District was conducted by Technical Working Groups (TWG) and Focus Group Discussion (FGD) members from various technical agencies at federal, state, and local community levels (Figure 2). A total of 97 purposive respondents participated in the survey, both in-person and online (Table 3).



Figure 2: Community participants filled out the CDRI survey form during the FGD session.

Table 3: Total Respondents Involved in CDRI Survey

Respondents	Physical	Online	Total
Agencies	27	26	53
Communities	34	10	44
Total	**61**	**36**	**97**

STUDY AREA

Yan District is located in the western region of Kedah State, bordering Kuala Muda District to the south, Kota Setar District to the north, and Pendang District to the east (Figure 3). It consists of five mukims and four islands, covering an area of 24,177.78 hectares (241.78 km^2). The Yan District Council administers the entire district. The proposed sea reclamation area for the Oil Refinery Plant

project (350 hectares) and Maritime Industrial and Trade Park (48.16 hectares) near Sungai Daun Mukim will give significant influence of development in Yan District. The best rice fields and fruit orchards can be found in Yan District, which is also rich in natural resources including beaches and islands. The Gunung Jerai range, which stretches to the sea region at Tanjung Jaga, is one of the many natural heritages found in Yan District. In keeping with Yan District's character as a tourist district, all of these local resources have the potential to be commercialised together. Additionally, there are seven islands in Yan District: Batuan Batu Kepala Rambut, Pulau Songsong, Pulau Bidan, Pulau Perak, Pulau Bunting, Pulau Telor, and Pulau Tukun Terendak which is very rich with natural assets and can become important tourist attractions to the district.

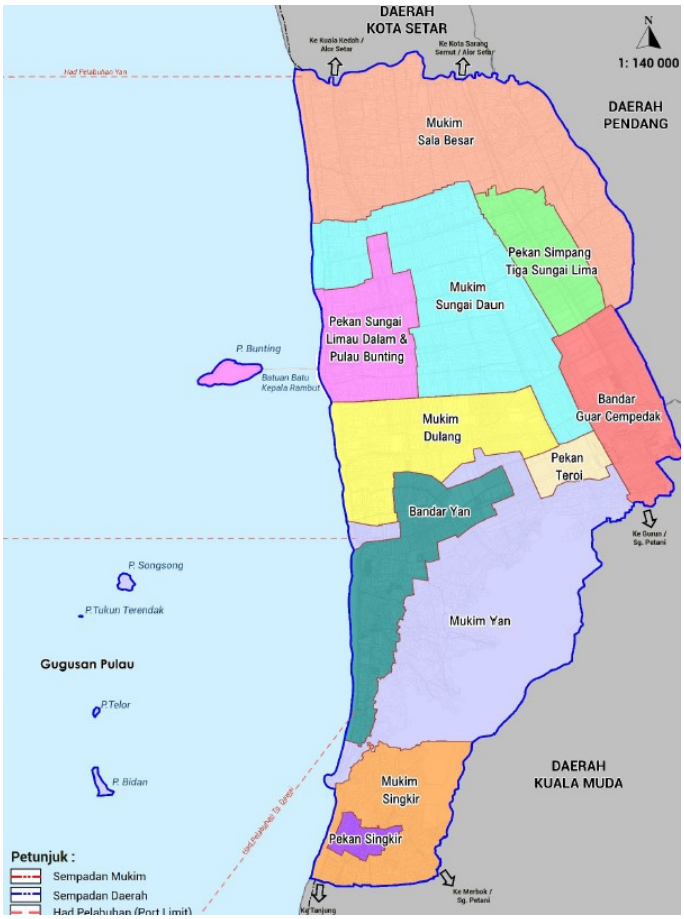


Figure 3: Study area of Yan District, Kedah
Source: PLANMalaysia (2024)

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Built-up land use covers 67.33% of the total area, totalling 16,278.10 hectares. Forest land use accounts for 15.42% with 3,725.81 hectares, mainly in Mukim Yan, Mukim Singkir, and island areas. The built-up area, including residential, industrial, commercial, institutional, and transportation infrastructure, occupies 3,123.50 hectares, representing 12.91% of the total land area.

ANALYSIS AND DISCUSSION

Results of the CDRI Physical Component

The CDRI results for the physical component are crucial as they offer a structured and measurable method to evaluate the resilience of infrastructure systems to climate-related disasters. This assessment encompasses different facets of physical resilience and is vital for measuring, informing decision-making, setting benchmarks, monitoring progress, mitigating risks, planning for the long term, and enhancing investments in climate resilience. The physical component includes five parameters: electricity supply, water supply, sewage and solid waste management, road accessibility, and housing and land use. According to Teo et al. (2013), infrastructure plays a critical role in community resilience by facilitating effective responses to, endurance of, and recovery from disasters. Access to key resources like food, water, sanitation, and shelter is essential for displaced individuals during the recovery process.

The survey results showed that all aspects of the physical component received resilience scores ranging from 3 (moderately satisfactory) to 4 (satisfactory) as shown in Figure 4. Electricity supply had the highest score of 3.93, almost reaching 4. On the other hand, housing and land use, as well as sewage and solid waste management, had the lowest resilience level at 3.43. These results demonstrate the infrastructure and utilities in District of Yan show resilience, distribution, and emergency readiness during disaster events. This sets a positive example for future sustainable and resilient planning in Yan District.

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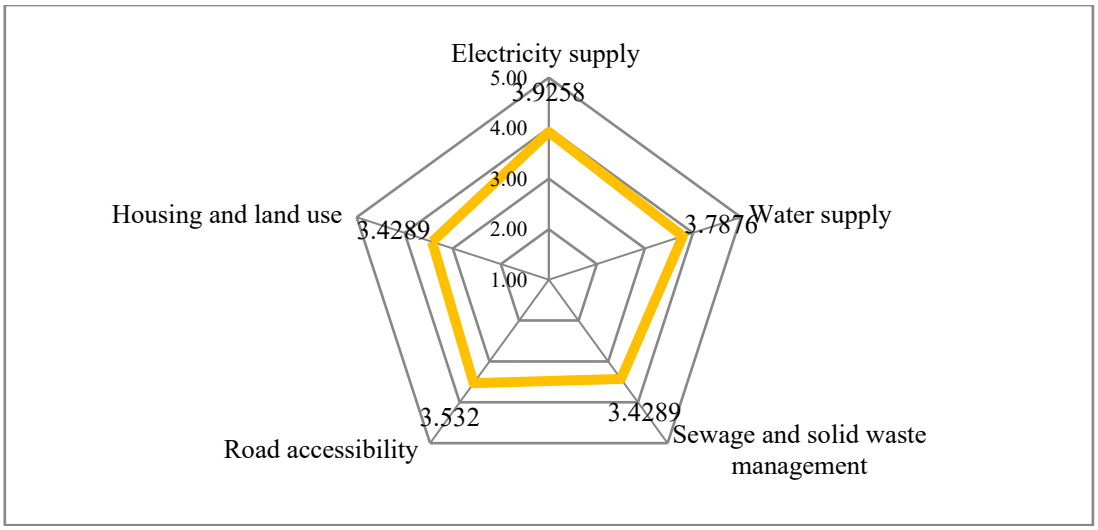


Figure 4: CDRI analysis for physical component

Results of the CDRI Social Component

The CDRI for social component is crucial for understanding and enhancing the social implication of resilience in the face of climate disasters. Therefore, it is important as it is able to identify the vulnerable groups of population, improve social cohesion and community networks, guide policy and decision-making, access to services and infrastructure, empower community, and incorporate social justice. Therefore, a specific set of question on social component is embedded in the CDRI questionnaire. The social components include population, population health, education and awareness, social capital, and community preparedness (Shaw et al., 2010).

The social component of the CDRI yielded overall resilience scores ranging from 3 to 4, indicating moderate to satisfactory levels (Figure 5). Education and awareness scored the highest at 3.61, demonstrating good disaster preparedness practices in Yan district. However, social capital scored lower at 3.34, indicating a need for improvement in building networks and relationships for effective collaboration during disasters. Strengthening social capital should be a priority for agencies involved in district planning.

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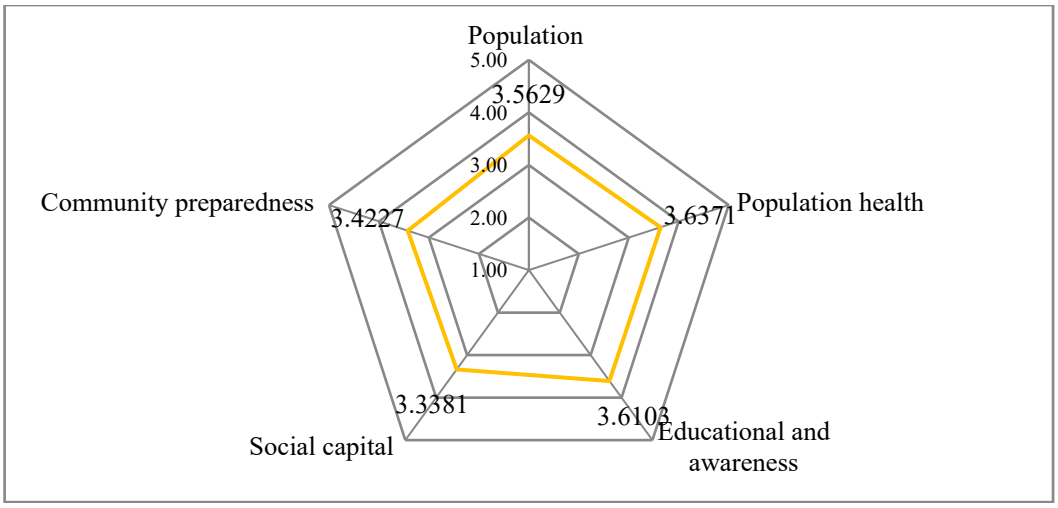


Figure 5: CDRI analysis for social component

Results of the CDRI Economy Component

Economic resilience, as defined by Dasgupta and Shaw (2013), refers to a community's ability to sustain itself with limited natural resources, particularly when it heavily relies on these resources. Economic factors play a crucial role in determining how well communities can prepare for and respond to disasters, influencing their resilience (Meng, 2024). The economic aspect is vital for a community's capacity to endure and bounce back from disasters. Therefore, it is important to assess the economic strength of a location. Robust financial stability and governance are essential to support economic activities post-disaster. Local authorities should invest in resilient infrastructure to ensure a prompt and effective recovery.

Figure 6 displays the CDRI results for the economy component in Yan District. Scores for this component ranged from 2 to 4, indicating a moderate to satisfactory level of economic development. While the physical and social parameters all had scores above 3, three economic components scored below 3. These components include income, budget and subsidies, and finance and savings, which received modest resilience scores. Household assets and employment sub-components, on the other hand, achieved a satisfactory resilience score of 3.92. This underscores the susceptibility of these sub-components to disaster impacts and their slower recovery process in this district. The economic development in Yan is heavily dependent on the agriculture sector, particularly paddy cultivation, demonstrating the district's capacity to effectively respond to disasters.

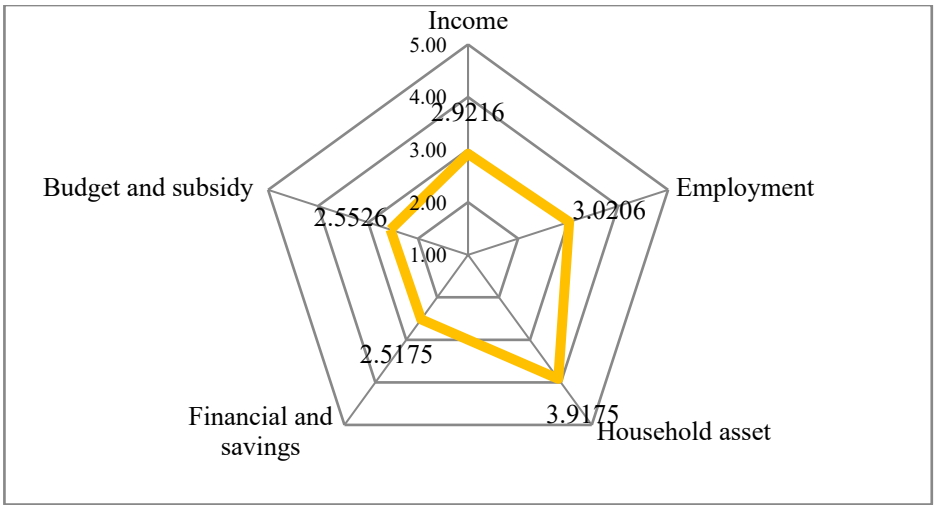


Figure 6: CDRI analysis for economy component

Results of CDRI Institutional Component

Effective disaster management relies on governance to provide the necessary structure, authority, and processes for preparing, responding to, and recovering from disasters. Good governance ensures strategic, inclusive, coordinated, and accountable disaster management. It influences decision-making, resource allocation, and community protection before, during, and after climate-related disasters (Bignami, 2024). Prioritizing the integration of climate change adaptation (CCA) and disaster risk reduction (DRR) considerations in urban planning and management is crucial for maintaining healthy populations and preventing economic disruptions (Centre for Excellence in Disaster Management & Humanitarian Assistance, 2022).

The institutional components in Yan District displayed different levels of resilience, with three sub-components scoring well and two sub-components, DRR and CCA, as well as governance, falling in the intermediate range between 2 and 3, which is relatively low (Figure 7). These results prompt necessary actions for improvement at the local level. It is essential to enhance governance, DRR, and CCA to effectively manage catastrophic situations. Increasing awareness of DRR and CCA in district planning of Yan is vital to ensure that future development can withstand disasters.

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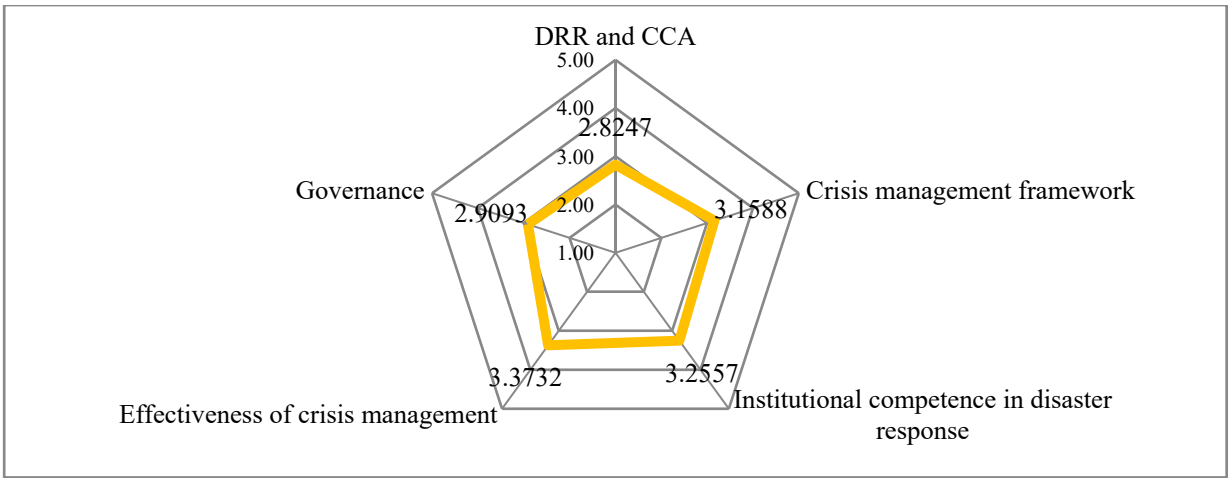


Figure 7: CDRI analysis for institutional component

Results of CDRI Environment Component

The environment is a key factor in the CDRI, as it affects exposure to and recovery from climate-related disasters, which can cause significant damage to communities. In the realm of disaster management, the environment plays a crucial role as a natural barrier against disasters, sustains livelihoods, regulates climate and weather patterns, and ensures food and security. The assessment of the environment component includes evaluating the sub-components of hazard intensity, frequency of hazards, ecosystem services, land use planning, and environmental policies.

The environmental components show good performance overall, with resilience scores above 3, except for hazard intensity which scored 2.76 (Figure 8). Debris flows contribute to this lower score, highlighting the need to strengthen environmental components for future disasters. Land use planning and environmental policy parameters indicate promising preparedness for disasters in the district. The planning system is stable and well-equipped to handle disaster-related situations.

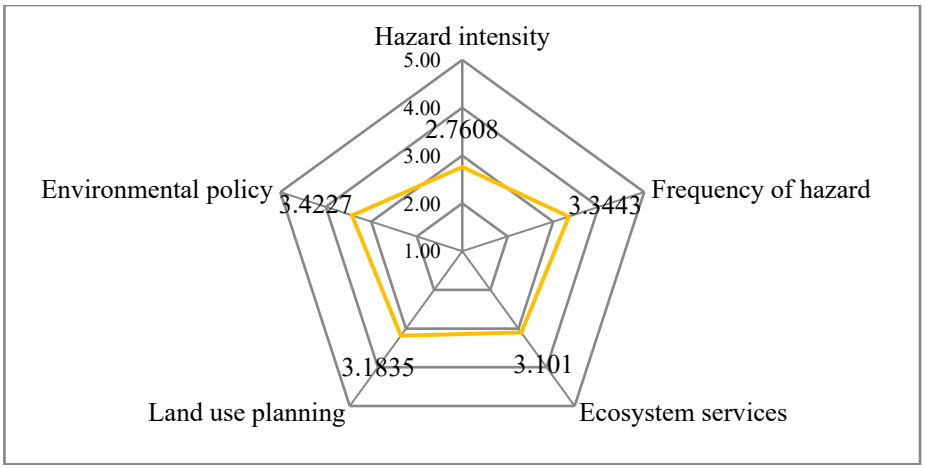


Figure 8: CDRI analysis for environment component

Results of the Overall CDRI

The overall CDRI results for Yan District reveal that economic resilience received the lowest score of 2.99, suggesting vulnerability stemming from dependence on paddy cultivation (Figure 9). On the other hand, physical development received the highest score of 3.62, indicating the community's robust capacity to withstand disasters. With four components scoring above 3 namely physical, social, institutional, and environment; Yan District is overall well-equipped and resilient to confront future challenges.

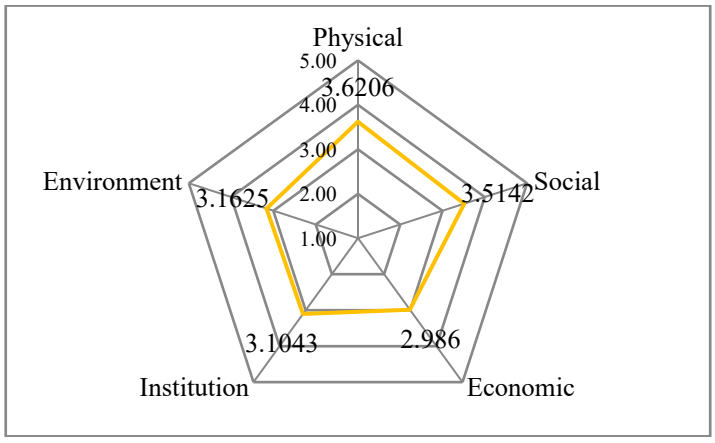


Figure 9: Overall CDRI analysis

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CONCLUSION

Cities need to improve their resilience and preparedness to address future risks. This paper underscores the significance of resilience in urban planning for community safety in Yan District, Kedah. The study utilized CDRI as a standardized tool to evaluate the city's resilience to climate-related disasters. The findings of the CDRI assessment in Yan District indicate that the economic aspect received the lowest score of 2.99, underscoring the necessity to boost economic development and disaster response mechanisms. The lack of access to credit facilities and disaster risk financing in Yan District underscores the importance of enhancing financial support accessibility. This would empower local communities in disaster-prone areas to better equip themselves for and respond to future disasters. While other components such as physical, social, institutional, and environmental aspects scored above 3, they still require further attention for enhancement. The overall CDRI performance in the district reflects the preparedness of local stakeholders to effectively manage disasters. Capacity building initiatives for local residents and officials in Yan District are in place to prepare for future disasters. This will enable more effective local action to ensure the stability of all components of the Community Disaster Risk Reduction Initiative.

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REFERENCES

Bignami, D. F., Ambrosi, C., Bertulessi, M., Menduni, G., Pozzoni, M., & Zambrini, F. (2024). Governance strategies and tools towards the improvement of emergency management of natural disasters in transboundary areas. *International Journal of Disaster Risk Reduction*, *111*, 104704. https://doi.org/10.1016/j.ijdrr.2024.104704

Berkes, F., & Ross, H. (2013). Community resilience: Toward an integrated approach. *Social Natural Resources*, *26*(1), 5–20.

Cai, H., Lam, N. S. N. N., Qiang, Y., Zou, L., Correll, R. M., & Mihunov, V. (2018). A synthesis of disaster resilience measurement methods and indices. *International Journal of Disaster Risk Reduction*, *31*, 844–855. https://doi.org/10.1016/j.ijdrr.2018.07.015

Center for Excellence in Disaster Management and Humanitarian Assistance (CFE-DMHA). (2022). *Malaysia: Disaster management reference handbook 2022*.

Chong, N. O., Kamarudin, K. H., & Abd. Wahid, S. H. (2017). Framework considerations for community resilient towards disaster in Malaysia. *Procedia Engineering*, *212*(2018), 165–172.

Chong, N. O., & Kamarudin, K. H. (2018). Disaster risk management in Malaysia: Issues and challenges from the perspectives of agencies. *Planning Malaysia*, *16*(1), 105–117.

Cutter, S. L., Ash, K. D., & Emrich, C. T. (2014). The geographies of community disaster resilience. *Global Environmental Change*, *29*, 65–77.

Dasgupta, R., & Shaw, R. (2015). An indicator-based approach to assess coastal communities' resilience against climate related disasters in Indian Sundarbans. *J. Coast. Conserv.*, *19*, 85–101.

Giang, N. T. H., Minh, T. X., Ha, H. D., & Chung, N. T. K. (2024). Assessing coastal community resilience to climate change in Central Vietnam through the Climate Disaster Resilience Index (CDRI). *Environ. Res. Commun.*, *6*, 105033. https://doi.org/10.1088/2515-7620/ad8620

Imani, M., Lo, S. L., Fakour, H., Kuo, C. Y., & Mobasser, S. (2022). Conceptual framework for disaster management in coastal cities using climate change resilience and coping ability. *Atmosphere*, *13*, 16.

Joerin, J., & Shaw, R. (2011). Mapping climate and disaster resilience in cities. 6, 47–61.

Khailani, D. K., & Perera, R. (2013). Mainstreaming disaster resilience attributes in local development plans for the adaptation to climate change induced flooding: A study based on the local plan of Shah Alam City, Malaysia. *Land Use Policy*, *30*(1), 615–627.

Laurine, F., Martin, J. G. C., & Mehryar, S. (2022). Climate and disaster resilience measurement: Persistent gaps in multiple hazards, methods, and practicability. *Climate Risk Management*, *37*(2022), 100443. https://doi.org/10.1016/j.crm.2022.100443

Lu, X., Liao, W., Fang, D., Lin, K., Tian, Y., Zhang, C., Zheng, Z., & Zhao, P. (2020). Quantification of disaster resilience in civil engineering: A review. *J. Saf. Sci. Resil.*, *1*, 19–30.

Meng, S. (2024). Environmental governance is critical for mitigating human displacement due to weather-related disasters. *Commun Earth Environ*, *5*, 363. https://doi.org/10.1038/s43247-024-01528-y

PLANMalaysia (Jabatan Perancangan Bandar dan Desa), Kementerian Wilayah Persekutuan. (2019). *Garis panduan perancangan bandar berdaya tahan di Malaysia*. Kuala Lumpur.

Ramli, M. W. A., Alias, N. E., Mohd Yusof, H., Yusop, Z., & Taib, S. M. (2021). Development of a local, integrated disaster risk assessment framework for Malaysia. *Sustainability*, *13*, 10792. https://doi.org/10.3390/su131910792

Rezaie, A. M., Ferreira, C. M., Walls, M., & Chu, Z. (2021). Quantifying the impacts of storm surge sea level rise and potential reduction and changes in wetlands in coastal areas of the Chesapeake Bay region. *Nat. Hazard. Rev.*, *22*, 04021044.

Shaw et al. (2010). *Climate and disaster resilience initiative capacity-building program*. UNISDR.

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Srinivas, H., & Nakagawa, Y. (2008). Environmental implications for disaster preparedness: Lessons learnt from the Indian Ocean Tsunami. *Journal of Environmental Management*, *89*(1), 4–13.

Surjan, A., Sharma, A., & Shaw, R. (2011). *Understanding urban resilience. 6,* 17–45.

Tan, C. T., Rawshan, A. B., Koh, F. P., Lim, C. S., & Ismail, R. (2013). *Memperkukuhkan ketahanan nasional melalui pengurangan risiko bencana di Malaysia: Peranan pihak berkuasa tempatan, hospital dan sekolah*. Institute Alam Sekitar dan Pembangunan (LESTARI), Universiti Kebangsaan Malaysia.

Teo, M., Goonetilleke, A., & Ziyath, A. (2013). An integrated framework for assessing community resilience in disaster management. In *Proceedings of the 9th Annual International Conference of the International Institute for Infrastructure Renewal and Reconstruction*, Brisbane, Australia, 7–10 July 2013, 309–314.

Wan Mohd Rani, W. N. M., Kamarudin, K. H., Razak, K. A., Che Hasan, R., & Mohamad, Z. (2018). Measuring urban resilience using Climate Disaster Resilience Index (CDRI). *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, *Volume XLII-4/W9*.

The World Bank. (2015). Climate and disaster resilience of greater Dhaka area: A micro level analysis. In *Bangladesh Development Series* (Paper No. 32). World Bank.

Wilson, G. (2011). *Community resilience and environmental transitions*. Routledge.

Zahari, R. K., Ariffin, R. N. R., Asmawi, M. Z., & Ibrahim, A. N. (2013). Impacts of the 2004 Tsunami: Preparedness of the Malaysian coastal communities. *Procedia - Social and Behavioral Sciences*, *105*, 569–576.

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THE COMBINATION FLOOD LAKE CHARACTERISTICS AND SIH3 (HYDROLOGY, HYDROMETEOROLOGY, HYDROGEOLOGY INFORMATION SYSTEM) TO BUILD AN EARLY WARNING MODEL FRAMEWORK

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Abstract

The plains of the Mahakam Cascading Lakes (MCL) are prone to annual flooding during the rainy season. One of the first steps in disaster risk reduction planning is to analyse the flood characteristics (FCs) of lakes and building of a model framework for an early warning system (EWS). As such, this study examined efforts to build a framework for a flood EWS by combining the FCs of the MCL with the Hydrology, Hydrometeorology, and Hydrogeology Information System (SIH3). A spatial descriptive approach was employed to analyse the FCs of the lakes using topographical data of the lake and the area surrounding the central Mahakam watershed as well as data on the lake drainage system. The EWS was analysed using the SIH3 based on an automatic water level recorder (AWLR) and automatic weather system (AWS). This system was also combined with the FCs of lakes and community experiences with lake floods. According to a topographical analysis, a bottleneck exists in the southeastern part of the central Mahakam area, which is causing the waters of the Mahakam, Belayan, Kedang Kepala, and Kedang Rantau rivers to be retained in the central Mahakam basin area, thereby causing flooding in the lake. In addition, the hydrographic model and community knowledge indicate that there is a backflow of water due to the presence of a bottleneck. The integration of the change in the water level system from the AWLR and precipitation fluctuations from the AWS at all the gauges in the upper central Mahakam, lower central Mahakam, and Mahakam tributaries can form a framework for an EWS connected to the Disaster Management Agency (BPBD). The EWS can help the community prepare for disaster mitigation and reduce the risk of lake flood disasters.

Keywords: Cascade Mahakam, Disaster Risk Reduction, Early Warning Framework, Flood Plain Lake, Flood

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INTRODUCTION

The Mahakam Cascading Lakes (MCL) flood almost every year. Extreme floods, such as those that occurred in 2005 and 2007, have been documented since 1989 due to variations in high water levels (Dam & Lake Work Unit, 2021). Lake water dynamics also affect the lake area, which is only about 30000 Ha under normal circumstances, but reached 115000 Ha during the 2005 flood and 213000 Ha during the 2007 flood (BWS Kalimantan IV, 2019). Extreme floods often caused losses to the community, especially those living in the Kota Bangun District area, which is the second most populous urban area in Kutai Kartanegara Regency. Based on data from the BNPB, the 2007 flood submerged 213576 houses, 4563 educational facilities, and 547 health facilities (BNPB, 2024).

The MCL are susceptible to flooding even in the absence of precipitation due to the influence of adjacent rivers on variations in the water levels of the lakes. Factors in the hydrological network connecting the rivers and lakes have a major impact on floods in the floodplains of the lake areas (Baker, 1994). Studies on flood characteristics (FCs) have mostly only looked at this issue mathematically (Bachri et al., 2021; Lei et al., 2020; Wang, 2021) together with the evolving lake shape (Papaioannou et al., 2021). Apart from that, studies still need to be carried out on the FCs of floods that occur in the floodplains of the lakes in terms of the morphology of the lake area and the water flow system in the lake. The FCs of lakes can be the basis for the building of an early warning system (EWS).

East Kalimantan started developing the Hydrology, Hydrometeorology, and Hydrogeology Information System (SIH3) in 2023. One of the priorities of this system was to build an EWS for floods. The SIH3 has the most recent data on water levels, groundwater conditions, and climatology (precipitation, temperature, wind speed, relative humidity, and solar radiation). An EWS for floods, such as for the MCL, can be determined using climatological and water level data. However, an EWS for lake floods influenced by inlets and backflows does not exist as yet, and so, there is a need to develop for an EWS framework for floods that accommodates these conditions.

Meanwhile, the flood EWS that pays attention to backflows is still rarely used, especially for floods in the lake floodplains. Indonesia has the Indonesian National Standard (SNI) 8840-3:2022 Flood Early Warning System for flood disasters, but the SNI only provides standard early warnings for upstream sources (inlets) (Rosya et al., 2022). Thus, the system is less suitable for lake floodplains that receive water from inlets and outlets during floods, which can be challenging because flooding does not only occur due to the inlet but the outlet as well. Therefore, it is necessary to create a new framework for an EWS for flooding in lake areas. This can provide new insights regarding an EWS, where water sources from inlets and outlets contribute to flooding. Therefore, this

study examined efforts to build a flood EWS framework by combining the FCs of the MCL with the SIH3.

LITERATURE REVIEW

Flood Characteristics (FCs)

Understanding the FCs is crucial for reducing the risk of floods since they reveal the dynamics of the flood system (Irawan et al., 2020). Knowledge of the risk of floods, which contributes to the creation of flood information and models for lakes, includes FCs (J. Chen et al., 2021; Irawan et al., 2024). Flooding in flood-prone lake areas is influenced by the hydrological network between rivers and lakes (Baker, 1994). The connectivity between floodplain lakes and main rivers plays an essential role in determining the characteristics of the overall ecosystem (Hamerlynck et al., 2011). The FCs of floodplain lakes are influenced by: (a) fluctuations in the water level of the main river, which are a determining factor in the waterlogging pattern of floodplain lakes (Schiemer et al., 2006); (b) the hydrological network between the lake and the main river, which is a necessary process that influences the flow of water into the lake (Hamerlynck et al., 2011); and (c) the capacity of the lake affects the amount of water that it can contain. When this capacity is exceeded, it causes flooding (Bachri et al., 2020; Schiemer et al., 2006).

Flood characteristics (FCs) can provide information on how an area can be inundated (Riadi et al., 2018). In fact, through the FCs, the causes, impacts, and flood risk reduction strategies that can be implemented can be identified (Irawan et al., 2022; Son et al., 2015). Knowing these FCs can help in disaster risk reduction scenarios (Worowirasmi et al., 2015), especially when building an EWS.

Early warning system (EWS)

It is necessary to build an EWS to reduce the risk of flooding because flooding is an unpredictable tragedy that can occur at any time (Fang et al., 2021). In order to enable communities, governments, business communities, and other stakeholders take prompt action to lower the risk of disasters, an EWS is expected to be an integrated system that involves monitoring, hazard estimations and predictions, disaster risk assessments, communication processes, and preparedness (Idfi et al., 2021). The goal of developing an EWS framework is to put in place a plan to lessen Indonesia's vulnerability to flooding. The development of this system mainly involves the use of a single input system, such as for floods that originate from one river (Mdegela et al., 2023), and sometimes there are already several dam or reservoir buildings that can easily provide warnings about flooding (Thomas et al., 2020).

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RESEARCH METHODOLOGY

Study Location

The MCL, located in East Kalimantan Province, are the largest lakes on the island of Borneo (Figure 1). These lakes are in West Kutai and Kutai Kartanegara districts, which are divided into eight sub-districts and 17 villages. The two sub-district city centres, namely Kota Bangun and Muara Muntai, have quite a high population density. A population of more than 60000 people live around these lakes, mostly above the lakes.

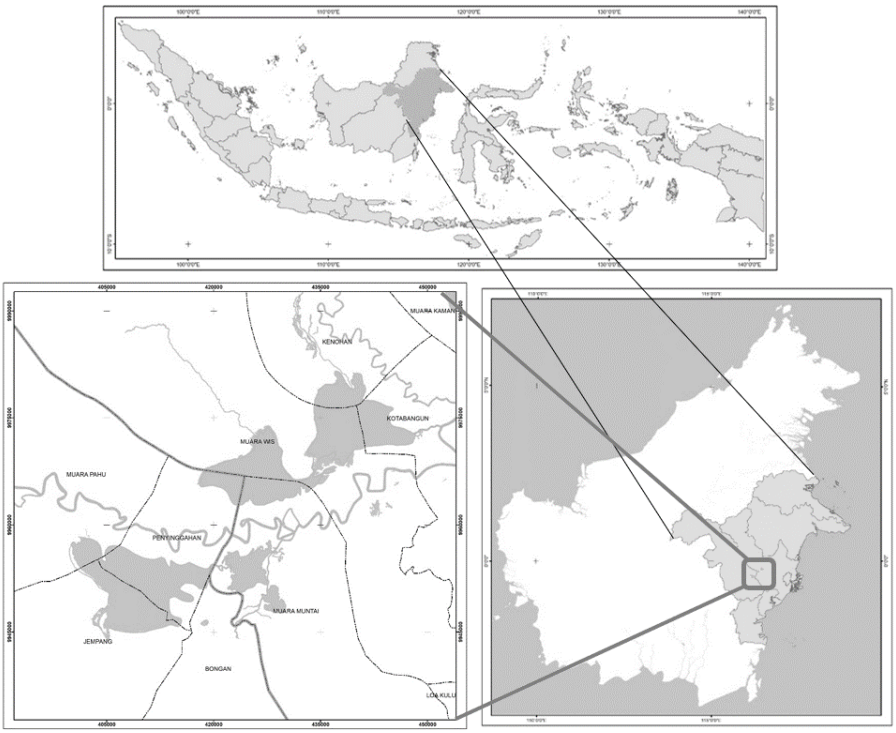


Figure 1: The Location of the MCL

Data Collection and Sources

The following research data was needed to determine the FCs of the lakes and to build an EWS for the floods (Table 1).

Table 1: The Research Data

No	Data	Source
1	Contour topography and bathymetry	BWS Kalimantan IV
2	Water level records of the lake	BWS Kalimantan IV
3	Fluctuative flow models of the MCL	BWS Kalimantan IV
4	Experience with lake floods: - Model of water flows into the lake during normal conditions and flood conditions - Model of changes (increases) in water levels at the lake - Method of predicting floods (EWS of the community) - Method of disseminating flood warnings	In-depth interviews with the community and head/staff of the village

Data Analysis

A descriptive approach was used to develop the FCs of the MCL from the topography analysis and lake drainage systems as well as from the experiences of the community living around the MCL. The topography analysis used Digital Elevation Model (DEM) data (Okolie & Smit, 2022) built from the contour data and 1-meter bathymetry. The lake topography was used to determine the shape of the lakes and the topographical causes of flooding. The data on the inputs and outputs of the rivers leading to the lakes were used to analyse the flow paths to the lakes, which would help to improve the flow model of the MCL from the BWS Kalimantan IV. In addition, the data from the community interviews also served to reinforce the observations of the water flow characteristics in the lakes during normal conditions, normal floods, and extreme floods. Meanwhile, the data on the water levels of the lakes were used to observe the duration and frequency of the floods each year.

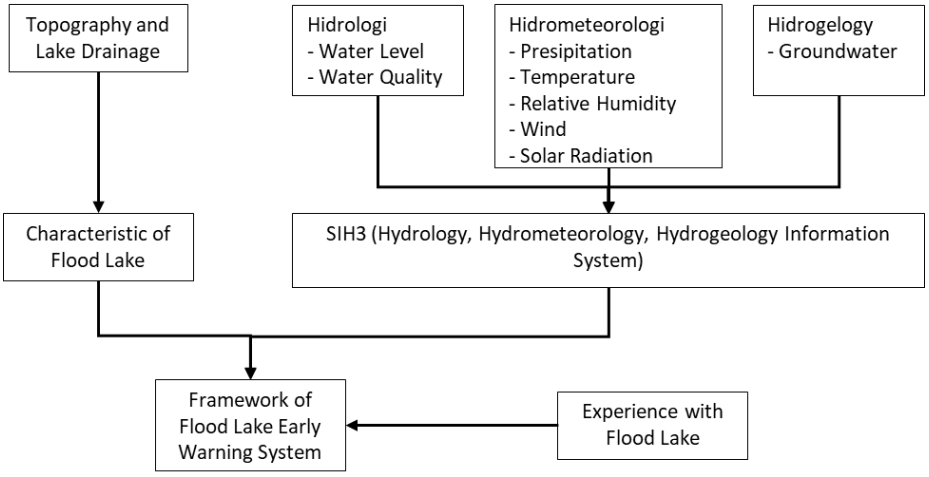


Figure 2: A Diagram of the Flow of the EWS Framework

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The Hydrology, Hydrometeorology, and Hydrogeology Information System (SIH3) is one of the actual information systems related to hydrological, hydro-climatological, and hydrogeological conditions. The information provided includes water level conditions, water quality, current climatological data (precipitation, temperature, wind velocity, relative humidity, and solar radiation), and groundwater conditions. Its primary function is to provide data for the management of water resources. Water resource management also pays attention to reducing the risk of water resource-related disasters. One of the efforts to reduce disaster risks is to create a flood EWS framework by combining the FCs of lakes with the SIH3. The steps in compiling this flood early warning framework are shown in Figure 2.

The combination of the FCs of lakes and the SIH3 still needs to be integrated with the experiences of the community with regard to lake floods so that EWS scenarios and dissemination of early warning information can be formulated. This is because people understand the conditions of their environment better and are aware of the flood disasters that occur. With the combination of the FCs of lakes and the SIH3, an accurate EWS framework model can be built according to the conditions of the lakes.

ANALYSIS AND DISCUSSION

Lake Flood Characteristics (FCs)

Flood Durations and Frequencies

The data on the water level from the Pela-Sangkuliman Lake Gauge from 1989-2023 showed that floods occurred at the MCL almost every year (Table 2). Normal floods occurred every year, and the longest duration of normal floods occurred in 2022 (198 days). Although extreme floods did not occur every year, they sometimes occurred for a long duration. The worst extreme flood occurred in 2007, lasting 55 days. The highest frequency of floods occurred in 2017 and 2001. This condition is caused by water fluctuations in the MCL, which causes floods to occur several times a year.

Table 2: The Durations and Frequencies of Floods at the MCL

Year	Flood Category		Frequency	Year	Flood Category		Frequency
	Normal (>3.9-5m) (Day)	Extreme (>5m) (Day)			Normal (>3.9-5m) (Day)	Extreme (>5m) (Day)	
1989	30		3	2005	82	30	2
1991	61		1	2006	79		2
1992	33		1	2007	70	55	2
1993	39	5	3	2009	40		2

Year	Flood Category		Frequency	Year	Flood Category		Frequency
	Normal (>3.9-5m) (Day)	Extreme (>5m) (Day)			Normal (>3.9-5m) (Day)	Extreme (>5m) (Day)	
1994	106		3	2010	157		3
1995	45	1	1	2011	61		2
1996	112	7	3	2013	90		3
1997	16		1	2014	25		2
1998	90		3	2015	81	2	2
1999	108		2	2016	44		3
2000	25		1	2017	92	46	4
2001	104	3	4	2021	81		3
2002	146		2	2022	198	34	3
2004	80		3	2023	26		3

Source: BWS Kalimantan IV

Topography

The MCL area is a basin located around small hills in the middle of the Mahakam watershed (Figure 3), with water input from the Mahakam River and other rivers flowing into the lakes. A ±186m-wide bottleneck, that obstructs the flow of the Mahakam River, was also discovered. Globally, a bottleneck often inhibits water flow and causes backflows (Stevaux et al., 2020). It also widens water bodies during floods (Harrison et al., 2022).

Before the bottleneck in the Mahakam River, three large rivers; namely, the Belaya (±105m wide), Kedang Kepala (±130m wide), and Kedang Rantau (±102m wide) rivers; flow into it. The total amount of water that flows from these three rivers into the Mahakam River exceed the Mahakam River's capacity at the bottleneck during floods.

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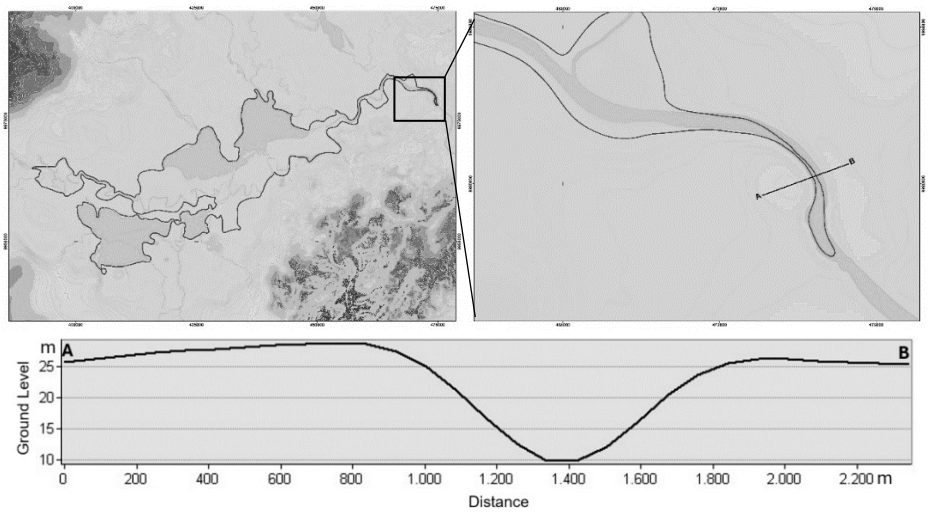


Figure 3: A Topographical Map of the MCL

Drainage System

According to the findings of the BWS Kalimantan IV study, under normal conditions, no water flows from the Blimbingan and N. N. Rivers into the MCL (BWS Kalimantan IV, 2019). However, under normal flood conditions, water from the Blimbingan, N. N., Belayan, and Mahakam River flow into the MCL. Under extreme flood conditions, in addition to the water from these four rivers, the flow of water at the MCL's outlets reverses and flows back into it instead (Figure 4) (BWS Kalimantan IV, 2019). This backflow is caused by the dynamics of the water flow in the floodplain area due to the bottleneck (Stevaux et al., 2020). Apart from that, the width of the Mahakam River's water channel widens, even to the low riparian areas, and appears to almost merge with the lake. This generally occurs in flood plain areas, which are often connected to river networks (X. Chen et al., 2020). Extreme floods also change the area of the lakes, whereby all the lakes appear to merge into a single lake. These changes around the lakes are a geomorphological response to the floodplain area (Yihan et al., 2022), which holds water and will make the waters between the lakes merge into a single body.

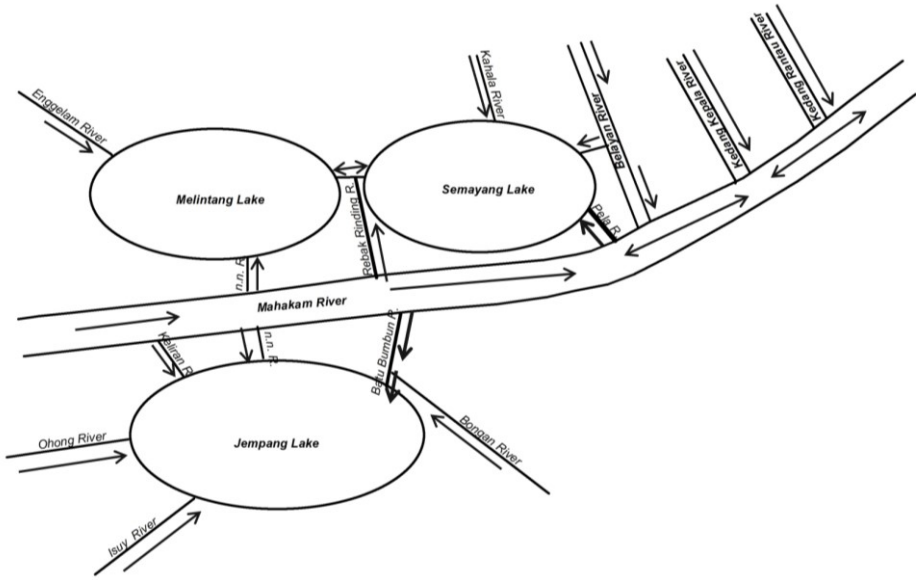


Figure 4: The MCL's Drainage System in an Extreme Flood Condition

Lake Flood Early Warning System (EWS) Framework

Based on the topography of the lakes, it can be seen that the lakes form a bottleneck that causes the water to flow backwards and back into the lakes. Waterlogging in flood-prone areas occurs when the river capacity is exceeded (Zhao & Shao, 2015). The characteristic conditions of the MCL, which have inputs from both upstream and downstream, define the water flow in the lake complex. The initial step for predicting floods is to determine the criteria for safe, alert, and warning/danger status (Antwi-Agyakwa et al., 2023), where the criteria for the water height limit are adjusted to the water height limit of each automatic water level recorder (AWLR) gauge which affects the lake input. The criteria for the water height at each existing AWLR gauge is shown in Table 3. In addition, in predicting the flood duration, it can be seen from the prediction of rainfall combined with the water level that the accuracy of flood duration prediction is higher. To help determine the flood early warning scenario, it is necessary to determine the following rainfall criteria:

- Advisory: >150 - <200mm
- Alert: >200 - <300mm
- Warning: >300mm

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Table 3: The Alert Levels of Every Gauge at the MCL

Alert Level	Gauge AWLR (m)				
	Melak	Penyinggahan Ulu	Kota Bangun	Pela-Sangkuliman (Outlet Melintang & Smayang Lake)	Muara Kaman (Near Bottleneck of Mahakam River)
Normal	<10.7	<8.7	<4.0	<3.4	<3.2
Watch	10.7-11.2	8.7-9.2	4.0-4.5	3.4-3.9	3.2-3.7
Warning	>11.2	>9.2	>4.5	>3.9	>3.7

Source: SIH3 East Kalimantan

To build an effective early warning framework for lake floods, it is necessary to understand the community's knowledge of the characteristics of lake floods and flood prediction techniques commonly used by the community. The community's knowledge of floods is fundamental to building a practical and applicable EWS (Kuller et al., 2021). Based on the results of interviews with the community and village government in the MCL, it was learned that they predicted the occurrence of floods and prepared for floods by paying attention to the weather in the hilly areas in the upper reaches of the Mahakam and Belayan Rivers as well as information received by short messaging service (SMS) and phone calls from relatives living along the upper streams of the Mahakam and Belayan Rivers. This information was in line with the results of the interviews of the Melintang Village respondents:

> "*Usually, we determine if a flood will occur by calling family in Melak to get information about the water level of the Mahakam River there. We also call family in Kembang Janggut to ask about the water level of the Belayan River.*"

Apart from that, according to Mr. Aji of Tubuhan Village:

> "*To determine if a flood will occur, we determine the frequency of the rain in the mountains, which can be seen from Lake, and we also call family in upstream areas, such as in Long Iram, Kembang Janggut, to get information about the water level of the Mahakam River or Belayan River there.*"

However, flood predictions by the community are still far from accurate. This lack of accuracy is due to the limited information with which to predict floods (Macherera & Chimbari, 2016), as the community has not taken into account the discharge from the Kedang Kepala and Kedang Rantau rivers, which blocks the flow of the Mahakam River and causes a backflow. This was

also reinforced by the interview results of the BWS Kalimantan IV study to determine the boundaries of the MCL. According to Mr. Alimin and Mr. Dhani:

> *"During the floods, water flows from the Pela River and enters the lake, especially when the Mahakam and Belayan rivers rise."*
> *"During severe flooding, the water from the lake no longer flows into the Batu Bumbun River. The water from the Batu Bumbun River enters the lake instead. So much so that the lake seems to merge with the Mahakam River as a lot of water from the Mahakam River enters the lake, too."*

From the community's knowledge of FCs, it is quite clear that the floods are not only influenced by the water inputted into the lakes from upstream but are also caused by the backflow of the Mahakam River into the lakes. Although the community already knows how to predict floods, their system still lacks accuracy and the information is spread only by word of mouth. Based on the interview results, most of the people failed to take action when the water began to rise and inundate their homes, and they did not know how high the water would rise and how long the floods would last. The loudspeakers of the mosque are used to disseminate information to the people in the village. The information dissemination tools commonly used by the community can also be used for early warning notifications of floods in the future, since the Internet network in the lake villages is unreliable and some people do not have mobile phones or smartphones. Hence, the most effective way to disseminate information is through the use of loudspeakers and sirens. However, with the continuous development of information technology in the remote areas, this can be brought about in the future through the use of cellular networks and the Internet. The most effective way to develop a flood EWS is to base it on the community's knowledge and experience (Pham et al., 2024). A flood early warning framework was designed, as shown in Figure 5, based on the FCs, the availability of the SIH3, and the results of the interviews with the community.

The AWLR and automatic weather system (AWS) gauges were integrated with the Hydrology, Hydrometeorology, and Hydrogeology Information System (SIH3) in East Kalimantan. The primary purpose of establishing a flood EWS is to help the community improve their adaptation and reduce casualties and damage to property (Fakhruddin et al., 2015). In the SIH3, warning status criteria were determined from the AWLR and AWS. The combination of AWLR, AWS, and the community's knowledge was used to create a lake flood prediction scenario.

The flood prediction scenario was based on the water level conditions in the Mahakam River, the rivers flowing close to the bottleneck, and the AWS status from all the gauges. The AWLR gauges for the rivers close to the

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bottleneck were available as yet, so for the time being, the EWS for floods from the rivers near the bottleneck was through direct observation predictions combined with the height of the Muara Kaman AWLR gauge. Meanwhile, the Melak, Penyinggahan Ulu, and Kota Bangun gauges were used to determine the warning status from the Mahakam River input. Meanwhile, the Pela-Sangkuliman gauge was able to determine the warning status at the Semayang-Melintang Lake outlet. The flood scenario was obtained when the water levels in the Mahakam River or rivers close to the bottleneck were in warning status simultaneously or only one of the AWS (from the Mahakam watershed or rivers close to the bottleneck watershed) recorded high rainfall at most gauges.

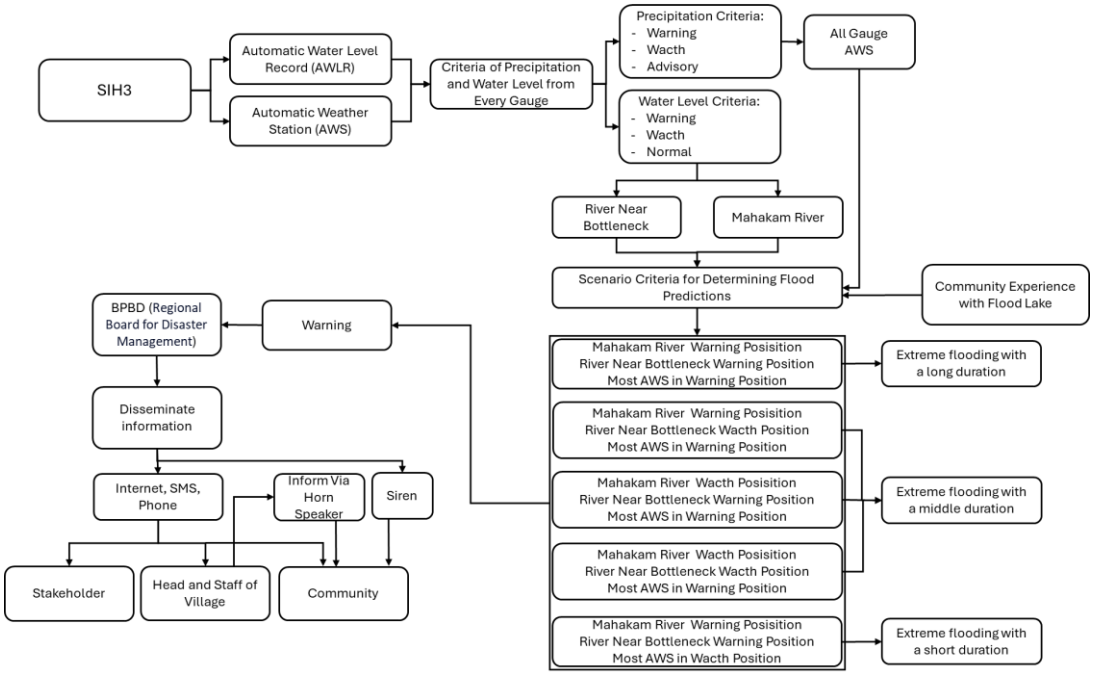


Figure 5: The Design of the Early Warning Framework for the MCL

The MCL flood early warning scenario was divided into three scenarios. The first was the Long Duration Extreme Flood Scenario, where extreme flooding would occur when all the AWLR gauges at the Mahakam River and rivers close to the bottleneck were in the "warning" status, and all the AWS gauges were also in the "warning" status. The second was the Moderate Duration Extreme Flood Scenario, where extreme flooding would occur if one or both of the AWLR gauges from both the Mahakam River and rivers close to the bottleneck were in the "watch" status, but all the AWS gauges were in "warning" status. The third scenario was a Short Duration Extreme Flood Scenario, where

extreme flooding would occur when the AWLR gauges at the Mahakam River and rivers close to the bottleneck were in the "warning" status, but all the AWS gauges were in the "watch" status. When a flood is predicted, the information will be forwarded to the Disaster Management Agency (BPBD) and disseminated.

The early warning information will be communicated to the community, the village government, and stakeholders to determine the best disaster management actions together with the BPBD. This information should be shared with the community through SMS, chats, loudspeakers, or sirens. The broadcast system should work in tandem with cellular providers to deliver SMSs in flood-prone areas so that all communities in the flood-prone buffer area can directly receive early warnings. It should also be combined with siren and loudspeaker system to ensure that the community is aware of the danger. It is hoped that an effective EWS will be able to help lake communities prepare for floods, especially extreme floods, to save property and reduce the number of casualties.

CONCLUSION

This study showed that the MCL have the characteristics of lakes that are prone to floods, where the input and output of the lakes contribute to the inundation of residential areas and productive land around the lakes. During a flood, the outlet of the MCL turns into a water inlet of the Mahakam River. This condition is caused by the retention of water from the Mahakam River due to the simultaneous overflow of the Belayan, Kedang Kepala, and Kedang Rantau rivers at the bottleneck at the Mahakam River. Therefore, to determine the design of the EWS framework, it was necessary to combine the FCs of the lake and the SIH3, while strengthening it with public knowledge about the lake floods.

Combining the FCs of the lakes with the SIH3 was able to help in the construction of a flood early warning framework. It was discovered that the FCs, which were influenced by input from the upper stream (Mahakam River) and downstream (rivers close to the bottleneck), can create backflows. The SIH3 can be used to build an early warning scenario through information from the AWLR and AWS from the upper stream and downstream of the lakes. This scenario would provide predictive information for extreme floods in the lake for long, moderate, and short durations. Therefore, this design could help the BPBD provide early flood warning s in the MCL.

Improvements to this system may include the placement of additional equipment, AWLRs in rivers close to the bottleneck, and AWS measurement instruments that are more evenly distributed throughout the sub-watershed. Moreover, it is necessary to calculate the amount of time that it takes the water to travel between the AWLR gauges to accurately estimate when a flood may occur.

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The main limitation of this study was the lack of adequate AWS and AWLR gauges in each sub-watershed. As such, the early warning scenarios could not be tested. Therefore, further research is needed to test the effectiveness of this EWS framework, if all the necessary measurement instruments are in place.

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REFERENCES

Antwi-Agyakwa, K. T., Afenyo, M. K., & Angnuureng, D. B. (2023). Know to Predict, Forecast to Warn: A Review of Flood Risk Prediction Tools. In *Water (Switzerland)* (Vol. 15, Issue 3). MDPI. https://doi.org/10.3390/w15030427

Bachri, S., Eka Aldianto, Y., Sastro U, K. B., & Naufal, M. F. (2021). Flood Modelling of Badeng River Using Hec-Ras In Singojuruh Sub-District, Banyuwangi Regency, East Java, Indonesia. *Jurnal Geografi*, *13*(1), 76–87. https://doi.org/10.24114/jg.v%vi%i.19211

Bachri, S., Sumarmi, Irawan, L. Y., Aldianto, Y. E., Fathoni, M. N., Fawaid, A. M., Utomo, K. S. B., & Nuraini, S. G. (2020). Analysis of the Badeng River Storage Capacity for Flood Modeling in Singojuruh Subdistrict, Banyuwangi Regency. *IOP Conference Series: Earth and Environmental Science*, *412*(1). https://doi.org/10.1088/1755-1315/412/1/012030

Baker, V. R. (1994). Geomorphological understanding of floods. *Geomorphology*, *10*(1–4), 139–156. https://doi.org/https://doi.org/10.1016/0169-555X(94)90013-2

BNPB. (2024). *Indonesian Disaster Information Data*. BNPB. https://dibi.bnpb.go.id/

BWS Kalimantan IV. (2019). *Mahakam Cascade Lake Boundary Delimitation Plan*.

Chen, J., Huang, G., & Chen, W. (2021). Towards better flood risk management: Assessing flood risk and investigating the potential mechanism based on machine learning models. *Journal of Environmental Management*, *293*. https://doi.org/10.1016/j.jenvman.2021.112810

Chen, X., Chen, L., Stone, M. C., & Acharya, K. (2020). Assessing connectivity between the river channel and floodplains during high flows using hydrodynamic modeling and particle tracking analysis. *Journal of Hydrology*, *583*. https://doi.org/10.1016/j.jhydrol.2020.124609

Dam and Lake Work Unit, M. of P. W. and H. (2021). *Prov Sum Hidrology of Cascade Mahakam Lake*.

Fakhruddin, S. H. M., Kawasaki, A., & Babel, M. S. (2015). Community responses to flood early warning system: Case study in Kaijuri Union, Bangladesh. *International Journal of Disaster Risk Reduction*, *14*, 323–331. https://doi.org/10.1016/j.ijdrr.2015.08.004

Fang, Z., Wang, Y., Peng, L., & Hong, H. (2021). Predicting flood susceptibility using LSTM neural networks. *Journal of Hydrology*, *594*. https://doi.org/10.1016/j.jhydrol.2020.125734

Fleischmann, A. S., Brêda, J. P. F., Passaia, O. A., Wongchuig, S. C., Fan, F. M., Paiva, R. C. D., Marques, G. F., & Collischonn, W. (2021). Regional scale hydrodynamic modeling of the river-floodplain-reservoir continuum. *Journal of Hydrology*, *596*. https://doi.org/10.1016/j.jhydrol.2021.126114

Hamerlynck, O., Duvail, S., Vandepitte, L., Kindinda, K., Nyingi, D. W., Paul, J. L., Yanda, P. Z., Mwakalinga, A. B., Mgaya, Y. D., & Snoeks, J. (2011). To connect or not to connect? Floods, fisheries and livelihoods in the Lower Rufiji floodplain lakes, Tanzania. *Hydrological Sciences Journal*, *56*(8), 1436–1451. https://doi.org/10.1080/02626667.2011.630002

Harrison, L. M., Coulthard, T. J., Robins, P. E., & Lewis, M. J. (2022). Sensitivity of Estuaries to Compound Flooding. *Estuaries and Coasts*, *45*(5), 1250–1269. https://doi.org/10.1007/s12237-021-00996-1

Idfi, G., Yulistyorini, A., Rahayuningsih, T., Dewi, V. A. K., & Setyawan, E. (2021). The scenario of reducing peak discharge on Sampean River using natural reservoir in Situbondo regency. *AIP Conference Proceedings*, *2447*(1).

Irawan, L. Y., Farihah, S. N., Prasetyo, W. E., Devy, M. M. R., Hartono, R., Masruroh, H., & Mapa, M. T. (2024). The local disaster knowledge of local residents towards semeru eruption period 2021 in KRB III Semeru Volcano. *IOP Conference Series: Earth and Environmental Science*, *1314*(1). https://doi.org/10.1088/1755-1315/1314/1/012039

Irawan, L. Y., Nadhifah, M. R., Sumarmi, Putra, A. K., & Tanjung, A. (2020). The analysis of learning material on flood disaster based on regional physical condition in Sampang, East Java. *IOP Conference Series: Earth and Environmental Science*, *485*(1). https://doi.org/10.1088/1755-1315/485/1/012050

Irawan, L. Y., Sumarmi, Panoto, D., Pradana, I. H., Faizal, R., Devy, M. M. R., & Putra, D. B. P. (2022). The identification of flood susceptibility and its contributing factors in Sampang Regency. *IOP Conference Series: Earth and Environmental Science*, *1089*(1). https://doi.org/10.1088/1755-1315/1089/1/012013

Kuller, M., Schoenholzer, K., & Lienert, J. (2021). Creating effective flood warnings: A framework from a critical review. In *Journal of Hydrology* (Vol. 602). Elsevier B.V. https://doi.org/10.1016/j.jhydrol.2021.126708

Lei, W., Ding, B., Kong, W., & Huang, P. (2020). Study on the characteristics of water level during the flood season in the Poyang Lake, China. *IOP Conference Series: Earth and Environmental Science*, *510*(3). https://doi.org/10.1088/1755-1315/510/3/032012

Macherera, M., & Chimbari, M. J. (2016). A review of studies on community based early warning systems. *Jamba: Journal of Disaster Risk Studies*, *8*(1). https://doi.org/10.4102/jamba.v8i1.206

Mdegela, L., De Bock, Y., Luhanga, E., Leo, J., & Mannens, E. (2023). Monitoring Kikuletwa river levels in northern Tanzania: A data set unlocking insights for effective flood early warning systems. *Data in Brief*, *49*. https://doi.org/10.1016/j.dib.2023.109395

Okolie, C. J., & Smit, J. L. (2022). A systematic review and meta-analysis of Digital elevation model (DEM) fusion: pre-processing, methods and applications. In *ISPRS Journal of Photogrammetry and Remote Sensing* (Vol. 188, pp. 1–29). Elsevier B.V. https://doi.org/10.1016/j.isprsjprs.2022.03.016

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Papaioannou, G., Vasiliades, L., Loukas, A., Alamanos, A., Efstratiadis, A., Koukouvinos, A., Tsoukalas, I., & Kossieris, P. (2021). A flood inundation modeling approach for urban and rural areas in lake and large-scale river basins. *Water (Switzerland)*, *13*(9). https://doi.org/10.3390/w13091264

Pham, T. D. M., Thieken, A. H., & Bubeck, P. (2024). Community-based early warning systems in a changing climate: an empirical evaluation from coastal central Vietnam. *Climate and Development*. https://doi.org/10.1080/17565529.2024.2307398

Riadi, B., Barus, B., Widiatmaka, Yanuar, M. J. P., & Pramudya, B. (2018). Identification and delineation of areas flood hazard using high accuracy of DEM data. *IOP Conference Series: Earth and Environmental Science*, *149*(1). https://doi.org/10.1088/1755-1315/149/1/012035

Rosya, A., Wilipo, W., Fathani, T. F., Santoso, Koesuma, S., Sukoco, B., Rini, M., Andika, N., Lestari, L., & Tommy Hariyanto. (2022). SNI 8840-3: Flood Early Warning System. In *Badan Standarisasi Nasional* (pp. 1–22). Badan Standarisasi Nasional.

Schiemer, F., Hein, T., & Peduzzi, P. (2006). Hydrological control of system characteristics of floodplain lakes. *Ecohydrology and Hydrobiology*, *6*(1–4), 7–18. https://doi.org/10.1016/S1642-3593(06)70121-5

Son, C. H., Baek, J. I., Ban, Y. U., & Ha, S. R. (2015). The effects of mitigation measures on flood damage prevention in Korea. *Sustainability (Switzerland)*, *7*(12), 16866–16884. https://doi.org/10.3390/su71215851

Stevaux, J. C., Macedo, H. de A., Assine, M. L., & Silva, A. (2020). Changing fluvial styles and backwater flooding along the Upper Paraguay River plains in the Brazilian Pantanal wetland. *Geomorphology*, *350*. https://doi.org/10.1016/j.geomorph.2019.106906

Thomas, M., Ummer, S., T K, S. V., T, V., & Kumar, A. S. (2020). Flood Prediction and Warning System using Dam Data Monitoring. *International Journal of Innovative Technology and Exploring Engineering*, *9*(9), 294–298. https://doi.org/10.35940/ijitee.I7152.079920

Wang, L. (2021). Flood characteristic description using the singularity method. *Journal of Physics: Conference Series*, *1978*(1). https://doi.org/10.1088/1742-6596/1978/1/012058

Worowirasmi, T. S., Waluyo, M. E., Rachmawati, Y., & Hidayati, I. Y. (2015). The Community – Based Flood Disaster Risk Reduction (CBDRR) in Beringin Watershed in Semarang City. *Jurnal Wilayah Dan Lingkungan*, *3*(2), 131. https://doi.org/10.14710/jwl.3.2.131-150

Yihan, L., B, W. D., & Yuan, L. (2022). Flood-Induced Geomorphic Change of Floodplain Extent and Depth: A Case Study of Hurricane Maria in Puerto Rico. *Journal of Hydrologic Engineering*, *27*(10), 04022019. https://doi.org/10.1061/(ASCE)HE.1943-5584.0002199

Zhao, T., & Shao, Q. (2015). Detecting floodplain inundation based on the upstream-downstream relationship. *Journal of Hydrology*, *530*, 195–205. https://doi.org/10.1016/j.jhydrol.2015.09.056

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DEVELOPMENT OF A FRAMEWORK FOR THE FOOD AVAILABILITY INDEX FOR RICE CULTIVATION IN PENINSULAR MALAYSIA

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Abstract

Food security is of utmost importance for various reasons, such as ensuring economic stability, national security, and the well-being of the population. In this regard, food security remains a frequently discussed topic in Malaysia, particularly rice being the national staple food and a strategic commodity under various governmental policies related to the agricultural sector. Food availability, as one of the dimensions of food security, plays a fundamental role in indicating the supply of food within the country. Hence, this paper develops a framework for the Food Availability Index (FAI) specifically for rice, aiming to assess food availability of rice throughout the states in Peninsular Malaysia for amplifying food security. The framework was developed by comparing the Global Food Security Index (GFSI) and the UK Food Security Assessment, selecting relevant components and indicators that are appropriate within the context of Malaysia. From the framework produced, the index for the eleven (11) states of Peninsular Malaysia has been calculated by using a composite index according to the scoring given based on data gained from the Department of Agriculture and PLAN Malaysia. The findings indicate that Perak and Pulau Pinang achieved the highest FAI scores of 29. Spatial mapping has also been produced to understand the disparities between rice production within the states in Peninsular Malaysia. The results reveal significant variation among states, with certain regions demonstrating high dependence on external supply sources, posing potential risks to their food security resilience. The study contributes a practical and replicable index framework for state-level food availability assessment, providing useful insights for policy formulation, resource allocation, and long-term national food planning.

Keywords: Agriculture, Food Availability Index, rice supply, food security, spatial mapping

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INTRODUCTION

Rice is a staple food for most Asian countries, including Malaysia. According to Zulkifli et al. (2025) and Das et al. (2020), the region of Asia-Pacific produces and consumes over 90% of the world's rice, which highlights that rice plays a vital role in ensuring food security not only in Malaysia but also in the Asia-Pacific region. However, Malaysia's self-sufficiency ratio (SSR) of rice in 2023 is at 62.6%, which indicates that this country still has a high reliance on imported rice and exposes its vulnerability towards global market fluctuation, climate change, and domestic production challenges (Dorairaj & Govender, 2023).

Malaysia's rice supply faces significant challenges, including limited arable land, competition from urban development, dependency on imports, and climate-related threats. These factors collectively hinder the country's goal of achieving self-sufficiency in rice production. According to Arshad et al. (2011), agricultural land specifically for rice cultivation has been increasingly encroached by urbanization and industrial development which causes land for rice farming is shrinking over the years. Herath et al. (2019) mention that paddy production in Malaysia, especially the temperature rising phenomenon has reduced the national rice production by 7% and rainfall affecting the production of Kedah state as the rice bowl of Malaysia, by 0.371%.

In this regard, this paper addresses the performance of the states within Peninsular Malaysia in rice cultivation based on selected components and indicators. The objective of this paper is (i) to identify the relevant key components and indicators for the food availability dimension of food security in Malaysia; (ii) to produce a model of the Food Availability Index (FAI); and (iii) to assess the index of food availability of rice in Malaysia to recognize gaps in food production. The outcome of this paper is not only a framework of FAI but also a comparison between states' indices for FAI in rice.

LITERATURE REVIEW

Conceptualizing Food Security and Food Availability

Food security has been defined by various researcher over the years but fundamentally being defined by the Food and Agricultural Organisation (FAO) during the 1996 World Summit as a state where all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. This definition has then evolved by various researchers by adding more elements that is vital in ensuring food security for a nation. The original definition has set food security as a global concern on the food development that emphasis on few aspects not only the availability but also the access, safety and the nutritional adequacy (Stashkevych, 2024). Clap et al. (2022) indicate that based on the definition, dimensions of food security though Global Food Security Index (GFSI) has been introduced which are availability, access, utilization, and stability. The FAO Food

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Security Policy Brief (2006) lays out the four-pillar food security conceptualization framework, as follows:

- Food availability: The availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports and including food aid.
- Food access: Access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet.
- Utilisation: Utilisation of food through adequate diet, clean water, sanitation and healthcare to reach a state of nutritional wellbeing where all physiological needs are met.
- Stability: To be food secure, a population, household or individual must have access to adequate food at all times without risking losing access to food as a consequence of sudden shocks.

Food Security has been further discussed as a global concern when Sustainable Development Goals (SDGs) also mention food security as one of the keys to sustainability through the second goal which is zero hunger. SDG 2 aims to end hunger, achieve food security, and improve nutrition while promoting sustainable agriculture by 2030. It focuses on ensuring universal access to safe, nutritious, and sufficient food for all, especially vulnerable populations (United Nations, 2015).

While the world is focusing on the food security, an inverse concept of it which is food insecurity has also actively being discussed. Food insecurity has been defined by Furey (2025) as the inability to afford or access a healthy diet which is further recognized as a public health emergency with significant implications for businesses, households, and civic society. In ensuring a nation achieves a desired food security, four pillars of food security have been assessed and monitored globally by using Global Food Security Index (GFSI). The first dimension is food availability which shows availability or agricultural productivity is the main vital components without disregarding the other three (3) pillars. According to Mohamed (2023), food availability is indeed a crucial pillar of food security, as it ensures that food is reliably accessible daily. Without consistent availability, individuals cannot achieve food security, highlighting its fundamental role in the overall framework.

Global Food Security Index (GFSI)

The Global Food Security Index (GFSI) is a composite indicator developed by the Economist Intelligence Unit to monitor food security progress at the country level, covering over 100 countries since 2012 (Izraelov & Silber, 2019). This index has been published annually for all 113 participating countries. Based on the GFSI in 2022, Finland has been ranked first with an overall score of 83.7.

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According to Niemi et al. (2023), Finland able to be ranked first in GFSI because of this country have a strong natural resource and climate resilience, including abundant clean water, low vulnerability to climate change, and robust policies for sustainable land use. On the other hand, Syria has been ranked in the last place with the total score of 36.3. The primary reason Syria ranks last in the Global Food Security Index (GFSI) is the severe degradation of its agricultural sector, primarily due to prolonged conflict and climate change. The civil war has devastated agricultural infrastructure, leading to a 75% decline in wheat production, while drought-like conditions and high fuel costs have further exacerbated food insecurity (World Food Programme, 2023).

The GFSI Availability component incorporates a diverse set of eight indicators: access to agricultural inputs, agricultural R&D, farm infrastructure, volatility of agricultural production, food loss, supply chain infrastructure, sufficiency of supply, and political/social barriers as shown in Figure 1. These indicators reflect not only production levels but also the systems that ensure food reaches consumers efficiently and equitably. For instance, supply chain infrastructure includes cold chains, storage facilities, and transportation networks are the main factors affecting food loss and timely availability.

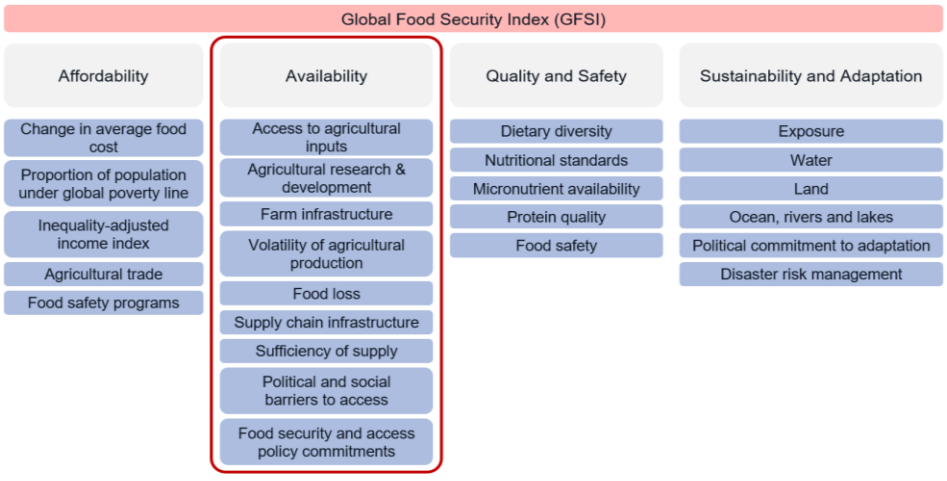


Figure 1: Framework of Global Food Security Index (GFSI)

The GFSI also provides insight into national-level performance. For Malaysia, GFSI scores show mixed progress: while affordability has improved significantly, availability has seen minimal gains over the past several years. This emphasizes the importance of enhancing domestic production and resilience in distribution systems which shows Malaysia is prioritising modernisation through sustainable practices and technological innovations (Asmawi et al., 2025).

UK Food Security Assessment Framework

The UK Food Security Assessment offers another robust framework, structured around four pillars: Availability, Food Chain Resilience, Household Food Security, and Safety and Confidence (Figure 2). It integrates both domestic and global indicators to assess the nation's food resilience, particularly in the wake of Brexit and the COVID-19 pandemic. Within the availability pillar, the UK framework measures dimensions such as the EU's share of imports, diversity of fruit and vegetable supply, and port infrastructure flexibility.

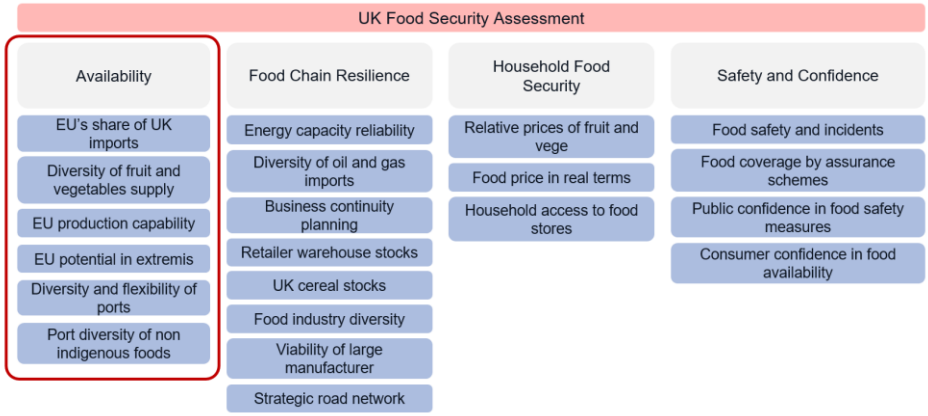


Figure 2: Framework of The UK Food Security Assessment

These indicators reflect how trade dependencies, import routes, and infrastructural diversity shape the availability of food across the UK. The framework's emphasis on port diversity and supply chain redundancy highlights a recognition that physical availability is not just about production but about distribution capacity and logistical resilience. This multidimensional approach aligns with global standards set by the FAO and is particularly useful for understanding systemic vulnerabilities and opportunities for strengthening food system infrastructure.

Insights on Food Losses, Infrastructure and Land Use

Extensive literature reinforces the relevance of the FAI indicators. Food loss remains a critical factor in food availability; global studies estimate cereal losses at 20–30%, and even higher for fruits and vegetables. In Malaysia, post-harvest losses for rice and vegetables can reach up to 50%, especially in rural states with limited infrastructure (MOA, 2021; Shamsudin & Selamat, 2012). Similarly, research on mechanization shows that the use of agricultural machinery can significantly reduce labor dependency and increase productivity. However,

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disparities exist between states, with urban areas showing higher machinery penetration and rural states relying more on manual labour.

Land use is another crucial aspect. While certain states like Perlis and Kedah exhibit high paddy land usage efficiency, others face urban encroachment or underutilization of designated agricultural parcels. Spatial planning and zoning policies, such as those under PLANMalaysia's KaGuMN initiative, play a pivotal role in maintaining land for food production.

RESEARCH METHODOLOGY

The Formulated Food Availability Index (FAI) Framework for Rice in Peninsular Malaysia

Building on the strengths of the GFSI and UK frameworks, this study formulates a localized national Food Availability Index (FAI) designed to assess rice availability across the eleven states in Peninsular Malaysia. Unlike broader international models, the FAI is specifically tailored to Malaysia's agricultural context, particularly for its staple food.

Based on models from the UK and globally, as well as the context of the agricultural sector in the country, the study developed a national FAI. The FAI framework includes four pillars and eight indicators (Figure 3). Agricultural Production being measured by average yield of cleaned paddy and total paddy production, capturing the efficiency and volume of rice cultivation at the state level. Land Use Proportion Indicators include planted area and the percentage of paddy parcels planted, reflecting land allocation and utilization efficiency. Supply infrastructure assess the road networks and levels of mechanization across six stages of production (land preparation, sowing, manuring, spraying, and harvesting). Food losses represented by post-harvest losses, which remain a significant challenge in the Malaysian agricultural supply chain. Each indicator is assessed through both quantitative and spatial methods, producing a composite score that enables state-level comparisons and categorization into low, medium, and high availability zones.

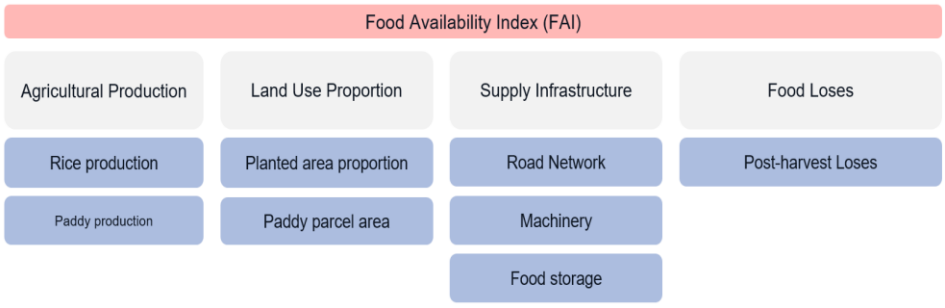


Figure 3: Framework of Food Availability Index (FAI) for Rice

Methods of Data Collection and Data Analysis

This study conducts quantitative research, which employed an expert validation method as its primary data collection technique, supplemented with secondary data obtained from authoritative government sources including the Department of Agriculture (DoA) and PLANMalaysia (Table 1). The research aimed to construct a localized and composite FAI that measures and monitors local rice availability.

Table 1 FAI Indicator Code and List

Component	Indicator Code	Indicator (Unit)
Agricultural Production	FAI 1.1	Average yield of cleaned paddy (Kilogram per Hectare)
	FAI 1.2	Paddy production (Metric Tons)
Land Use Proportion	FAI 2.1	Planted area for paddy (Ha)
	FAI 2.2	Percentage for paddy parcel and paddy planted (%)
Supply Infrastructure	FAI 3.1	Road Network (Rank)
	FAI 3.2	Machinery usage in land preparation (%)
	FAI 3.3	Machinery usage in sowing (%)
	FAI 3.4	Machinery usage in manuring (%)
	FAI 3.5	Machinery in chemical spraying (%)
	FAI 3.6	Machinery usage in harvesting (%)
Food Losses	FAI 4.1	Post-Harvest Looses (%)

To create the composite index, the data was normalized using Min-Max normalization to standardize measurements across different units. Each indicator in its component was given equal weight based on expert consensus obtained through the expert validation method. Two experts from Public Works and Ladang Perlating Jerneh, specializing in agriculture and infrastructure, were consulted to validate the final FAI output. The component scores were then combined to generate a composite FAI score for each state. The results were classified into three availability levels: low, medium, and high based on their composite scores. Spatial analysis was also conducted to visualize the distribution of FAI values across the eleven states, in addition to statistical processing.

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ANALYSIS AND DISCUSSION

Table 2 shows the detailed FAI for rice in eleven states of Peninsular Malaysia using a set of sub-components capturing different dimensions of food availability. Perak and Pulau Pinang had the highest FAI scores of 29, which corresponded to an FAI percentage of 87.9%. Both states scored consistently 3 in almost all the sub-components, reflecting a robust agricultural system, good infrastructure, and minimal food losses.

Table 2: Ranking of Composite FAI for the states in Peninsular Malaysia.

Sub-component	Perak	Pulau Pinang	Kedah	Perlis	Selangor	Pahang	Negeri Sembilan	Kelantan	Terengganu	Johor	Melaka
Agricultural Production	1	3	2	2	2	2	1	2	2	2	1
	3	2	3	3	2	1	1	3	1	1	1
Land Use Proportion	3	2	3	3	2	1	1	3	2	1	1
	3	3	3	3	3	1	1	1	1	1	3
Supply Infrastructure	3	3	1	1	3	2	2	1	1	3	2
	3	3	3	3	3	3	3	2	3	3	2
	3	2	3	3	1	3	3	2	3	3	2
	3	3	3	3	3	3	3	2	2	1	2
	3	3	3	3	3	3	3	2	2	1	2
	3	3	3	3	3	3	3	2	3	3	3
Food Losses	1	2	1	1	2	2	3	2	1	2	1

FAI Level	High	High	High	High	High	High	High	Medium	Medium	Medium	Medium
FAI Score	29	29	28	28	27	24	24	22	21	21	20
FAI Percentage	87.9	87.9	84.8	84.8	81.8	72.7	72.2	66.7	63.6	63.6	60.6
FAI Ranking	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th

Negeri Sembilan and Pahang also scored a "High" level of FAI with 24 points and percentage scores greater than 72%. Though not as good as the first-order states, their performance shows equitable contribution by all the sub-components. The two states significantly outperformed in the supply infrastructure category, indicating that they possessed a steady support system for rice availability.

On the other hand, Johor, Melaka, Terengganu, and Kelantan were categorized under "Medium" FAI, with 20 to 22 scores and 60.6% to 66.7% percentages. These states generally had lower agricultural output and land use proportion scores, which might indicate less emphasis on rice cultivation or less available resources for its growth. The relatively lower infrastructure and moderate food loss levels also contributed to their medium ranking. For example, Johor and Melaka poorer performed in terms of agriculture output as well as wastages in food, and these are areas that need improvement.

Agricultural Production

In terms of agricultural production, the states of Pulau Pinang, Kedah, Perlis, and Kelantan achieved the highest performance with a composite agricultural production percentage of 83.3%. Pulau Pinang, in particular, recorded the highest average yield of cleaned paddy at 5,655.5 kg per hectare, indicating superior productivity despite limited land availability.

Perak, although having a relatively lower yield of 3,260.5 kg per hectare, produced the highest total volume of paddy with total of 244,397 metric tons due to its extensive paddy cultivation area. In contrast, Negeri Sembilan and Melaka recorded the lowest agricultural production scores, mainly attributed to both low yield and small-scale paddy cultivation. Other states such as Pahang, Johor, and Terengganu also fell short in this category with production volumes under 100,000 metric tons per year, raising concerns about their contribution to national rice self-sufficiency (SSR).

Land Use Proportion

Regarding land use proportion, the findings showed that Perak, Kedah, and Perlis achieved perfect scores, indicating both large paddy cultivation areas (exceeding 30,000 hectares) and high land utilization efficiency (over 90% of paddy parcels actively planted). Kelantan, while possessing a large area of paddy land (40,333 hectares), demonstrated relatively low land utilization at 77%, suggesting underutilization of available resources.

States such as Johor, Pahang, and Negeri Sembilan were the weakest in this component, each with less than 10,000 hectares of paddy land and less than 80% land usage. On the other hand, urbanized states like Selangor and Pulau Pinang, despite land constraints, showed strong land efficiency, likely due to integrated zoning policies and optimized land use planning.

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Supply Infrastructure

The third component, supply infrastructure, showed that Perak led with a perfect score, reflecting full mechanization in all farming stages and excellent road network connectivity. Pulau Pinang, Pahang, and Negeri Sembilan also performed well, each scoring 94.4%, indicating that these states are highly equipped to support rice cultivation and distribution. Conversely, Kelantan and Melaka lagged in this component due to limited adoption of agricultural machinery and weaker logistics.

Notably, Selangor scored poorly in the sowing phase (22.2%) because of a strategic transition to transplanter technology, highlighting an evolution toward modern practices rather than a decline in performance. States with strong road infrastructure, such as Selangor, Perak, Johor, and Pulau Pinang, benefit from enhanced inter-state logistics and efficient market access, reinforcing their advantage in rice supply chains.

Food Losses

Food losses, measured through post-harvest unfilled grains, revealed that Negeri Sembilan performed best with the lowest loss (5%) and the highest index score in this category. States such as Pulau Pinang, Selangor, Kelantan, Pahang, and Johor experienced moderate losses between 5.1% and 10%, indicating areas for potential improvement through better harvesting techniques and input management. In contrast, Perak, Kedah, Perlis, Melaka, and Terengganu showed losses above 10%, which is concerning, especially for large-scale producers like Perak and Kedah. These high loss rates may be attributed to a lack of skilled labor, suboptimal post-harvest handling, or inadequate infrastructure, such as drying and storage facilities.

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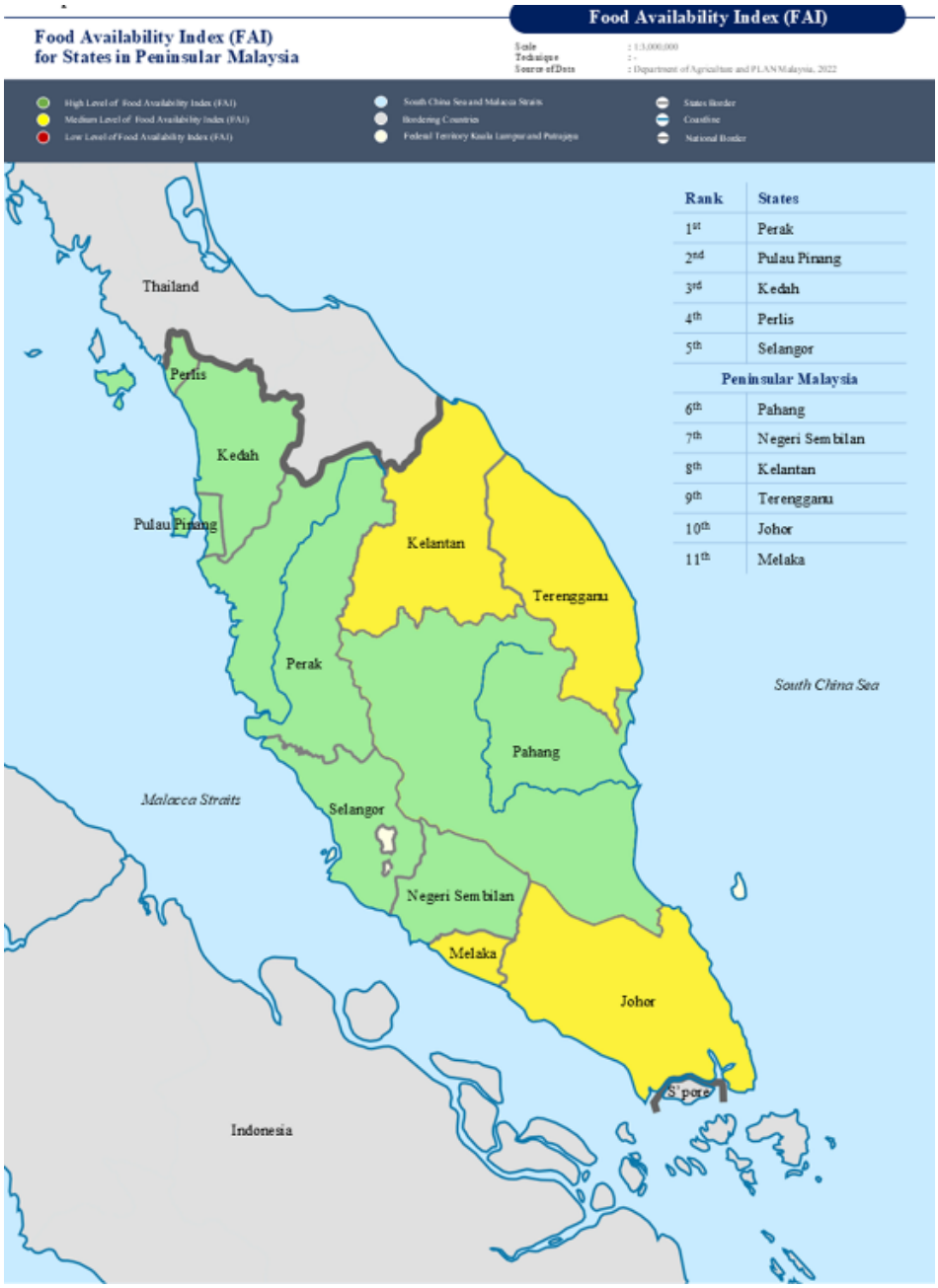


Figure 4: Mapping Result for Food Availability Index (FAI) for Eleven (11) States

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Figure 5: Mapping Result for Food Availability Index (FAI) for Peninsular Malaysia

The results of the Food Availability Index (FAI) analysis indicate that Peninsular Malaysia as a whole achieves a high FAI level (25 scores) for rice, yet this status hovers just slightly above the moderate threshold, signalling that the region is performing satisfactorily but not optimally. Malaysia is also facing issues on underutilised land and traditional method used caused unoptimized yield.

This dual challenge of low land utilisation and reliance on traditional methods is a key barrier to improving national rice self-sufficiency. It signals the need for both technical and policy interventions to revitalise underperforming regions. States like Pahang, Johor, and Negeri Sembilan, in particular, present significant untapped potential for increased rice production if supported with proper incentives, infrastructure, and land use protection mechanisms.

CONCLUSION

The analysis reveals clear spatial disparities in rice availability across the country. Perak and Pulau Pinang emerged as the top-performing states, achieving the highest FAI scores. These states demonstrated strong performance in terms of yield, mechanization, and land utilization, reflecting a relatively well-developed infrastructure and more modernized agricultural practices. In contrast, Melaka recorded the lowest FAI score, pointing to significant gaps in production capacity and resource utilization. The national composite score of 25, which falls within the high availability category, indicates that while Malaysia as a whole has a solid foundation for rice availability, substantial inter-state variation still exists and requires targeted policy responses.

The findings also highlight critical issues that continue to hinder optimal performance in several regions. Underutilized agricultural land and the continued reliance on traditional farming methods are major constraints that prevent states from realizing their full production potential. These inefficiencies not only limit yield but also contribute to food insecurity risks in the event of supply chain disruptions or environmental shocks. The results suggest a pressing need for integrated strategies that promote land optimization, expand mechanization, and reduce post-harvest losses.

Beyond its immediate application, this study lays important groundwork for the future of food security monitoring in Malaysia. The FAI offers a replicable and adaptable model that can serve as the basis for a fully localized, national Food Security Index. Such an index would be invaluable for streamlining policy formulation and enforcement, enabling more responsive and geographically targeted interventions. By adopting this localized approach, Malaysia will be better equipped to ensure sustainable food security, reduce dependency on imports, and respond proactively to emerging challenges in the agro-food sector.

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REFERENCES

Abd Rahman, A. A., Yasid, A. F. M., bin Alias, M. S., & Hamid, N. F. A. (2025). Literature review on Malaysia national food security: Challenge and strategy in meeting population rise. *Journal of Ecohumanism*, *4*(1), 1876–1893.

Asmawi, M. Z., Sulwani, M., & Ibrahim, I. (2025). A comparative study of global food security index (GFSI) between Malaysia and Vietnam. *J. Umm Al-Qura Univ. Eng. Archit.* https://doi.org/10.1007/s43995-025-00144-x

Bouxine, H. (2024). Food production, availability, agricultural systems, and food security: A detailed review. *International Journal of Agricultural and Life Sciences*, 450–454. https://doi.org/10.22573/spg.ijals.024.s122000123

Clapp, J., Moseley, W. G., Burlingame, B., & Termine, P. (2022). The case for a six-dimensional food security framework. *Food Policy*, *106*, 102164. https://doi.org/10.1016/j.foodpol.2021.102164

Das, L., Sethy, P., Srivastava, S., Mishra, S., Hemrom, A., & Pattanaik, S. (2020). Gender role analysis for institutionalizing a women-centric rice value chain model. *International Journal of Current Microbiology and Applied Sciences*, *9*(6), 2561–2567. https://doi.org/10.20546/IJCMAS.2020.906.311

Dorairaj, D., & Govender, N. (2023). Rice and paddy industry in Malaysia: Governance and policies, research trends, technology adoption and resilience. *Frontiers in Sustainable Food Systems*, *7*. https://doi.org/10.3389/fsufs.2023.1093605

Food and Agriculture Organization. (1996). *Rome declaration on world food security and World Food Summit Plan of Action*. Food and Agriculture Organization of the United Nations. https://www.fao.org/3/w3613e/w3613e00.htm

Food and Agriculture Organization. (2006). *Food security, policy brief, June 2006, Issue 2*. http://www.fao.org/forestry/13128-0e6f36f27e0091055bec28ebe830f46b3.pdf

Food and Agriculture Organization. (2021). *The state of the world's land and water resources for food and agriculture – Systems at breaking point*. FAO. https://doi.org/10.4060/cb9910en

Furey, S. (2025). Capturing food insecurity data and implications for business and policy. *Proceedings of the Nutrition Society*, 1–13. https://doi.org/10.1017/s0029665125000035

Herath, G., Hasanov, A., & Park, J. (2019). Impact of climate change on paddy production in Malaysia: Empirical analysis at the national and state level experience (pp. 656–664). Springer. https://doi.org/10.1007/978-3-030-21248-3_48

Izraelov, M., & Silber, J. (2019). An assessment of the global food security index. *Food Security*, *11*(5), 1135–1152. https://doi.org/10.1007/S12571-019-00941-Y

Ministry of Agriculture and Food Security. (2021). *Dasar Agromakanan Negara 2.0 (2021–2030)*. MOA.

Mohamed, S. (2023). The three pillars of food security - availability, adequate income and increasing productivity (pp. 1–12). Edward Elgar Publishing. https://doi.org/10.4337/9781035312719.00006

Moshi, A. B. (2019). *Local and regional variations in conditions for agricultural and*

food security in Tanzania. AgriFoSe2030 Report, (13).
Niemi, J., Aakkula, J., Rikkonen, P., & Väre, M. (2023). The determinants of a resilient food system for Finland in the 2020s. *European Journal of Futures Research*, *11*(1), 1–14. https://doi.org/10.1186/s40309-023-00215-z
Niles, M. T., & Brown, M. E. (2020). *Food security*. Oxford University Press. https://doi.org/10.1093/hesc/9780198814375.003.0011
Palkovič, J., & Sojková, Z. (2023). *The dynamics of European food security: Key drivers and measurement framework*. https://doi.org/10.15414/2023.9788055226736
Shamsudin, M. N., & Selamat, J. (2012). Food security in Malaysia: Challenges and issues. *Asian Journal of Agriculture and Development*, *9*(1), 1–13.
Stashkevych, I. O. (2024). Food security: Definition and evolution of the concept. *Vìsnik Donec'kogo Nacìonal'nogo Unìversitetu Ekonomìki ì Torgìvlì Ìmenì Mihajla Tugan-Baranovs'kogo*, *1*(80), 96–105. https://doi.org/10.33274/2079-4819-2024-80-1-96-105
United Nations. (2015). *Transforming our world: The 2030 Agenda for Sustainable Development*. https://sdgs.un.org/2030agenda
World Food Programme. (2023, March). More than half of all Syrians going hungry: WFP. *UN News*. https://news.un.org/en/story/2023/03/1134567
Zulkifli, M. F., Abd Rahman, A. A., Zulkifli, N., Yasid, A. F. M., Mat, B., & bin Alias, M. S. (2025). Implications due to challenges to food security in Malaysia. *Journal of Ecohumanism*, *4*(1), 1894–1904.

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ECOLOGICAL SENSITIVITY EVALUATION BASED ON GIS: A CASE STUDY IN HENGSHUI, CHINA

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Abstract

Hengshui City, located in China, serves as an ecological barrier for the coordinated development of the Beijing-Tianjin-Hebei region. The city prioritizes ecological civilization construction and actively promotes pollution control and ecological restoration. This study examines nine ecological factors from three categories: natural resources, terrain, and social factors. These factors include the digital elevation model (DEM), slope, rainfall, land use and cover (LUCC), normalized vegetation index (NDVI), net primary productivity (NPP), population, night light (NL), and soil erosion (SE). Using data from 2010 to 2020, we constructed an evaluation index system. We conducted a comprehensive analysis and evaluation of the ecological sensitivity of Hengshui City by combining the Analytic Hierarchy Process (AHP) with Geographic Information Systems (GIS). The results indicate that the comprehensive ecological sensitivity of Hengshui City can be categorized into four levels: mild sensitivity, moderate sensitivity, high sensitivity, and extreme sensitivity. Overall, Hengshui City exhibits mainly mild ecological sensitivity, with minimal changes in area over the study period. These research findings provide valuable insights for maintaining the health of Hengshui City's ecosystem and optimizing ecological management strategies.

***Keywords*:** Ecological sensitivity, GIS, Hengshui city

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INTRODUCTION

Since the onset of the Industrial Revolution, urbanization has accelerated significantly worldwide. In China, the trajectory of economic development has entered a new phase characterized by rapid urbanization. This swift urbanization has brought about numerous urban environmental challenges (Wu, 2014), most notably the substantial increase in urban construction land outpacing the growth rate of the urban population (Guan et al., 2018). Early scholarly inquiries into urban ecology primarily focused on experimental physiology, integrating studies on flora and fauna, outdoor energy flow cycles, and related domains (Bi et al., 2020). Over time, urban ecology has evolved into a pivotal field in interdisciplinary studies, encompassing human ecology, environmental psychology, and ecological functions (Niu et al., 2020).

Ecological sensitivity refers to the degree to which ecosystems reflect human disturbances and natural environmental changes. It serves as a critical indicator of ecosystem stability (J. Yu et al., 2020) and quantifies regional ecological environmental changes. Research outcomes in this field can provide a scientific basis for policymakers in formulating regional environmental policies (T. Yu et al., 2020). Ecologically sensitive areas are regions particularly vulnerable to environmental changes and human activities. These areas include natural reserves, biodiversity hotspots, regions rich in water resources, and areas susceptible to natural disasters (Liang & Li, 2012). In such regions, environmental degradation can lead to biodiversity loss, land degradation, and water pollution, adversely affecting human livelihoods and economic development (Xu et al., 2014). Therefore, safeguarding and managing ecologically sensitive areas is crucial. This requires comprehensive consideration of factors such as the natural environment, biodiversity, and socio-economic dynamics, and the formulation of corresponding protection policies and management measures to achieve sustainable ecosystem development.

LITERATURE REVIEW

Hengshui City plays a crucial role in bridging and linking the coordinated development of the Beijing-Tianjin-Hebei region, thereby promoting regional economic integration and sustainable development. However, in recent years, there has been a noticeable lack of attention from experts and scholars, both domestically and internationally, regarding the ecological sensitivity of Hengshui City. Instead, research has predominantly focused on the evaluation of human settlements (L. Yu et al., 2022), the optimization of landscape patterns (L. Yu et al., 2022), the management of groundwater resources (Sun et al., 2020; Zhao et al., 2020), and the analysis of heavy metal pollutants (W. Liu et al., 2022).

The concept of ecological sensitivity emerged in the 1960s and gained momentum in the 1970s with technological advancements facilitating further research into evaluation methods. Despite these developments, significant

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shortcomings remain. Current evaluation methods often depend on a limited set of indicators, such as land use type and vegetation coverage, thereby neglecting the diversity and complexity of ecosystems (Khan et al., 2022; Tsou et al., 2017; Wei et al., 2023). Additionally, data acquisition and technological constraints limit the effectiveness of these methods. Although remote sensing and GIS technologies are widely used in ecological sensitivity assessments, issues with spatial and temporal data resolution persist, hindering the ability to achieve high precision and timeliness (Chen et al., 2022; Meraj et al., 2022; Yilmaz et al., 2020). Furthermore, current methods inadequately address the dynamic nature of ecosystems. They predominantly rely on static analyses, failing to account for ecological changes over varying time scales (X. Liu et al., 2023; Ran et al., 2022).

RESEARCH METHODOLOGY

Study area

Hengshui City is located in the southeastern part of Hebei Province, with geographical coordinates ranging from 37°03' to 38°23' N and 115°10' to 116°34' E. The city comprises 11 districts and counties (Figure 2), with the municipal government situated in Taocheng District, approximately 250 kilometers from Beijing, the capital of China. Hengshui spans a total land area of 8,815 square kilometers and is part of the planned "1+9+3" Jingnan District within the Bohai Rim Economic Circle and the Capital Economic Circle. It is also a member city of the Mayor's Joint Conference for Cooperation in the Bohai Rim region, known as the "Golden Cross Intersection."

Geographically, Hengshui City is positioned within the alluvial plain of Hebei Province, featuring an average elevation of 12 to 30 meters. The terrain slopes from southwest to northeast, with elevation differences mainly ranging between 30 to 50 meters. Hengshui experiences a typical temperate monsoon climate, characterized by four distinct seasons and significant variations in temperature, dryness, and humidity. The city receives an average annual precipitation of 524 millimeters.

As of 2021, Hengshui City has a permanent population of 4.2129 million, with 2.306 million urban residents (54.74% of the total population) and 1.9067 million rural residents (45.26% of the total population).

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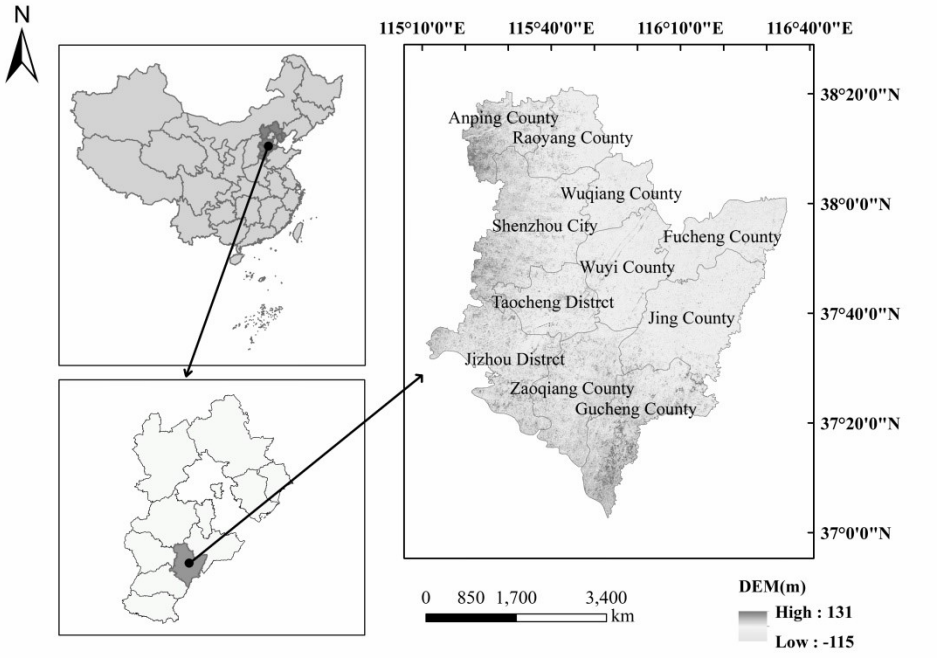


Figure 1: Administrative division map of Hengshui City

Data sources

The statistical data for the research area are derived from the "Hengshui Municipal People's Government Statistical Bulletin," the "Hengshui City Environmental Quality Bulletin," and the "Hengshui Statistical Yearbook." The vector data represent the dataset prior to integration and optimization. The Digital Elevation Model (DEM) is sourced from the geospatial data clouds available at [http://www.gscloud.cn] (http://www.gscloud.cn), specifically the ASTERGDEM30M dataset. Altitude and slope information are extracted from this dataset using ArcGIS software.

The vegetation index is comprised of remote sensing images obtained from the Landsat8 OLI-TIRS satellite digital product, also accessed through the geospatial data cloud platform. These images are processed using the Remote Sensing Image Processing Platform (ENVI).

For reference purposes, administrative divisions and high-definition image maps of Hengshui City are utilized.

Research method

Utilizing a hybrid methodology that integrates single-factor evaluation and multi-factor comprehensive evaluation techniques, our study aims to establish robust criteria for accurately assessing the ecological sensitivity of Hengshui City. This

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involves a meticulous single-factor assessment of ecological sensitivity, using predefined sensitivity grading levels as benchmarks (the sensitivity factors and corresponding grading scores are presented in Table 1). After the initial assessment, the Analytic Hierarchy Process (AHP) will be employed to determine the weight values assigned to each evaluation factor. These weights, as shown in Table 1, are synthesized from ratings provided by 15 experts, relevant literature, and previous academic research in the region. These weight values will then be used to compute comprehensive ecological sensitivity data (Song et al., 2010; Ying et al., 2007).

Subsequently, a comprehensive analysis and evaluation of ecological sensitivity will be conducted, encompassing the entire geographic domain of Hengshui City. This systematic approach is expected to yield valuable insights into the region's ecological dynamics, thereby informing decision-making and proactive environmental management strategies.

Table1: Evaluation index and classification criteria of ecological sensitivity assessment

Single factor indicator	Evaluation criterion	Ecological sensitivity grading	Score	Weight
Digital Elevation Model (DEM): m	>28	Extremely sensitive	5	0.0485
	24-28	Highly sensitive	4	
	21-24	Medium sensitive	3	
	17-21	Low sensitive	2	
	<17	Non sensitive	1	
Slope:°	>4	Extremely sensitive	5	0.0692
	3-4	Highly sensitive	4	
	2-3	Medium sensitive	3	
	1-2	Low sensitive	2	
	0-1	Non sensitive	1	
Rainfall: mm/year	>510	Extremely sensitive	5	0.0765
	480-510	Highly sensitive	4	
	450-480	Medium sensitive	3	
	420-450	Low sensitive	2	
	<420	Non sensitive	1	
Land use and land cover (LUCC):km^2	Forest land	Extremely sensitive	5	0.113
	waters	Highly sensitive	4	
	Grassland	Medium sensitive	3	
	Cultivated land	Low sensitive	2	
	Construction land	Non sensitive	1	
Normalized vegetation index (NDVI)	>0.8	Extremely sensitive	5	0.1685
	0.6-0.8	Highly sensitive	4	
	0.4-0.6	Medium sensitive	3	
	0.2-0.4	Low sensitive	2	
	<0.2	Non sensitive	1	
Net primary productivity (NPP): g*c/m^2	<210	Extremely sensitive	5	0.1646
	210-250	Highly sensitive	4	
	250-290	Medium sensitive	3	
	290-320	Low sensitive	2	
	>320	Non sensitive	1	

Single factor indicator	Evaluation criterion	Ecological sensitivity grading	Score	Weight
Population: people	>22000	Extremely sensitive	5	0.0671
	22000-9100	Highly sensitive	4	
	3000-9100	Medium sensitive	3	
	600-3000	Low sensitive	2	
	<600	Non sensitive	1	
Night light index (NL)	>0.8	Extremely sensitive	5	0.0743
	0.6-0.8	Highly sensitive	4	
	0.4-0.6	Medium sensitive	3	
	0.2-0.4	Low sensitive	2	
	<0.2	Non sensitive	1	
Soil erosion intensity (SE)	Highly erosion	Extremely sensitive	5	0.2184
	Relatively erosion	Highly sensitive	4	
	Medium erosion	Medium sensitive	3	
	Mild erosion	Low sensitive	2	
	Slightly erosion	Non sensitive	1	

Based on the availability of data and to eliminate the influence of a single evaluation indicator, we selected common indicators such as land use and plant coverage, as well as natural and social impact indicators such as terrain, slope, and precipitation. This selection was intended to enrich and enhance the diversity of ecosystems. Additionally, we utilized GIS technology to screen spatial image data with a resolution of 30 x 30 meters, ensuring high resolution and accuracy of the spatial data. We then analyzed the dynamic changes in ecological sensitivity across three periods: 2010, 2015, and 2020.

ANALYSIS AND DISCUSSION

Single-factor sensitivity assessment and analysis

DEM sensitivity

The DEM factor serves as the cornerstone among the evaluation criteria for assessing ecological sensitivity in secondary forests, exerting direct or indirect influence on factors such as slope and vegetation coverage (Khan et al., 2022). Consequently, the DEM factor occupies a pivotal position in the appraisal of ecological sensitivity within secondary forest ecosystems. Based on the distribution of elevations across diverse administrative regions within Hengshui City, the sensitivity levels of the DEM have been categorized into five grades, as outlined in Table 1. Sensitivity classification maps for the years 2010, 2015, and 2020 were generated by assigning values to the designated study area, as depicted in Figure 2.

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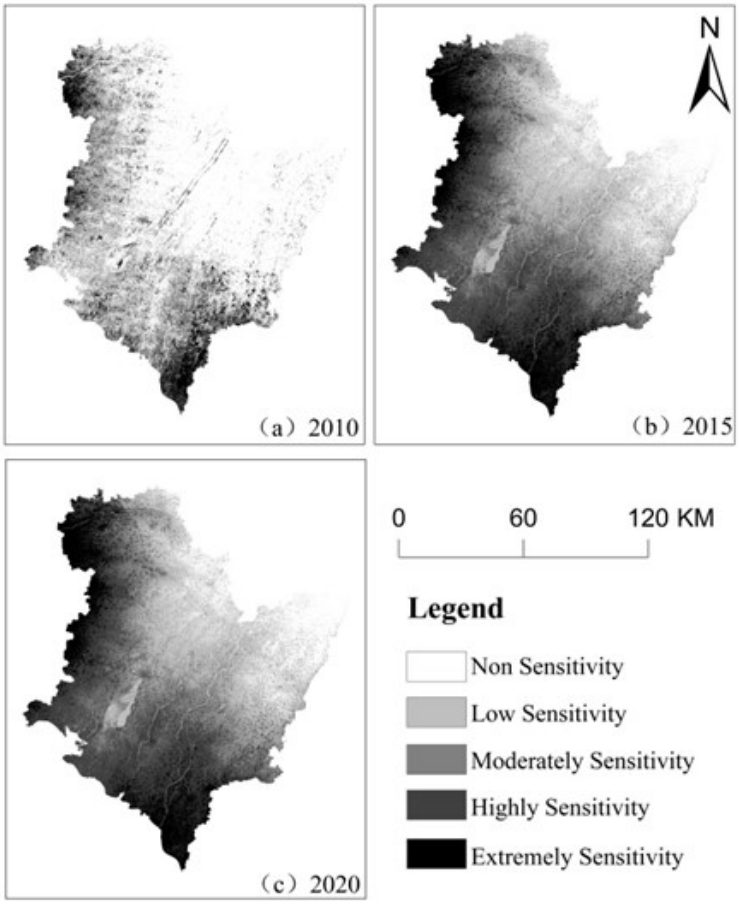


Figure 2: The influencing factors of DEM

Analysis of both charts and maps reveals that in 2010, elevation sensitivity throughout Hengshui City predominantly fell within the non-sensitive and low-sensitive categories, covering a total area of 6913.11 km², approximately 78.42% of the total land area. However, starting in 2015, there was a continuous decline in the area covered by regions classified as low-sensitivity, while conversely, areas classified as high-sensitivity and extremely high-sensitivity notably increased. Minimal disparities were observed in the areas and proportions of sensitivity levels between 2015 and 2020.

Furthermore, the northeastern part of Hengshui City features relatively flat terrain and lower sensitivity, whereas the western and southern regions exhibit greater elevation variations compared to the northeastern part, indicating higher sensitivity levels. This observation implies a direct correlation between

terrain fluctuation and sensitivity levels, where increased terrain variations correspond to heightened sensitivity.

Slope sensitivity

Based on the analysis of slope distribution across various regions of Hengshui City, we have categorized the sensitivity assessment into five distinct levels. This classification system has facilitated the creation of a slope factor ecological sensitivity classification map (Figure 3).

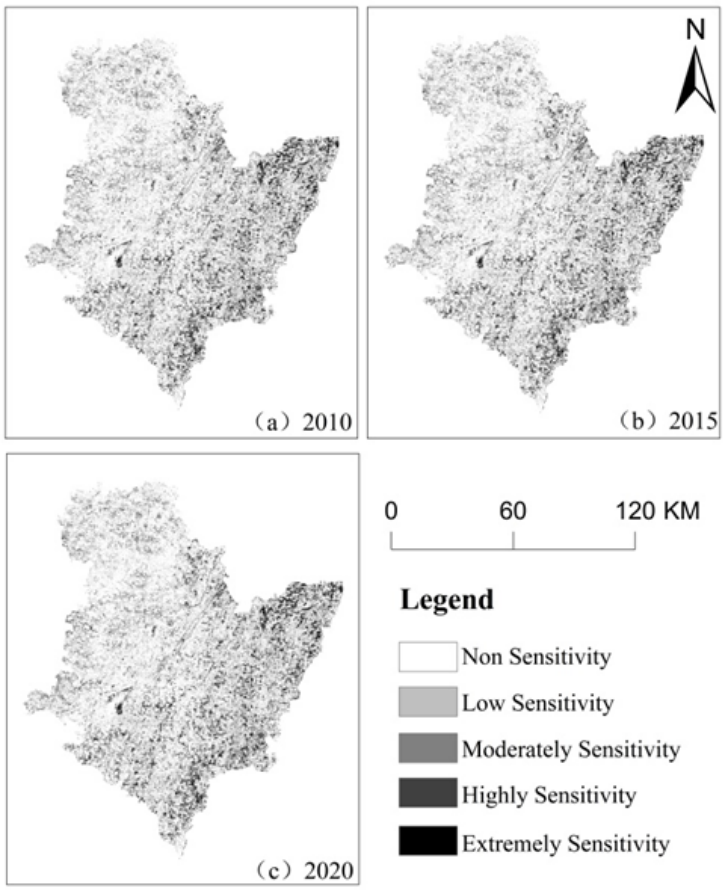


Figure 3: The influencing factors of Slope

Upon examining this map, it becomes apparent that Hengshui City is characterized by predominantly flat terrain, with minimal variations in slope gradients. Remarkably, spanning from 2010 to 2020, the sensitivity levels associated with the slope factor consistently indicate a low degree of sensitivity, showing negligible fluctuations across all data levels.

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NDVI sensitivity

NDVI (Normalized Difference Vegetation Index) stands as a pivotal metric in the assessment of ecological sensitivity within the designated study area(Wei et al., 2023). It effectively captures the nuances of vegetation growth and coverage across Hengshui City. Drawing from the vegetation cover data obtained from various sectors within Hengshui City, the NDVI sensitivity is
stratified into five distinct levels, culminating in the development of an NDVI sensitivity classification map, as depicted in Figure 4.

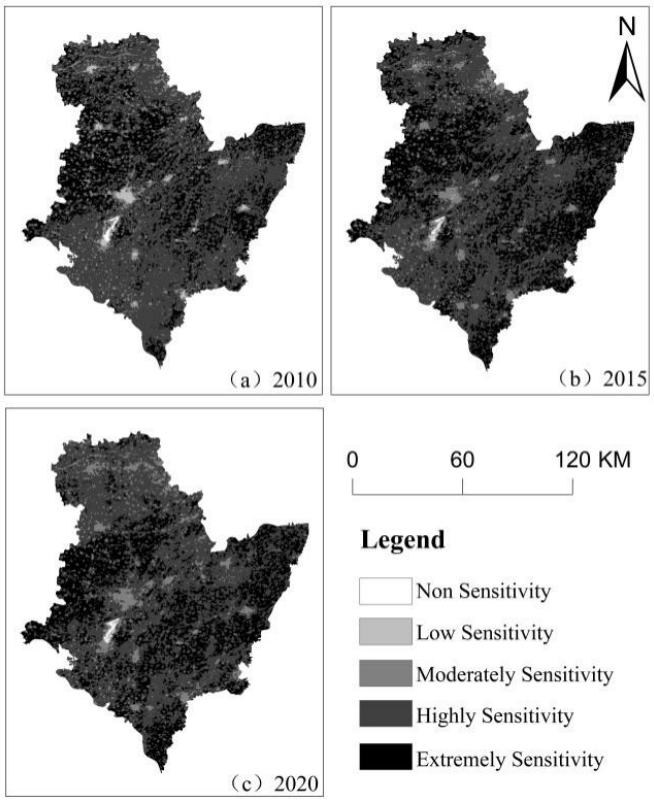


Figure 4: The influencing factors of NDVI

Upon examining the map and its corresponding dataset, it is evident that from 2010 to 2020, Hengshui City predominantly exhibits areas characterized by high and extremely high sensitivity according to NDVI assessments. Specifically, in 2010, sensitive regions covered 7746.66 square kilometers, representing 90.15% of the total land area. By 2015, these areas expanded to 8215.70 square kilometers, accounting for 93.20% of the total area. By 2020, sensitive regions further extended to cover 8270.53 square kilometers, constituting 93.82% of the

total land area. Noteworthy is the concentration of low-sensitivity areas across all three time periods, primarily localized within the water surface region of Hengshui Lake.

NPP sensitivity

NPP, short for Net Primary Productivity, refers to the surplus energy derived by vegetation through photosynthesis, after subtracting the energy consumed via metabolic processes. This metric serves as a fundamental gauge for ecosystem productivity and energy conversion efficiency, holding paramount significance in understanding ecological functionality and vitality. Typically, elevated NPP values indicate robust vegetative growth and heightened energy utilization efficiency within an ecosystem, while diminished NPP values may suggest constraints or compromised ecological health. Similarly, the assessment of NPP sensitivity in Hengshui City is stratified into five tiers, as illustrated in Figure 5.

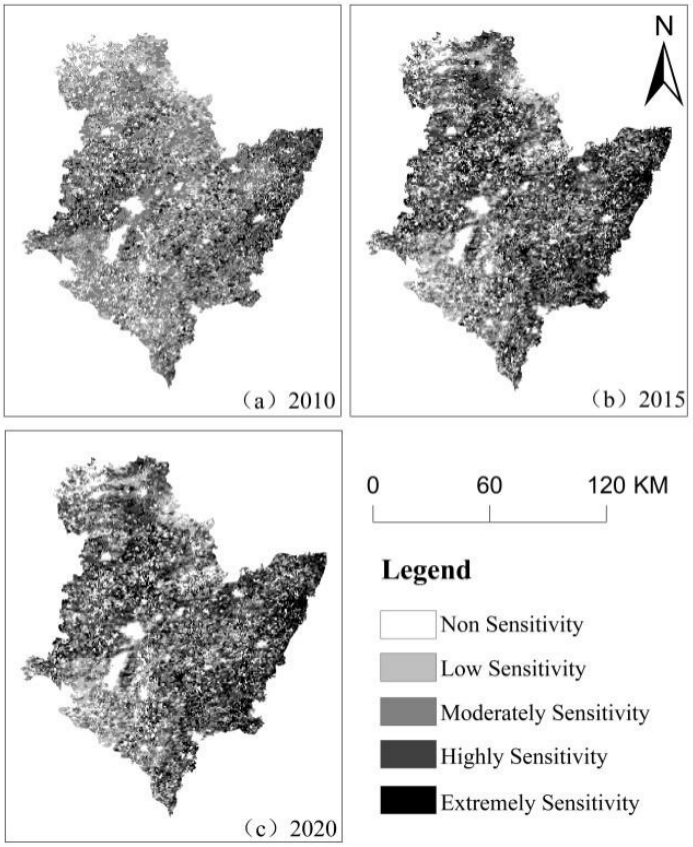


Figure 5: The influencing factors of NPP

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Overall trends indicate a shift in Hengshui City's NPP sensitivity from moderate to heightened levels during the period from 2010 to 2020.

Integrated Sensitivity Assessment and Analysis

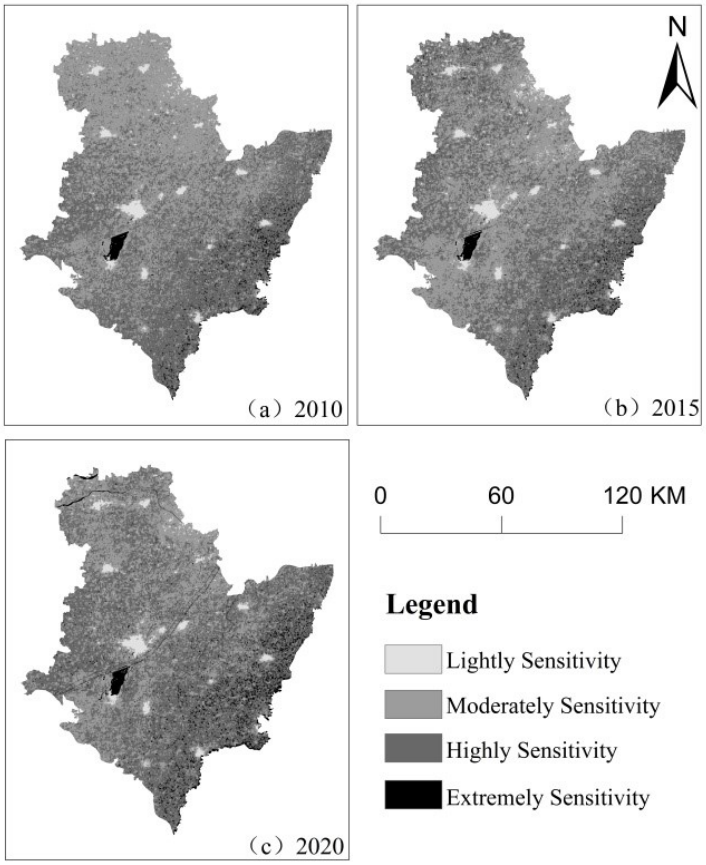


Figure 6: Distribution of comprehensive ecological sensitivity

Using GIS software and employing Analytic Hierarchy Process (AHP) analysis, we determined the weights of various sensitivity factors outlined in Table 1. All imagery underwent normalization using fuzzy tools to mitigate the impacts of dimensional variations on the data. Subsequently, GIS methodologies were used to overlay the weighted single-factor sensitivity indicators, resulting in the ecological sensitivity distribution of Hengshui City for the years 2010, 2015, and 2020. Combining all data outcomes, the ecological sensitivity of Hengshui City was categorized into four tiers: mild sensitivity, moderate sensitivity, high sensitivity, and extreme sensitivity (Figure 6).

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Analysis of graphical and tabular representations reveals that in 2010, Hengshui City exhibited ecological sensitivity levels including moderate sensitivity (4472.05 km², 50.73%), severe sensitivity (3919.01 km², 44.46%), mild sensitivity (217.26 km², 2.46%), and extreme sensitivity (206.67 km², 2.34%). By 2015, the ecological sensitivity profiles of Hengshui City showed a decline in the following order: moderate sensitivity (4405.36 km², 49.98%), severe sensitivity (3928.08 km², 44.56%), mild sensitivity (284.39 km², 3.23%), and extreme sensitivity (197.17 km², 2.24%). In 2020, the area of severe sensitivity in Hengshui City expanded to 4764.87 km², representing 54.05% of the total area, while the territory characterized by moderate sensitivity decreased to 3377.37 km², accounting for 38.31%. Meanwhile, the region classified as extreme sensitivity (466.26 km², 5.69%) saw a slight increase, and the area designated as mild sensitivity (206.10 km², 2.34%) remained relatively stable.

CONCLUSION

Hengshui City demonstrates a high ecological sensitivity overall. The northern region exhibits moderate sensitivity, indicating a stable ecological environment conducive to moderate development and utilization. In the southeastern region, which shows notably high and extensive ecological sensitivity, factors such as NDVI and NPP exert significant influence. Upholding the prevailing ecological conditions in these areas is imperative, prioritizing vegetation conservation and natural preservation.

The area of extreme sensitivity is relatively small but densely concentrated, primarily within the Hengshui Lake Nature Reserve. This concentration is due to the reserve's abundant natural resources and high vegetation coverage. However, once the ecological equilibrium is disrupted, restoring it becomes challenging within a short timeframe. Therefore, these regions require considerable attention and scrutiny from relevant authorities.

The precision of ecological sensitivity research concerning Hengshui City is somewhat constrained by limitations in temporal and spatial resolutions, as well as data disparities. Acquiring data specific to the Hengshui Lake Nature Reserve presents a formidable challenge, receiving marginal emphasis in this study. Future scientific endeavors aim to leverage advancements in artificial intelligence and big data analytics to procure datasets of higher accuracy. These efforts seek to facilitate a more thorough investigation into areas exhibiting high and extreme ecological sensitivity within Hengshui City.

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REFERENCES

Bi, M., Xie, G., & Yao, C. (2020). Ecological security assessment based on the renewable ecological footprint in the Guangdong-Hong Kong-Macao Greater Bay Area, China. *Ecological Indicators*, *116*(April), 106432. https://doi.org/10.1016/j.ecolind.2020.106432

Chen, J., Wang, S., & Zou, Y. (2022). Construction of an ecological security pattern based on ecosystem sensitivity and the importance of ecological services: A case study of the Guanzhong Plain urban agglomeration, China. *Ecological Indicators*, *136*, 108688. https://doi.org/10.1016/j.ecolind.2022.108688

Guan, X., Wei, H., Lu, S., Dai, Q., & Su, H. (2018). Assessment on the urbanization strategy in China: Achievements, challenges and reflections. *Habitat International*, *71*(September 2017), 97–109. https://doi.org/10.1016/j.habitatint.2017.11.009

Khan, R., Saxena, A., Shukla, S., Goel, P., Bhattacharya, P., Li, P., Ali, E. F., & Shaheen, S. M. (2022). Appraisal of water quality and ecological sensitivity with reference to riverfront development along the River Gomti, India. *Applied Water Science*, *12*(1), 13. https://doi.org/10.1007/s13201-021-01560-9

Liang, C., & Li, X. (2012). The ecological sensitivity evaluation in yellow river delta national natural reserve. *CLEAN–Soil, Air, Water*, *40*(10), 1197–1207. https://doi.org/10.1002/clen.201200051

Liu, W., Guo, Z., Wang, H., Wang, D., & Zhang, M. (2022). Spatial-temporal variations for pollution assessment of heavy metals in Hengshui Lake of China. *Water*, *14*(3), 458. https://doi.org/10.3390/w14030458

Liu, X., Su, Y., Li, Z., & Zhang, S. (2023). Constructing ecological security patterns based on ecosystem services trade-offs and ecological sensitivity: A case study of Shenzhen metropolitan area, China. *Ecological Indicators*, *154*, 110626. https://doi.org/10.1016/j.ecolind.2023.110626

Meraj, G., Singh, S. K., Kanga, S., & Islam, M. N. (2022). Modeling on comparison of ecosystem services concepts, tools, methods and their ecological-economic implications: A review. *Modeling Earth Systems and Environment*, *8*(1), 15–34. https://doi.org/10.1007/s40808-021-01131-6

Niu, Q., Yu, L., Jie, Q., & Li, X. (2020). An urban eco-environmental sensitive areas assessment method based on variable weights combination. *Environment, Development and Sustainability*, *22*(3), 2069–2085. https://doi.org/10.1007/s10668-018-0277-x

Ran, Y., Lei, D., Li, J., Gao, L., Mo, J., & Liu, X. (2022). Identification of crucial areas of territorial ecological restoration based on ecological security pattern: A case study of the central Yunnan urban agglomeration, China. *Ecological Indicators*, *143*, 109318. https://doi.org/10.1016/j.ecolind.2022.109318

Song, G., Chen, Y., Tian, M., Lv, S., Zhang, S., & Liu, S. (2010). The ecological vulnerability evaluation in southwestern mountain region of China based on GIS and AHP method. *Procedia Environmental Sciences*, *2*, 465–475. https://doi.org/10.1016/j.proenv.2010.10.051

Sun, J., Wang, X., & Shahid, S. (2020). Precipitation and runoff variation characteristics in typical regions of North China Plain: A case study of Hengshui City.

Theoretical and Applied Climatology, *142*, 971–985. https://doi.org/10.1007/s00704-020-03344-8

Tsou, J. Y., Gao, Y., Zhang, Y., Sun, G., Ren, J., & Li, Y. (2017). Evaluating urban land carrying capacity based on the ecological sensitivity analysis: A case study in Hangzhou, China. *Remote Sensing*, *9*(6), 529. https://doi.org/10.3390/rs9060529

Wei, X., Eboy, O. V., Xu, L., & Yu, D. (2023). Ecological Sensitivity of Urban Agglomeration in the Guanzhong Plain, China. *Sustainability*, *15*(6), 4804. https://doi.org/10.3390/su15064804

Wu, J. (2014). Urban ecology and sustainability: The state-of-the-science and future directions. *Landscape and Urban Planning*, *125*, 209–221. https://doi.org/10.1016/j.landurbplan.2014.01.018

Xu, L., Yin, H., Li, Z., & Li, S. (2014). Land ecological security evaluation of Guangzhou, China. *2*, 10537–10558. https://doi.org/10.3390/ijerph111010537

Yilmaz, F. C., Zengin, M., & Tekin Cure, C. (2020). Determination of ecologically sensitive areas in Denizli province using geographic information systems (GIS) and analytical hierarchy process (AHP). *Environmental Monitoring and Assessment*, *192*(9), 589. https://doi.org/10.1007/s10661-020-08514-9

Ying, X., Zeng, G.-M., Chen, G.-Q., Tang, L., Wang, K.-L., & Huang, D.-Y. (2007). Combining AHP with GIS in synthetic evaluation of eco-environment quality—A case study of Hunan Province, China. *Ecological Modelling*, *209*(2–4), 97–109. https://doi.org/10.1016/j.ecolmodel.2007.06.007

Yu, J., Li, F., Wang, Y., Lin, Y., Peng, Z., & Cheng, K. (2020). Spatiotemporal evolution of tropical forest degradation and its impact on ecological sensitivity: A case study in Jinghong, Xishuangbanna, China. *Science of the Total Environment*, *727*, 138678. https://doi.org/10.1016/j.scitotenv.2020.138678

Yu, L., Xie, D., & Xu, X. (2022). Environmental suitability evaluation for human settlements of rural residential areas in Hengshui, Hebei Province. *Land*, *11*(12), 2112. https://doi.org/10.3390/land11122112

Yu, T., Bao, A., Xu, W., Guo, H., Jiang, L., Zheng, G., Yuan, Y., & Nzabarinda, V. (2020). Exploring variability in landscape ecological risk and quantifying its driving factors in the Amu Darya Delta. *International Journal of Environmental Research and Public Health*, *17*(1), 79. https://doi.org/10.3390/ijerph17010079

Zhao, Y., Wang, L., Li, H., Zhu, Y., Wang, Q., Jiang, S., Zhai, J., & Hu, P. (2020). Evaluation of groundwater overdraft governance measures in Hengshui City, China. *Sustainability*, *12*(9), 3564. https://doi.org/10.3390/su12093564

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NAVIGATING URBAN HERITAGE CONSERVATION IN HISTORIC DISTRICTS OF DALIAN CITY – INSIGHTS FROM REGIONAL CULTURAL EXPERIENCES

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Abstract

Responding to this crisis, the Chinese government has undertaken the initiative to conserve and revitalise the urban historic districts in recent years. However, it has been observed that the process of historical heritage conservation in China is significantly influenced by the top-down protection system that renders the heritage voiceless. Past studies have explored the context of urban heritage conservation based on morphological integrity alone. This necessitates examining the context of the conservation of historic districts from a micro perspective involving human behaviour activities and experiences. This article aimed to navigate the path of urban heritage conservation in historic districts of China from a micro perspective of reviewing the regional cultural experiences. To do so, this article focused on the case of the historic district in Dalian City in China particularly Zhongshan District which is known for Zhongshan Square surrounded by classical buildings built in the early 20th century. Following the field visit and qualitative interviews with the residents, the collected data in the form of transcribed responses was thematically analysed. This article presents the main themes identified from the thematic coding of the collected data. The findings from the interviews indicated that the residents were dissatisfied with the heritage conservation interventions implemented by the government. This article concludes that the dissatisfaction among the residents was attributed to the concerns of the residents about the lack of connection between heritage buildings and the urban textures of their surroundings and the lack of supportive policies. This calls for strategic measures driven by regional cultural experiences.

Keywords: heritage conservation, cultural landscape, historic districts, Zhongshan Square, Dalian City

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INTRODUCTION

During the late 20th century, China faced a rapid rate of urbanisation owing to the opening up and reform policies. As explained by Farrell and Westlund (2018), this urban transition in Chinese cities led to the reorganisation of the spaces and associated population. This can be understood from the observation that the road to urbanisation in China has been different than that of Western countries (Chen et al., 2013). However, with the rapid rate of urbanisation in China, cities in contemporary times are challenged by a far greater challenge – the challenge of sustaining a balance between the built heritage and modernisation. As Wu et al. (2022) explained, with the large-scale urbanisation in China, the historic districts have encountered the threat of decline and destruction. For instance, Figures 1 and 2 below show how the local government in Guangdong has destroyed the historic district in the name of reconstruction with their pseudo-antique style of architecture (Yang, 2021).



Figure 1: Reconstructed houses on the left versus original Hui architecture
Source: Yang (2021)



Figure 2: Original urban fabric versus the reconstructed one
Source: Yang (2021)

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Given the perceived threat and decline to the historic built heritage in Chinese cities, this calls for the efforts of planners and policymakers to sustain a balance between preservation and modernisation. In fact, this problem is more pronounced in the context of Dalian City in China. As discussed by Zhang et al. (2023), being a port city throughout history and now being a megacity, Dalian in Northeast China has a demonstrated history of colonisation for roughly five decades. Following the reforms in the 1980s, the city began to witness rapid urbanisation thereby making it crucial to address the conflict between preservation and modernisation (Wang et al., 2023). Also, as shown in Figure 3, the prominence of ensuring protection and regeneration grew quite late. It is this context of Dalian City that makes it an intriguing context to explore the initiative to conserve and revitalise the urban fabric of its historic districts (Liu et al., 2019).

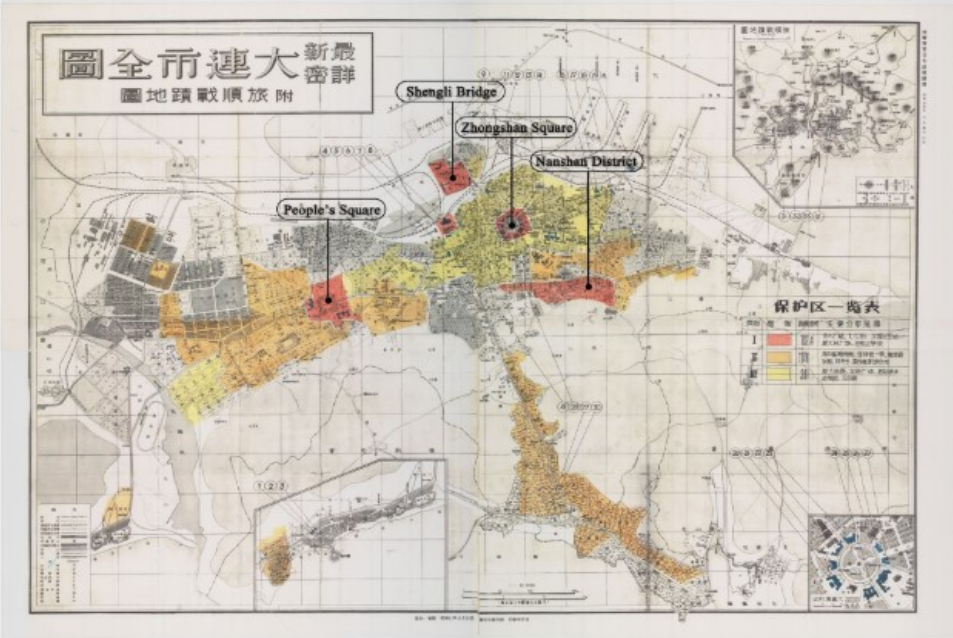


Figure 3: Historic map of Dalian showing the urban conservation areas during the colonial period
Source: Zhang et al. (2023)

Based on these perspectives, this paper aimed to navigate the path of urban heritage conservation in historic districts of China from a micro perspective of reviewing the regional cultural experiences. In order to attempt this, this study focused on the case of the historic district in Dalian City in China particularly Zhongshan District which is known for Zhongshan Square surrounded by classical buildings built in the early 20th century.

URBAN HERITAGE CONSERVATION IN HISTORIC DISTRICTS IN CHINA

A review of International and Chinese approaches to built-heritage

The idea of conservation of built heritage originated in the 19th century in response to the French Revolution following which it spread across the Western nations. As explained by Zhang et al. (2023), during the 20th century, the term heritage conservation grew stronger owing to the expansion of the legal and regulatory framework in the Western context. In fact, the term "heritage" began to include a broad range of buildings, landscapes and objects (Scott, 1998). This led to the increase in centralised management of heritage, a trend that gained prominence in the 1960s.

Also, in the period following 1970s, new economic forms were introduced that changed public values thereby influencing the politics of representation (Parry, 2007). On the basis of this observation, it can be deduced that the theme of preserving urban history gained recognition. Not only did it become a specialised topic but also attracted the attention of diverse stakeholders not limited to professionals but also the community at large. In the Chinese context, heritage conservation is heavily influenced by official and unofficial heritages. For instance, in the Chinese system, there exists a hierarchical system for classifying urban heritage from the viewpoint of conservation, however, it is vastly dominated by political structures (Liu et al., 2019). This can be understood from the fact that the **"Famous Historic and Cultural Cities (FHCC)"** system which consists of three tiers emerged from significant national policies over time.

Furthermore, reviewing the theme of heritage conservation policies in China indicated the influence of the goal of economic development. As Cao and Li (2023) discussed, the current heritage conservation policy applies to built and intangible cultural heritage only. In fact, Zan (2013) drew attention to how policy concerning urban heritage conservation has evolved in the context of China. Also, past studies have focused on policy development, analysing policy changes and understanding organisational behaviours involved in it. This can be understood from the differences between the studies published in the context of tangible and intangible heritage. Studies such as the one by Zhang (2022) on tangible heritage conservation policy emphasise concept and typology development, while those on intangible heritage conservation focus on policy frameworks and the management approach to production-based conservation (Xu et al., 2022). This indicates that there is a need to adopt a contextual approach to analysing the urban built heritage conservation in the context of Chinese cities owing to the inherent differences in the underlying policy frameworks.

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Protecting and Conserving Historic Districts

One of the most crucial factors influencing the assessment and protection of the built heritage in the urban context is the developed conservation system. As explained by Wang et al. (2023), the growth in interest in heritage conservation can be traced to the mid-20th century wherein a deeper understanding of heritage areas emerged. In the words of Chen et al. (2021), the Chinese historical heritage conservation system emerged with the designation of historic conservation areas (DHCA) within Chinese cities. This was recognised as the most effective way of preserving large-scale historical environments in Chinese cities that were challenged by rapid urbanisation. As can be observed from Figure 4 below, this can be understood from the designated historic conservation areas within the historic urban area in the city.

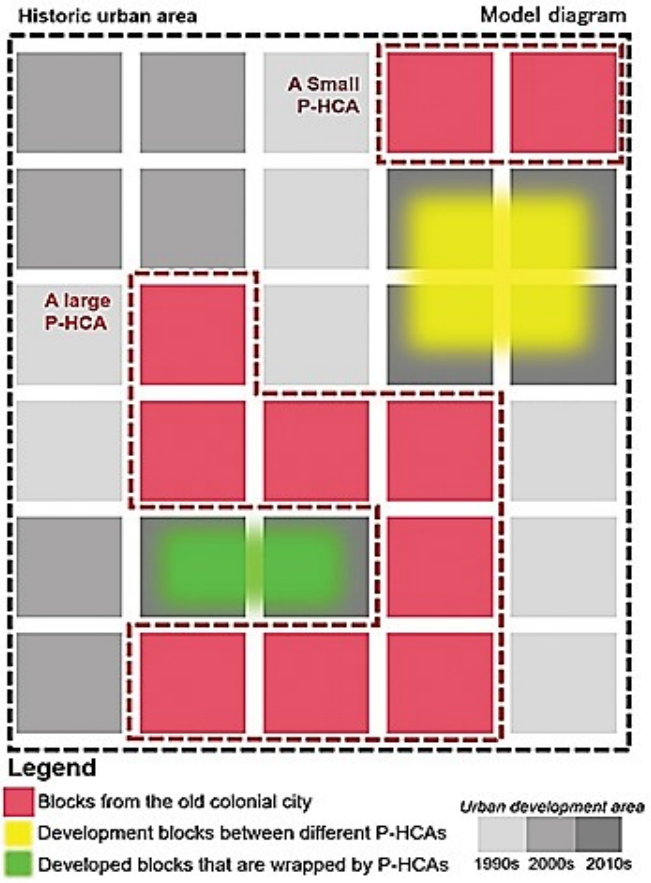


Figure 4: Historic conservation area in Chinese cities
Source: Wang et al. (2023)

While the method was initially thought to be effective, the forces of rapid urbanisation have led to the designation of only a few historic districts in accordance with the requirement of the conservation system. As Chan and Ma (2004) discussed, this is owing to the challenge posed by large-scale demolition practices by several cities to reconstruct their historic districts. For instance, this can be understood by the case of Shanghai which is recognised as a national FHCC in China but still, the Shikumen Lilong neighbourhoods of Shanghai remain unrecognised as DHCA owing to their abundance. This can be understood from Figures 5 and 6 shown indicating the declining state of Shikumen Lilong neighbourhoods in Shanghai.



Figure 5: Shikumen neighbourhoods in Shanghai in decline
Source: Anne, 2013

As Liu et al. (2019) explained, this lack of recognition is owing to the strict and cumbersome nature of process of selecting built heritage areas under DHCA system. Consequently, this paves the way for the demolition of the unrecognised heritage areas followed by the redevelopment of the land. This explains the reason for disappearing historic urban areas in China owing to the strict reliance on the current DHCA system alone. Besides, it may be noted that the lack of clear boundaries and policies concerning historic conservation areas makes it crucial to develop new conservation strategies based on a regional approach (Cao & Li, 2023).

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Figure 6: Lost Shikumen neighbourhoods in Shanghai
Source: Anne, 2013

The review of past studies indicated that conservation in historic districts in China has been significantly influenced by the DHCA system only. However, these inferences in the past studies are mostly theoretical and lack empirical evidence. In this context, Zhang (2022) drew attention to inadequacy of restrictions on urban renewal which could have otherwise encouraged their preserving rather than redeveloping them. On a similar note, Ruan and Sun (2001) discussed about the scope of conservation which should be based on managing the functional use of the neighbourhoods and landscape. Interestingly, past studies have also examined the morphological features of historic urban areas in China. Such studies have been undertaken in the context of cities namely Guangzhou and Suzhou with the use of space syntax theory in the past as discussed by Wu et al. (2019). From these studies, it can be deduced that, planners and policymakers must consider the significant role played by restrictions and guidelines in heritage conservation planning.

Not only this but heritage conservation system must involve a robust system to evaluate and designate areas of priority. In this context, Liu et al. (2019) highlighted the need for a diverse evaluation mechanism and government-enterprise cooperation. In their opinion, such approach can play a crucial role in historical continuity as well as creating economic value. Besides, Yang (2022) drew attention to the role of policy in conserving heritage in non-FHCC areas such as Jiangyin. As discussed by the author, this must involve policies for restoring urban form and developing renovation guidelines. Despite these studies,

there has been little analysis of the morphological characteristics of such heritage conservation areas. This is so because past studies have explored the context of urban heritage conservation based on little morphological integrity. Thus, it is not wrong to infer that the process of historical heritage conservation in China is significantly influenced by the top-down protection system that renders the heritage voiceless.

A Case of Zhongshan District, Dalian City, China

In order to navigate the path of urban heritage conservation in historic districts of China from a micro perspective of reviewing the regional cultural experiences, the case of Zhongshan District in Dalian City presents a relevant context.

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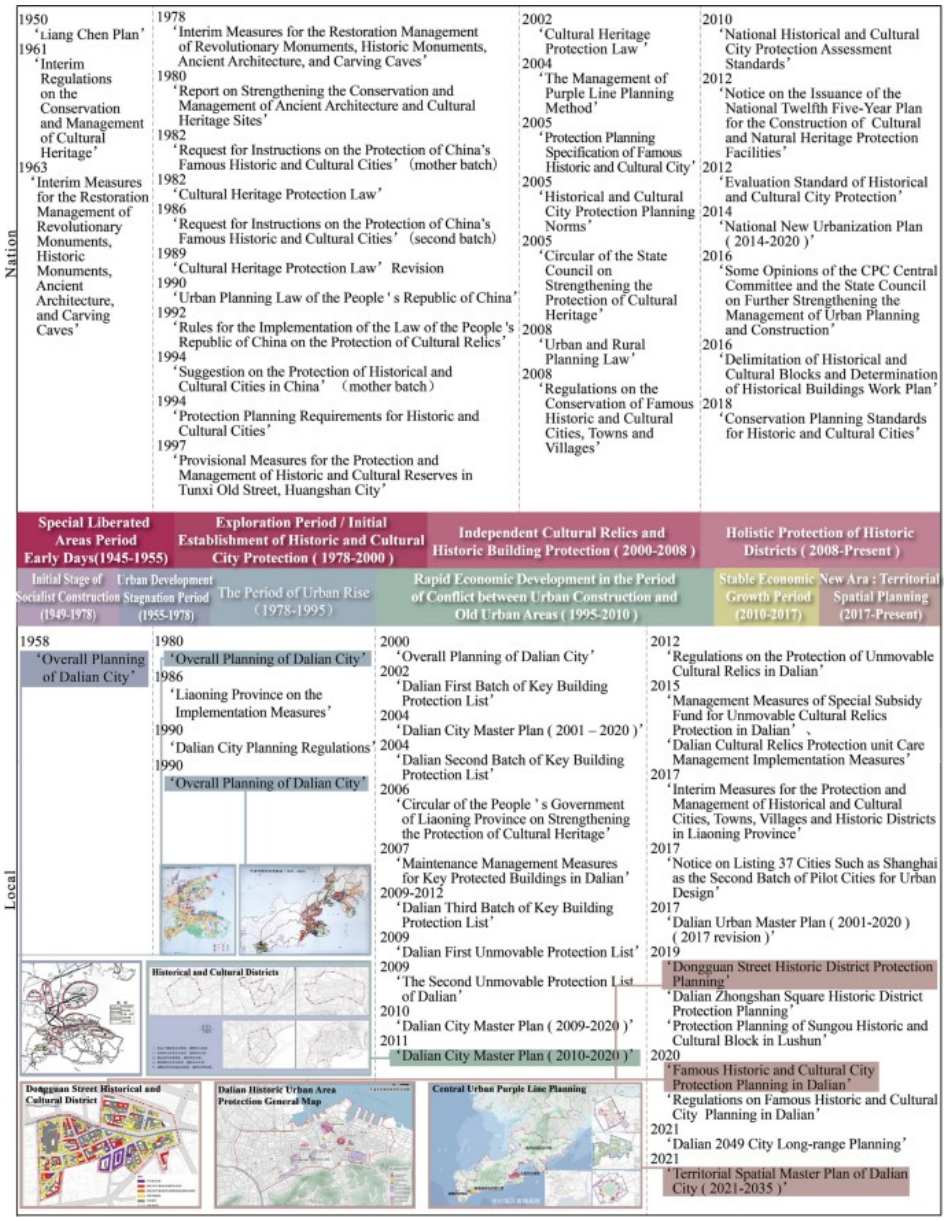


Figure 7: Development of heritage protection system at national, city and district levels
Source: Zhang et al., 2023

Dalian City is known to have a profound history despite being modern. This can be understood from the concentration of several historic districts in the city built

during different periods of history. As explained by Zhang et al. (2023), Dalian City is known to have traditional buildings that are mostly inspired by Western architectural styles. This is so because this part of the city was developed by foreigners, unlike other colonial cities. Figure 7 above shows the development of heritage protection systems at the national, city and district levels. As can be observed from the figure, the planning for heritage conservation of historic districts in Dalian City fails to consider constructive indicators. As of now, there exist limited historical and cultural blocks at the provincial level that are certified under the system of heritage protection system (Figure 8). Not only there is a detailed plan for community participation and funding, but there is also a lack of consideration of regional experiences which could pave the way for the dynamic protection of built heritage.

File Name	Release Time	Quantity	Identifying neighbourhood information
'The members of the CPPCC visited the protected historic districts in our city'—Dalian Daily	2006	5 historic and cultural blocks	Historic and cultural blocks: 1. Zhongshan Square (~15 ha) 2. Shengli Bridge (~9 ha) 3. Nanshan District (~40 ha) 4. Blackstone Reef (~18 ha) 5. Taiyanggou, Lvshun (~350 ha) Historic sites: 1. 87 Sanatoriums (~5 ha) 2. Xiaolong Street Cadre Sanatoriums (~6 ha) 3. Xinghai Street Lot (~9 ha) 4. Russian Army Barracks Site (~5 ha)
'Dalian City Master Plan (2009–2020)'	2010	5 historic and cultural blocks, 4 new historic sites	
'Dalian City Master Plan (2010–2020)'	2011	5 historic and cultural blocks	
'Dalian City Master Plan (2001–2020) (Revised 2017)'	2017	5 historic and cultural blocks	Historic and cultural blocks: 1. Zhongshan Square [a](~15 ha), core area 9.1 ha; 2. Shengli Bridge (~13.4 ha), core area 9.6 ha; 3. Nanshan District (~41.4 ha), core area 26.5 ha; 4. Blackstone Reef (~18.3 ha), core area 5.2 ha; 5. Taiyanggou, Lvshun (~350 ha), core area 28.6 ha.
FHCCPPD	January 2021	2 historic urban areas 4 historic and cultural blocks 6 historic and cultural scenic areas 20 sites with historic conditions (not listed)	Historic urban areas: Lvshun historic urban area, Dalian historic urban area Historic sites: Lvshun Old Market historic site Jinzhou ancient city historic site Historic and cultural blocks: Zhongshan Square[a], Dongguan Street[a], Shengli Bridge, Taiyanggou (Lvshun)[a] Historic and cultural scenic areas: Nanshan District, the Dalian Institute of Chemical Physics, Fengming Street, Liansuo Street, People's Square, Golden Hill, and others.
'Dalian 2049 city long-range planning'	May 2021	2 historic urban areas 2 historic sites 4 historic and cultural blocks 24 historic and cultural scenic areas	
'TSMPDDC (2021–2035)' draft	September 2021		

Figure 8: Existing historical and cultural blocks at the provincial level as presented
Source: Zhang et al. (2023)

As can be observed from Figure 6, Zhongshan District is one of the historical districts in Dalian City that has been officially recognised under the heritage conservation system. Located at the eastern edge of Dalian City, Zhongshan District constitutes a major business and commercial centre for the city. One of the most significant heritage areas in the district is Zhongshan Square which constitutes the heart of the district. As shown in Figure 9 below, the site of Zhongshan Square has been modernised with the development of high-rise

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buildings. This offers a context to explore the regional cultural experiences with respect to the broad goal of conservation of historic districts.



Figure 9: Zhongshan Square and its surroundings in the central business and commercial district
Source: Zhang et al., 2023

RESEARCH METHODOLOGY

In order to explore the urban heritage conservation of Zhongshan Square and surrounding spaces, this study involved field visits and qualitative interviews with residents of Zhongshan District (Figure 10). The first phase of the study was designed to undertake a field survey involving visit to the site followed by the second phase of the study in which interviews were conducted to gather insights from individuals.

Fieldwork

Before undertaking the fieldwork, this study involved reviewing a detailed map of Zhongshan District including Zhongshan Square, its surroundings, and notable streets within the district. During the fieldwork, the researcher was involved in visiting the site to observe the current state of heritage conservation efforts in Zhongshan Square and its surrounding areas. The aim here was to identify any discrepancies between preserved historical sites and modern development. This was accomplished by capturing the images of existing historic buildings, modern constructions and urban landscapes so as to visually document the current state of the area. Also, the fieldwork involved detailed notes on the condition of buildings, layout and signs of neglect/conservation.

Qualitative Interviews

During the second phase of the study, the study involved interacting with ten individuals concerning their experiences and perceptions of heritage conservation in Zhongshan District. The sample size of n = 10 was chosen in line with the guidelines (sample size range 5 to 25) by Beitin (2012) so as to ensure objectivity of findings while also being mindful of constraints of time and resources. These conversations were held in the form of interviews with owners, residents as well as visitors so as to understand their views on how to sustain a balance between preserving the heritage and the demand for modern spaces. The broad list of aspects that were focused upon during interviews were as follows.

- *Current state of heritage conservation in Zhongshan District*
- *Changes observed over time in Zhongshan Square and its surrounding areas*
- *Main concerns regarding the conservation efforts*
- *Personal experiences pertaining to the historic sites*

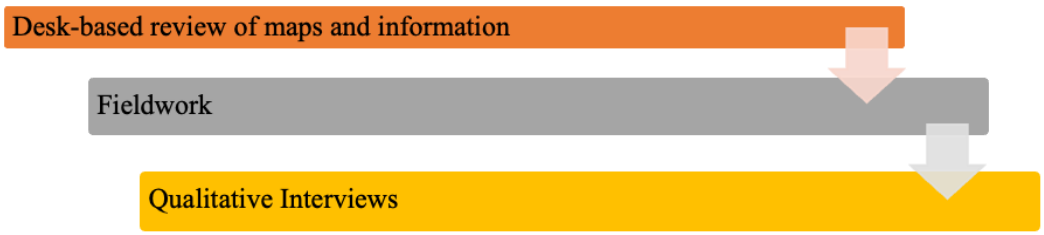


Figure 10: Research design adopted in the current study

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RESULTS AND DISCUSSION

Based on the analysis of the collected data, the current study found that the current heritage conservation interventions in Zhongshan District of Dalian City are met with dissatisfaction among residents. This was found to be attributed to the perceived loss of connection, insufficient supportive policies, lack of community engagement, and loss of cultural identity as discussed below.

Loss of connection between heritage buildings and urban textures

The current study found that there is a significant loss of connection between the heritage buildings and the surrounding urban textures in Zhongshan District. As observed during the field visits, many historic buildings are now overshadowed by modern high-rise constructions. At the same time, the current study observed that the contrast between traditional architecture and contemporary developments has led to a fragmented urban landscape (Figure 11).

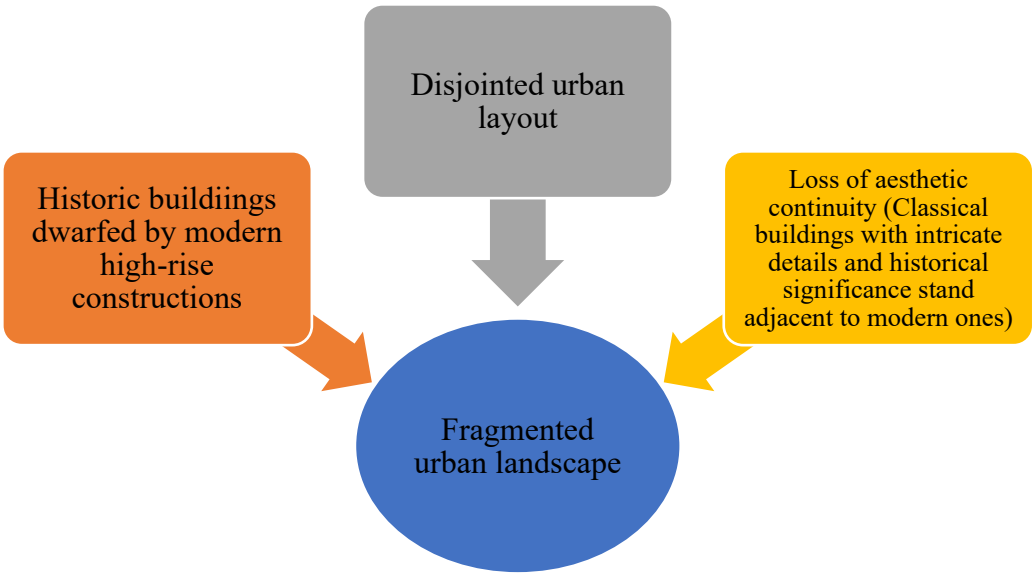


Figure 11: Patterns identified during the fieldwork (Created by the Author)

Furthermore, analysis of the responses of the interviewees at the site supported these observations. This was found to be supported by the views of the residents that the new constructions were not in harmony with the historic aesthetic which in turn paved the way for a disjointed appearance. This implies that the existing preservation efforts undermine the historic significance of the area. Besides, when it comes to preserving the urban textures of Zhongshan

Square and surrounding areas, the current study found that the urban textures in the case study region have witnessed irreversible damage. Therefore, while this may be attributed to the lack of detailed conservation strategies in the existing conservation system, there is a need to ensure a detailed plan for regaining the lost connection.

Lack of supportive policies and inadequate community engagement

Furthermore, analysis of the data confirmed the lack of supportive policies in conserving the heritage in the concerned area. This was evident in the responses of the interviewees that the existing heritage conservation system in Dalian City lacked in terms of protecting historic buildings. Majority of the interviewees expressed that the historic buildings in the case study region were challenged by the threat of being replaced or modified permanently which was found to be supported with the changing urban form of the case study site (Figure 12).

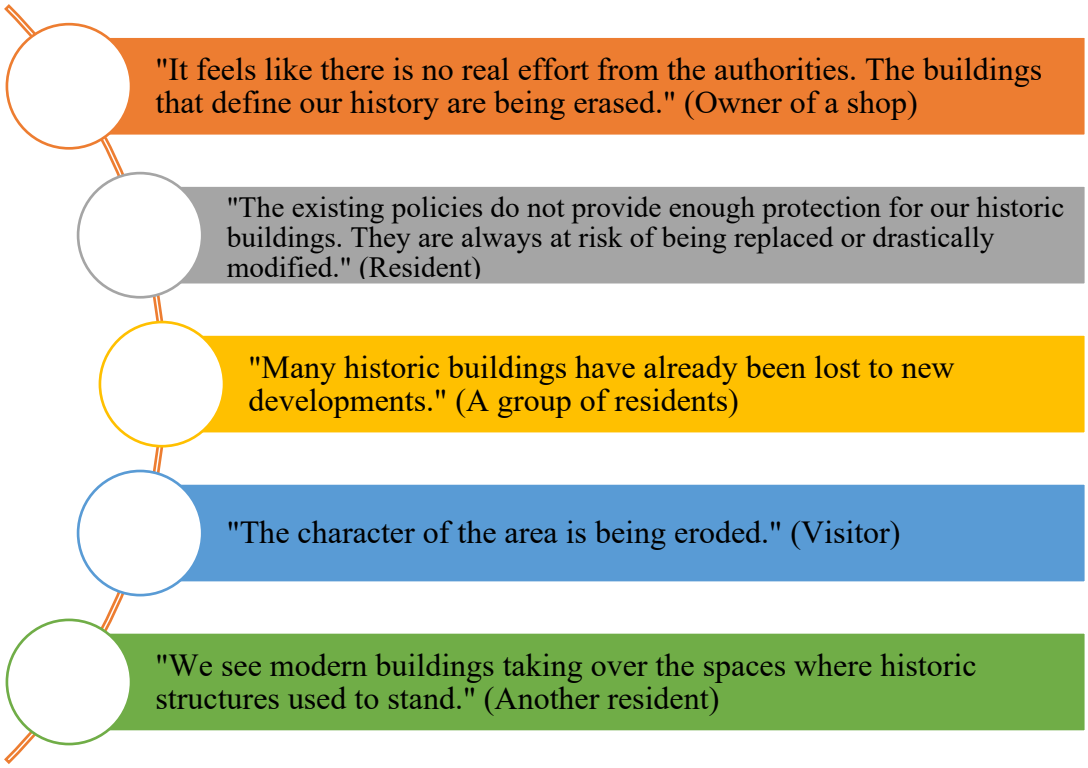


Figure 12: Responses of interviewees expressing concerns (Created by the Author)

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Also, the findings of the current study drew attention to a lack of community engagement under the existing heritage conservation system. Majority of the interviewees stated that they felt a sense of exclusion from the process of decision-making when it comes to preserving the urban built heritage. This implies that the current heritage conservation system in the context of Dalian City lacked consideration of the needs and values of the broader community as a whole. This draws the attention of planners and policymakers to consider the needs and values of the local community and align conservation efforts with them.

Loss of Cultural Identity and Living Heritage

Based on the analysis of the collected data, the current study found a sense of loss of cultural identity among the individuals interviewed during the visits to the case study region. This was attributed to their opinion that demolition and alteration had changed the appearance of many historic spaces in Zhongshan District which actually were tangible links to the past. In fact, the current study found from the interactions at the site that the existing strategies in the case study region lack the preservation of the living heritage. This is not only concerning owing to the changing appearance of the buildings in the case study region but also the loss of cultural practices associated with them. This indicates that with the influence of modern development, there is a loss of the cultural fabric in the area which in turn makes it even more difficult for people to connect with their historical roots. This paves the way for planners and policymakers to develop heritage conservation strategies to enhance the experiences of the community. In doing so, the focus should be on enabling the connection between the community and the cultural fabric of the region. Such strategic integration of historical heritage with the community can promote preservation and cultural continuity.

Holistic conservation based on regional experiences

Realising the need for a more holistic approach to heritage conservation, the findings of the current study indicates that it should not be limited to their physical preservation alone. As emphasised by the interviewees, conservation efforts should focus on preserving individual buildings as well as the broader urban context and cultural landscape. Such an approach would involve the creation of policies for sustainable conservation while integrating the heritage with modern development. For instance, this can involve encouraging the use of traditional architectural elements in new modern development. Additionally, the current study implies that local communities must be involved in the process of decision-making. In this way, their regional knowledge and cultural awareness can pave the way for complementing the urban built heritage conservation. As a

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result, it is possible to preserve the urban built heritage of Zhongshan District based on regional experiences.

CONCLUSION

The aim of this paper was to navigate the path of urban heritage conservation in historic districts of China from a micro perspective of reviewing the regional cultural experiences. In order to attempt this, this study focused on the case of the historic district in Dalian City in China particularly Zhongshan District which is known for Zhongshan Square surrounded by classical buildings built in the early 20th century. Following the field visit and qualitative interviews with the residents, the collected data in the form of transcribed responses was thematically analysed. This paper concludes that the residents were dissatisfied with the heritage conservation interventions implemented by the government. Furthermore, this paper concludes that the dissatisfaction among the residents was attributed to the concerns of the residents about the lack of connection between heritage buildings and the urban textures of their surroundings and the lack of supportive policies. This calls for strategic measures driven by regional cultural experiences. The findings of this paper have significant implications for planners and policymakers to preserve the urban built heritage of Zhongshan District based on regional experiences.

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REFERENCES

Anne, S. (2013). Shanghai's lost shikumen and villas in 2013. *Shanghai Street Stories*. https://shanghaistreetstories.com/?p=6351

Beitin, B. K. (2012). Interview and sampling. In *The SAGE handbook of interview research: The complexity of the craft* (pp. 243-253).

Cao, J., & Li, T. (2023). Analysis of spatiotemporal changes in cultural heritage protected cities and their influencing factors: Evidence from China. *Ecological Indicators*, *151*, 110327.

Chan, W., & Ma, S. (2004). Heritage preservation and sustainability of China's development. *Sustainable Development*, *12*(1), 15-31.

Chen, M., Liu, W., & Tao, X. (2013). Evolution and assessment on China's urbanization 1960–2010: Under-urbanization or over-urbanization? *Habitat International*, *38*, 25-33.

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Farrell, K., & Westlund, H. (2018). China's rapid urban ascent: An examination into the components of urban growth. *Asian Geographer*, *35*(1), 85-106.

Liu, Y., Dupre, K., Jin, X., & Weaver, D. (2019). Dalian's unique planning history and its contested heritage in urban regeneration. *Planning Perspectives*, *35*(5), 873-894.

Parry, R. (2007). *Recoding the Museum: Digital heritage and the technologies of change*. Routledge.

Ruan, Y., & Sun, M. (2001). Some problems in the protection of Chinese historic conservation area. *City Planning Review*, *25*(10), 25–32. Scott, J. C. (1998). *Seeing like a state: How certain schemes to improve the human condition have failed*. Yale University Press.

Wang, Y., Matsumoto, K., Wang, R., Zhou, W., & Sawaki, M. (2023). Investigating the potential historic conservation area in China: A case study on 11 old colonial cities. *Journal of Asian Architecture and Building Engineering*, *22*(6), 3718-3731.

Wu, C., Li, G., Li, Y., Pu, Y., & Zhang, Y. (2022, November). A review of research on strategies and methods for the revitalization of urban historic districts. In *IOP Conference Series: Earth and Environmental Science* (Vol. 1101, No. 5, p. 052021). IOP Publishing.

Wu, Z., Fang, Y., & Shi, Z. (2019). Research on spatial forms of historical and cultural blocks based on space syntax: Taking the Changmen historical and cultural block in Suzhou as an example. *Architecture & Culture*, *12*, 36-38.

Xu, Y., Zhang, H., Tian, Y., Xia, X., Chen, X., Yang, Y., & Zhang, J. (2022). When technology meets heritage: A moderated mediation of immersive technology on the constraint-satisfaction relationship. *Current Issues in Tourism*, *25*(4), 632-649.

Yang, C. (2022). Cultural landscape space system: A case study on the regeneration planning of non-historic and cultural old city of Tangyin. *City Planning Review*, *5*, 81–92.

Yang, Z. (2021). Destructive reconstruction in China: Interpreting authenticity in the Shuidong Reconstruction Project, Huizhou, Guangdong Province. *Built Heritage*, *5*(1), 1-14.

Zan, L. (2013). Economic discourse and heritage conservation: Towards an ethnography of administrations. *Heritage & Society*, *6*(2), 167-184.

Zhang, H., Wang, F., Guo, F., Cai, J., & Dong, J. (2023). Urban built heritage protection and realistic dilemmas: The development process, protection system, and critical thinking of historic districts in Dalian. *Built Heritage*, *7*(1), 25.

Zhang, S. (2022). The development and institutional characteristics of China's built heritage conservation legislation. *Built Heritage*, *6*(1), 11.

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WHAT IS THE ROLE OF SUB-NATIONAL AUTHORITIES IN PUBLIC TRANSPORT POLICY? – A MULTI-LEVEL GOVERNANCE PERSPECTIVE IN INDONESIA

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Abstract

This paper examines the role and engagement of sub-national authorities in BTS Teman Bus policy-making in Yogyakarta Special Region (DIY) Province. The national government has primarily taken the lead in the program without significant involvement from regional authorities. Using the multi-level governance (MLG) theory, this study provides a new perspective on transport governance. Despite limited resources at regional levels, the non-involvement of regional governments is questionable. This poses a question whether the BTS Teman Bus policy-making reflect the emergence and existence of MLG. To address this issue, we conducted interviews with eight key informants in BTS Teman Bus policy-making and gathered information through documentation study. The results revealed two institutional types of MLG in Yogyakarta, but this did not necessarily translate to MLG being evident in the BTS Teman Bus policy-making process. This case study in DIY Province provides insights into the BTS Teman Bus policy-making process. It has significant implications for the understanding of public transport policy-making in Indonesia, emphasizing the need for more effective decision-making and collaboration in the future.

Keywords: Sub-national Authorities, Policy-making, Public Transport, Multi-Level Governance

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INTRODUCTION

Efforts to coordinate transportation and urban development at the metropolitan level in Indonesia face persistent challenges. Unlike other developed countries with supportive institutional capacity, the task of overseeing metropolitan governance remains a complicated problem in Indonesia (Diwangkari, 2014). After the decentralization policy through the Decentralization Act 22/1999 (further reiterated by Act 32/2004), Indonesia experienced a massive transition in the spatial planning system from a highly hierarchical and centralized system to less hierarchical and empowered local governments (Firman, 2010). This transition, while enhancing local autonomy, also created policy fragmentation across jurisdictions (Talitha & Hudalah, 2014). This sudden transformation pushed local governments to seek a new regional governance instrument through collaborations that conform to the current system (Okitasari & Kidokoro, 2014).

Even though some countries have developed national transport policies, the implementation remains challenging due to weak institutions, poor governance mechanisms, and inadequate capacity of policymakers (Sridhar et al., 2019). Furthermore, in the case of spatial planning law in Indonesia, the content of the spatial plan formulated by lower-level governments should be aligned with the directions for urban development that the central government has decided in the national spatial plan. Similar to spatial plans, sectoral planning (transport, environment, and energy) is also prepared in a hierarchical fashion involving multi-level actors. It is imperative for sectoral planning to be in alignment with the national and provincial spatial plans. Regarding this matter, the arrangement and implementation of policies can indirectly reflect the multi-level governance (MLG) concept, in which policy actors and organizations at different levels can make decisions that may influence the types and characteristics of policies and projects.

Public transport governance often remains fragmented and must face coordination challenges (Rye et al., 2018). Previous studies have found that frequent changes in governance structures, including their responsibilities, lead to coordination and integration challenges(G. R. Marsden & May, 2006). In most developing countries, changes in governance structure, responsibilities, and authorities have also occurred, including in Indonesia. Employing comprehensive metropolitan transportation planning among several local authorities' jurisdictions becomes a critical issue in the metropolitan transport context. Creating an efficient public transport system will require a successful collaboration among several discrete organizations, both public and private organizations (Hrelja et al., 2018). Therefore, local and regional public transport planning processes must be developed in accordance with the MLG culture based on negotiation and consensus with local governments.

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In 2020, the Ministry of Transportation (MoT) launched BTS Teman Bus to implement a road-based mass transportation development program with Buy the Service (BTS) scheme. BTS was first introduced in five pilot cities: Medan, Palembang, Surakarta, Yogyakarta, and Denpasar. Regarding governance, the Ministry of Transportation (MoT) has been responsible for all decision-making processes of BTS Teman Bus program. Regional authorities, on the other hand, have been restricted to providing transport infrastructure and suggesting operation routes, positioning them as policy receivers rather than active contributors. Regardless of the limited resources at regional levels, the non-involvement of regional governments is questionable. This also raises a question whether MLG emerges and exists in the BTS Teman Bus policy-making.

Drawing insights from the aforementioned discussion, it is critical to elaborate on the metropolitan public transport governance and understand the policy-making processes in public transport planning and policy. This paper is structured by using MLG theory as an entry point to understand the complexity of transport governance in metropolitan public transport planning, which serves as instances of multi-level policy-making. Using MLG approach, this study examines the role and engagement of sub-national authorities in BTS Teman Bus policy-making in Yogyakarta Special Region (DIY) Province. BTS Teman Bus has been chiefly directed by the national government without significant involvement from regional authorities. The governance discussion is structured through an introduction to the critical concepts of MLG, which was introduced by (Bache & Flinders, 2004; Hooghe & Marks, 2003; Piattoni, 2009)

LITERATURE REVIEW

Inter-local Government Collaboration

In terms of transportation, urban problems such as traffic congestion, pollution, and economic losses are closely linked to the effectiveness or inadequacy of the provision of efficient transportation services, the design of which would raise challenges that transcend local government boundaries (Miharja et al., 2021). An imbalance between the supply and demand for transportation can be readily caused by local governments' fragmented planning, which has become one of the leading causes of severe transportation problems cities are facing today (Hirschhorn et al., 2019).

(Phillimore, 2013) shows how informal processes and power dynamics have historically dominated intergovernmental relations, but that formalization and institutionalization have grown and can offer sub-national governments more security and protection when interacting with the state government. Developing countries, which mainly apply a decentralized system to their state system, have a growing financial independence and autonomous decision-making authority of their regional governments.

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Top-down decision-making is different from inter-local collaboration. Inter-local collaboration occurs when local governments work horizontally to address social challenges across geographic boundaries. It incorporates varied ideals, brings stakeholders from different fields and cities together, and holds all stakeholders accountable for effective collaborative solutions (Shen et al., 2016).

Actualizing a collaborative governance environment will encounter some challenges, not to mention the process of participation and methods of communication among institutions, organizations, and actors across levels which tend to pass through various frictions (Tanner et al., 2009). Consequently, there would be a tenuous relationship and minimal communication between regulators, providers, operators, and public transport users in developing countries (Sohail et al., 2006). This also accords with research by (Kumar et al., 2012) which found that non-technical aspects of planning, such as communication, need to be prioritized in developing countries. Regarding planning regulations in Indonesia, the importance of public participation is already acknowledged in the Spatial Planning Law, but with limited implementation during the planning process (Rukmana, 2015).

Interesting findings were found in a study of transport governance in the UK, in which the interaction between governance scales and the relationship between transport stakeholders and other actors might be necessary (Pemberton, 2000). In the context of metropolitan areas, transport authorities can play an essential role as an agency responsible for coordinating transport planning and policy by involving various actors across levels and territories. (G. R. Marsden & May, 2006) highlighted the need for authorities with financial capability and powers across all territories to facilitate the implementation of public transport policies. In the inter-local government collaboration process, actors may use their power under their hierarchical structure to intervene in policy-making while potentially dealing with a reactive move made by other actors.

Multi-Level Governance

MLG was previously employed to define the outcome of different governance structures in tackling transport issues at various spatial scales (Hooghe & Marks, 2003). The governance study in the transport sector, which uses an agglomeration area in the UK, demonstrated the significant role of higher-level government in decision-making as well as the intervention of sub-national governments throughout the process of formulating policies in transport governance within the agglomeration area (Pemberton, 2000). A recent study sought to discover the challenge of a national transport program using MLG context due to the involvement of actors from different levels of government and non-government organizations (Mladenovič et al., 2022).

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Multi-level governance (MLG) recognizes policy-making that involves multi-actor within and across institutions at diverse levels (Stephenson, 2013). The key principle of multi-level governance theory emphasizes that the central government is not necessarily the dominant policy-making unit. Thus, policy formulation and implementation mainly occur within 'a system of continuous negotiation among nested governments at several territorial levels' (Marks, 1993, cited in (G. Marsden et al., 2014), which are international, national, regional, sub-regional or local levels. Another characteristic of MLG is defined as a large and diverse group of actors, being non-hierarchical (which is not being controlled from higher level), not being bound by formal agreements or rules (informal bargaining can be just as important as formal power), and largely ignoring structure (instead focusing on process and outcomes) (Peters & Pierre, 2004). Previous studies have examined sub-national governance structure within the case of Australia. Sub-national levels are identified as an adequate scale for addressing several policy challenges, for instance the significant contribution that regions make to specific policy domains (Fawcett & Marsh, 2017). However, some scholars pointed out that power still matters as (Fairbrass & Jordan, 2004) argued that MLG might serve the interests of the nation states as the dominating players although it is conceptualised as giving structurally weaker sub-national entities more power.

According to Hooghe and Marks (Hooghe & Marks, 2003), MLG can be explained within Type I and Type II institutions. Type I is used to define a hierarchical description of roles of formal central, provincial, and local or city government institutions in planning and policy-making processes. This type discloses vertical relationships and power in hierarchical settings. Type II refers to intersecting actors with specific tasks, who build horizontal relationships. This type indicates power diffusion in a polycentric model that allows public and private actors to collaborate in policy-making.

In order to operationalize MLG in a given policy area, three criteria must be met: 1) the relative roles and responsibilities of territorial actors, with a weakened but still dominant role for the central state; 2) the presence and functionality of forums for bargaining and negotiation between national and regional actors regarding the definition of priorities and resource allocation; and 3) the ability of various sub-national actors to take advantage of opportunities created nationally and/or develop policy from the bottom-up (Crespy et al., 2007). The hallmark of MLG is the ongoing negotiation of institutions and actors at different levels within ad hoc, flexibly defined decision-making processes. Institutional contacts can be more ad hoc and less formally formed, with less emphasis on hierarchies than at-level interactions or between-level interactions (G. Marsden et al., 2014)

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RESEARCH METHODOLOGY

Data Collection and Analysis

The study adopts a qualitative approach to achieve the objective of this study. The primary data was collected through documentation study and semi-structured interviews with stakeholders involved in the BTS Teman Bus policy-making. The interviews, conducted in Bahasa and recorded by the authors, aimed to collect data regarding the policy-making processes of BTS Teman Bus. Interviewees included actors from all levels, from national to sub-national levels. The features of roles and functions of each actor in the BTS Teman Bus policy-making were determined by a thorough case study and an examination of current legitimate regulations. Table 1 shows the list of interviewees in this study. The respondents selected for the interview were individuals who were responsible for and in charge of the BTS Teman Bus program within the institution.

Table 1: List of interviewees

Interviewee	Level	Affiliation
I1	National	Ministry of Transportation
I2	National	BAPPENAS
I3	Sub-national	Transport Agency (Dishub) of DIY
I4	Sub-national	BAPPEDA of Yogyakarta
I5	Sub-national	BAPPEDA of DIY
I6	Sub-national	PT. Jogja Tugu Trans
I7	Sub-national	Transport for Yogya (TfY)
I8	Sub-national	Transport Agency (Dishub) of Yogyakarta

After data collection, we transcribed the interview results, together with the relevant documentation from documentation study. The transcripts were uploaded in NVIVO for coding process. The analysis was performed by categorizing data into various thematic headings. In line with the research objectives, the process of identifying codes and thematic headings focused on the roles of actors and interaction among actors in the policy-making of BTS Teman Bus.

There are two main reasons for choosing DIY Province as the case study. By choosing DIY Province, it was possible to capture the cultural character of the government and the political characteristics that could influence government interactions in the policy-making process. Moreover, Yogyakarta was also a pilot city in the BTS Teman Bus implementation at the beginning of the program although it was not plotted as a major urbanized area for the urban mass development program from the national planning document.

Study Area

Yogyakarta Special Region (DIY) is a province located in the south of Java Island in Indonesia with rapid development in the economy. DIY is comprised of four

regencies and one city as the provincial capital, namely Yogyakarta City. The existence of a development catalyst in the city of Yogyakarta has triggered the growth of the Yogyakarta Urbanized Area (YUA) as a result of the overflow of various activities. YUA has grown beyond the administrative boundaries of Yogyakarta City and expanded to several sub-districts in Sleman Regency and Bantul Regency. This area becomes the center of the provincial government, a regional scale service center, and has the potential to develop a cultural area and tourist destination due to its large number of cultural heritage sites.

DIY Province already has a public transport system called TransJogja, which has been operating since 2008. TransJogja was first initiated to improve the public transport system, which was served by the regional bus. The operator of TransJogja was the regional bus consortium, which was later incorporated as PT. Jogja Tugu Trans (PT. JTT). However, since 2016, the operation of TransJogja has been taken over by PT. Anindya Mitra Internasional (PT. AMI) through an assignment scheme from the regional authority. The Transport Agency of DIY is the regional government agency responsible for the TransJogja planning, operation, and evaluation. Currently, the regional authority is funding public transport subsidies through the provision of TransJogja services, not to mention the cost of planning and infrastructure development of the system.

Case Study

In order to resolve development issues, the government has prepared a strategic priority project to implement the national priority development agenda of the National Medium Term Development Plan (RPJMN) 2020-2024 on public transport. One of the strategic priority projects is developing an urban mass public transport system in 6 metropolitan areas. To expand the scope of development of urban public transport in Indonesia, a Strategic Plan Document for the Directorate General of Land Transportation, Ministry of Transportation (MoT) 2020-2024 has been prepared, which determines urban areas that receive subsidized programs for urban mass public transportation through a Buy the Service (BTS) scheme in 21 cities.

Since 2020, the Indonesian government through the MoT has been committed to improve public transport services by implementing the BTS Teman Bus program. This program is a service purchasing scheme by the central government using state budget allocation (APBN) of the MoT to pay the operators who provide the services with minimum service standards (SPM) through auction mechanism that has been determined on specific routes in several cities in Indonesia. Ten regions have been selected to receive the BTS Teman Bus program: Medan, Palembang, Yogyakarta, Surakarta, Bali, Bandung, Banyumas, Surabaya, Banjarmasin, and Makassar.

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ANALYSIS AND DISCUSSION

Mechanism of BTS Teman Bus Policy and Management

The BTS Teman Bus program is a scheme for purchasing urban public transport services by the central government through the MoT, which purchases the services from operators. The operators are legal entities using a predetermined SPM-based auction mechanism. The operator for the BTS Teman Bus program in DIY Province is PT. JTT. In the service purchasing scheme, the government posits themselves between operators and public transport users, where the government collects revenue obtained from users and other sources through business entities which is then used to purchase public transport services provided by the operators. Cooperation between the government and operators in implementing service purchases is outlined in a work agreement or contract that contains the SPM and a standard operating procedure (SOP), which operators must comply with. Public transport services provided by operators are monitored and evaluated by the Management Business Entity, called BUMP, based on the SPM and the SOP (ITDP Indonesia, 2023).

The MoT appointed the BUMP to prepare, supervise, and evaluate the operational implementation of urban public transport. In this case, the BUMP ensures that the operations of urban public transport services provided by the operators run well in accordance with the SOP and SPM. The BUMP for the BTS Teman Bus program is PT. Surveyor Indonesia (PT SI).

The government appointed an IT Systems Business Entity to improve the monitoring function and effectiveness of services and provide a technological approach to services. The IT system is tasked with procuring equipment and systems that support BTS Teman Bus program activities and creating an integrated, transparent, effective, and efficient system to ensure the optimal functioning of monitoring and evaluation of urban public transport operations. Information and data monitoring play a central role in implementing the BTS Teman Bus program. Information and data are used as a reference for developing urban public transport systems and verifying the performance of urban public transport services that operators have run. Based on the results of the verification, which meet eligibility, the BUMP then recommends the MoT to pay for urban public transport services provided by the operator. In this case, the BUMP function is to verify subsidy payments to operators.

Distribution of Actor Roles in BTS Teman Bus Policy

The MoT plays a crucial role in the development of urban public transport through coaching, implementation, and provision. The government's role in the coaching aspect is regulated in Law Act No. 22 of 2009. The state is responsible for road traffic and transportation, with the government providing essential guidance. Apart from that, following the Law Act No. 22 of 2009, the government

is responsible for organizing public transportation. In this case, the government needs to guarantee the availability of road-based mass transportation to meet transportation needs of public motorized vehicles in urban areas. Therefore, as a manifestation of the government's responsibility, the government provides subsidies for mass public transportation as regulated in the RPJMN 2020-2024 and the Minister of Transportation's Regulation No. 9 of 2020. Technically, through the Strategic Plan of the Directorate General of Land Transportation 2020-2024, the government has prepared a road-based mass transportation development program with a BTS scheme known as BTS Teman Bus. In carrying out its role in providing services, the central government is assisted by state-owned enterprises, regional-owned enterprises, or other legal entities as stipulated in Law Act No. 22 of 2009.

Regarding the purchase of the services, the MoT, governors, and regents/mayors have the authority to determine routes, set tariffs, and monitor and evaluate. Route determination is based on the results of studies or general plans for the existing urban transport route network. In the case of BTS Teman Bus, the route is determined through a route proposal mechanism submitted by the DIY Transport Agency to the MoT. Meanwhile, the MoT determines tariffs based on input from a study on the community's capacity and readiness to pay. The BUMP carries out monitoring and evaluation by referring to the SPM and the SOP outlined in the service purchase contract. According to their authority, the results of the monitoring and evaluation conducted by the ministers, governors, and/or regents/mayors can be used to consider granting subsidies. Furthermore, following the Minister of Transportation's Regulation No. 2 of 2022, subsidies for urban public passenger transportation are given to public transportation companies appointed by the minister, governor, or regent/mayor in accordance with their authority through an election process. In this case, the appointment of a public transport company to operate the BTS in DIY is carried out by the MoT through the Directorate General of Land Transportation. The appointment of a public transport company as the BTS Teman Bus operator was conducted through an auction mechanism with PT. JTT as the auction winner. Both the operators of BTS Teman Bus, PT. JTT and the BUMP are directly responsible to the MoT.

In implementing the current BTS Teman Bus program, the central and regional governments also signed a memorandum of understanding. In this agreement, the role of local governments is still limited to 1) providing a budget for the development of BTS supporting infrastructure, 2) proposing BTS service routes in accordance with their authority, 3) preparing traffic engineering management, 4) preparing the required data and information, and undertaking an outreach programme and facilitating the exchange of information and learning related to the BTS program. This supports the arguments that the role of sub-

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national authorities is restricted to the planning and evaluation of BTS Teman Bus. MLG practice in the BTS Teman Bus is in line with (Fairbrass & Jordan, 2004)'s argument about overstating the autonomy of sub-national actors as the state can still play a significant role in shaping and gatekeeping in post-decisional politics. Additionally, MLG frequently perceives sub-national actors as being largely passive, in which also happened in the case of BTS Teman Bus. The MLG of BTS Teman Bus in YUA is presented in Figure 1.

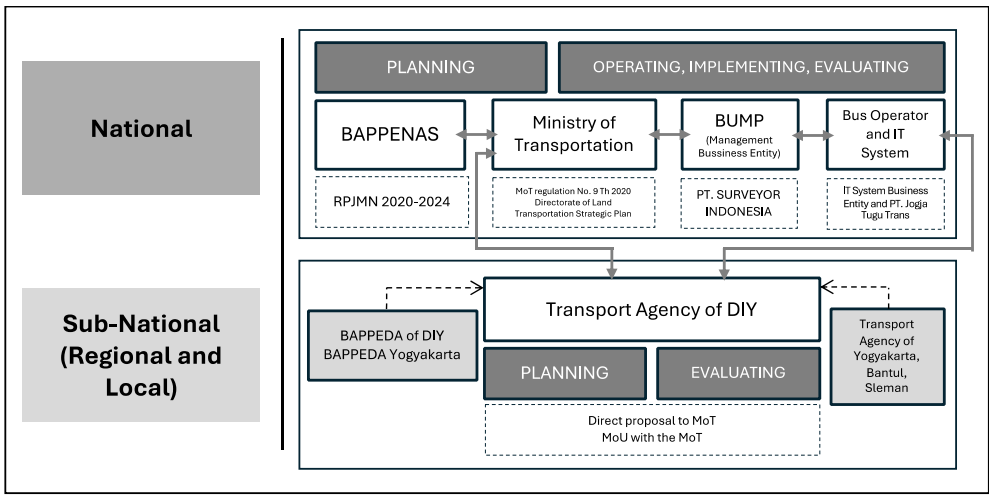


Figure 1: MLG of BTS Teman Bus

Regarding urban transport services in DIY, the service coverage consists of three areas, including two districts, Sleman and Bantul, and one city area, Yogyakarta City. According to Minister of Transportation's Regulation No. 9 of 2020, the governor should provide urban transport subsidies that exceed district/city boundaries in one province. However, because the governor, in accordance with his authority, is unable to provide subsidies, he can apply for urban transport subsidies to the minister. As a requirement for the application, the region must be able to prepare supporting facilities for urban transport. Therefore, in implementing the BTS Teman Bus program, local governments should provide supporting infrastructure, especially in the forms of bus stops, markings, and signs.

Furthermore, the interviews revealed that the regional authorities (Transport Agency of DIY) and the bus operator (Teman Bus, PT. JTT) have a pseudo-relationship. PT. JTT, as the BTS Teman Bus operator, is not obligated to report and build a network with the regional authority. The MoT evaluates them through third parties, PT. SI, as the BUMP. However, according to the results of the evaluation, MoT could directly summon the regional authority to

discuss the improvement of the BTS Teman Bus services. For example, in 2022, based on the results of the evaluation, the MoT asked to reroute the services to the Transport Agency of DIY. One of the routes had a low ridership level, which became one of the service's success parameters. The MoT demanded a route that could attract a large number of passengers. Meanwhile, the primary consideration of the Transport Agency of DIY in determining routes was the service coverage area and intersecting routes with other public transport services in DIY. Therefore, to address the MoT's request, the Transport Agency of DIY rerouted one of the BTS Teman Bus's corridors by swapping it with the TransJogja corridor, which had a busy route. This indicates that different interests and perspectives among actors at different levels on public transport success parameters affect the public transport policy-making in the region.

This further suggests that the different institutional structures and governance settings or arrangements at the sub-national level might show different results towards the BTS Teman Bus implementation. Interviewee I1 from the MoT said that regional government commitment was essential in ensuring the BTS Teman Bus's sustainability and readiness to take over the management, which was previously managed by the MoT. As the interviewee explained:

> *"Well, it goes back to the regional government's commitment regarding urban transportation. For now, we set to maximum 5 years according to the duration of MoU (related to the duration of program funding). But we encourage them to take it as early as possible. Banjarmasin is one of the cities that has already taken action, but unfortunately, Jogja has not". (Interviewee I1)*

It was further explained that the lack of regional financing capacity remained the biggest issue in most regions, including DIY Province.

During the interview, staff from the Transport Agency of DIY were aware of the obligation to take over the management of BTS Teman Bus in the future. However, until now, the Transport Agency of DIY admits that they are not prepared to take over BTS Teman Bus, given the considerable financial burden of TransJogja subsidies on the regional budgets. Apart from the areas served by the BTS Teman Bus corridor, the regional governments of Sleman and Bantul do not seem to be involved or help implement the services.

> *"As for now, the future is still uncertain, just bearing TransJogja subsidies is already burdensome". (Interviewee I3)*

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Following the MLG framework, non-governmental actors also influence the policy-making (Marsden et al., 2014). In the context of the BTS Teman Bus, non-governmental actors do not involve themselves in policy-making processes. However, some NGOs are seen to be indirectly involved in the evaluation process. At the sub-national level, there is Transport for Yogya (TfY), a social media-based transport community that actively reports customer complaints to the service provider of public transportation, including BTS Teman Bus, in Yogyakarta. Furthermore, TfY also developed a wayfinding of the public transport system in Yogyakarta to ease the passengers' access to public transport. Interviewee I7 stated that members funded their activities by themselves.

> *"Usually we collect money from the members. Fortunately, both PT. AMI and transport agency appreciate it and sometimes hire us to help them in improving bus services". (Interviewee I7)*

At the national level, there is the Institute for Transportation and Development Policy (ITDP), an international nonprofit organization that focuses on public transport, non-motorized transport, travel demand management, parking, transport policy, and urban development. Most ITDP's work promotes environmentally friendly and equitable transport policies and projects worldwide. In recent years, ITDP has focused on working with city government and other NGOs to implement some transport projects. In early 2023, ITDP released their report on the BTS Teman Bus program evaluation in Indonesia, including the BTS Teman Bus in Yogyakarta. ITDP's study aims to evaluate and measure the success of the current BTS Teman Bus implementation. The ITDP study offers some recommendations that can be adopted to improve the current BTS Teman Bus services.

CONCLUSION

Public transport planning and policy can represent the architecture of MLG towards policy-making process, which involves actors across different levels. BTS Teman Bus is a product of the national policy. The MoT seems to be the most important actor in terms of the power and control of the BTS Teman Bus program as they are responsible for allocating funding to subsidize BTS Teman Bus in DIY Province. The BAPPENAS set out the national policy regarding the development of urban public transport systems through the RPJMN 2020-2024 document. This policy was further translated into strategic planning, which is listed on the Strategic Plan Document of Directorate General of Land Transportation, MoT 2020-2024. One of the implementation strategies is the implementation of subsidized urban public transport through the buy the service (BTS) scheme. The Transport Agency of DIY, as a sub-national authority, has

proposed the funding for the BTS Teman Bus to the MoT; however, its role is limited to the planning and evaluating process.

The study underscores the importance of sub-national actors in public transport policy-making and identifies regional financial constraints and self-interest as critical barriers to local government involvement. Unlike the traditional notion of MLG, where state and non-state actors collaborate on policy programs, the BTS Teman Bus policy demonstrates a more centralized approach with the national government as the primary decision-maker. This case study in DIY Province provides insights into the BTS Teman Bus policy-making process. It offers implications for public transport policy-making in Indonesia, emphasizing the need for more effective decision-making and collaboration in the future.

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REFERENCES

Bache, I., & Flinders, M. (2004). Multi-Level Governance and the Study of the British State. *Public Policy and Administration*, *19*(1), 31–51. https://doi.org/10.1177/095207670401900103

Crespy, C., Heraud, J. A., & Perry, B. (2007). Multi-level governance, regions and science in France: Between competition and equality. *Regional Studies*, *41*(8), 1069–1084. https://doi.org/10.1080/00343400701530840

Diwangkari, A. (2014). *Metropolitan Transport Planning Collaboration in Decentralized Indonesia Case Study of Greater Yogyakarta*.

Fairbrass, J., & Jordan, A. (2004). Multi-level Governance and Environmental Policy. In I. Bache & M. Flinders (Eds.), *Multi-Level Governance* (pp. 147–164). Oxford University Press.

Fawcett, P., & Marsh, D. (2017). Rethinking Federalism: Network Governance, Multi-level Governance and Australian Politics. In K. A. K. A. Daniell (Ed.), *Multi-level Governance: Conceptual challenges and case studies from Australia* (pp. 57–79). The Australian National University Press.

Firman, T. (2010). Multi local-government under Indonesia' s decentralization reform: The case of Kartamantul (The Greater Yogyakarta). *Habitat International*, *34*(4), 400–405. https://doi.org/10.1016/j.habitatint.2009.11.005

Hirschhorn, F., Veeneman, W., & van de Velde, D. (2019). Organisation and performance of public transport: A systematic cross-case comparison of metropolitan areas in Europe, Australia, and Canada. *Transportation Research Part A: Policy and Practice*, *124*(April), 419–432. https://doi.org/10.1016/j.tra.2019.04.008

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Hooghe, L., & Marks, G. (2003). Unraveling the central state, but how? Types of multi-level governance. *American Political Science Review*, *97*(2), 233–243. https://doi.org/10.1017/S0003055403000649

Hrelja, R., Rye, T., & Mullen, C. (2018). Partnerships between operators and public transport authorities. Working practices in relational contracting and collaborative partnerships. *Transportation Research Part A*, *116*(August 2017), 327–338. https://doi.org/10.1016/j.tra.2018.06.032

ITDP Indonesia. (2023). *Dokumentasi Evaluasi Program Buy-the-Service Teman Bus di Indonesia*.

Kumar, A., Zimmerman, S., & Agarwal, O. P. (2012). *International Experience in Bus Rapid Transit (BRT) Implementation: Synthesis of Lessons Learned from Lagos, Johannesburg, Jakarta, Delhi, and Ahmedabad*. 1–67. https://openknowledge.worldbank.org/handle/10986/13049

Marsden, G., Ferreira, A., Bache, I., Flinders, M., & Bartle, I. (2014). Muddling through with climate change targets: a multi-level governance perspective on the transport sector. *Climate Policy*, *14*(5), 617–636. https://doi.org/10.1080/14693062.2014.905823

Marsden, G. R., & May, A. D. (2006). Do institutional arrangements make a difference to transport policy and implementation? Lessons for Britain. *Environment and Planning C: Government and Policy*, *24*(5), 771–789. https://doi.org/10.1068/c0543

Miharja, M., Woltjer, J., Arsallia, S., & Diab, A. H. (2021). *Bandung Metropolitan Transportation Planning Collaboration and Perceived Transaction Cost Changes after 2 Decades of Decentralization*. *12*(January), 506–517. https://doi.org/10.14716/ijtech.v12i3.4345

Mladenovič, L., Plevnik, A., & Rye, T. (2022). Implementing national support programmes for sustainable urban mobility plans in a multilevel governance context. *Case Studies on Transport Policy*, *10*(September 2021), 1686–1694. https://doi.org/10.1016/j.cstp.2022.06.007

Okitasari, M., & Kidokoro, T. (2014). *Understanding collaborative governance in decentralizing Indonesia: A dimensional approach to emerging intergovernmental and cross-sectoral collaboration*. *1*(C), 82–98.

Pemberton, S. (2000). Institutional governance, scale and transport policy - lessons from Tyne and Wear. *Journal of Transport Geography*, *8*(4), 295–308. https://doi.org/10.1016/S0966-6923(00)00019-3

Peters, B. G., & Pierre, J. (2004). Multi-level Governance and Democracy: A Faustian Bargain? In I. Bache & M. Flinders (Eds.), *Multi-level Governance* (pp. 75–89). Oxford University Press.

Phillimore, J. (2013). Understanding Intergovernmental Relations: Key Features and Trends. *Australian Journal of Public Administration*, *72*(3), 228–238. https://doi.org/10.1111/1467-8500.12025

Piattoni, S. (2009). *Multi-level Governance: a Historical and Conceptual Analysis*. *September 2013*, 37–41. https://doi.org/10.1080/07036330802642755

Rukmana, D. (2015). The Change and Transformation of Indonesian Spatial Planning after Suharto's New Order Regime: The Case of the Jakarta Metropolitan Area.

International Planning Studies, *20*(4), 350–370. https://doi.org/10.1080/13563475.2015.1008723

Rye, T., Monios, J., Hrelja, R., & Isaksson, K. (2018). The relationship between formal and informal institutions for governance of public transport. *Journal of Transport Geography*, *69*(April), 196–206. https://doi.org/10.1016/j.jtrangeo.2018.04.025

Shen, R., Feiock, R. C., & Yi, H. (2016). China's Local Government Innovations in Inter-Local Collaboration. In Y. Jing & S. P. Osborne (Eds.), *Governing China in the 21st Century: Public Service Innovations in China* (pp. 25–42). Palgrave Macmillan.

Sohail, M., Maunder, D. A. C., & Cavill, S. (2006). Effective regulation for sustainable public transport in developing countries. *Transport Policy*, *13*(3), 177–190. https://doi.org/10.1016/j.tranpol.2005.11.004

Sridhar, K. S., Gadgil, R., & Dhingra, C. (2019). Paving the way for better governance in urban transport: The transport governance initiative. In *Paving the Way for Better Governance in Urban Transport: The Transport Governance Initiative*. https://doi.org/10.1007/978-981-13-9620-5

Stephenson, P. (2013). Twenty years of multi-level governance: "Where Does It Come From? What Is It? Where Is It Going?" *Journal of European Public Policy*, *20*(6), 817–837. https://doi.org/10.1080/13501763.2013.781818

Talitha, T., & Hudalah, D. (2014). MODEL KERJASAMA ANTAR DAERAH DALAM PERENCANAAN SISTEM TRANSPORTASI WILAYAH. *Tata Loka*, *16*(4), 194–208.

Tanner, T., Mitchell, T., Polack, E., & Guenther, B. (2009). Urban Governance for Adaptation: Assessing Climate Change Resilience in Ten Asian Cities. In *IDS Working Papers* (Vol. 2009, Issue 315). https://doi.org/10.1111/j.2040-0209.2009.00315_2.x

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RESIDENTIAL VULNERABILITY: INVESTIGATING SOCIO-SPATIAL STIGMATISATION OF STUDENT PREMARITAL SEXUAL BEHAVIOURS IN JAMBI PROVINCE, INDONESIA

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Abstract

The increasing number of cases of premarital sexual behaviours (PSBs) among students around the university area has had an impact on the process of territorial stigmatisation (TS) in residential areas. The TS process has crucial consequences on people's lives. A limited number of studies have examined residential vulnerability (RV) to TS, but the researchers generally study urban areas affected by TS. This research aims (1) to determine the zoning level of RV to TS related to PSBs and (2) to differentiate RV to TS based on the temporal aspect of residential development. The investigation focused on residential areas around Jambi University, UIN Sulthan Thaha Saifuddin Jambi, and rural-urban fringe areas. The research design used mixed methods with a spatial approach. A total of 661 respondents were considered from three zones based on the distance from the two universities, namely the 1, 2, and 3km zones covering seven villages. Determination of the sample area considered temporal aspects, construction methods, and housing density. The research results show that the concentration of RV to TS tends to increase when the residential areas are closer to universities. Interestingly, TS can arise in new or old residential areas when there is an increasing concentration of student PSB cases. Therefore, policies are needed to improve social control in new and old residential areas to prevent student PSBs, which have an impact on TS.

Keywords: Premarital Sexual Behaviour, Residential Vulnerability, Socio-Spatial, Stigmatization Territorial

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INTRODUCTION

Residential construction continues to proliferate due to the significant demand for housing, especially in educational or university areas in Jambi Province. People want a healthy, safe, comfortable residence that is free of negative aspects (Soseco et al., 2017). To create an ideal residential area, strong social control is needed from the community so that negative incidents do not happen, such as juvenile delinquency and crime, which can give rise to a negative stigma towards the residential environment (Meade, 2021). Territorial stigmatisation (TS) of residential environments can cause negative impacts on residents, such as a lack of pride in themselves, feelings of shame, exclusion from society, and impact on health (Arthurson, 2013).

The existence of new residential areas around two universities in Jambi Province, which are mainly rented to students, requires strong social control by owners or the local community. Indifference or low social control regarding students' premarital sexual behaviours (PSBs) can create a negative stigma towards the residential environment. Wacquant (2007) explains that a bad environmental reputation creates TS related to its people. The stigmatisation process has significant consequences for the community's living environment, which can trigger vulnerability to other destructive behaviours, such as discrimination and marginalisation of individuals (Bürk et al., 2012). In addition, a bad environmental reputation will affect the social inclusion of residents (Arthurson, 2013). TS may even be called "symbolic violence" (Meade, 2021).

Some research related to TS, such as that conducted by Horgan (2020), explores the stigmatisation process of stigmatised residential types, forms of ownership, environments, and identities. In addition, research by Keene and Padilla (2014) revealed that spatial stigma can influence health through three main pathways: (1) access to material resources, (2) stress and coping processes, and (3) processes related to identity and identity management. The created model shows that spatial stigma contributes to various physical and mental health impacts. Carter et al. (2016) explored how stigma, isolation, and socio-spatial factors influence access to health services and social support for women living with HIV.

Very few studies have specifically examined the hidden vulnerabilities of the socio-spatial dimensions of stigmatisation in residential environments due to the phenomenon of PSBs among students in rural-urban fringe areas. In general, existing research only discusses territorial stigma in urban areas (Hincks & Powell, 2022) but has not studied the level of vulnerability of residential areas (RV) due to students' PSBs. Likewise, there are open issues, such as the differences in TS between new and old residential environments, owing to students' PSBs. This deficiency leaves many questions that need to be answered.

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Therefore, this research aims to (1) determine the zoning level of RV to TS related to PSBs and (2) differentiate the level of RV to TS related to PSBs of students based on the temporal aspect of residential development. This research is expected to contribute to knowledge about RV to TS related to student PSBs in the rural-urban fringe.

LITERATURE REVIEW

Residential vulnerability (RV) focuses on aspects of residential environmental conditions that indicate social discrimination and structural disadvantages for residents (Garcia-Almirall et al., 2021). The United Nations refers to vulnerability as being susceptible to certain risks and uncertainties and having a low capacity to defend and protect oneself from risks and face negative consequences. Furthermore, the National Disaster Management Agency defines vulnerability as a condition caused by human activities (the result of physical, social, economic, and environmental processes) that increases community prevalence of hazards. In this research, the concept of RV to TS due to students' PSBs is closely related to the level of informal social control in the community. Identifying RV to TS is vital to preventing social hell for society.

Understanding the concept of TS in residential environments related to the phenomenon of PSBs is needed to support the analysis of social control and socio-spatial stigmatisation. Horgan (2018) revealed that TS is the most powerful concept for understanding how social, spatial, and symbolic processes are interrelated in producing inequality in contemporary urban spaces. Wacquant et al. (2014) explained that TS is not a static condition but a form of action consequential and detrimental to society; this process manifests through collective representations tied to a place.

Stigma can manifest in individuals, groups, communities, and spaces (social, economic, political, cultural, environmental, and place) (Larsen and Delica, 2019). The territorial stigma process arises when individuals, groups, or communities assess differences in social, health, cultural, economic, and environmental status or problems considered inferior or deviant, violating values and norms and negatively impacting the environment. This condition triggers residents to stigmatise a person or space. Jahiu & Cinnamon (2022) added that TS refers to the perception and representation of a place by outside parties, especially the media. The media has a significant role in spreading defamation of a space. Wacquant et al., (2014) emphasised that TS is closely related to residential areas that are considered degraded, immoral, and crime-prone.

Territorial stigmatisation (TS) has a tremendous impact on several aspects of life. The self-perception of people living in a residential environment can trigger frustration and self-isolation (Slater & Anderson, 2012; Wacquant et al., 2014). It also results in individual and collective humiliation, experiences of

shame, and exclusion from society. This condition can trigger residents to move or leave the neighbourhood (Arthurson, 2013; Meade, 2021). Not only that, the process of stigmatisation triggers the loss of a human and cultural place, as well as social isolation (Wacquant, 2007). For this reason, the phenomenon of student PSBs needs special attention to prevent the TS inherent in the residential environment. At the policy level, the effects of TS are hazardous. When a residential area is considered a free zone or even a lawless area or outside the general norm, the authorities and even society easily justify deviations from laws and customs. This condition can disrupt and worsen the residential environment due to low awareness and creating indifferent spaces. Thus, TS can also trigger the loss of humane and cultural places (Wacquant, 2007).

RESEARCH METHODOLOGY

This research design uses mixed methods with a spatial approach to determine and differentiate the distribution of levels of RV to TS due to students' PSBs. Combining quantitative and qualitative data analysis methods to analyse RV to TS provides a holistic understanding. Researchers can obtain validation and verification and explain the patterns of emerging phenomena. This research design can clarify research results comprehensively (Sumarmi et al., 2024; Aksa, 2019). The research location is in Muaro Jambi Regency. There are two well-known campuses located in the border area between Muaro Jambi Regency and Jambi City, namely UIN Sulthan Thaha Saifuddin Jambi and Jambi University, comprising about 60,000 students in 2024 (Figure 1).

This research was conducted in a campus area experiencing increased population flow toward the city's outskirts due to pull factors related to educational and economic activities (Alzouby & Talalqa, 2023). The choice of location was based on several aspects: 1) the research location is a rural-urban fringe area with changes in the physical appearance of village cities, characterised by converting agricultural land to the service/housing sector; 2) massive housing development due to high consumer demand for investment; 3) complex socio-cultural dynamics; 4) the level of student PSB cases. The study population consists of residents within a 3 km radius of UIN Sulthan Thaha Saifuddin Jambi and Universitas Jambi. Sampling zones are divided into three based on distance from the two campuses: 1 km, 2 km, and 3 km, encompassing seven villages. The zoning of the research area is based on the principle that zones closer to universities have higher student densities. This zoning illustrates that the closer to the university, the more residential housing is dominated by students. Research zones closer to universities have high population turnover due to the transient nature of students. This distance has implications for the level of social relations and informal social control implemented by the community in residential areas in each zone. This zoning division is expected to provide additional

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understanding and unique contributions to the analysis of housing typologies that are vulnerable to TS due to the PSBs of students.

All zoning areas comprise a total of 91 residential clusters with approximately 15,000 houses. The number of house samples was determined based on the formula developed by Issac and Michael (1981), which had an error rate of 1%, indicating about 661 houses. One research respondent was selected for each house. Respondents were selected based on their knowledge of housing environmental conditions and experience as house residents in responding to problems related to students' PSBs. This criterion ensures that respondents have relevant and in-depth insight into the research topic so the data obtained is accurate and reliable. Respondents included students, boarding house owners, heads of households, and homemakers. The technique for determining the number of sample locations is based on several spatial-temporal characteristics, namely variations in the zoning of the university area, the year of construction of the residential cluster, and housing density, resulting in 18 residential clusters (Figure 1).

Respondents were asked to fill out a questionnaire on how strongly they agreed with a series of questions and statements by ticking four answer options according to a Likert scale ranging from 1 (strongly agree) to 4 (strongly disagree). Data was collected using a survey method and a structured questionnaire. Furthermore, to deepen the results from quantitative data, researchers conducted in-depth interviews with several key informants (Susilo, 2021; Zulfi et al., 2024). The level of RV to TS related to students' PSBs was analysed using a weighting formulation. The level of difference in RV of new and old residential areas to TS was analysed using the Independent Sample T Test. The weighting value scheme was in the 1-100 range. The most significant value weight is given to the variable item with the most significant influence on TS. Next, the researcher calculated the average for each variable item that had been weighted. The weighting formula can combine various variables that have different levels of influence on the complex and multidimensional issue of TS. Weighting can help emphasise variables relatively and reflect each factor's relative influence. The weighting formulation can be seen as follows:

$$\textit{Vulnerability} = \textit{Factor a} \times \textit{weight 1} + \textit{Factor b} \times \textit{weight 2} + \cdots \textit{Factor n} \times \textit{weight n}$$

Furthermore, researchers used spatial analysis in ArcGIS Pro to assess RV to TS based on the zone and year of construction of the residential cluster. Researchers also carried out multi-crosstab analysis in ArcGIS Insight and visualised it with an alluvial diagram. This research has been approved by the

Research Ethics Committee of Universitas Negeri Malang through document No.16.2.2/UN32.14.2.8/LT/2024.

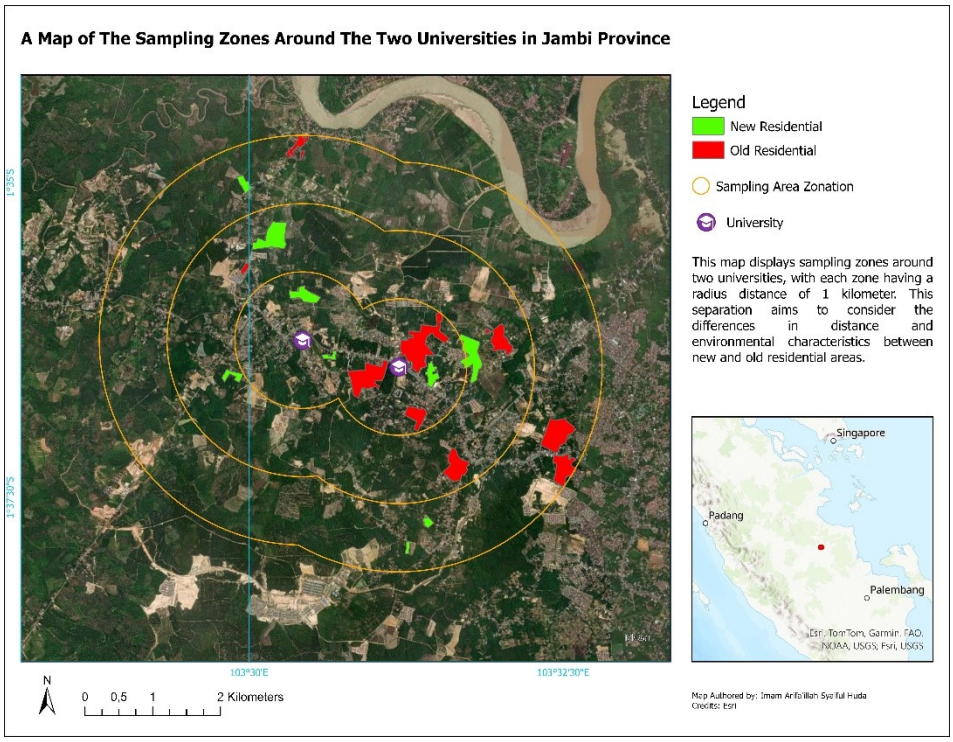


Figure 1: A map of the sampling zones around the two universities in Jambi Province.

ANALYSIS AND DISCUSSION

The survey results of 661 respondents regarding RV to TS were obtained through several statements and questions designed on a Likert scale. The scale score starts from 1 (strongly disagree) to 4 (strongly disagree). Statements and questions were designed based on the literature on the concept, characteristics, and negative impacts of TS. Some examples of questions include: *What is the reputation of your residential area due to students' PSBs?* This question is used to identify the extent to which residents perceive their residential reputation as a result of PSBs. This question is also based on Blokland (2008) statement that the perceptions of residential populations cannot be separated from the influence of how outsiders view their environment. Overall, the question items and statements to measure the level of RV to TS are summarised in Table 1.

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Table 1. The results of the principal component analysis of statements related to RV to TS (Nédélec, 2017; Wacquant, 2007; Slater & Anderson, 2012; Arthurson, 2013; Kearns & Parkinson, 2001).

No	Variable	Weight
1	Levels of premarital sexual behaviour of students in residential area	35
2	I am ashamed of my residential environment due to students' PSBs	10
3	I am worried about children's development in my residential area due to the influence of students' PSBs	5
4	I am worried about how other people view my residential area due to students' PSBs	10
5	I am worried about the reputation of my residential area due to students' PSBs	10
6	I am proud of my residential area	5
7	I want to move out of my residential area	5
8	I am aware that people think badly/negatively about my residential area	20
	Total	100

The basis for selecting variables for analysing RV to TS includes several aspects, including the level of PSBs of students, which has the potential to trigger TS in the housing environment, as is the case in Las Vegas (Nédélec, 2017). Other variables, such as shyness (Wacquant, 2007; Slater & Anderson, 2012) and concerns about children's development (Wacquant, 2007), as well as concerns about other people's views of the environment (Arthurson, 2013), indicate the emotional and social impact of TS. Neighbourhoods' reputation (Arthurson, 2013; Slater & Anderson, 2012), residential pride (Arthurson, 2013), and desire to move (Kearns & Parkinson, 2001; Andersen, 2008) describe a neighbourhood's reputation, whether polluted or not, as well as explaining the economic impact and population mobility. Negative perceptions from outside communities (Arthurson, 2013; Slater & Anderson, 2012) emphasise how TS affects residents' emotions. All of these variables are important to gain a comprehensive understanding of the level of RV to TS.

(1) Level of residential vulnerability (RV) to territorial stigmatisation (TS) of Each Zone

In general, the research results indicate that the RV level in the process of TS is highest in Zone 1. The level of RV to TS begins to decrease when moving away from the central university area. Another important finding is that there is no low level of RV in Zone 1 and no high level of RV in Zone 3. It means that residential environments close to universities have a higher RV to TS. A detailed diagram of the RV level to TS based on zoning can be seen in Figure 2. An example of this is research conducted by Kasim et al. (2018) and Chukwubueze (2013), which found that cohabitation occurs more often in university areas because students inhabit the majority of them.

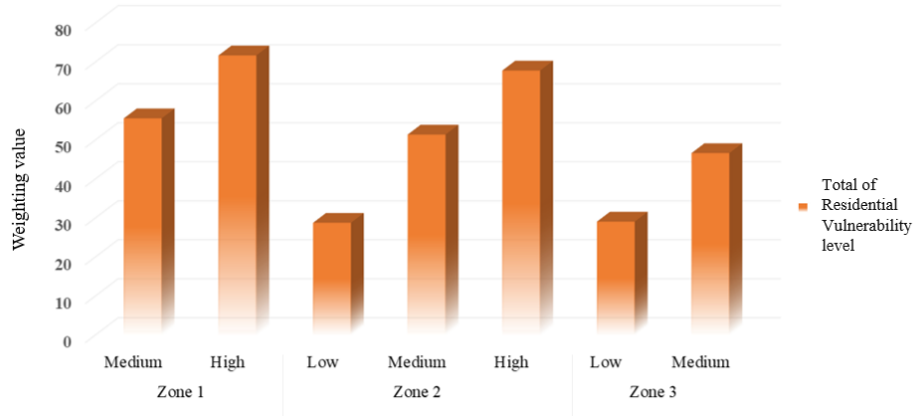


Figure 2: *A graph of the level of RV to TS of each zone.*

This zoning division provides additional understanding and unique contributions to the analysis of the level of RV to TS due to the PSBs of students. The spatial aspect can provide a deep and comprehensive understanding (Otero et al., 2022). The level of PSBs that falls into the "very high" and "high" categories is generally in zone 1; this condition cannot be separated from the large number of students who inhabit the area. Interestingly, the level of PSBs of students in the "none" category is mainly found in Zone 3 and Zone 2, which have various characteristics of residential populations, such as self-employed, professional, housewives, students, civil servants, soldiers, police, and others. This condition illustrates that diverse residents in residential environments tend to have better social control compared to residential environments, which students predominantly inhabit (Figure 3).

Students with high population turnover mainly inhabit the zone closer to the university. Chainey (2021) states that the factors influencing this condition are the cost and travel time to the university, as so many students live in the first zone. This condition has implications for the level of social relations and informal social control implemented by the community in residential areas in each zone. Hence, the potential for student PSBs is higher in residential areas near universities. This phenomenon answers why the level of PSBs of students in the first zone is higher compared to other zones. Researchers also found an interesting phenomenon from several informants who lived around the university. There are residential complexes that have a bad reputation due to the high number of cases of student PSBs.

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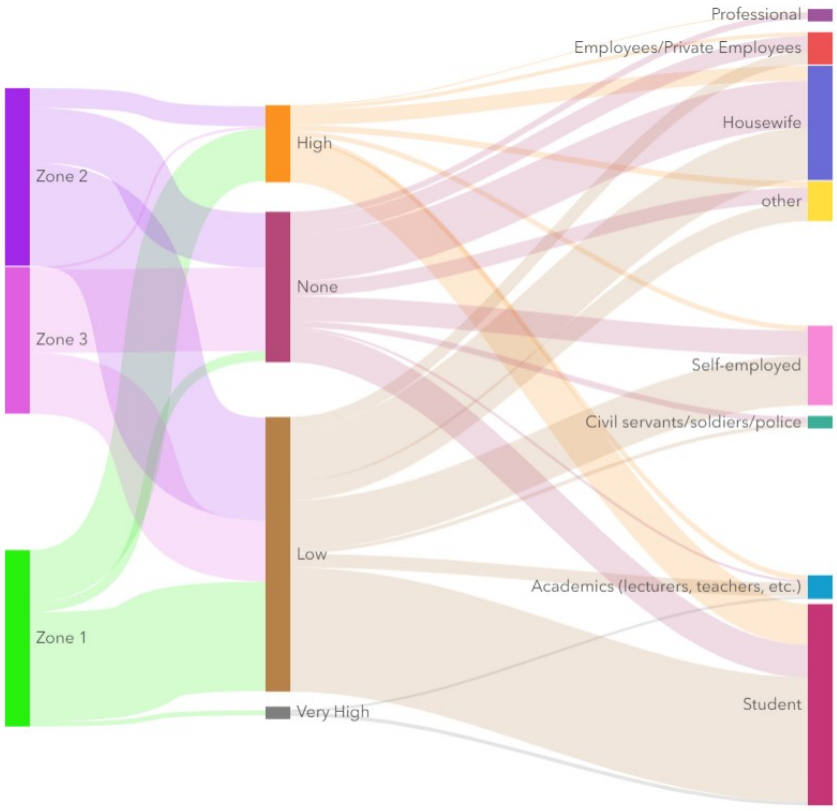


Figure 3. *An alluvial diagram of the multi-crosstab analysis results with the zone, level of students' PSBs, and occupation variables of each zone.*

Horgan (2020) states that TS is closely related to morality. Several informants stated that residents in this environment had a high degree of freedom in interacting with the opposite sex, which often did not conform to the values and norms of village society. Informal social control is inconsistent, leading students to feel free to engage in PSBs. This residential area is often compared to Las Vegas.

> *...Many people already call the [Name of Residential 1] Las Vegas. It is free there. Moreover, most of the residents are students (Subject 1, Lecturer, 10+ years).*
> *...[the] PSBs of the students can tarnish the reputation and image of the residential area. These behaviours are like a non-physical waste that is difficult to remove and attached to the environment. Take a look at [Name of Residential 1], many people call it Las Vegas. (Subject 2, Head of RT, 30+ years).*

The informant likened the condition of the residential environment to Las Vegas. Indirectly, residents have described a new culture that has entered and is not based on the moral values of the local community. It also explains that TS can be contagious (Horgan, 2020). In a piece by Nédélec (2017) about the TS of Las Vegas, residents expressed resentment at the negative representations made by outsiders. This condition states that TS has become attached to the population's reputation. There is a process of transfer of values and condemnation from the "Las Vegas" scene to residents who are not involved in any way with gambling, drugs, and other activities. In other residential areas, immoral perpetrators who were caught by the community stated that [Name of Residential 2] was like Texas. The informant stated that PSBs carried out by students hurt the good name of the residential complex and its residents. Housing residents feel their good names have been tarnished due to students' PSBs. This condition makes the residents angry and tired of exercising informal social control over students. This case is in line with Wacquant's (2007) statement that negative representations of residential environments like Texas trigger the loss of humane, cultural places and create indifferent spaces in residential environments.

> *... Some students have given this residential area a stigma, like Texas. I want to move. I'm tired of taking care of people, especially students who engage in PSBs. Our residential area has a bad name (Subject 6, Religious leader, 5 -7 Years).*

The above phenomenon illustrates that there is a trend of residents feeling exhausted when implementing informal social control due to the phenomenon of student PSBs, which continues to recur in the residential environment. People also want to move if they have sufficient financial capacity. In this condition, people do not have the option to leave the residential area. They are also haunted by worry about the development of their children. Dissatisfaction with social problems encourages residents to move to better environments (Andersen, 2008). This phenomenon is also in line with the statement that residents who have the choice to leave often want to leave areas that are stigmatised; they leave the environment that has the least resources. On the other hand, remaining residents may feel trapped in a disreputable neighbourhood (Kearns & Parkinson, 2001). Ultimately, these findings have implications for improving surveillance and security programmes in residential neighbourhoods close to universities. On the other hand, it is necessary to implement education and social awareness programmes regarding the phenomenon of PSBs by targeting residents, students, and boarding house owners.

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(2) Temporal impact of residential vulnerability (RV) to territorial stigmatisation (TS)

Researchers categorise the construction of residential clusters with a period of >10 years of house construction (old residential) and <10 years (new residential). This period division is based on the assumption that people who live in a residential environment for >10 years have more solid social ties and identity. The integration of temporal dimensions contributes to variations in the analysis of the tendency of residential environments to be vulnerable to TS. Research findings reveal that RV to TS based on the temporal aspect of residential cluster development is generally higher in new residential than in old residential areas (Figure 4). However, the independent sample *T*-test results show no significant difference in the level of vulnerability between new and old residential areas to TS, with a Sig (2-tailed) value of 0.167, more significant than the significance threshold value of 0.05. This condition illustrates that new and old residential areas are equally vulnerable to TS. This is in line with Larsen & Delica (2019) statement that TS can appear in space without time limits. In Zone 2, the RV level of new residential areas to TS is at medium and high levels; there is no low level. This data illustrates that the potential RV of new residential areas to TS in Zone 2 is also as significant as in Zone 1. This case is because students predominantly occupy residential areas in Zone 2. In contrast to Zone 3, no data shows the RV of new and old residential areas in the high category; this condition can be attributed to the diversity of characteristics of residential populations in this zone (Figure 5).

Interestingly, the findings from in-depth interviews with several informants revealed that [Name of Residential 1], labelled bad by the outside community, was an old residential area built by developers and was generally subsidised. Most of this residential cluster is rented to students (Figure 5). Value systems and social norms are complex because of students' transient nature. Students also tend to be casual about PSBs. Indifference to students' PSBs can trigger other perpetrators to join in committing immoral acts. They assume that the environment is relatively safe and free of rules. Herdiana (2019) revealed that constructing new residential clusters could also hurt awareness and encourage a more individualistic attitude. Additionally, according to Wacquant et al. (2014), TS can damage social relations, undermine self-confidence, and weaken the capacity to take collective action.

[Name of Residential 1], which experiences TS, is also seen as a haven of freedom or an environment with low social control. This case is also the same as that exemplified by Nédélec (2017), who states that many people stigmatise Las Vegas as an accessible area. *[Name of Residential 1]* has a high level of sexual behaviours, and this area is included in the old residential cluster built by

developers, and students occupy the majority. This condition illustrates that RV to TS can occur if it is located in old or new residential clusters built by developers, most of which are rented to students.

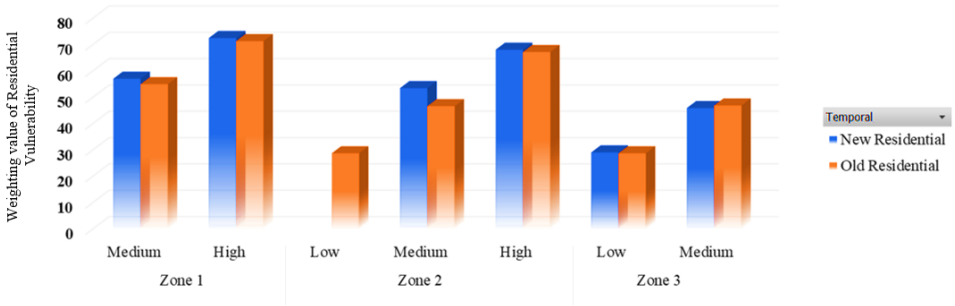


Figure 4: A graph of the levels of RV to TS (temporal), 2024.

This statement aligns with the assertion that stigma can be attached to certain types of residential areas and forms of ownership (Horgan, 2020). Territorial stigmatisation (TS) is also part of symbolic violence that worsens the already dire conditions of the residential environment (Nédélec, 2017; Wacquant et al., 2014). Therefore, improving the quality of the housing environment and strengthening supervision and implementation of educational programmes covering old and new residential areas is necessary. Policy interventions need to be prioritised in residential neighbourhoods that students predominantly occupy because social ties and control in these neighbourhoods are relatively low.

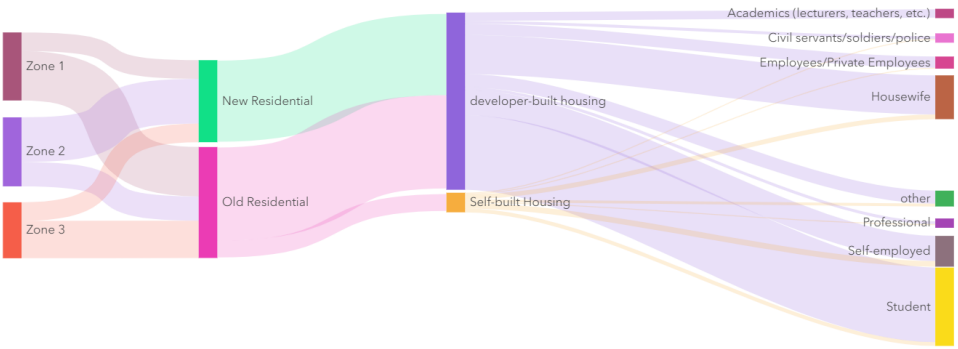


Figure 5. *An alluvial diagram of multi-crosstab analysis results with the zone, temporal aspect, type of development, and occupation variables of each zone.*

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CONCLUSION

This article reveals that RV to TS due to students' PSBs is closely related to the spatial dimension. Residential vulnerability (RV) to TS is highest in Zone 1 or areas close to universities. This condition occurs because most residential populations are students, so social control in this environment tends to be less effective. Residential vulnerability (RV) to TS decreases with increasing distance from the university as the residential population becomes more diverse. TS can emerge in new and old residential areas when the concentration of PSB cases increases. However, the tendency of RV to TS is relatively greater in new residential clusters. These findings reveal that social control in new residential areas has not been well established, especially in areas that students predominantly occupy. The results of this research deepen the understanding that TS is also closely related to moral degradation, both spatial and temporal. Therefore, it is necessary to increase social control in residential areas close to universities, especially in new residential areas, because they are more vulnerable to TS due to the concentration on PSBs.

The urgency of understanding RV to TS can be part of the right strategy. Future research can develop an understanding of the capacity and role of community informal social control on students' PSBs and the impact of TS by integrating spatial, temporal, and cultural dimensions as well as residential neighbourhood typology. Furthermore, future researchers can also explore the role and destigmatisation programmes carried out by the community in residential areas that experience TS. The exploration and investigation of informal social control is also an important aspect of combating and preventing the process of TS.

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REFERENCES

Aksa, F. I. (2019). Geografi dalam Perspektif Filsafat Ilmu. *Majalah Geografi Indonesia*, *33*(1), 43. https://doi.org/10.22146/mgi.35682

Alzouby, A. M., & Talalqa, E. R. (2023). The Role of University Campus Locations in the City Urban Growth: the Case of German Jordanian University in Madaba. *Journal of Sustainable Architecture and Civil Engineering*, *32*(1), 105–129. https://doi.org/10.5755/j01.sace.32.1.31666

Andersen, H. S. (2008). Why do residents want to leave deprived neighbourhoods? The importance of residents' subjective evaluations of their neighbourhood and its reputation. *Journal of Housing and the Built Environment*, *23*(2), 79–101.

https://doi.org/10.1007/s10901-008-9109-x
Arthurson, K. (2013). Mixed tenure communities and the effects on neighbourhood reputation and stigma: Residents' experiences from within. *Cities*, *35*, 432–438. https://doi.org/10.1016/j.cities.2013.03.007
Blokland, T. (2008). "You got to remember you live in public housing": Place-Making in an American housing project. *Housing, Theory and Society*, *25*(1), 31–46. https://doi.org/10.1080/14036090601151095
Bürk, T., Kühn, M., & Sommer, H. (2012). Stigmatisation of Cities. The Vulnerability of Local Identities. *Raumforschung Und Raumordnung | Spatial Research and Planning*, *70*(4). https://doi.org/10.1007/s13147-012-0160-4
Carter, A., Greene, S., Nicholson, V., O'Brien, N., Dahlby, J., de Pokomandy, A., Loutfy, M. R., & Kaida, A. (2016). 'It's a very isolating world': the journey to HIV care for women living with HIV in British Columbia, Canada. *Gender, Place and Culture*, *23*(7), 941–954. https://doi.org/10.1080/0966369X.2015.1073701
Chainey, S. (2021). Understanding Crime Analyzing The Geography of Crime. In *Angewandte Chemie International Edition, 6(11), 951–952.* Esri Press. http://repo.iain-tulungagung.ac.id/5510/5/BAB 2.pdf
Chukwubueze, O. (2013). Cohabitation among University of Ibadan Undergraduate Students. *Research on Humanities and Social Sciences*, *3*(5), 185–193.
Garcia-Almirall, P., Cornadó, C., & Vima-Grau, S. (2021). Residential vulnerability of barcelona: Methodology integrating multi-criteria evaluation systems and geographic information systems. *Sustainability (Switzerland)*, *13*(24). https://doi.org/10.3390/su132413659
Herdiana, D. (2019). Dampak Pembangunan Perumahan Terhadap Perubahan Sosial Masyarakat Desa (Studi Kasus Di Desa Jayamekar, Kabupaten Bandung Barat). *Jurnal Pembangunan Wilayah & Kota*, *14*(4), 265.
Hincks, S., & Powell, R. (2022). Territorial stigmatisation beyond the city: Habitus, affordances and landscapes of industrial ruination. *Environment and Planning A*, *54*(7), 1391–1410. https://doi.org/10.1177/0308518X221107022
Horgan, M. (2018). Territorial Stigmatization and Territorial Destigmatization: A Cultural Sociology of Symbolic Strategy in the Gentrification of Parkdale (Toronto). *International Journal of Urban and Regional Research*, *42*(3), 500–516. https://doi.org/10.1111/1468-2427.12645
Horgan, M. (2020). Housing stigmatization: A general theory. *Social Inclusion*, *8*(1), 8–19. https://doi.org/10.17645/si.v8i1.2345
Jahiu, L., & Cinnamon, J. (2022). Media coverage and territorial stigmatization: an analysis of crime news articles and crime statistics in Toronto. *GeoJournal*, *87*(6), 4547–4564. https://doi.org/10.1007/s10708-021-10511-5
Kasim, O. F., Omirin, O. J., & Okoro, D. I. (2018). Spatial analysis of cohabiting tertiary students' housing location in Ibadan, Nigeria. *GeoJournal*, *83*(1), 137–151. https://doi.org/10.1007/s10708-016-9758-3
Kearns, A., & Parkinson, M. (2001). The significance of neighbourhood. *Urban Studies*, *38*(12), 2103–2110. https://doi.org/10.1080/00420980120087063
Keene, D. E., & Padilla, M. B. (2014). Spatial stigma and health inequality. *Critical Public Health*, *24*(4), 392–404. https://doi.org/10.1080/09581596.2013.873532
Larsen, T. S., & Delica, K. N. (2019). The production of territorial stigmatisation: A

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conceptual cartography. *City*, *23*(4–5), 540–563. https://doi.org/10.1080/13604813.2019.1682865

Meade, R. R. (2021). Territorial stigmatization in theory and practice, and its implications for community development: an introduction to the themed section. *Community Development Journal*, *56*(2), 191–202. https://doi.org/10.1093/cdj/bsab002

Nédélec, P. (2017). Negative Neighbourhood Reputation and Place Attachment. In *The stigmatisation of Las Vegas and its inhabitants*. https://doi.org/10.4324/9781315597607

Otero, G., Méndez, M. L., & Link, F. (2022). Symbolic domination in the neoliberal city: space, class, and residential stigma. *Urban Geography*, *43*(4), 632–658. https://doi.org/10.1080/02723638.2021.1887632

Slater, T., & Anderson, N. (2012). The reputational ghetto: Territorial stigmatisation in St Paul's, Bristol. *Transactions of the Institute of British Geographers*, *37*(4), 530–546.

Soseco, T., Sumanto, A., Soesilo, Y. H., Wafa, A. A., Istiqomah, N., Yunikawati, N. A., & Puspasari, E. Y. (2017). Income inequality and access of housing. *International Journal of Economic Research*, *14*(6), 53–62.

Sumarmi, Putra, A. K., Mutia, T., Masruroh, H., Rizal, S., Khairunisa, T., Arinta, D., Arif, M., & Ismail, A. S. (2024). Local Wisdom for Global Challenges: Memayu Hayuning Bawono as a Model for Sustainable Environmental Practices. *International Journal of Sustainable Development and Planning*, *19*(2), 527–538. https://doi.org/10.18280/ijsdp.190210

Susilo, S. (2021). Investigation of Early Marriage: A Phenomenology Study in the Society of Bawean Island, Indonesia. *Journal of Population and Social Studies*, *29*, 544–562. https://doi.org/10.25133/JPSSv292021.034

Wacquant, L. (2007). Territorial Stigmatization in the Age of Advanced Marginality. *Thesis Eleven*, *91*(1), 66–77. https://doi.org/10.1177/0725513607082003

Wacquant, L., Slater, T., & Pereira, V. B. (2014). Territorial stigmatization in action. *Environment and Planning A*, *46*(6), 1270–1280. https://doi.org/10.1068/a4606ge

Zulfi, M., Ghani, A., & Susilo, S. (2024). *Social Capital in Social Construction : In-Depth Investigation of Early Marriages in Bawean Island , Indonesia Keywords*. 631–649.

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