



Original scientific paper

UDC: 338.484:502.131

<https://doi.org/10.2298/JGI250326016T>

Received: March 26, 2025

Reviewed: June 18, 2025

Accepted: September 5, 2025



TOURISM CLUSTERS IN EMERGING DESTINATIONS: PERCEIVED COMPETITIVENESS AND ECONOMIC SUSTAINABILITY

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Abstract: This study examines the development and competitiveness of tourism clusters in Kazakhstan's Turkestan region, one of the key Silk Road destination. It also explores the perceptions of tourists, local residents, and stakeholders on the development of a tourism cluster in this selected region. Cluster analysis revealed distinct visitor segments, with cultural and ecotourism as dominant demand types, alongside the differences in income, stay duration, and spending. Using Porter's Diamond Model, the study identified challenges such as poor sectoral coordination, limited promotion, and weak institutional support. Regression analysis showed income-related variation in preferences, while SWOT analysis underscored the need for improved infrastructure, digital marketing, and service integration. Although sustainability outcomes were not empirically measured, the findings contribute to understanding the economic dimension of sustainability by examining stakeholder views on clustering and competitiveness. The results offer strategic guidance for policy and tourism development, emphasizing Turkestan's cultural and ecological value within the Silk Road corridor. While sustainability was not directly measured, the outcomes offer strategic direction for enhancing the region's competitiveness and advancing its role as a vital destination along the Silk Road.

Keywords: tourism clusters; economic sustainability; tourist segmentation; Silk Road destination; Turkestan region

1. Introduction

Tourism is widely recognized as a catalyst for socio-economic development, contributing to job creation and regional competitiveness (Abzhalov et al., 2022; Moldagaliyeva et al., 2024). In global practice, tourism clusters represent an effective organizational and managerial framework for tourism development (Niyazbayeva & Yessengeldina, 2016), aiming to

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harmonize environmental, economic, and social goals while enhancing infrastructure (Alimova et al., 2020). Their application improves the efficiency of regional tourism systems and supports sustainable development objectives (Ivanovic et al., 2010; Larionova et al., 2017). Assessing the perceptions of stakeholders, tourists, residents, and operators, provides strategic insights into the viability and direction of cluster-based initiatives (Gáll & Strežo, 2019). While tourism clustering has proven successful in developed countries, its implementation in Kazakhstan, particularly in the Turkestan region, remains limited (Kuralbayev et al., 2017). Despite tourism being a declared strategic sector, persistent structural limitations, including the absence of a systemic cluster approach, constrain destination competitiveness (Akbar & Yang, 2022; Mukhambetov et al., 2014). This is evident in the underutilization of the region's cultural and natural assets (Aktymbayeva et al., 2023; Pratt, 2015). Existing studies have primarily addressed economic dimensions, with insufficient attention to cultural, spatial, and integrative stakeholder aspects. The novelty of this study lies in addressing not only the economic but also the cultural, spatial, and stakeholder dimensions of tourism development in the Turkestan region.

Despite tourism's strategic importance in Kazakhstan, the lack of a coherent legal and institutional framework for cluster development remains a key barrier (Dmitriyev et al., 2021; Mamirkulova et al., 2020; Mamutova, 2020). Unlike many European and Asian countries that have institutionalized cluster policies, Kazakhstan operates under fragmented regulations limited to individual destinations, without mechanisms for cross-sectoral coordination (Wendt, 2020). This regulatory vacuum restricts innovation, hinders international investment, and slows the progress toward sustainable development. The Turkestan region, once a central hub of the Silk Road, offers exceptional potential for developing diverse tourism forms, including cultural, religious, health, and ecotourism. However, this potential remains underexploited due to the absence of an integrated cluster approach. In response, this study aims to conceptualize a tourism cluster model tailored to the region's unique natural and cultural attributes. By addressing institutional and strategic gaps, the proposed model seeks to enhance coordination, promote innovation, and foster sustainable competitiveness.

2. Overview of existing studies

The international literature widely explores tourism clusters as drivers of regional economic growth and sustainable destination development. Globally, tourism clusters are considered an effective framework for organizational and managerial practices aimed at tourism development (Niyazbayeva & Yessengeldina, 2016), with the main purpose to harmonize environmental, economic, and social goals while enhancing infrastructure (Alimova et al., 2020). Gorbunov et al. (2018) and Askeyev and Baizholova (2021) emphasize structural prerequisites for cluster formation, drawing on European experiences. Models from the U.S., India, Russia, and China confirm that clustering improves competitiveness, investment appeal, and long-term market stability (Cao et al., 2022; Doçaj et al., 2018; Dziekański et al., 2024; Gidebo, 2021; Shah & AhmadWani, 2014). Tourism clusters have also been positioned as instruments for transforming post-industrial and rural areas. Kuzior et al. (2021) argue that repurposing industrial zones for tourism requires integration of economic, environmental, and social dimensions. However, the transferability of this model to rural regions relying on natural and cultural capital remains uncertain. In urban contexts, clustering supports institutional coordination. Hua and Wondirad (2020) highlight that networks between hotels, cultural entities, and transport improve urban destination competitiveness, though

implementation is constrained in regions with underdeveloped infrastructure. Regarding Kazakhstan, a persistent concern is whether clustering can emerge where institutional support and access to strategic information are lacking. The link between sustainability and competitiveness is central to cluster studies. Streimikiene et al. (2021) stress the importance of innovation and environmental management, yet their findings are based on secondary sources, limiting practical generalizability across diverse regional settings. Derlukiewicz et al. (2020) examine the role of clusters in advancing sustainable development through European policy frameworks, emphasizing public-private partnerships in financing and promotion. However, their findings suggest that reliance on external funding can jeopardize long-term sustainability in the absence of continued government support. This concern is particularly relevant in Kazakhstan, where state-led cluster initiatives dominate and raise questions about reducing dependency on subsidies. In rural settings, clusters are linked to sustainable tourism and conservation. Guizzard et al. (2022) stress the importance of community engagement in enhancing social sustainability, while Priatmoko et al. (2023) note that small enterprises often lack institutional backing, limiting their integration into cluster networks. This highlights structural and financial constraints that question the actual effectiveness of rural tourism clusters. Rodríguez-Díaz and Pulido-Fernández (2019) identify sustainability as a key driver of competitiveness, linking it to long-term economic benefits. However, their model lacks adaptation guidelines for different destination types, especially in developing contexts. Despite their theoretical advantages, clusters face significant implementation challenges. Gomez-Vega et al. (2022) point to the importance of institutional capacity and unique value propositions, noting that such conditions are often absent in less developed regions like Kazakhstan. Croce (2018) underlines the need for transparency and accountability, yet many destinations lack mechanisms to evaluate clustering impacts, particularly in terms of local community outcomes. Recent research also emphasizes innovation and digital tools. Santos et al. (2021) highlight digitalization as a means to improve cluster coordination and promotion, though practical applicability in low-infrastructure settings remains uncertain. Joshi et al. (2020) discussed the potential of circular economy models in agritourism, but noted the limited feasibility in destinations without established sustainability frameworks.

In Central Asia, developing tourism clusters along the Silk Road are increasingly viewed as a strategic measure to integrate cultural and historical assets into the global tourism context (Mitroshenko, 2020). Authorities in Uzbekistan and Kazakhstan are prioritizing interregional cultural and historical tourism, driven by the rising demand for authentic experiences (Issakov et al., 2023). According to Pratt et al. (2015) and Hall and Page (2016), tourism clusters in border areas should be based on cultural resources, recreational potential, and inter-firm collaboration. In Kazakhstan, tourism cluster development is considered essential for linking environmental, technological, and socio-economic changes with sustainable tourism outcomes (Zharkenova et al., 2023). These clusters can enhance regional competitiveness and stimulate cross-sectoral cooperation (Garda, 2022). Nonetheless, practical challenges persist, including underdeveloped infrastructure and low sector profitability (Tokbergenova et al., 2023). While natural and cultural heritage sites have been identified as core cluster components due to their ecological and political relevance, the implementation remains weak due to limited investment, insufficient promotion, and the absence of a regulatory framework (Koshim et al., 2023). The Turkestan region exemplifies this gap. Although it possesses key preconditions for clustering, tourism activities remain fragmented and disconnected from a strategic model (Beisenova et al., 2018). Despite its rich

heritage, the region faces promotion deficits, infrastructural gaps, and lacks a defined cluster approach. Abishov and Abishova (2023) underscore the need to modernize natural and cultural resources, including historical and gastronomic elements, to build sustainable clusters. Nakhimbekova et al. (2023) emphasize digital branding and destination image management as critical to increasing visibility and coherence in regional tourism development. The literature highlights a disconnect between conceptual models of clustering and their practical application in Kazakhstan. While the prerequisites exist, strategic, legal, and institutional frameworks are lacking. This study addresses this gap by proposing an integrated cluster model that incorporates geographical, cultural, and economic components to support sustainable tourism development in the Turkestan region. The term “integrated cluster model” in this study refers to a framework that combines economic, cultural, spatial, and stakeholder dimensions, ensuring that tourism development is coordinated across sectors and aligned with principles of sustainable competitiveness (Niyazbayeva & Yessengeldina, 2016). Based on the literature and study objectives, the following research questions (RQs) are posed:

- *RQ₁*: What are the key cultural, economic, and infrastructural factors shaping the tourism cluster in the Turkestan region?
- *RQ₂*: How do perceptions of infrastructure and the economic status of tourists affect the sustainability of the tourism cluster?
- *RQ₃*: How can a tourism cluster contribute to the sustainable development of the region through tourism diversification and enhanced economic competitiveness?

3. Methodology

3.1. Research area

The Turkestan region of southern Kazakhstan, adjacent to the borders with Uzbekistan and Kyrgyzstan, has an area of about 117,300 km² and is one of the biggest administrative units of the country (Tokbergenova et al., 2023). It is characterized by a variety of physical-geographical conditions such as steppe plains, foothills of the Karatau range, semi-arid zones with a strongly continental climate characterized by hot summers and cold winters (Nurmukhamedova & Myrzakhan, 2023). The natural conditions, as well as the presence of mineral springs, are the foundation for the formation of health tourism, the production of sanatorium and spa services (Doskhozina & Yessekeyeva, 2019).

The population of the region is estimated at approximately 2 million inhabitants, while Turkestan city is both administrative and cultural centre (Baltabayeva et al., 2019). The age structure is very young and provides labor for tourism and related industries. The economy of the region is heavily agricultural (cotton, cereals, livestock) with a supporting trade and small-scale manufacturing. However, the strategic orientation in recent decades has been the development of the tourism sector, especially cultural, religious, and wellness tourism. According to regional statistics (as cited in Nurmaghanbetkyzy et al., 2025), tourism accounts for about 3–4% of the gross regional product, but has a great potential for development taking into account the existence of the UNESCO heritage sites and numerous cultural monuments (Issakov et al., 2023; Nurmukhamedova & Myrzakhan, 2023; Figure 1).

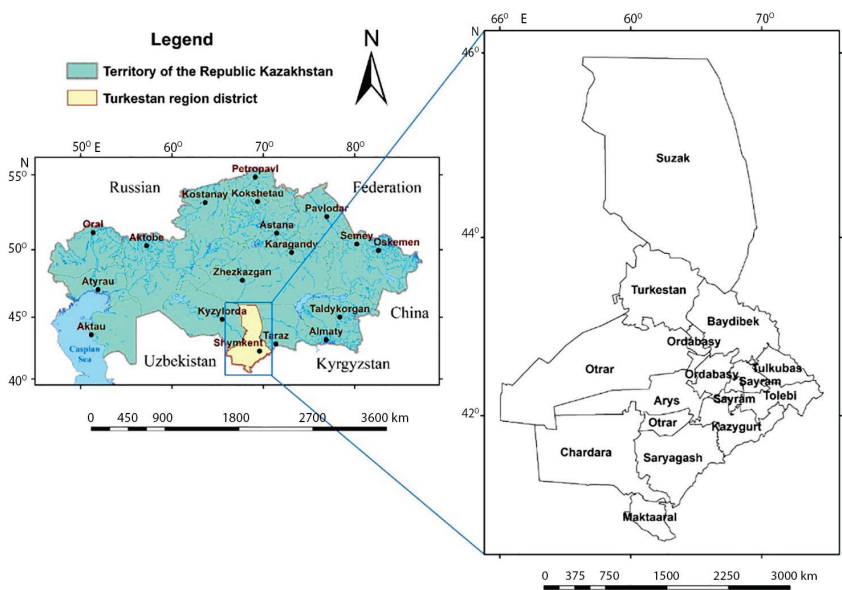


Figure 1. Map of the selected Kazakhstan region and its districts.

Known for its historical monuments, diverse landscapes, and wellness facilities, the region plays a strategic role in Central Asian tourism flows (Baltabayeva et al., 2019; Nurmukhamedova & Myrzakhan, 2023). Health tourism remains a key segment, driven by sanatorium-based services that leverage the local climate and environment to support visitor recovery (Doskhozina & Yessekeyeva, 2019).

3.2. Procedure and sample

This study explores the cultural and geographical foundations for tourism cluster development in the Turkestan region, relying exclusively on fieldwork data. To ensure sample representativeness, data were collected in five major tourism centers, with respondents selected based on their role as tourists, local residents, or industry stakeholders.

Data collection was conducted from August 2024 to February 2025 using Computer-Assisted Personal Interviewing (CAPI), with trained student volunteers from tourism and social sciences conducting on-site interviews via tablets. This method increased accuracy, minimized transcription errors, and facilitated real-time validation and efficient data processing (Phillips & Lu, 2018). Semi-structured interviews and surveys were used to gain in-depth insights into perceptions related to tourism cluster development (Allsop et al., 2022).

A total of 1,378 participants were surveyed across five locations: 482 in Turkestan, 215 in Otrar, 192 in Sauran, 298 in Saryagash, and 191 in Maktaaral. Respondents included tourists, residents, and stakeholders such as hoteliers, guides, medical staff, rural hosts, and officials. The data revealed variations by gender, education, income, and tourism perception. Tourists were generally more educated and oriented toward cultural and ecotourism, while individuals with lower education favored religious tourism. Residents, mostly with secondary education, emphasized tourism's economic role. Stakeholders, with the highest education and income, focused on infrastructure and strategic development. Younger respondents

supported innovation and digital promotion, while older participants prioritized heritage preservation (Table 1).

Table 1. Sociodemographic characteristics of respondents

Characteristics	Category	Tourists (N = 548)	Residents (N = 677)	Stakeholders (N = 153)
		%	%	%
Gender	Male	49.8	48.1	54.9
	Female	50.2	51.9	45.1
Age	18–30	35	28	20
	31–45	40	43	48
	46+	25	29	32
Education	Primary school	0	8	0
	Secondary school	29	50	15
	Higher education	71	42	85
Income (EUR)	Up to 500	22	41	0
	501–1,000	48	39	5
	1,001–1,500	23	15	15
	1,501–2,000	7	5	20
	Over 2,001	–	–	60
Main reason for visit	Cultural tourism	62	–	–
	Ecotourism	25	–	–
	Religious tourism	13	–	–
	Economy & employment	–	54	–
	Regional promotion	–	31	–
	Preservation of traditions	–	15	–
	Infrastructure development	–	–	47
	New tourism products	–	–	34
	International promotion	–	–	19

The study adhered to strict ethical standards: respondents were informed about the study's purpose, and all data were collected anonymously to protect privacy and encourage honest responses. Volunteers were trained to maintain neutrality and avoid bias. Data entry was verified immediately after fieldwork to ensure accuracy and reliability.

3.3. Data examination

A multi-stage qualitative analysis was carried out to uncover key themes related to tourism cluster formation in the Turkestan region. Interviews were audio-recorded and transcribed using Express Scribe for accuracy (Porter, 1990), then analyzed in three coding phases using NVivo software to reduce subjectivity (Allsop et al., 2022). Open coding identified initial concepts, axial coding organized them into broader themes, and selective coding revealed dominant patterns relevant to cluster development (Gajić et al., 2023; Mamirkulova et al., 2020; Mooi et al., 2018). The interview framework was grounded in Porter's Diamond Model, which evaluates competitiveness across six dimensions: factor conditions, firm strategy and rivalry, demand, related industries, government policy, and external influences (Fang et al., 2018; Nakhimbekova et al., 2023). This model guided the interpretation of regional tourism dynamics and informed the development of the proposed cluster model (Figure 2).

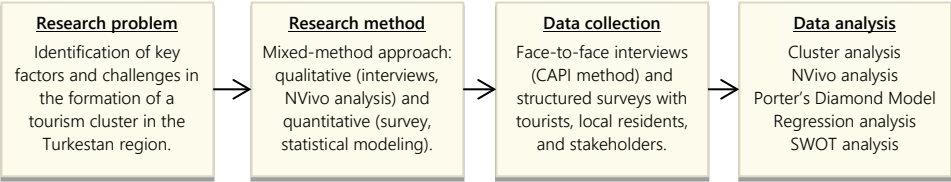


Figure 2. Research flowchart.

The focus of the interviews was on understanding the respondents' perception of the current state of the tourism sector and identifying obstacles and opportunities for its further development. The structure of the interviews and key interview questions are presented in Table 2.

Table 2. Interview structure based on Porter's Diamond model

Dimension	Interview Questions
Factor conditions	What is the current state of infrastructure in your area? Are there enough tourism facilities?
Firm Strategy and competition	How would you assess competition among tourism operators? What are the main barriers to innovation in tourism?
Demand conditions	What are the most common reasons tourists visit the region? How would you evaluate the interest of foreign tourists?
Related and supporting industries	How well are local hotels, restaurants, and transport providers integrated with the tourism sector?
Government policy	Are there incentives or subsidies for tourism development? How effective are they?
External factors	How do international trends and global economic factors affect tourism in the region?

To ensure analytical rigor, the coding process followed a three-stage sequence, open, axial, and selective coding, systematically identifying themes and linking them to Porter's model. The reliability of findings was strengthened through data triangulation, comparing interview insights with statistical data and prior studies on tourism in Kazakhstan. To maintain coding consistency, two independent researchers conducted repeated transcript analyses, minimizing subjectivity and ensuring reproducibility. The coding process continued until theoretical saturation was achieved, and quota sampling secured a representative cross-section of tourists, local residents, and key stakeholders. To evaluate the sustainability of the tourism model, the study integrated cluster segmentation and regression analysis. Cluster segmentation performed using the K-Means algorithm (Blashfield et al., 1978; Cipresso et al., 2018), and grouped tourists based on motivations, demographics, and perceptions of tourism development. Prior to analysis, variables were standardized (Demirović et al., 2016) to eliminate scale effect and ensure comparability. The optimal number of clusters was determined by testing a range from $K = 2$ to $K = 10$, with $K = 5$ selected as optimal based on the Elbow method and a Silhouette score of 0.617. Compared with Ward's hierarchical method (Silhouette score: 0.443), the K-Means model demonstrated greater internal consistency. A complementary regression analysis explored the relationship between tourist income, daily expenditure, and tourism preferences, providing insights into the economic sustainability of the identified segments. Additionally, a descriptive analysis was used to highlight the most frequently mentioned strengths and weaknesses of tourism development in the region. To

assess the economic contribution of tourism clusters, an Ordinary Least Squares (OLS) regression was conducted to examine the relationship between tourists' income, daily spending, and their preferences for cultural and ecotourism (Mooi et al., 2018). The analysis was performed using the stats model's library in Python, providing beta coefficients, standard errors, R^2 values, and p -values. Model validity was confirmed through Variance Inflation Factor ($VIF < 5$), the Kolmogorov–Smirnov test ($KS = .121$, $p = .097$), and the Durbin–Watson statistic. Model efficiency was further assessed using Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC). The integration of AI tools ensured precise data processing and automated statistical calculations. Additionally, a SWOT analysis was conducted (Puyt et al., 2023) to evaluate key strengths, weaknesses, opportunities, and threats affecting tourism cluster development. Combined with interview findings, this approach provided a comprehensive understanding of the region's tourism potential and strategic challenges.

4. Results

4.1. Analysis of results through NVivo coding and Porter's model

Analysis of semi-structured interviews and surveys revealed that the development of tourism clusters in the Turkestan region is constrained by several challenges. Infrastructural deficiencies, particularly poor roads and limited accommodation, reduce accessibility and visitor satisfaction, highlighting the need for investment in transport and hospitality infrastructure. The low competitiveness of tourism agencies, with generic and undifferentiated offers, limits innovation and market appeal, underscoring the need to support SMEs. Weak integration between tourism and related sectors, such as hospitality and transport, reduces the overall efficiency of cluster formation. Institutional frameworks are insufficiently developed, and existing government support lacks targeted investment and long-term financial planning. Moreover, limited international promotion and poor destination branding restrict the region's global visibility. Respondents emphasized the importance of digital marketing to attract foreign visitors. External shocks, like the COVID-19 pandemic, revealed the sector's vulnerability, but also spurred interest in ecotourism, pointing to the need for adaptable and diversified offerings (Phillips & Lu, 2018).

Table 3. NVivo analysis findings and Porter's Diamond model of competitiveness

Factor	Main Finding (Perception)	Porter's Model Connection	Example Quote
Resource factors	Poor infrastructure (66%)	Limits cluster development	"The road to some historical sites is in poor condition..." (Tourist)
Competition & strategy	Lack of agency competition (58%)	Weak innovation, few tourism firms	"There are only a few tourism agencies..." (Stakeholder)
Demand factors	Weak international promotion (60%)	Low global visibility	"Many people don't know about these destinations..." (Stakeholder)
Supporting industries	Weak links with hospitality & transport (53%)	Poor intersectoral cooperation	"Local restaurants are underdeveloped..." (Resident)
Government role	Lack of targeted subsidies (48%)	Insufficient investment	"We still don't see concrete projects..." (Stakeholder)
External factors	Impact of pandemic & instability (37%)	Global threats to tourism	"The pandemic significantly reduced the number of tourists..." (Hotel owner)

Overall, the study confirms that strengthening infrastructure, sectoral competitiveness, cross-sector integration, institutional support, and promotional efforts are essential for effective and sustainable tourism clustering in Turkestan. Table 3 provides a detailed summary of these findings, linking each identified challenge to its corresponding factor in Porter's Diamond model of competitiveness.

4.2. Segmentation of the research population

The analysis of cluster number optimization using the Silhouette Score method indicates a gradual improvement in clustering quality as the number of clusters increases. In the initial values, at $K = 3$, a drop in the Silhouette Score is observed, suggesting weaker cluster coherence at that point. However, after $K = 4$, the values start to rise, indicating that a higher number of clusters enables a more precise segmentation of respondents. The most significant increase in coherence is observed in the range from $K = 5$ to $K = 9$, where clusters become more clearly defined. This suggests that with a higher number of clusters, respondents are grouped in a way that better reflects their characteristics and motivations. However, an excessive number of clusters may lead to over-segmentation, reducing the practical applicability of the model. The choice of the optimal number of clusters depends on balancing segmentation precision and practical data interpretation. Based on the graph, $K = 5$ can be considered a good compromise, as it provides clear insights into different respondent profiles while avoiding excessive fragmentation that would complicate analysis and application of the results (Figure 3).

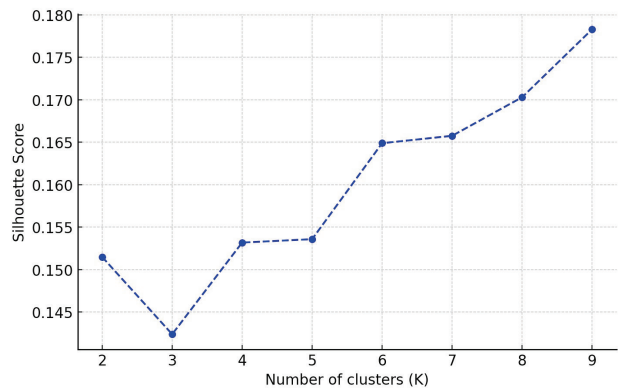


Figure 3. Optimization of the number of clusters.

The scatter plot shows the distribution of respondents by age and income across clusters, each represented by a different color. Lower-income individuals (fewer than 1,000 EUR) are more concentrated in younger age groups (20–40), while higher-income respondents (over 2,000 EUR) appear more evenly across ages, including older groups (50+). Some clusters are distinct, while others overlap, indicating shared demographic or economic traits. This suggests that similar tourism motivations may exist across income levels, with age influencing preferences based on economic status (Figure 4).

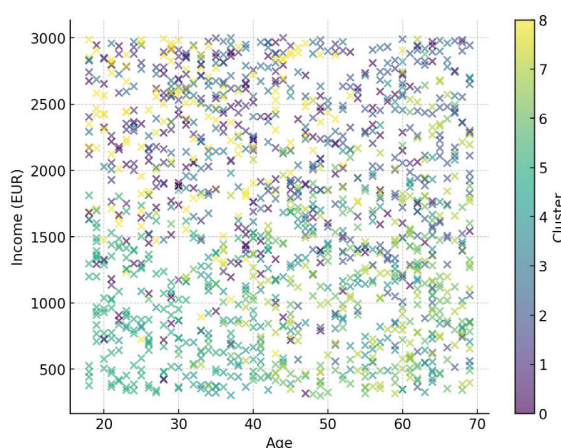


Figure 4. Cluster analysis of respondents.

K-means analysis revealed five distinct visitor segments in the Turkestan region, defined by differences in age, income, and travel motivations. Younger, high-income tourists showed strong interest in cultural and ecotourism, while religious tourism was less relevant to them. Older respondents with moderate incomes preferred spiritual and historical sites, reflecting high interest in religious and cultural tourism. One middle-aged, affluent group favored natural and religious attractions, but not historical ones. Tourists with the lowest incomes showed notable interest in cultural heritage, indicating accessibility for budget travelers. A separate segment of middle-aged visitors with average income showed low motivation across all tourism types, possibly indicating non-leisure travel purposes (Table 4).

Table 4. Segmentation of respondents using the cluster method

Cluster	Cultural motivation	Ecotourism motivation	Religious motivation	Average age	Average income (EUR)
0	2.91	2.66	2.61	40.82	1,973.67
1	7.40	6.36	2.50	33.73	2,338.78
2	7.08	5.55	7.15	58.47	1,896.67
3	2.56	7.29	6.19	38.93	2,381.66
4	7.22	2.80	3.02	48.90	1,097.21

Given the previously identified impact of infrastructure on the tourist experience, an additional analysis was conducted to examine how infrastructure deficiencies influence satisfaction across different visitor segments. Results show that tourists in Cluster 3, characterized by lower incomes and shorter stays, reported the highest level of dissatisfaction with infrastructure (78%). In contrast, visitors in Cluster 1, who had higher incomes and longer stays, were somewhat more tolerant, with a dissatisfaction rate of 59%. A Chi-square test confirmed a statistically significant difference between clusters ($\chi^2 = 108.16$, $df = 4$, $p < .001$), with a moderate effect size (Cramér's $V = 0.31$), indicating that infrastructure challenges impact visitor groups differently. These findings underscore the importance of tailored infrastructure improvements to meet the expectations of the most affected segments.

4.3. Regression analysis results

The OLS regression examined the relationship between tourist income, daily spending, and preferences for cultural and ecotourism. Income showed a positive, but marginally significant effect ($\beta = .0002$, $p = .095$), while daily spending was not significant. The high R^2 value (0.998) indicates that these variables strongly explain tourism preferences. The results highlight the economic potential of investing in cultural and ecotourism, as higher-income groups consistently demonstrate stronger interest in these segments. This suggests that targeted investments in cultural and ecological attractions could increase revenue by attracting affluent visitors, while simultaneously ensuring that the diversification of tourism products meets the preferences of different market segments. Strengthening infrastructure, interpretation facilities, and marketing for cultural and eco-oriented destinations would therefore not only enhance competitiveness, but also generate sustainable economic returns for the region. Full details are presented in Table 5.

Table 5. Regression analysis results

Parameter	Value
Model	OLS regression
Dependent variable	Cultural and ecotourism (%)
Independent variables	Tourist income (USD), Daily expenditure (USD)
Coefficient for tourist income (β)	.0002
p -value (Tourist income)	.095
Coefficient for daily expenditure (β)	0.0010
p -value (Daily expenditure)	.582
R -squared (R^2)	.998
Adjusted R -squared (Adj. R^2)	.995
F-statistic	416.2
p -value of F-statistic	.0024
Number of observations (N)	5 clusters
Degrees of freedom (df)	2
Durbin-Watson test	2.226
Log-Likelihood	17.877
AIC	–29.75
BIC	–30.92

4.4. SWOT analysis

The SWOT analysis highlights Turkestan's strong tourism potential, rooted in its cultural and natural heritage, an essential competitive resource in Porter's framework. This is especially relevant for clusters showing strong interest in cultural and ecotourism. However, infrastructure deficiencies and weak promotion limit competitiveness, with some tourists being dissatisfied with accommodation and access to information. Despite these weaknesses, global trends in cultural and eco-travel offer growth opportunities, especially among younger, high-income tourists. Still, external risks such as pandemics and economic instability could impact tourism sustainability, particularly among older visitors (Table 6).

Table 6. SWOT analysis

SWOT	Porter's Model	Cluster Insight
Strength	Cultural and natural heritage as key resources	Clusters 1 and 2 show strong interest in cultural/ecotourism
Weakness	Poor infrastructure and weak promotion	Cluster 3 reports dissatisfaction; Cluster 4 needs better info
Opportunities	Rising demand for cultural and ecotourism	Cluster 1 (young, high-income) ideal for investment targeting
Threatens	Pandemic and economic instability as global threats	Cluster 2 (older tourists) most vulnerable

The findings indicate that the development of the tourism cluster in the Turkestan region is shaped by cultural, economic, and infrastructural factors, with the perceptions of tourists, residents, and stakeholders offering valuable insight into both challenges and development potential. Clustering analysis identified five distinct visitor segments, with cultural-historical and ecotourism emerging as the dominant preferences (RQ_1). This supports Rodríguez-Díaz and Pulido-Fernández (2019), who stress the importance of aligning demand with local resources in cluster development. Similarly, Zhoya et al. (2024) emphasize the value of market segmentation for tailoring tourism offerings, which contributes to regional competitiveness and more efficient resource use. A cluster-based strategy may enhance the sector's sustainability while preserving cultural and natural assets. Despite the Mausoleum of Khoja Ahmed Yasawi attracting most visitors (61%), other sites like Arystan Bab, Sauran, Otrar, and Aksu-Zhabagly remain underserved. This uneven distribution highlights the need for more balanced development and improved management of regional attractions (Guizzardi et al., 2022). Infrastructure-related analysis reveals differences among segments: cultural tourists report relatively good accessibility, while ecotourists face more barriers. Half of the respondents expressed dissatisfaction with service quality, 33% criticized route organization, and 17% noted poor signage and information. These results are consistent with Hua and Wondirad (2020), who emphasize the role of digitalization and improved communication in boosting destination competitiveness. The perception of infrastructure quality thus significantly affects cluster sustainability (RQ_2).

Beyond infrastructure, the economic sustainability of the destination depends on effective market segmentation and targeted investments. The identification of younger, high-income tourists as a key segment highlights the potential for investing in innovative and sustainable tourism products, while older visitors require secure and stable conditions due to their sensitivity to economic and health-related risks. This aligns with Seken et al. (2019), who emphasize the importance of segmentation for developing flexible, group-specific strategies. These findings address RQ_3 by confirming that well-managed clusters can enhance economic competitiveness through tourism diversification and investment optimization, particularly in cultural and ecotourism. The SWOT analysis revealed that, despite strong cultural and natural assets, infrastructure deficiencies and limited promotion hinder development. Addressing these weaknesses through investments in infrastructure, service quality, and the visibility of lesser-known sites could boost the region's attractiveness and reduce seasonality. Global trends in cultural and ecotourism offer additional opportunities, but integrated strategies are needed to improve resource management and visitor satisfaction. Combining Porter's Diamond model with SWOT enabled a comprehensive assessment of competitive strengths and constraints. While the region's heritage offers a strong foundation for sustainable tourism, weak integration with supporting industries and limited institutional support remain key barriers. According to

Porter's model, improving coordination with sectors like hospitality and transport is essential for competitiveness. Although this study was guided by the concept of sustainable development, it primarily focused on economic dimensions through income-based segmentation and spending analysis. Environmental and social aspects were not measured directly, indicating the need for future research to include ecological and community-level indicators for a more comprehensive sustainability assessment.

5. Conclusion

This study provided new insights into tourism cluster development in the Turkestan region by emphasizing the role of tourist segmentation in enhancing sustainability and competitiveness. Unlike earlier research that focused solely on the region's cultural heritage, this study incorporated economic and infrastructural factors to offer a more holistic view. The clustering of tourists revealed distinct visitor profiles, enabling better strategic planning and targeted development of cultural and ecotourism products. These findings support the view that tourism clusters are dynamic systems that require continual adaptation to sustainable development principles (Rakhmetulina & Omurzakov, 2018; Tiberghien, 2019). The study expands clustering theory by integrating it with sustainable development and competitiveness frameworks. It shows that segmentation is not only a methodological tool, but a strategic approach to improving tourism policy. From a practical standpoint, it provides a framework for destination managers to design targeted strategies, allocate resources efficiently, and address seasonality (Akbar et al., 2019; Tóth et al., 2014; Tuyakbayev et al., 2021). These insights are particularly relevant for destinations with limited infrastructure and low international visibility, offering a model for strengthening market positioning and improving service delivery.

While the study offers a valuable understanding of stakeholder perceptions, it is limited by its reliance on subjective assessments and a cross-sectional dataset. Future research should integrate objective indicators, such as tourist flow data, economic metrics, and longitudinal analyses, to validate findings and monitor long-term impacts. Also, expanding the segmentation variables (e.g., emotional connection, social media influence, return visits) could enrich the model. Geographic limitation is another constraint; although the clustering approach is broadly applicable, its generalizability should be tested in other tourism contexts. Comparative studies, particularly with countries like Germany, Spain, and Italy, where clustering has enhanced rural and cultural tourism, could provide further insights. Future research should also examine how different clusters contribute to economic development, local employment, and sustainability outcomes. Additionally, exploring the role of digital technologies and AI in personalizing tourism services would offer practical benefits for implementing segmentation strategies. Long-term monitoring of visitor preferences could help develop adaptive, forward-looking tourism policies.

Acknowledgements

This research was supported by the Committee of Science of the Ministry of Science and Higher Education of the Republic of Kazakhstan under the grant funding within the project AP23490857 "Assessment of degradation processes of irrigated lands in Turkestan region for sustainable land use". This paper was supported by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia (Contract No. 451-03-136/2025-03/200172).

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