



Cultural Tourism as a Catalyst for Rural Development: A Spatial-Econometric Study of a Tourism Village in North Sumatra, Indonesia

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ABSTRACT

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Cultural tourism is increasingly viewed as a strategic pathway for inclusive rural development, particularly in culturally rich yet economically underdeveloped regions. This study examines its role through an integrated spatial and econometric framework, focusing on Meat Tourism Village in North Sumatra, Indonesia. Despite its policy recognition and cultural assets, the village has lacked empirical evaluation of tourism's development outcomes. Data were collected through structured surveys with 300 domestic and international tourists conducted between June and September 2024, and supplemented by stakeholder interviews. Geographic Information Systems (GIS) were used to identify tourism clusters, while multiple linear regression and path analysis assessed the effects of tourist behavior on income, employment, and infrastructure, with community participation as a mediating variable. Results reveal that tourist expenditure, length of stay, and cultural product consumption significantly predict household income growth. Spatial analysis highlights distinct cultural nodes as economic hotspots. Path analysis confirms that community participation amplifies employment outcomes, underscoring the value of inclusive governance. The study contributes a replicable methodological model integrating spatial diagnostics and econometric evaluation for rural cultural tourism. These findings underscore the transformative potential of cultural tourism when embedded within participatory and place-based development frameworks.

1. INTRODUCTION

Cultural tourism has increasingly gained recognition as a strategic vehicle for regional development, particularly in rural areas endowed with rich heritage and localized creative capital. As global tourism transitions from mass consumption to experience-driven travel, destinations rooted in cultural identity are being reimagined not merely as attractions, but as engines of inclusive growth and spatial revitalization [1]. As notes, the modern tourist seeks authenticity, immersion, and meaning—characteristics that are inherently embedded in cultural landscapes.

In the context of Indonesia, a country with immense ethnocultural diversity and a growing commitment to sustainable tourism, cultural tourism has become a national priority. Villages such as Meat in North Sumatra—designated as part of the Ministry of Tourism's rural tourism development initiative—offer unique opportunities to harness culture as a development resource. Yet, the empirical understanding of how cultural tourism shapes socio-economic outcomes remains limited. Existing studies often apply either econometric tools to assess impacts or spatial models to map

activity, but rarely integrate both [2]. Furthermore, Southeast Asian rural contexts remain underrepresented in this discourse, with much of the comparative literature focused on Europe and East Asia. This methodological and geographical gap inhibits a full understanding of the dynamics at play in culturally rich but economically constrained areas.

To address this gap, the present study investigates the role of cultural tourism in rural development by integrating spatial analysis and econometric modeling in a single analytical framework. Focusing on the Meat Tourism Village, the research examines how tourist engagement with cultural experiences affects local household income, employment, and infrastructure, while also exploring the mediating role of community participation [3]. The use of Geographic Information Systems (GIS) allows for the visualization of tourism activity clusters, while regression and path analysis provide statistical insights into causal mechanisms.

This study contributes to the literature and policy discourse in three key ways. First, it introduces a replicable methodology that captures both spatial and economic dimensions of tourism's impact. Second, it expands empirical knowledge from a Southeast Asian perspective, enhancing global

comparability. Third, it offers policy-relevant insights on how inclusive planning and cultural resource management can transform rural tourism into a platform for sustainable development [4]. In doing so, it responds to urgent calls for place-based, participatory models of tourism that empower communities while preserving cultural integrity.

2. LITERATURE REVIEW

2.1 Cultural tourism and regional development

Cultural tourism is increasingly recognized as a tool for regional transformation, particularly in rural contexts where cultural heritage remains underutilized. Defined as tourism centered on heritage, tradition, and creative expressions of local communities, cultural tourism contributes to economic diversification, social cohesion, and cultural preservation [5]. Its value lies not only in economic output but also in the reinforcement of local identity and territorial distinctiveness, both of which are crucial for place-based development strategies.

From a development standpoint, cultural tourism aligns closely with endogenous development theory, which emphasizes growth through the activation of local assets and knowledge systems. Unlike exogenous models driven by external capital, endogenous approaches encourage participatory governance and local ownership [6]. This makes cultural tourism particularly compatible with rural settings, where development pathways are often constrained by limited infrastructure and access to capital.

Empirical studies have shown that well-managed cultural tourism can enhance local income, generate employment, and foster infrastructure development. For example, found that cultural tourism in rural China contributed not only to economic growth but also to social capital formation [7]. However, these benefits are not automatic—they depend on strategic planning, authenticity, and active community participation.

$$(1+x)^n = 1 + \frac{nx}{1!} + \frac{n(n-1)x^2}{2!} + \dots$$

2.2 Spatial dimensions of cultural tourism

While economic impacts are often emphasized, the spatiality of cultural tourism has received growing attention. Tourism does not occur uniformly across space; rather, it clusters around what scholars call “cultural nodes”—geographic concentrations of attractions, performances, and artisan production. These nodes serve as focal points for tourist flow, expenditure, and interaction, and their identification is critical for planning interventions [8].

GIS have proven effective in visualizing these clusters and understanding accessibility patterns. Spatial analysis supports zoning policies, infrastructure prioritization, and the development of thematic tourism trails, especially in decentralized rural regions where assets are scattered [9]. However, few studies integrate spatial mapping with quantitative modeling to understand how these spatial arrangements correlate with socio-economic outcomes.

2.3 Modeling the socioeconomic impact of tourism

Econometric approaches—especially multiple linear

regression and path analysis—are widely used to assess tourism’s impact on local economies. utilized regression models to quantify how tourist spending influences income and employment, while used path models to explore mediating factors like community governance and visitor satisfaction [10].

Despite their analytical power, many of these studies remain contextually limited to urban or international tourism and rarely focus on integrated community-based tourism in developing rural settings. Moreover, Southeast Asia, and Indonesia in particular, remains underrepresented in these empirical discussions.

2.4 Identified gaps and study positioning

From the above, three critical gaps emerge. First, there is a lack of integrated studies that combine spatial and econometric analysis to evaluate cultural tourism’s multi-dimensional impact. Second, there is limited empirical evidence from Southeast Asian rural contexts, particularly in culturally rich but economically marginalized villages [11]. Third, few studies systematically assess the mediating role of community participation in translating cultural tourism into development gains. Recent empirical studies from Southeast Asia provide further insight into cultural tourism’s transformative potential. Rahman and Baddam [12] demonstrated how community empowerment directly contributes to sustainable cultural heritage tourism in Indonesia, reinforcing endogenous development principles through locally-driven management structures. Similarly, previous studies highlight how sustainability and community participation are fundamental to ecotourism initiatives, creating authentic experiences that bolster local economies and social cohesion [13]. Further, work on rural tourism in Guangdong, China, underscores the critical role of community perception and governance structures in effectively leveraging cultural tourism for inclusive growth. Collectively, these recent findings emphasize the importance of authentic, participatory approaches to cultural tourism in the Southeast Asian context, aligning closely with endogenous development frameworks and underscoring the significance of authenticity as a core strategic asset [14].

This study addresses these gaps by applying a mixed-method approach to a culturally prominent village in North Sumatra, integrating GIS-based spatial analysis and econometric modeling to uncover how cultural tourism affects income, employment, and infrastructure—while accounting for the social variable of community engagement.

2.5 Theoretical justification for methodological integration

The integration of spatial analysis and econometric modelling in this study is theoretically supported by three distinct but interrelated arguments. First, endogenous growth theory emphasises the importance of local resources, cultural authenticity and their use as tools for sustainable development. This justifies the use of econometric indicators to assess the extent to which local cultural resources contribute economically to development, including in terms of appropriate income and employment levels [15]. Second, spatial economy theory focuses on the importance of spatial clustering, which describes tourism clusters or nodes that are economically efficient in themselves or direct visitor traffic through proximity and low transaction costs. This dynamic is captured by GIS, which allows for the spatial diagnosis of

major cultural tourism hubs. Finally, the participatory development framework emphasises the importance of community empowerment and participation to ensure the sustainability and inclusiveness of outcomes [16]. This justifies the examination of community participation as a mediating variable, analysed through travel analysis and incorporating spatially targeted cultural tourism activities and social capital to identify greater socio-economic impact. These theories are powerful in generating spatial diagnostic reasoning combined with econometric evaluation to comprehensively analyze the linkages of cultural tourism development in rural areas.

2.6 Necessity and value-added of dual-method approach

Previous studies on cultural tourism have usually used either spatial analysis or econometric modelling separately, which limits their depth of explanation and practical applicability. Spatial analyses effectively visualize the geographical concentration of tourism activities, but cannot quantify the direct economic impact [17]. Econometric models, on the other hand, effectively reflect economic performance but often overlook critical spatial dimensions such as cluster effects and accessibility patterns. Consequently, isolated approaches offer incomplete perspectives that can be misleading political interventions. In this study, a two-method approach is explicitly used to overcome this methodological limitation – the integration of spatial diagnostics based on GIS with econometric methods (regression and road analysis) [18]. This combined approach is necessary because it simultaneously reflects the spatial complexity of cultural tourism activities and quantifies their precise economic and social impact. In addition to previous single-method models, it offers greater analytical accuracy, richer explanatory power, and more accurate policy insights [19]. Thus, this integrative framework significantly advances a scientific understanding of cultural tourism by providing an empirically grounded, spatially explicit, and economically robust evaluation model that is both innovative and replicable.

3. METHODS

3.1 Research design

This study adopts a mixed-methods quantitative approach to investigate the impact of cultural tourism on regional development in the Meat Tourism Village, North Sumatra, Indonesia [20]. The methodology combines spatial analysis and econometric modeling, providing both a geographical and statistical lens to examine how tourism activity translates into socio-economic outcomes.

3.2 Data collection

Primary data were collected through structured questionnaires administered to 300 tourists—both domestic and international—who visited the site between June and September 2024. Respondents were selected using stratified random sampling at major tourist entry points to ensure representation across age groups, origins, and trip purposes [21]. The questionnaire covered demographic characteristics, travel motivations, spending behavior, and satisfaction with cultural experiences and local infrastructure.

To enhance triangulation, semi-structured interviews were conducted with 20 local stakeholders, including homestay providers, artisans, cultural performers, and tourism officials [22]. These interviews enriched the interpretation of quantitative findings by providing contextual depth on community dynamics and tourism governance.

3.3 Operationalization of key variables

3.3.1 Community participation

Community participation was operationalized as the extent to which local residents actively engage in tourism development processes, decision-making, and benefit-sharing practices. This variable was measured using a five-item scale adapted from previous validated scales [23]:

- 1) Local community members actively participate in tourism planning meetings.
- 2) Community opinions significantly influence tourism development decisions.
- 3) Local community members directly benefit economically from tourism activities.
- 4) Community members participate in promoting local cultural tourism activities.
- 5) There are effective local community groups or cooperatives involved in tourism management.

Each item was rated by stakeholders (local artisans, homestay providers, tourism officials, and community leaders) using a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The composite measure was constructed by averaging responses, with higher scores representing higher levels of community participation. The internal consistency reliability (Cronbach's alpha) of this scale was $\alpha=0.85$, confirming its suitability for statistical analysis.

3.3.2 Visitor satisfaction

Visitor satisfaction was defined as tourists' overall evaluation of their experiences regarding cultural authenticity, hospitality, infrastructure, and overall enjoyment of the tourism offerings [24]. This construct was measured using a six-item scale adapted from validated visitor satisfaction instruments:

- 1) Satisfaction with the authenticity of cultural experiences.
- 2) Satisfaction with cultural performances (music, dance, storytelling).
- 3) Satisfaction with the quality and authenticity of local cuisine.
- 4) Satisfaction with the quality and availability of local artisan products.
- 5) Satisfaction with hospitality and service quality provided by the local community.
- 6) Overall satisfaction with the tourism infrastructure (accommodations, transportation, cleanliness).

Responses were captured using a 5-point Likert scale from 1 (Very Dissatisfied) to 5 (Very Satisfied). A composite satisfaction score was calculated as the mean across all items, where higher scores indicated greater satisfaction [25]. The reliability of this scale was strong, with a Cronbach's alpha of $\alpha=0.88$.

3.3.3 Sources and validation

Both scales underwent expert panel review and were pre-tested with a pilot sample ($n=30$) to confirm content validity and clarity of items before full-scale implementation [26].

Scales and items were informed by previously validated instruments, ensuring theoretical and empirical alignment with existing literature.

3.4 Spatial analysis

To map and analyze the spatial distribution of tourism activity, GIS were employed. Data on tourism assets—including homestays, performance venues, artisan workshops, and food hubs—were gathered through GPS-enabled field mapping and satellite imagery [27]. Using kernel density estimation, clusters of tourism activity were identified, while buffer analysis assessed the proximity of cultural nodes to transport infrastructure and accommodations. The spatial data were processed and visualized using ArcGIS Pro. GIS was selected due to its ability to reveal spatial concentrations and accessibility patterns in a rural, decentralized tourism setting—critical for planning spatial interventions and identifying high-impact zones.

3.5 Econometric modeling

To assess the economic contribution of tourism, a multiple linear regression model was developed with local household income as the dependent variable. Predictor variables included tourist expenditure, length of stay, cultural product consumption, and visitor satisfaction. Prior to modeling, diagnostic checks confirmed the absence of multicollinearity and ensured normal distribution of residuals to examine indirect relationships, path analysis was conducted using AMOS software, assessing the mediating role of community participation in the link between tourism variables and employment outcomes [28]. This allowed for a deeper understanding of causal pathways and stakeholder dynamics beyond direct economic effects. The choice of linear regression and path modeling was guided by the continuous nature of the dependent variables and the study's objective to evaluate both direct and mediated relationships, rather than latent constructs.

3.6 Validity, reliability, and limitations

Instrument validity was ensured through expert panel review and pre-testing with a pilot sample of 30 respondents. Internal consistency of scale items was confirmed using Cronbach's Alpha, with all constructs exceeding the threshold of 0.70 [29]. Data were analyzed using SPSS (version 26) for descriptive and regression analysis, AMOS for structural modeling, and ArcGIS Pro for spatial processing. While the study offers a comprehensive analysis, its cross-sectional design limits causal inference and does not capture seasonal variation. Future research using longitudinal or panel designs is recommended to better assess dynamic patterns over time. Mitigating Seasonality Bias and Bias Representativeness. The data collection dates for this survey were between June and September 2024. This timeframe raises potential concerns about seasonality bias. This area has a peak tourist season during these dates, which can affect visitor demographics, spending behaviors, and satisfaction [30]. To balance these concerns and alleviate prejudices, the sampling method was designed to cover both weekdays and weekends during peak visitor hours. In addition, consultations with local tourism authorities and stakeholders showed that visitor demographics, including the ratio of national and international visitors, age

groups and activity preferences during the survey period, tend to coincide with the annual averages.

Nevertheless, the applicability of the data outside the peak season, when there are fewer tourists with different spending habits, should be approached with caution [31]. Tourism researchers may consider collecting data year-round or conducting comparative seasonal surveys to increase representativeness and more accurately depict holistic tourism patterns throughout the year.

4. RESULT

This research presents the integrated findings of the spatial analysis, econometric modeling, and demographic survey, revealing how cultural tourism activities impact regional development in the Meat Tourism Village, North Sumatra, Indonesia.

4.1 Tourist demographics and preferences

Out of 300 respondents, 52% were male and 48% female, with the dominant age group being 31-50 years (43.3%). The majority were domestic tourists (78.3%) and most stayed for 1-2 days (62.0%): indicating a predominance of short visits. These figures suggest an opportunity to develop longer-stay cultural tourism packages targeting middle-aged domestic travelers.

Tourist preferences demonstrate high satisfaction levels across various cultural aspects, with the highest rating given to perceived authenticity ($M=4.44$, $SD=0.59$): followed by satisfaction with performances ($M=4.35$) and cuisine ($M=4.21$). These trends emphasize the importance of offering authentic, immersive experiences that resonate with cultural identity. Average daily spending was substantial at IDR 572,000 ($SD=198,000$): underscoring the revenue-generating potential of localized cultural offerings.

4.2 Spatial analysis: Distribution and accessibility of cultural nodes

Using GIS, the spatial distribution of tourism activities was visualized and analyzed [32]. Kernel density estimation identified distinct clusters around traditional performance spaces, culinary hotspots, and artisan workshops, termed here as "cultural nodes." These high-density areas represent both social hubs and economic growth zones (Figure 1).

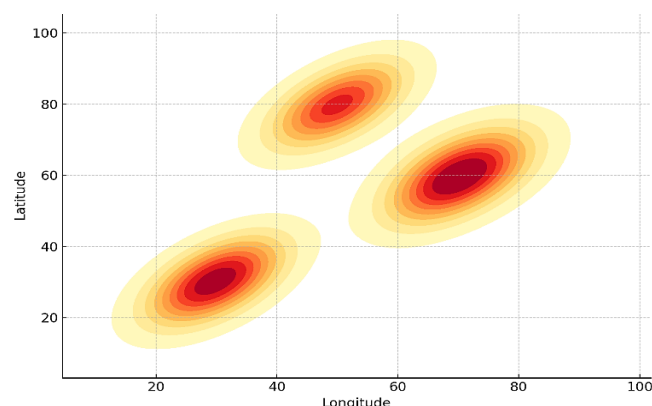


Figure 1. Kernel density map of cultural tourism activities

Buffer analysis revealed that most cultural attractions were within 300 meters of accommodations and transport nodes, indicating a compact and walkable tourism layout. This proximity enhances visitor flow and satisfaction while minimizing infrastructure strain [33]. These spatial insights provide a strategic foundation for developing site-based zoning policies and visitor management plans.

4.3 Econometric results: Predictors of local household income

Multiple linear regression analysis was conducted to examine the relationship between tourist behavior and changes in household income [34]. All four predictor variables were statistically significant ($p < 0.01$) (Table 1):

Table 1. All four predictor variables were statistically significant

Predictor	B	β	t	p
Tourist Expenditure	0.458	0.471	7.39	<0.001
Length of Stay	0.312	0.278	3.51	0.001
Cultural Product Consumption	0.225	0.193	3.08	0.002
Visitor Satisfaction	0.188	0.172	2.81	0.005

The model explains 48.2% of the variance in income change ($R^2 = 0.482$; $F(4, 295) = 68.65$, $p < 0.001$). Tourist expenditure is the most influential variable, suggesting that every IDR 100,000 increase in tourist spending is associated with an approximate IDR 45,800 increase in local household income. Length of stay and cultural product consumption also exert significant impacts, indicating that extended visits and deeper engagement with local crafts boost economic returns.

4.4 Clarification of the factors influencing unexplained variance and the shortcomings of the model

Although regression analysis captures a significant proportion (48.2%) of the local household's income variance, approximately 51.8% remains unexplained. This gap suggests that other relevant factors that are not covered by the model are likely to play a role. Examples of such excluded variables can be seasonality, peripheral market conditions such as regional economic indicators, inflation or national tourism promotion campaigns, socio-economic characteristics at the household level such as family size, level of education or alternative earning activities, and the overall quality of infrastructure in the area compared to tourism-specific infrastructure [35]. In addition, unmeasured qualitative variables, such as local attitudes towards tourism, informal economic interactions, and changes in tourists' cultural background or spending behaviour, may increase the difference. Due to the cross-sectional scope of this study, the ability to capture dynamic changes and long-term trends is limited, which may mask temporal factors affecting income levels [36]. Further research may include such variables, switch to longitudinal approaches, or combine qualitative methods to construct a more comprehensive explanatory model and reduce unexplained variance even further.

4.5 Mediating role of community participation

Path analysis reveals that community participation significantly mediates the relationship between visitor satisfaction and employment generation ($\beta = 0.211$, $p < 0.01$).

This indicates that satisfied tourists indirectly promote employment when local communities are effectively engaged in the tourism system [37]. The finding underscores the need for inclusive development practices, where community empowerment translates cultural capital into tangible employment outcomes.

4.6 Expanded interpretation of indirect effects

The analysis of the roads showed significant indirect effects through community involvement, highlighting in particular how factors such as length of stay, consumption of cultural products and visitor satisfaction are indirectly reflected in employment outcomes [38]. Specifically, the mediation analysis shows that longer tourist stays indirectly contribute to local employment by increasing opportunities for deeper community engagement, such as greater interaction with local businesses, participation in cultural activities, and patronage of community-managed services. Such synergies not only extend the economic benefits to a wider segment of the local community, but also encourage the development of sustainable job opportunities that are directly linked to community-led initiatives [39]. Similarly, in addition to direct economic benefits, the consumption of cultural products indirectly strengthens employment outcomes by motivating the community to actively preserve and innovate culturally authentic products and experiences, thereby increasing their employability in tourism-related sectors. Community participation thus emerges as a critical link—transforming tourists' spending behaviour into meaningful local job opportunities, especially in culturally driven occupations [40]. In addition, the indirect impact of visitor satisfaction on employment through community participation highlights that satisfied tourists are likely to support and promote more extensive community-based activities. As communities actively participate and receive positive feedback from visitors, they are motivated to invest more in hospitality, cultural preservation, and infrastructure improvement, creating a cycle of self-reinforcing employment and local empowerment. In essence, indirect pathways obtained through community participation highlight that the benefits of tourism go beyond direct economic exchange, highlighting the social mechanisms through which tourism has a sustainable impact on employment outcomes [41]. Therefore, facilitating and strengthening community participation should be a strategic priority for policymakers, aiming to leverage cultural tourism for inclusive growth (Figure 2).

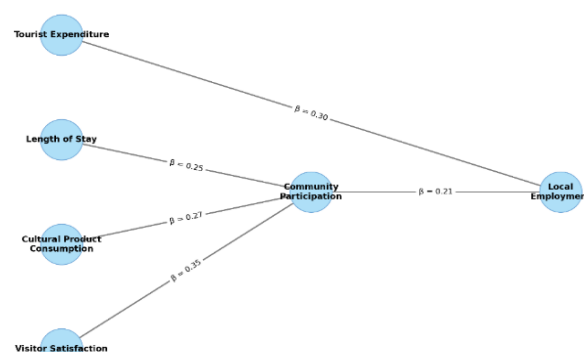


Figure 2. Path analysis diagram illustrating relationships between tourism variables, community participation, and local employment (standardized coefficients)

4.7 Synthesis

The results collectively reveal that:

- authenticity and cultural richness drive visitor satisfaction and spending;
- strategic spatial clustering of cultural assets enhances tourism experience and economic efficiency;
- community engagement amplifies the economic benefits of tourism, particularly in employment growth.

These findings serve as the empirical foundation for the policy discussion in the following section and highlight the necessity of integrated planning in cultural tourism development.

5. DISCUSSION

The findings of this study provide compelling evidence for the transformative potential of cultural tourism in regional development, particularly in rural areas endowed with strong cultural heritage [42]. Through the integrated use of spatial analysis and econometric modeling, this study not only affirms existing theoretical frameworks but also advances the discourse by empirically demonstrating the mechanisms through which tourism impacts socio-economic outcomes.

5.1 Cultural authenticity as a driver of local spending

The high satisfaction ratings for authenticity and cultural performances substantiate theories that posit authenticity as a core attractor in cultural tourism [43]. This aligns with the experience economy model, where value is derived from the depth of immersion rather than the breadth of services. Importantly, authentic cultural engagement does not require scale—it requires integrity.

The positive and significant effects of tourist expenditure and cultural product consumption on household income suggest that economic returns are maximized when spending remains embedded in the local economy. This reinforces endogenous development theory, which emphasizes internal resource mobilization as a path to sustainable growth. Moreover, the relatively high average daily spending reported in this study illustrates the untapped economic value that resides in cultural capital, particularly when presented in a way that preserves its local meaning [44]. These insights echo findings highlighting the importance of localized value chains in community-based tourism systems.

5.2 Spatial planning and the role of cultural nodes

Building on the economic findings, the spatial analysis revealed clustering of tourism activity around key cultural assets—what this study identifies as “cultural nodes.” These are not simply points of interest; they are functional and symbolic centers where economic, social, and cultural exchanges intersect.

This spatial concentration supports nodal development strategies in rural tourism planning, where accessibility and experience density become key levers of policy intervention. Notably, buffer analysis showed that most attractions were within walking distance of accommodations and transportation hubs [45]. This compact and walkable ecosystem not only enhances visitor satisfaction but also

lowers the environmental and infrastructural burdens of tourism. These spatial patterns reflect findings, who argued that tourism spatiality must be aligned with local infrastructural realities.

5.3 Community participation as a mediator of impact

Perhaps the most policy-relevant insight from this study lies in the mediating role of community participation. The path analysis confirmed that tourism’s contribution to employment generation is significantly amplified when communities are directly involved in the tourism system ($\beta=0.211$, $p<0.01$).

This finding underscores a broader truth: development outcomes are shaped not only by what tourists do, but by how communities are empowered to respond [46]. In line with participatory development models this highlights the importance of shifting from a provider–consumer model of tourism to one of co-creation. Policies that institutionalize community co-ownership—such as participatory planning forums, community cooperatives, and local revenue-sharing schemes—are vital to translating tourism benefits into long-term economic resilience.

5.4 Addressing short visit durations and market diversification

The predominance of short-stay tourists (1-2 days) in the dataset presents both a constraint and an opportunity. On the one hand, short visits limit the depth of local economic engagement. On the other, they signal potential for developing bundled cultural experiences [47]. These could include thematic itineraries, cultural trails, and seasonal festivals that encourage extended stays.

Furthermore, while domestic tourists currently dominate, the presence of international visitors—albeit smaller in proportion—offers a promising niche. International tourists often demonstrate higher per capita spending and longer stays. Strategic marketing to heritage-seeking or experience-driven segments may help diversify the visitor base and increase economic yield.

5.5 Comparative perspectives and methodological contribution

Compared with parallel studies in Portugal and China, the case of the Meat Tourism Village illustrates that culturally rich rural destinations in Southeast Asia are equally capable of leveraging tourism for regional development [48]. This strengthens the external validity of the findings and adds a Global South perspective to a literature dominated by Western and East Asian contexts.

Equally important is the methodological integration used in this study [49]. Few cultural tourism studies combine spatial and econometric tools in a single analytical framework. This dual-method approach not only enhances the robustness of the findings but also offers a replicable model for research in similar destinations where both cultural density and socio-economic disparity coexist.

5.6 Study limitations and directions for future research

While the findings are robust, several limitations warrant acknowledgment. First, the study employed a cross-sectional design, limiting the ability to capture dynamic or seasonal

changes in tourist behavior and economic impact [50]. Second, the focus on a single case study—though rich in depth—may constrain generalizability across regions with different cultural and institutional contexts.

Future research could adopt a longitudinal approach to track changes over time, or apply comparative case studies across multiple cultural tourism villages [51]. Additionally, incorporating qualitative ethnographic methods could provide deeper insights into the lived experiences and motivations of both tourists and local stakeholders.

6. CONCLUSION

This study demonstrates that cultural tourism, when grounded in authenticity, spatially optimized, and community-driven, holds significant potential to drive inclusive rural development. Through the case of the Meat Tourism Village in North Sumatra, Indonesia, spatial analysis identified clusters of cultural activity—or cultural nodes—as focal points of economic and social exchange, while econometric modeling confirmed that tourist spending, length of stay, and cultural engagement significantly increase local income and employment. Community participation emerged as a critical mediating factor, highlighting that tourism's developmental impact depends not just on visitor activity but on the extent of local empowerment.

These findings reinforce the need for integrated tourism planning, participatory governance, and product diversification to enhance development outcomes. Local authorities and tourism stakeholders should collaborate in designing immersive, experience-based offerings and institutionalizing data-driven monitoring. To our knowledge, this is the first study in Southeast Asia that simultaneously applies spatial and econometric techniques to assess the impacts of cultural tourism. While the results are robust in context, future research should expand this framework through longitudinal and comparative studies to further validate and refine its applicability across diverse rural landscapes.

6.1 Political and strategic recommendations

Based on the results of the study, local authorities and tourism stakeholders should prioritize three strategic areas. First, develop and implement structured community co-ownership programs (cooperatives or joint steering committees) to institutionalize community participation, ensuring a fair distribution and sustainable management of the economic benefits of cultural tourism. Second, introduce targeted marketing and promotion campaigns that focus on extending the length of stay for tourists, such as combined cultural experiences, thematic cultural trails, or periodic festivals and events that showcase local heritage and encourage deeper engagement with visitors. Finally, invest strategically in infrastructure improvement, especially around identified "cultural nodes", improving walking opportunities, visitor comfort, and access to authentic experiences, thereby maximizing the economic and social potential of existing spatial clusters. Together, these steps will help make cultural tourism a more inclusive and economically resilient driver of rural development.

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REFERENCES

- [1] Guo, R., Kou, I.E., Jiang, Q. (2023). Unlocking the creative potential: A case study of Luoyang City's creative tourism development. *Sustainability*, 15(20): 14710. <https://doi.org/10.3390/su152014710>
- [2] Rausell-Köster, P., Ghirardi, S., Sanjuán, J., Molinari, F., Abril, B. (2022). Cultural experiences in the framework of "cultural cities": Measuring the socioeconomic impact of culture in urban performance. *City, Territory and Architecture*, 9(1): 40. <https://doi.org/10.1186/s40410-022-00189-8>
- [3] Zhou, M., Yu, H. (2022). Exploring how tourist engagement affects destination loyalty: The intermediary role of value and satisfaction. *Sustainability*, 14(3): 1621. <https://doi.org/10.3390/su14031621>
- [4] Yin, J., Feng, J., Jia, M. (2024). Research on rural tourism environment perception based on grounded theory: A case study of Beishan Village, Zhuhai City, Guangdong Province, China. *Heliyon*, 10(11): e32373. <https://doi.org/10.1016/j.heliyon.2024.e32373>
- [5] Kalvet, T., Olesk, M., Tiits, M., Raun, J. (2020). Innovative tools for tourism and cultural tourism impact assessment. *Sustainability*, 12(18): 7470. <https://doi.org/10.3390/su12187470>
- [6] Nordberg, K., Mariussen, Å., Virkkala, S. (2020). Community-driven social innovation and quadruple helix coordination in rural development. Case study on LEADER group Aktion Österbotten. *Journal of Rural Studies*, 79: 157-168. <https://doi.org/10.1016/j.jrurstud.2020.08.001>
- [7] Wang, Y., Chen, Y., Zhang, W., Chao, I., Li, H. (2024). The impact of rural tourism on rural culture evidence from China. *Agriculture*, 14(12): 2116. <https://doi.org/10.3390/agriculture14122116>
- [8] Panzera, E., De Graaff, T., De Groot, H.L. (2020). European cultural heritage and tourism flows: The magnetic role of superstar world heritage sites. *Papers of the Regional Science Association*, 100(1): 101-123. <https://doi.org/10.1111/pirs.12562>
- [9] Šoltésová, M., Iannaccone, B., Štrba, L., Sidor, C. (2025). Application of GIS technologies in tourism planning and sustainable development: A case study of Gelnica. *ISPRS International Journal of Geo-Information*, 14(3): 120. <https://doi.org/10.3390/ijgi14030120>
- [10] Huseynli, N. (2022). Econometric analysis of the relationship between tourism revenues, inflation and economic growth: The case of Morocco and South Africa. *African Journal of Hospitality Tourism and Leisure*, 11(1): 135-146. <https://doi.org/10.46222/ajhtl.19770720.216>

- [11] Cattaneo, A., Adukia, A., Brown, D.L., Christiaensen, L., Evans, D.K., Haakenstad, A., McMenomy, T., Partridge, M., Vaz, S., Weiss, D.J. (2022). Economic and social development along the urban-rural continuum: New opportunities to inform policy. *World Development*, 157: 105941. <https://doi.org/10.1016/j.worlddev.2022.105941>
- [12] Rahman, S.S., Baddam, P.R. (2021). Community engagement in Southeast Asia's tourism industry: Empowering local economies. *Global Disclosure of Economics and Business*, 10(2): 75-90. <https://doi.org/10.18034/gdeb.v10i2.715>
- [13] Jackson, L.A. (2025). Community-based tourism: A catalyst for achieving the United Nations Sustainable Development Goals one and eight. *Tourism and Hospitality*, 6(1): 29. <https://doi.org/10.3390/tourhosp6010029>
- [14] Suriyankietkaew, S., Krittayaruangroj, K., Thinthan, S., Lumlongrut, S. (2025). Community capitals framework for sustainable development: A qualitative study of creative tourism in ban Chiang world heritage site. *Sustainability*, 17(8): 3311. <https://doi.org/10.3390/su17083311>
- [15] Kostakis, I., Lolos, S. (2024). Uncovering the impact of cultural heritage on economic growth: Empirical evidence from Greek regions, 2000-2019. *The Annals of Regional Science*, 73(3): 1209-1239. <https://doi.org/10.1007/s00168-024-01280-3>
- [16] Costa, D.G., Bittencourt, J.C.N., Oliveira, F., Peixoto, J.P.J., Jesus, T.C. (2024). Achieving sustainable smart cities through geospatial data-driven approaches. *Sustainability*, 16(2): 640. <https://doi.org/10.3390/su16020640>
- [17] Ferrante, M., Magno, G.L.L., De Cantis, S., Hewings, G.J. (2020). Measuring spatial concentration: A transportation problem approach. *Papers in Regional Science*, 99(3): 663-682. <https://doi.org/10.1111/pirs.12485>
- [18] Petropoulos, F., Laporte, G., Aktas, E., Alumur, S.A., et al. (2024). Operational research: Methods and applications. *Journal of The Operational Research Society*, 75(3): 423-617. <https://doi.org/10.1080/01605682.2023.2253852>
- [19] Jiang, S., Zhang, Z., Xu, H., Pan, Y. (2024). What influences users' continuous behavioral intention in cultural heritage virtual tourism: Integrating experience economy theory and stimulus-organism-response (SOR) model. *Sustainability*, 16(23): 10231. <https://doi.org/10.3390/su162310231>
- [20] Ahmad, M.F., Alexakis, C., Aziz, S., Eleftheriou, K. (2025). Cross-border mergers and acquisitions activity in the tourism industry: A spatial econometrics analysis. *International Journal of Hospitality Management*, 130: 104238. <https://doi.org/10.1016/j.ijhm.2025.104238>
- [21] Bursa, B., Mailer, M., Axhausen, K.W. (2022). Travel behavior on vacation: Transport mode choice of tourists at destinations. *Transportation Research Part A: Policy and Practice*, 166: 234-261. <https://doi.org/10.1016/j.tra.2022.09.018>
- [22] Basyar, M.R., Mardiyanta, A., Setijaningrum, E. (2025). Multi-stakeholder analysis in building tourism resilience: Collaborative governance implementation in the Majapahit house heritage area, Indonesia. *Tourism and Hospitality*, 6(1): 5. <https://doi.org/10.3390/tourhosp6010005>
- [23] Santos, E.R.M.D., Pereira, L.N., Pinto, P., Boley, B.B. (2024). Development and validation of the new resident empowerment through tourism scale: RETS 2.0. *Tourism Management*, 104: 104915. <https://doi.org/10.1016/j.tourman.2024.104915>
- [24] Pivac, T., Blešić, I., Kovačić, S., Besermenji, S., Lesjak, M. (2019). Visitors' satisfaction, perceived quality, and behavioral intentions: The case study of exit festival. *Journal of The Geographical Institute "Jovan Cvijic", SASA*, 69(2): 123-134. <https://doi.org/10.2298/IJGI1902123P>
- [25] Elshaer, I.A., Azazz, A.M., Fayyad, S., Aljoghaiman, A., Fathy, E.A., Fouad, A.M. (2025). From asymmetry to satisfaction: The dynamic role of perceived value and trust to boost customer satisfaction in the tourism industry. *Tourism and Hospitality*, 6(2): 68. <https://doi.org/10.3390/tourhosp6020068>
- [26] Fernández-Gómez, E., Martín-Salvador, A., Luque-Vara, T., Sánchez-Ojeda, M.A., Navarro-Prado, S., Enrique-Mirón, C. (2020). Content validation through expert judgement of an instrument on the nutritional knowledge, beliefs, and habits of pregnant women. *Nutrients*, 12(4): 1136. <https://doi.org/10.3390/nu12041136>
- [27] Alsahafi, R., Alzaharani, A., Mehmood, R. (2023). Smarter sustainable tourism: Data-driven multi-perspective parameter discovery for autonomous design and operations. *Sustainability*, 15(5): 4166. <https://doi.org/10.3390/su15054166>
- [28] Bansal, R., Ansari, Y. (2025). The role of drivers for sustainable development in the electric vehicle adoption: A two-staged structural equation modelling-artificial neural network technique. *Resources, Conservation & Recycling Advances*, 26: 200255. <https://doi.org/10.1016/j.rcradv.2025.200255>
- [29] Taber, K.S. (2017). The use of Cronbach's Alpha when developing and reporting research instruments in science education. *Research in Science Education*, 48(6): 1273-1296. <https://doi.org/10.1007/s11165-016-9602-2>
- [30] Zhang, S., Li, Z., Liu, S. (2025). Exploring the tourism development potential and distinctive features of traditional wooden architecture in central Hunan: A case study of 18 villages. *Sustainability*, 17(6): 2573. <https://doi.org/10.3390/su17062573>
- [31] Massidda, C., Piras, R., Seetaram, N. (2022). Analysing the drivers of itemised tourism expenditure from the UK using survey data. *Annals of Tourism Research Empirical Insights*, 3(1): 100037. <https://doi.org/10.1016/j.annale.2022.100037>
- [32] Yang, J., Hasna, M.F., Abu Bakar, N.A. (2025). Rediscovering spatial configurations and cultural symbolism in Beijing's official Pailou through landmark spatial indexing. *Journal of Asian Architecture and Building Engineering*, 1-27. <https://doi.org/10.1080/13467581.2025.2510609>
- [33] Baobeid, A., Koç, M., Al-Ghamdi, S.G. (2021). Walkability and its relationships with health, sustainability, and livability: Elements of physical environment and evaluation frameworks. *Frontiers in Built Environment*, 7(3): 1-17. <https://doi.org/10.3389/fbuil.2021.721218>
- [34] Yan, Z., Zhou, H. (2024). Research on influencing factors of domestic tourism revenue based on multiple linear regression analysis. *Highlights in Science*

- Engineering and Technology, 107: 60-64. <https://doi.org/10.54097/bkqr3p23>
- [35] Sun, X., Zheng, C., Wandelt, S., Zhang, A. (2024). Airline competition: A comprehensive review of recent research. *Journal of the Air Transport Research Society*, 2: 100013. <https://doi.org/10.1016/j.jatrs.2024.100013>
- [36] Linderová, I., Scholz, P., Almeida, N. (2021). Attitudes of local population towards the impacts of tourism development: Evidence from Czechia. *Frontiers in Psychology*, 12: 684773. <https://doi.org/10.3389/fpsyg.2021.684773>
- [37] Yang, G., Chaiyasoonthorn, W., Chaveesuk, S. (2024). Exploring the influence of live streaming on consumer purchase intention: A structural equation modeling approach in the Chinese E-commerce sector. *Acta Psychologica*, 249: 104415. <https://doi.org/10.1016/j.actpsy.2024.104415>
- [38] Kanwal, S., Rasheed, M.I., Pitañi, A.H., Pitañi, A., Ren, M. (2019). Road and transport infrastructure development and community support for tourism: The role of perceived benefits, and community satisfaction. *Tourism Management*, 77: 104014. <https://doi.org/10.1016/j.tourman.2019.104014>
- [39] Fansurya, A.H., Susanto, P., Abrian, Y., Fadilah, R., Wulansari, N., Permata Lisna, Y., Adrian, A. (2024). Tourist's length of stay: The perspective of flow experience theory. *Cogent Business & Management*, 11(1): 2310258. <https://doi.org/10.1080/23311975.2024.2310258>
- [40] Turčinović, M., Vujko, A., Stanišić, N. (2025). Community-led sustainable tourism in rural areas: Enhancing wine tourism destination competitiveness and local empowerment. *Sustainability*, 17(7): 2878. <https://doi.org/10.3390/su17072878>
- [41] 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>
- [42] Kourtiti, K., Nijkamp, P., Suzuki, S. (2025). Environmental and cultural tourism in heritage-led regions-performance assessment of cultural-ecological complexes using multivariate data envelopment analysis. *Sustainability*, 17(13): 5871. <https://doi.org/10.3390/su17135871>
- [43] Zhu, P., Chi, X., Ryu, H.B., Han, H. (2025). Experience economy and authenticity in the heritage tourism sector: A multiple-dimensional approach. *Acta Psychologica*, 257: 105118. <https://doi.org/10.1016/j.actpsy.2025.105118>
- [44] Bibri, S.E., Krogstie, J., Kärrholm, M. (2020). Compact city planning and development: Emerging practices and strategies for achieving the goals of sustainability. *Developments in the Built Environment*, 4: 100021. <https://doi.org/10.1016/j.dibe.2020.100021>
- [45] Pang, H., Li, Y., Zhang, J. (2025). Spatial evolution and influencing factors of rural tourism destinations in an ecologically fragile region of northwest China-The case of Lanzhou City. *Sustainability*, 17(8): 3618. <https://doi.org/10.3390/su17083618>
- [46] Szreter, S., Woolcock, M. (2004). Health by association? Social capital, social theory, and the political economy of public health. *International Journal of Epidemiology*, 33(4): 650-667. <https://doi.org/10.1093/ije/dyh013>
- [47] Geng, Y., Jiang, X., Bai, W., Yan, Y., Gao, J. (2024). Research progress of tourism marketing over 30 years: Bibliometrics based on CiteSpace. *Ecological Indicators*, 162: 112059. <https://doi.org/10.1016/j.ecolind.2024.112059>
- [48] Abbas, A.F., Hashim, H.M., Sahi, A.M., Bayram, G.E., Valeri, M. (2025). Exploring the landscape of family business research in Asia: A bibliometric analysis. *Journal of the International Council for Small Business*, 1-34. <https://doi.org/10.1080/26437015.2025.2457146>
- [49] Kumawat, E., Datta, A., Prentice, C., Leung, R. (2024). Artificial intelligence through the lens of hospitality employees: A systematic review. *International Journal of Hospitality Management*, 124: 103986. <https://doi.org/10.1016/j.ijhm.2024.103986>
- [50] Akamavi, R.K., Ibrahim, F., Swaray, R. (2023). Tourism and troubles: Effects of security threats on the global travel and tourism industry performance. *Journal of Travel Research*, 62(8): 1755-1800. <https://doi.org/10.1177/00472875221138792>
- [51] Yanan, L., Ismail, M.A., Aminuddin, A. (2024). How has rural tourism influenced the sustainable development of traditional villages? A systematic literature review. *Heliyon*, 10(4): e25627. <https://doi.org/10.1016/j.heliyon.2024.e25627>