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Journal of Tourism & Hospitality

Review Article

Mini Review on the Evolution and Driving Factors of the Coupling Relationship between Tourism Industry, Urbanization and Human Living Environment in the Middle Reaches of the Yangtze River Urban Agglomeration

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ABSTRACT

This study draws on the research published in PLoS One titled Mini Review on the Evolution and Driving Factors of the Coupling Relationship between Tourism Industry, Urbanization and Human Living Environment in the Middle Reaches of the Yangtze River Urban Agglomeration. It systematically examines the interaction between tourism, urbanization and human living environments within the urban agglomerations of the Yangtze River's middle reaches. Utilizing quantitative methods such as the entropy method, coupling coordination degree model, coefficient of variation, Taylor index and geographic detector model, the study investigates the evolution and driving factors of these relationships from 2005 to 2019. The findings reveal that the coupling coordination level in this region has steadily improved, though the rate of growth has slowed over time. Additionally, regional disparities have gradually diminished. Tourism resource endowment emerges as the primary driver of this coupling relationship, while factors such as tourism economic benefits, social urbanization, spatial urbanization and advancements in science, education, culture and health have increasingly influenced the system. These results underscore the need for governments to adopt tailored regional development policies that foster the coordinated growth of tourism, urbanization and human living environments, ultimately supporting sustainable regional development. Future study should focus on exploring the coupling mechanisms, conducting multi-scale analyses, developing dynamic simulations and engaging in international comparisons to provide a more robust foundation for policymaking.

Keywords: Tourism industry; Urbanization; Human habitation environment; Coupling relation; Middle reaches of Yangtze River; Urban agglomeration

INTRODUCTION

With the rapid advancement of globalization and urbanization, the interaction between the tourism industry, urbanization and the human living environment has become increasingly complex and interdependent. In China, the accelerated pace of urbanization and the rapid expansion of the tourism sector have further intensified these interactions, making them an essential subject of study in the context of regional economic growth and sustainable development.

This paper draws upon the study Mini Review on the Evolution and Driving Factors of the Coupling Relationship between Tourism Industry, Urbanization and Human Living Environment in the Middle Reaches of the Yangtze River Urban Agglomeration, published in PLoS One. It examines the coupling relationship between these three factors within the urban agglomerations of the middle reaches of the Yangtze River. The discussion will cover the background, methodology, key findings, policy implications and directions for future study, aiming to provide valuable insights for both academic study and policy formulation.

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Received: 26-Dec-2024, Manuscript No. JTH-25-36303; **Editor assigned:** 30-Dec-2024, PreQC No. JTH-25-36303 (PQ); **Reviewed:** 13-Jan-2025, QC No. JTH-25-36303; **Revised:** 17-Jul-2026, Manuscript No. JTH-25-36303 (R); **Published:** 24-Jul-2026, DOI: 10.35248/2167-0269.26.15.650

Citation: Xie A, Leh FC, Rambeli N (2026) Mini Review on the Evolution and Driving Factors of the Coupling Relationship between Tourism Industry, Urbanization and Human Living Environment in the Middle Reaches of the Yangtze River Urban Agglomeration. J Tourism Hospit. 15:650.

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Review background

The city cluster in the middle reaches of the Yangtze River is one of China's important economic regions, covering Hubei, Hunan and Jiangxi provinces. The region not only has rich tourism resources, but also has experienced rapid urbanization. However, with the acceleration of the urbanization process, the quality of human living environment has gradually become prominent, especially under the promotion of tourism, the contradiction between urbanization and living environment is increasingly intensified. Therefore, it is of great significance to study the coupling relationship between tourism industry, urbanization and human living environment for promoting regional sustainable development.

The background of this paper is based on the following points:

Importance of tourism industry: As an important part of the global economy, tourism can not only bring economic benefits, but also promote social and cultural transformation. Especially in China, tourism has become a major driver of economic growth in many regions [1].

Acceleration of urbanization process: Urbanization is not only the result of economic development, but also an important force to promote social progress. However, the urbanization process is also accompanied by resource consumption, environmental pollution and other problems, especially with the promotion of tourism, the contradiction between urbanization and residential environment is increasingly intensified [2].

Quality of human living environment: The quality of human living environment directly affects the living quality of residents and the sustainable development of the city. With the acceleration of urbanization, how to improve the quality of living environment has become an important issue for urban development [3].

LITERATURE REVIEW

Study methods

This study uses a combination of quantitative analysis techniques to systematically examine the coupling relationship between the tourism industry, urbanization and the human living environment in the urban agglomeration of the middle reaches of the Yangtze River. The methods used include the entropy method, coupling coordination degree model, coefficient of variation, Taylor index and geographic detector model.

Entropy method: The entropy method is utilized to assess the overall quality of the tourism industry, urbanization and the human living environment. The weight of each indicator is determined through a multi-step process involving standardization, normalization and information entropy calculation. These weights are then used to compute a comprehensive evaluation index for each of the three dimensions [4].

Coupling coordination degree model: Drawing on coupling theory in physics, this model is designed to quantify the degree of interaction and coordination between tourism, urbanization and the living environment. By calculating both the coupling degree and the coordination degree, the model provides insight into the evolving relationship between these factors.

Coefficient of variation and Taylor index: These statistical tools measure the disparities in coupling coordination levels across different regions. The coefficient of variation captures the overall variation within a region, while the Taylor index decomposes this variation into intra-regional and inter-regional differences [5,6].

Geographic detector model: The geographic detector model is employed to identify spatial heterogeneity and determine the underlying factors driving these variations. Through factor detection and interaction detection, the model helps analyze the key drivers influencing the evolution of the coupling relationship among tourism, urbanization and the human living environment [7].

Key findings

Evolutionary trends in coupling coordination levels: Between 2005 and 2019, the coupling coordination level of tourism, urbanization and the human living environment in the middle reaches of the Yangtze River urban agglomeration exhibited a steady upward trend. However, the growth rate gradually declined over time. Among the various sub-regions, the Chang-Zhu-Tan city cluster demonstrated the fastest improvement in coordination, followed by the Wuhan metropolitan area and the Poyang Lake city cluster.

Reduction in regional disparities: The analysis of the coefficient of variation and Taylor index indicates a decreasing disparity in coupling coordination levels across different regions, suggesting a trend toward regional convergence. However, intra-regional differences remain the primary source of overall disparity, particularly among the Wuhan metropolitan area, Chang-Zhu-Tan urban agglomeration and Poyang Lake urban agglomeration.

Evolutionary path of coupling coordination: The findings suggest that the coupling coordination level of the urban agglomeration in the middle reaches of the Yangtze River has progressed through distinct stages, from severe imbalance to moderate imbalance and subsequently to mild imbalance. Despite these improvements, the overall coordination level remains misaligned, highlighting the need for further policy interventions.

Analysis of driving factors: The availability of tourism resources emerges as the dominant factor influencing the evolution of the coupling relationship. Over time, additional factors such as the economic benefits of tourism, social urbanization, spatial urbanization and advancements in science, education, culture and healthcare have gained increasing significance. This suggests a shift toward a more diversified set of drivers influencing the interaction between tourism, urbanization and the living environment.

DISCUSSION

Policy implications

Enhancing the synergy between tourism and urbanization: Governments should formulate policies aimed at promoting the balanced development of tourism and urbanization. In regions rich in tourism resources, sustainable urban planning should be prioritized to prevent overdevelopment, which could negatively impact the living environment [8].

Improving the quality of the human living environment: As urbanization progresses, efforts should be made to enhance the overall quality of human settlements. This includes investing in infrastructure, optimizing the ecological environment and improving public services to foster sustainable urban development and enhance residents' well-being [9].

Promoting regional coordination: Given the varying levels of coupling coordination across different regions, it is essential to implement region-specific development policies. In key urban clusters such as the Wuhan metropolitan area, Chang-Zhu-Tan city cluster and Poyang Lake city cluster, enhanced collaboration and policy coordination should be encouraged to reduce development disparities and ensure balanced growth.

Leveraging diverse driving factors: With the increasing complexity of the factors driving the coupling relationship, governments should take full advantage of multiple influences, including tourism economic benefits, social urbanization, spatial urbanization and advancements in science, education, culture and healthcare. In particular, greater investment in technological innovation and public services can enhance urban competitiveness and support long-term sustainable development.

Future study direction

Although this paper makes an in-depth analysis of the coupling relationship between tourism industry, urbanization and human living environment in urban agglomerations in the middle reaches of the Yangtze River, there are still some problems worthies of further discussion:

In-depth study on coupling mechanism: Future study should further explore the coupling mechanism between the tourism industry, urbanization and the human living environment, with an emphasis on their complex interactions and feedback effects. Tourism development influences urban spatial patterns, infrastructure expansion and ecological balance, while urbanization reshapes the distribution of tourism resources, consumer preferences and destination accessibility. At the same time, changes in the human living environment, including environmental quality, public services and cultural landscapes, affect both urban growth and tourism dynamics. Investigating how improvements or declines in living conditions impact tourism sustainability and how tourism activities, in turn, transform urban environments is essential. A deeper analysis of the regulatory frameworks, economic policies and spatial planning strategies guiding these interrelations is necessary. Utilizing advanced methods such as system dynamics modeling, spatial econometrics and big data analysis can offer valuable insights, supporting the coordinated development of tourism, cities and human settlements for sustainable growth.

Multi-scale analysis: This study primarily examines urban agglomeration scale, but future study can extend to finer spatial levels, such as cities, districts, or communities, to explore how coupling relationships vary across different scales. Analyzing urban dynamics at smaller spatial units allows for a more precise understanding of how infrastructure, economic activities and environmental factors interact within cities. Examining intra-city variations can help uncover localized patterns of urban growth, resource allocation and sustainable development strategies. Additionally, different spatial scales may exhibit distinct interactions between urban expansion, land use changes and ecological constraints, necessitating more refined analytical approaches. Future studies can employ methods such as spatial econometrics, GIS analysis and big data techniques to reveal micro-scale spatial dependencies and feedback mechanisms. This approach can provide valuable insights for urban planning, policy formulation and regional coordination, helping cities achieve balanced development while addressing spatial inequalities and optimizing resource distribution.

Dynamic simulation and prediction: Future study can utilize dynamic simulation methods to predict the evolving relationship between the tourism industry, urbanization and the human living environment, providing a scientific foundation for policy decisions. By constructing simulation models, studies can analyze how tourism growth, urban expansion and environmental changes interact over time, identifying trends and potential challenges. Applying methods such as system dynamics, spatial simulation and agent-based modeling can help explore various development scenarios, assess the impact of different policies and optimize decision-making. These approaches allow for a deeper understanding of regional differences, feedback mechanisms and spatial dependencies, offering insights into the sustainable coordination of tourism and urban development. By simulating future trends and evaluating intervention effects, such studies can assist policymakers in formulating adaptive strategies that enhance tourism's role in urban sustainability, improve resource efficiency and support the long-term development of livable cities while balancing economic, social and environmental objectives.

International comparative studies: Future study can conduct comparative studies on urban agglomerations in different countries to analyze the coupling relationship between the tourism industry, urbanization and the human living environment under diverse socio-economic conditions. By selecting cases from regions with varying levels of economic development, governance models and cultural backgrounds, scholars can explore how tourism influences urban expansion and residential environments in different contexts. Cross-country comparisons can reveal common patterns in tourism-driven urban growth, such as infrastructure improvements and economic benefits, while also highlighting regional differences, including environmental pressures, policy constraints and social impacts. Moreover, analyzing how different governments and markets regulate and promote tourism development can provide

insights into effective planning strategies. Future studies can employ spatial analysis, econometric modeling and qualitative assessments to deepen the understanding of these interactions, offering valuable references for optimizing urban planning and sustainable tourism development across different socio-economic landscapes.

CONCLUSION

Through a comprehensive analysis of the coupling relationship among the tourism industry, urbanization and the human living environment in the middle reaches of the Yangtze River, this study uncovers the interaction mechanisms and evolutionary trends of these three factors. The findings indicate that the availability of tourism resources serves as the primary driver influencing the evolution of this relationship. Over time, the driving factors have become more diverse, incorporating elements such as tourism economic benefits, social urbanization and advancements in public services.

To foster balanced regional development, the government should implement differentiated policies that promote the coordinated growth of tourism, urbanization and human settlements while ensuring long-term sustainability. Future study should delve deeper into the coupling mechanisms, conduct multi-scale analyses, apply dynamic simulation models and explore international comparisons to provide a more robust scientific foundation for policy formulation.

FUNDING

This study was funded by National Social Science Foundation of China (Grant No. 21BGL150).

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