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COMPETITIVE ADVANTAGES OF THE ALMATY MOUNTAIN CLUSTER IN THE DEVELOPMENT OF SKI TOURISM

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ABSTRACT

Research aim. The aim of the research is to identify and evaluate the distinctive competitive advantages of ski tourism within Kazakhstan's Almaty Mountain Cluster (AMC), and determine how these advantages can be strategically leveraged to enhance sustainable regional tourism development.

Research Methodology. The study employs a mixed-method approach, integrating Geographic Information Systems (GIS)-based spatial analysis, comparative benchmarking against established ski destinations (French Alps and Georgian ski clusters), and economic impact assessments based on secondary data from governmental and international sources. GIS methodologies included data extraction via Python from open-source geospatial databases (2GIS, OpenStreetMap), proximity analysis, and infrastructure density visualization.

Value of the study. This research is significant as it provides a comprehensive comparative spatial and economic analysis of AMC, a strategically crucial yet relatively understudied ski tourism destination. The combination of advanced GIS analytical tools and comparative benchmarking delivers practical insights and robust strategic recommendations, uniquely tailored to the sustainable tourism development needs of Kazakhstan.

Research findings. The study identified AMC's core competitive strengths, including its accessibility, affordability, unique cultural and ecological assets, and governmental support. At the same time, the study reveals significant infrastructure scarcities in hospitality, gastronomic services, and complementary tourist facilities were evident. Comparative analysis with Georgian and French counterparts underscored AMC's critical need to substantially expand its infrastructure, recommending the construction of 30-40 new accommodations, 60-70 restaurants, and approximately 20-30 complementary service facilities. Strategic infrastructure development aligned with sustainable tourism practices is projected to notably enhance AMC's tourism capacity and its contribution to Kazakhstan's GDP by an estimated 0.5%-1.5% annually by 2027.

Keywords: ski tourism, Almaty Mountain cluster, competitive advantage, GIS spatial analysis, sustainable development, infrastructure development.

INTRODUCTION

Tourism represents one of the most dynamic sectors in the global economy, significantly contributing to employment creation, regional development, and national income diversification. Especially ski tourism is gaining greater popularity among the tourists and becoming a competitive market [1]. Within this broad industry, as Hudson and Shephard asserted ski tourism occupies a distinguished niche, marked by high revenue per visitor, robust seasonal demands, and substantial infrastructural investments [1]. As global competition intensifies among traditional and emerging ski destinations, regions increasingly aim to identify and leverage distinctive competitive advantages to capture larger shares of this lucrative market. Central Asia, historically less visible in international ski tourism circles, is now experiencing heightened global interest, driven by its unique cultural heritage, diverse landscapes, and improving tourism infrastructure. Kazakhstan, particularly the Almaty Mountain Cluster (AMC), exemplifies this emerging competitive environment, showcasing significant potential for development into a prominent international ski tourism destination.

Kazakhstan's focus on tourism, and specifically ski tourism development, stems from broader national objectives of economic diversification and regional economic growth beyond reliance on hydrocarbon resources. With its proximity to the economic and cultural hub of Almaty city, the AMC comprises several interconnected ski resorts and natural areas, such as Shymbulak, Oi Qaragai, Ak-Tas, Medeo, and Butakovka. These locations collectively form an attractive and potentially competitive regional ski tourism product due to their favorable climate conditions, accessible location, and rich natural and cultural heritage. Recent governmental initiatives and substantial infrastructural investments indicate a clear strategic intent to position AMC prominently on the global ski tourism map, aiming for significant visitor growth by 2025 according to Kazakhstan Government Report issued in 2023 [2].

However, while considerable optimism surrounds the AMC's tourism prospects, significant gaps in infrastructural development, hospitality services, and tourism-related business sectors remain evident, particularly when compared to established European ski resorts or rapidly developing competitors such as those in Georgia. Therefore, a comprehensive evaluation of the AMC's current competitive positioning, infrastructural capabilities, and development opportunities is critically important. This evaluation necessitates an evidence-based approach, utilizing contemporary analytical methodologies and international benchmarking to inform strategic and sustainable growth policies.

This research addresses several interconnected and critical dimensions within the context of ski tourism competitiveness, specifically focusing on the AMC:

First, understanding spatial distribution and infrastructural density within ski tourism clusters provides critical insights into the accessibility and attractiveness of these destinations. Research on established ski clusters demonstrates that efficient spatial distribution of accommodations, restaurants, and complementary facilities significantly enhances visitor satisfaction and overall destination competitiveness [3]. Consequently, this study incorporates GIS-based spatial analysis to precisely assess AMC's infrastructure density and spatial dynamics, providing clarity on current infrastructural strengths and identifying critical gaps.

Second, benchmarking AMC against successful international models is crucial for realistic strategic positioning and planning. The comparative framework adopted here draws from the experiences of the French Alps, recognized globally for their mature infrastructure and high-quality services, and Georgian ski resorts such as Gudauri and Bakuriani, representing rapidly evolving destinations that successfully balance affordability with improving infrastructure. This comparison not only contextualizes AMC's current infrastructural and service levels but also elucidates clear development pathways and best practices adaptable to AMC's specific regional and economic context.

Third, sustainable development is an essential consideration in contemporary tourism planning, particularly in sensitive alpine ecosystems such as AMC. Expanding ski tourism facilities requires deliberate and sustainable practices to ensure minimal environmental disruption and long-term economic benefits. This study explicitly integrates sustainability considerations, ensuring recommended infrastructural expansions align with best practices in ecological preservation, resource management, and community engagement, enhancing both environmental and socio-economic sustainability.

Ultimately, addressing these dimensions collectively ensures a robust analytical framework, capable of informing practical and sustainable tourism development strategies. This comprehensive evaluation is essential not only for AMC's successful growth but also for broader regional development objectives and Kazakhstan's economic diversification efforts.

The primary aim of this research is to identify and evaluate the distinctive competitive advantages of ski tourism within Kazakhstan's Almaty Mountain Cluster, and to determine how these advantages can be strategically leveraged to foster sustainable tourism development in the region.

The article is structured as follows: First, a detailed literature review examines theoretical perspectives on tourism clusters, competitive advantages, and methodological approaches, contextualizing the study within existing academic discourse. Second, a clearly articulated methodology outlines the mixed-method approach, integrating spatial GIS analysis, comparative benchmarking, and economic impact assessment. Third, the results section presents empirical findings, detailed maps, and statistical comparisons, clearly demonstrating AMC's infrastructural status and competitive potential. Subsequently, the discussion critically synthesizes

these findings, offering comparative insights, identifying strategic infrastructure needs, and exploring economic implications. Finally, the article concludes with clear strategic recommendations, practical proposals for infrastructural development, and identified directions for future research.

Through this integrated, academically rigorous approach, the article aims to contribute significantly to the academic understanding of ski tourism competitiveness while providing actionable insights for policymakers, tourism managers, and stakeholders actively engaged in AMC's sustainable development.

Literature review. To organize the literature analytically rather than descriptively, this review is structured into four themes: (1) cluster theory and destination competitiveness; (2) destination attributes for ski tourism; (3) consumer choice and market positioning; and (4) sustainability and governance. Within each theme, prior findings are compared, areas of consensus and contention are highlighted, and implications for the Almaty Mountain Cluster (AMC) are drawn.

Tourism clusters globally increasingly rely on strategic integration to achieve sustainable competitive advantages. This literature review critically analyzes existing research on the competitive advantages, challenges, and sustainability prospects specifically for ski tourism in the Almaty Mountain Cluster (AMC), Kazakhstan.

Cluster Theory and Destination Competitiveness (Critical Synthesis)

Tourism clusters are geographically concentrated groups of interconnected tourism enterprises and institutions that collaboratively and competitively enhance destination competitiveness through shared resources, innovation, and market positioning [4]. Industrial cluster theory, originally conceptualized by Alfred Marshall and further developed by Michael Porter's Diamond Model, emphasizes geographic proximity, factor conditions, demand conditions, related supporting industries, and strategic rivalry as key components driving competitiveness [5, 6].While Porter's and Marshallian perspectives are widely applied, their transferability to emerging, state-supported destinations remains debated: some studies emphasize endogenous rivalry and dense supplier networks as prerequisites for cluster upgrading, whereas others show state-led coordination can substitute for early-stage private rivalry. This divergence matters for AMC, where government activation is pronounced and private supplier depth is still forming; therefore, the expected pathways to competitiveness may differ from mature Alpine contexts. Network theory further highlights the significance of relationships, information exchange, and collective learning within clusters [7]. The tourism cluster as a regional innovation system accentuates collaborative frameworks involving businesses, research institutions, and governments as crucial for fostering destination innovation and competitiveness [8, 9].

Ski Destination Attributes and Performance

In addition, key destination attributes such as altitude, piste length, snow quality, and infrastructure significantly influence the competitiveness of ski resorts [1, 3]. The AMC, particularly through resorts like Shymbulak and potential developments in Turgen Gorge, is gaining recognition due to its unique physical features such as extensive snow cover, varied climatic zones, rich biodiversity, and scenic landscapes [10, 11]. Its proximity to Almaty city, which serves as a major transportation hub, further enhances accessibility, positioning the AMC as a highly competitive emerging ski destination [4]. Yet, evidence is mixed on whether proximity and altitude can compensate for thinner hospitality density during peak load. European cases suggest that when lift capacity outpaces beds and F&B, perceived quality declines despite strong natural assets. This tension frames AMC's central challenge: converting physical endowments and access advantages into reliably positive service experiences under seasonal stress.

Consumer Preferences, Pricing, and Market Segmentation

However, in analyzing competitive advantage, it is important to consider consumer preferences, as they are pivotal in shaping the competitive landscape for ski tourism, with factors such as snow quality, infrastructure, affordability, and distinct cultural experiences significantly influencing destination choice [12]. According to Turgen Investment Proposal, the AMC offers competitive pricing for ski services and accommodation, attracting budget-conscious international tourists and local visitors according to Turgen Investment Proposal,

2023 [11]. Its blend of skiing, urban tourism, and unique cultural offerings, such as Soviet-era heritage and the Medeu skating rink, differentiates it from traditional ski resorts and enhances its appeal as a multi-faceted tourism destination [4]. Comparatively, low-cost positioning can attract first-time or regional skiers, but may also anchor expectations around price rather than quality unless complemented by visible service upgrades. For AMC, the managerial question is whether affordability functions as an entry strategy en route to midmarket quality, or as a long-run differentiator targeting budget and short-break segments.

Sustainability, Seasonality, and Governance

The economic significance of ski tourism extends beyond immediate tourism revenues, contributing notably to employment, SME development, and regional economic diversification [13]. The AMC is strategically positioned as part of Kazakhstan's broader initiative to diversify its economy through tourism, highlighted by government investments exceeding 25 billion tenge aimed at infrastructure improvements [2]. Initiatives such as the integrated concept of tourism clusters within the Almaty-Bishkek Economic Corridor aim to enhance year-round visitation and regional competitiveness, reducing the seasonal dependence of the tourism industry according to Asian Development Bank[10]. However, cluster upgrading constrained by alpine environmental limits raises governance trade-offs: higher densities improve visitor convenience and firm viability but can increase ecological pressures unless carrying capacity, waste, and mobility are actively managed. This underscores the need for AMC-specific sustainability thresholds linked to investment phasing.

Comparatively, the AMC presents notable advantages and constraints relative to established global ski destinations. While smaller in terms of total piste length and lacking certain snow reliability advantages seen in high-altitude European resorts like Val Thorens, AMC distinguishes itself with lower costs, accessibility, and unique natural and cultural experiences [2]. These characteristics make it particularly attractive for tourists seeking affordable yet culturally enriching ski experiences [4].

Kazakhstan’s government has identified the AMC as a top tourism development priority, with plans for substantial infrastructure investments and improved regional connectivity through cable cars and integrated resorts [14]. However, successful future development depends critically on overcoming existing knowledge gaps and implementing international best practices, especially regarding sustainability and environmental management [2].

Existing scholarship on ski clusters provides strong theoretical scaffolding but reveals three gaps relevant to AMC: (i) a shortage of empirically derived, GIS-based infrastructure density thresholds tied to visitor experience and competitiveness outcomes in emerging clusters; (ii) limited comparative benchmarking that integrates spatial metrics, price positioning, and service mix across mature (Alps) and catch-up (Georgia) contexts; and (iii) insufficient integration of sustainability constraints (e.g., access, waste, habitat sensitivity) into cluster-upgrading roadmaps for Central Asian alpine destinations. This study addresses these gaps by combining GIS spatial analysis with cross-cluster benchmarking and by proposing density targets compatible with sustainable growth.

The existing body of literature confirms that the Almaty Mountain Cluster (AMC) holds considerable competitive advantages in ski tourism through its natural diversity, strategic location, affordability, and cultural uniqueness. These advantages are reinforced by state-backed infrastructure investments and strategic integration within the broader Almaty-Bishkek Economic Corridor [2, 10]. Despite growing investments and its proximity to Almaty city, the Almaty Mountain Cluster (AMC) remains insufficiently studied in terms of competitive positioning within global ski tourism. However, gaps remain in understanding how these advantages can be strategically leveraged to ensure long-term sustainability and destination competitiveness. Current research lacks focused empirical analysis that connects spatial advantages and economic impact directly to competitive positioning. Therefore, this study addresses the research question: What are the distinctive competitive advantages of ski tourism in the Almaty Mountain Cluster, and how can these be leveraged to enhance the area’s sustainable tourism development?

METHODOLOGY

The methodological design is anchored in cluster competitiveness theory (Marshall/Porter) and destination performance logics, linking three constructs: (A) spatial configuration (facility proximity and density); (B)

service capacity (beds, F&B, ancillary services); and (C) market positioning (affordability/access). The study tests whether A→B alignment, under sustainability constraints, explains AMC's observed and potential competitiveness relative to benchmarks.

This study adopts a mixed-method approach that combines GIS-based spatial analysis and economic impact assessment to identify and analyze the distinctive competitive advantages of ski tourism in the Almaty Mountain Cluster (AMC), using parsed geospatial data and secondary sources. The approach ensures methodological rigor and empirical precision, addressing the research question within a realistic short-term research framework.

This study employs a mixed-method approach integrating Geographic Information Systems (GIS)-based spatial analysis, economic impact evaluation, and comparative benchmarking to assess the competitive advantages and sustainable tourism potential of the Almaty Mountain Cluster (AMC). The methodology was refined to align closely with empirical findings derived from spatial infrastructure mapping, quantitative analysis of tourism facility densities, and comparative assessments against internationally recognized ski tourism clusters.

GIS-based spatial analysis constituted the foundational element of the methodological framework. Geographic data were systematically extracted using Python parsers from open-access mapping services, notably 2GIS and OpenStreetMap. Python libraries, specifically geopandas, folium, requests, and geopy, facilitated precise extraction, processing, and visualization of geospatial data, including ski resorts, hotels, restaurants, tourist gift shops, and equipment rental services. Spatial distribution and infrastructure density analyses were performed using proximity analysis techniques to evaluate distances between ski facilities and hospitality services, effectively assessing accessibility and infrastructure integration within AMC. 2GIS and OpenStreetMap were selected due to (i) broad coverage and frequent updates in Almaty and comparator regions; (ii) open licensing enabling reproducible spatial workflows; and (iii) compatibility with Python geospatial libraries (geopandas, folium) for transparent parsing and visualization. Python was chosen to ensure auditability of data pipelines, versioned scripts, and replicable map generation. Benchmarks (French Alps; Georgia) represent, respectively, a mature and a fast-scaling model, providing upper- and mid-bound comparators relevant to AMC's trajectory.

Interactive digital maps were generated using the Folium mapping library, which allowed for an intuitive visualization of facility locations, types, and proximities. These maps (Figure 1) provided a clear representation of spatial dynamics, highlighting infrastructure gaps and potential zones for targeted tourism development within AMC.

To contextualize AMC within a global competitive framework, a comparative analysis was conducted, evaluating infrastructure densities and spatial arrangements relative to established ski tourism clusters in Georgia and the French Alps. This benchmarking involved parsing similar geospatial datasets from OpenStreetMap for resorts including Gudauri, Bakuriani (Georgia), and Chamonix, Val Thorens, Courchevel (French Alps). GIS visualizations of these international benchmarks (Figure 2 and Figure 3) were analyzed alongside AMC maps, identifying critical differences and areas of competitive strength and weakness. This comparison facilitated a robust understanding of AMC's positioning in terms of infrastructure maturity, service density, and potential areas for infrastructural investment and expansion.

Economic impact assessment was undertaken using secondary sources, including government tourism reports, strategic development plans from Kazakh authorities, and official tourism statistics from Georgia and France. Quantitative data covering tourist visitation trends for 2022–2024, alongside projections through 2027, were analyzed to assess AMC's capacity relative to infrastructure readiness. Sources included national reports such as Kazakhstan's Government Report [2], Atout France tourism analyses, and publications from the Georgian National Tourism Administration [15]. This enabled the assessment of current and projected demand for tourism services, underpinning the identification of potential business opportunities and infrastructure gaps within AMC.

The final methodological step involved an integrated analytical synthesis, combining GIS mapping insights, comparative benchmarking outcomes, and economic data analyses. This synthesis was critical in addressing the primary research question regarding AMC's competitive advantages and the strategies necessary for leveraging these advantages towards sustainable tourism development. Open-source POI datasets may be incom-

plete or lag seasonal openings/closures; density measures reflect mapped facilities rather than capacity utilization; secondary economic statistics differ in definitions across countries. To mitigate these risks, the analysis triangulates multiple sources, reports assumptions explicitly, and interprets projections conservatively.

Through this refined methodological approach, the study not only elucidated AMC's spatial and infrastructural characteristics but also provided concrete recommendations for strategic investment and sustainable development, closely aligned with empirical findings. The chosen methodologies collectively facilitated a detailed, practical, and actionable assessment, directly informing policies and business strategies aimed at enhancing AMC's long-term competitiveness and sustainability.

RESULTS

This section synthesizes a detailed comparative analysis of ski resort clusters in Almaty, Kazakhstan, alongside international counterparts in Georgia and the French Alps, identifying critical spatial characteristics and infrastructure density. The insights gained from GIS-based spatial analysis and secondary data from governmental and international reports highlight the competitive advantages and potential avenues for sustainable tourism development in the Almaty Mountain Cluster (AMC).

The Almaty Mountain Cluster encompasses prominent sites including Oi Qaragai, Ak-Tas, Pioneer, Tabagan, Butakovka, Medeo, and Shymbulak. Collectively, these form a coherent tourist zone, comprising 150 km of ski trails during winter and over 100 km of hiking trails available during summer months [11]. Spatial analysis, using GIS mapping techniques, has shown significant concentration of tourism facilities—hotels, restaurants, equipment rentals, and related services—within close proximity to major ski resorts such as Shymbulak and Oi Qaragai (Figure 1).

1a Hotels within 10 km distance

1b Restaurants within 5 km distance

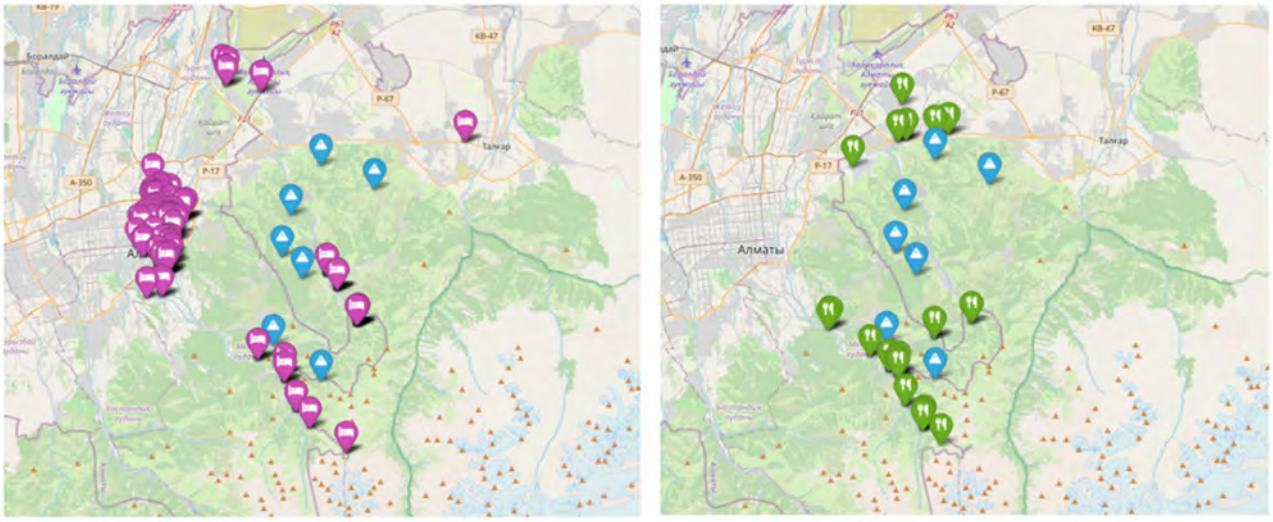


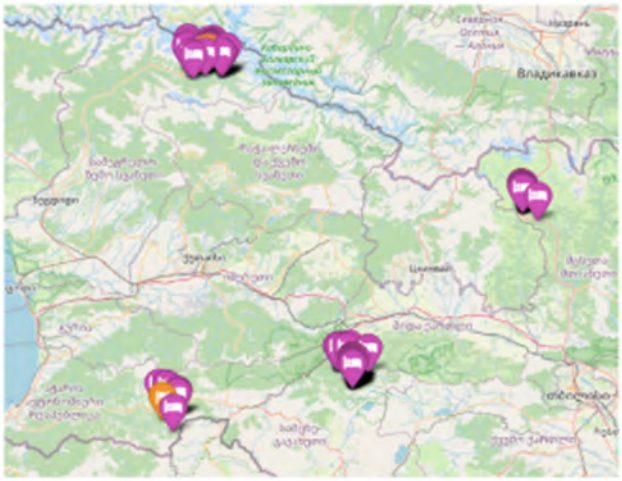
Figure 1 – AMC tourism facilities distribution map

Note - the figure has been constructed by the author in Python Programming language using data from 2GIS and OpenStreetMap

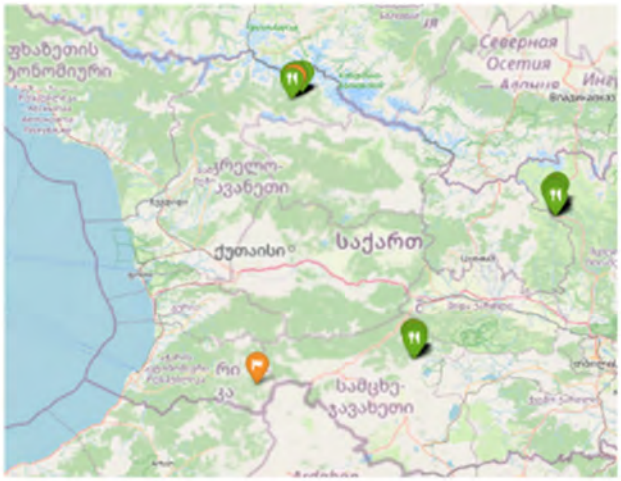
The analysis identified distinct clusters of accommodation and gastronomic facilities predominantly within a 10-kilometer radius of major ski hubs. For instance, the region surrounding Oi Qaragai demonstrated diverse lodging options including motels, guest houses, and luxury accommodations such as the Hygge Home Almaty. Hotels such as "Ak Sunkar," "Favorit," and "Almaty-Tranzit" are strategically located within easy access (8-10 km) to the ski resorts based on the Hotels Clusters analysis. Restaurant distribution, exemplified by establishments such as "Kuanysh" and "Aruzhan," was notably denser, concentrated within a 5-kilometer radius, enhancing the cluster's appeal as an integrated leisure destination according to Restaurants Clusters analysis.

However, in comparing infrastructure density across ski tourism regions, AMC exhibits potential advantages regarding the proximity of accommodations and hospitality facilities to ski slopes. Georgian ski destinations (Gudauri, Bakuriani, and Svaneti) and French Alpine resorts offer more extensive and well-established infrastructure but often at higher costs. Svaneti, for instance, shows a high density of hospitality services closely integrated with the ski area, creating a compact yet highly functional tourism hub (Figure 2). The comparison of proximity and density illustrated in Figures 1 and 2 allows to conclude that the AMC cluster is heavily underequipped with needed facilities to accommodate rising number of international and local visitors in the high season. Moreover, the comparison of the spatial proximity of the facilities indicates that in the case of Georgia the facilities are clustered around the touristic sites and easily available to the visitors (lower part of the Figure 2), while in the case of AMC, the visitors need to drive around 5 or 10 km to access the majority of the accommodation or dining options.

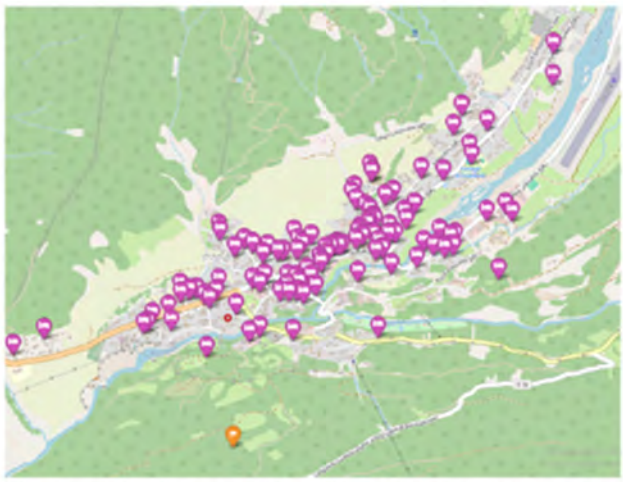
2a Hotels within 10 km distance



2b Restaurants within 5 km distance



2c Hotels clustered around one location (Svaneti)



2d Restaurants clustered around one location (Svaneti)

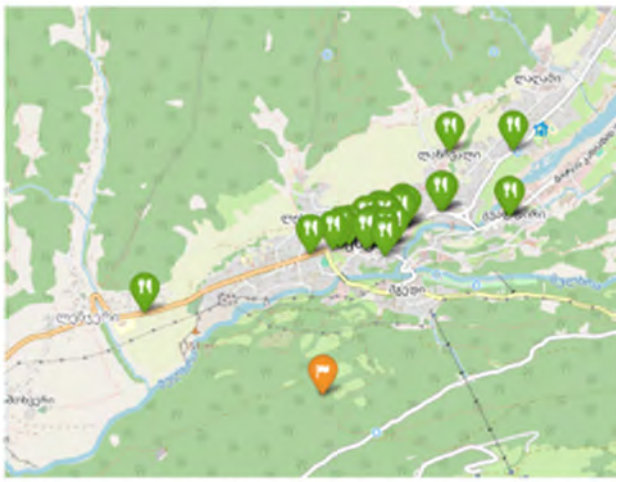


Figure 2 – Georgia ski resorts infrastructure map

Note - the figure has been constructed by the author in Python Programming language using data from 2GIS and OpenStreetMap

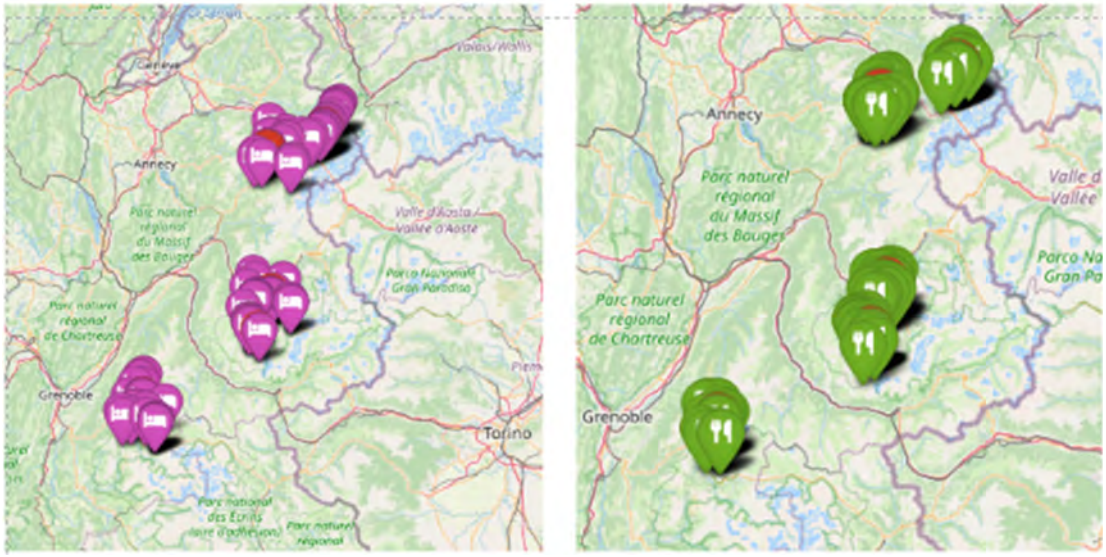
In contrast, French Alps resorts (Figure 3), while offering superior accommodation quality and greater overall numbers of facilities, frequently require transportation between resorts and amenities due to dispersed layouts.

These spatial insights underscore AMC's unique selling proposition of close integration between ski infrastructure and hospitality services, a critical competitive advantage appealing to tourists seeking convenient and cost-effective ski experiences

Quantitative insights indicate a rising trajectory in visitor numbers across all clusters examined. Georgian resorts, notably Gudauri and Bakuriani, experienced a significant rise in visitation, reporting 1.2 million tourists in 2022 and a projected growth to 1.5 million by 2025 [15]. Similarly, the French Alps continue to attract vast international tourism flows with annual visitors surpassing 5 million in 2023, projected to steadily grow at approximately 4% annually [16].

3a Hotels within 10 km distance

3b Restaurants within 5 km distance



3c Hotels clustered around one location (Megeve)

3d Restaurants clustered around one location (Megeve)

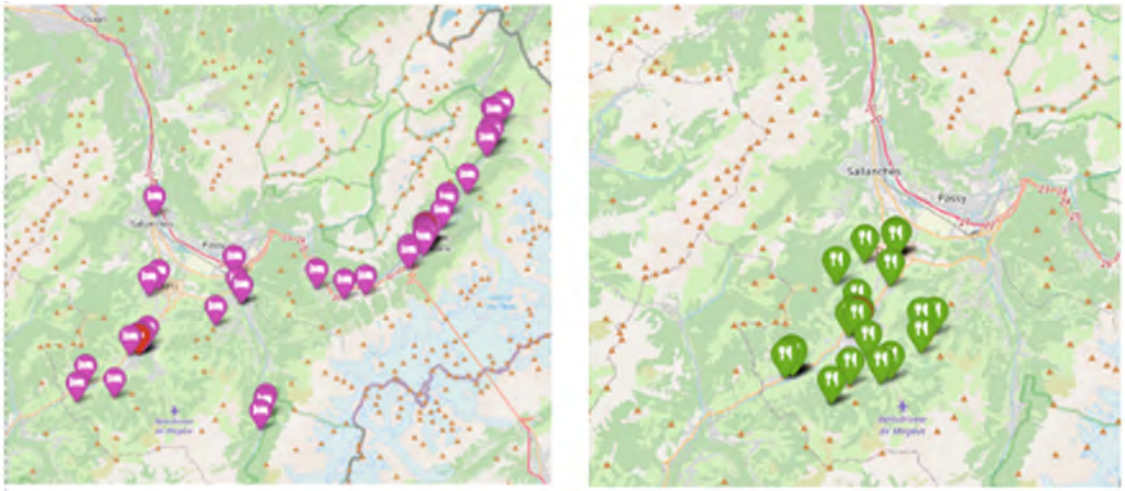


Figure 3 – French Alps infrastructure density map

Note - the figure has been constructed by the author in Python Programming language using data from 2GIS and OpenStreetMap

AMC, while currently smaller in visitor volume—approximately 900,000 tourists reported in 2023 [2] possesses significant latent potential due to strategic investments and planned infrastructural developments. AMC is forecasted to experience accelerated growth with estimates indicating potential visitor numbers surpassing 1.5 million annually by 2027, contingent on successful implementation of planned infrastructural enhancements [2].

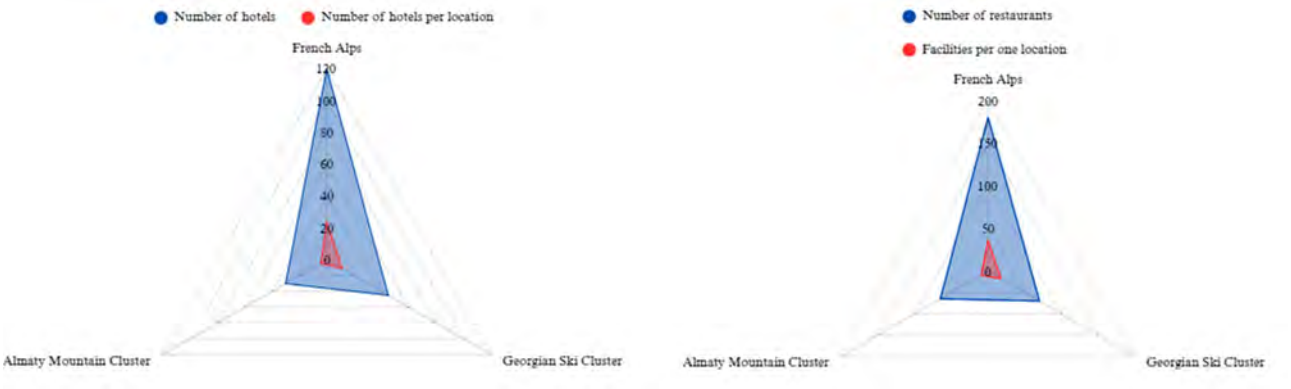


Figure 4 – Infrastructure comparison AMC vs international ski clusters
Note - the figure has been constructed by the author in Python Programming language by scrapping data from 2GIS and OpenStreetMap

AMC clearly demonstrates infrastructure growth potential, particularly in hospitality and dining sectors, essential for supporting projected visitor increases.

Table 1 – Infrastructure comparison AMC vs international ski clusters

Cluster	Type of facilities	Number of locations	Number of facilities per location
Total number of facilities in French Alps	**300**	**10**	**30**
French Alps Hotels	120	5	24
French Alps Restaurants	180	5	36
Total number of facilities in French Alps	**115**	**8**	**14,4**
Georgian Ski Cluster Hotels	45	4	11,2
Georgian Ski Cluster Restaurants	70	4	17,5
Total number of facilities in French Alps	**95**	**14**	**6,8**
Almaty Mountain Cluster Hotels	30	7	4,3
Almaty Mountain Cluster Restaurants	65	7	9,3
Note - the table has been constructed by the author in Python Programming language by scrapping data from 2GIS and OpenStreetMap			

Analyzing the collected data reveals that the Almaty Mountain Cluster (AMC) possesses a set of clear competitive strengths and promising opportunities for sustainable tourism development. One of the most notable advantages lies in its strategic accessibility. The close proximity of AMC resorts to Almaty city, a major economic and transportation hub, significantly enhances ease of access for both domestic and international travelers. This geographic advantage positions AMC favorably compared to many remote European resorts, where longer travel times often serve as a deterrent for potential visitors.

In addition to accessibility, affordability and cost competitiveness further bolster AMC's appeal. Comparative pricing analysis indicates that the cost of accommodation and ski lift passes in AMC is approximately 40% lower than in leading European alpine resorts. This substantial price differential not only enhances AMC's

attractiveness to budget-conscious travelers but also broadens its potential market to include emerging middle-class tourists from neighboring countries and other global regions seeking more affordable yet high-quality ski experiences.

Moreover, AMC benefits from an integrated multi-season tourism potential that many traditional ski destinations lack. Thanks to its varied climatic zones and rich natural resources, including thermal springs, expansive hiking trails, and diverse cultural landscapes, AMC can offer compelling tourism activities year-round. This diversification of seasonal offerings is crucial for mitigating the sharp visitor declines typically experienced by winter-dependent destinations during off-peak months, thereby supporting more stable and sustainable economic activity throughout the year.

Finally, AMC's cultural and environmental distinctiveness contributes significantly to its competitive edge. The combination of unique Soviet-era heritage landmarks, such as the iconic Medeo Skating Rink, along with the ecological richness of its high-altitude terrain, offers tourists experiences that go well beyond traditional skiing. This distinctive identity is particularly appealing to international visitors seeking authentic cultural immersion and diverse recreational opportunities, reinforcing AMC's position as a differentiated and attractive destination in the global ski tourism market.

Challenges and Areas for Development

Despite the considerable advantages identified, several challenges remain evident, underscoring the need for a strategic and measured approach to AMC's future development. One of the foremost issues relates to infrastructure scalability. Currently, AMC hosts approximately 35 hotels and 47 restaurants across the cluster, a figure significantly lower than that of comparative destinations such as the French Alps, which boast over 250 hotels and 200 restaurants within similar proximity ranges. With AMC aiming to attract up to 3 million tourists annually by 2025 and plans to accommodate 18,380 guests simultaneously through infrastructural expansions, the existing facilities are insufficient in both scale and quality to meet these ambitious targets. Without the construction of at least 30–40 additional accommodation facilities and the introduction of 60–70 new gastronomic venues, AMC risks facing severe infrastructural bottlenecks. Should such upgrades and expansions not materialize, there is a considerable risk that the visitor experience will deteriorate, thereby undermining AMC's emerging competitive positioning in the regional and international ski tourism market.

Another critical challenge pertains to environmental sustainability. The anticipated increase in tourist flows will inevitably place additional pressure on AMC's delicate mountain ecosystems. Consequently, there is an urgent need for the implementation of stringent environmental management systems and sustainable tourism practices. Proactive measures are essential to safeguard the natural environment, ensuring that tourism development does not lead to long-term ecological degradation and that the region's unique environmental assets remain intact for future generations.

Furthermore, seasonal dependency presents an ongoing concern. Although AMC's natural diversity offers opportunities for year-round tourism, these potentials have yet to be fully realized. Continuous investment in the development of summer tourism activities—such as hiking, eco-adventure tours, and cultural events—is imperative to sustain high visitor numbers beyond the traditional winter season. Addressing seasonality would not only stabilize tourism revenues but also enhance community employment opportunities throughout the year.

On the other hand, the findings of the comprehensive spatial and economic analysis clearly highlight significant opportunities for sustainable development and new business emergence. The current gap between tourist demand and available infrastructure presents a favorable environment for the establishment of new accommodations, restaurants, and complementary services. With growing tourist flows and relatively limited competition compared to more mature international destinations, AMC is particularly well-positioned to attract private investment and entrepreneurial initiatives. Targeted and sustainable business developments would not only enhance the tourist experience but also contribute meaningfully to regional economic growth and resilience.

The findings confirm that AMC's distinctive competitive advantages are rooted in its accessibility, affordability, integrated tourism offerings, and unique cultural and ecological assets. Strategically leveraging these strengths through targeted infrastructure expansion and sustainable management will position AMC for

significant growth in the global ski tourism market. However, addressing infrastructure gaps and environmental sustainability remains essential to fully realize this potential. This analysis directly answers the research question, highlighting how AMC's advantages can be harnessed to drive sustainable tourism development. The insights gained provide a solid foundation for future research and practical strategies, guiding efforts to establish AMC as a leading, resilient, and competitive ski tourism destination.

DISCUSSION

This discussion is organized into: theoretical implications; policy and managerial implications; sustainability and risk governance; and limitations and future research.

Theoretical Implications

Findings align with cluster theory by demonstrating that spatial co-location of core and supporting services (lifts, beds, food & beverage, rentals) is a proximate mechanism for competitiveness in early-stage clusters. In Porter's Diamond terms, AMC's factor conditions (topography, access to Almaty) are relatively strong, demand conditions are growing, while related/supporting industries are nascent—implying that targeted density-building can accelerate the transition from factor-driven to efficiency-driven performance. This study has comprehensively explored the competitive advantages, infrastructure development, and sustainable tourism potential of the Almaty Mountain Cluster (AMC), Kazakhstan. By integrating GIS-based spatial analysis, comparative infrastructure benchmarking, and economic impact assessment, this research provides substantial insights into AMC's current positioning and its potential trajectory in the global ski tourism market. The detailed comparative analysis against well-established ski clusters, notably in the French Alps and emerging destinations in Georgia, further contextualizes AMC's competitive strengths and infrastructural gaps, informing strategic recommendations for future development.

A thorough comparative analysis revealed pronounced disparities in infrastructure maturity, service density, and spatial distribution among AMC, Georgian ski clusters (Gudauri and Bakuriani), and French alpine resorts (Chamonix, Val Thorens, Courchevel). The French Alps, benefiting from decades of investment and tourism development, demonstrate highly mature infrastructure with extensive hotel, restaurant, and ancillary service networks. Their established brand recognition and integrated tourist facilities significantly surpass both Georgian and Kazakhstani counterparts. Conversely, Georgian ski clusters, while less developed than the Alps, exhibit rapid growth and intermediate infrastructure density. They represent a practical intermediate model of development, balancing affordability with steadily improving infrastructure, an approach AMC could realistically emulate.

In contrast, AMC's current infrastructure, while strategically positioned close to Almaty city, is relatively sparse, evident through significantly lower densities of hotels and restaurants within close proximity to key resorts such as Shymbulak and Oi Qaragai (see Figure 1). Despite this scarcity, AMC uniquely offers a combination of proximity to major urban centers, affordability, cultural distinctiveness, and extensive government backing—elements less pronounced in Georgian and French counterparts.

Policy and Managerial Implications

Thus, AMC's immediate strategy should focus on infrastructure enhancement to bridge existing gaps, aligning its offerings closer to Georgia's emerging clusters while gradually developing select upscale offerings characteristic of the French Alps.

Spatial analysis identified clear infrastructure scarcities within AMC, notably in accommodation and gastronomic facilities, crucial for achieving the ambitious goal of attracting approximately 3 million annual visitors by 2025 [2]. Given that AMC's current accommodation capacity remains limited to serving significantly fewer than the projected 18,380 simultaneous guests, substantial expansion is required.

Sustainability and risk governance

Capacity growth should be gated by carrying-capacity metrics (visitor loads per km² of sensitive habitat, waste/water thresholds, mobility emissions per visitor). Implement low-impact mobility (cable links, shuttle

loops), strict waste/water standards, and habitat buffers. Tie investment approvals to meeting these thresholds to ensure competitiveness gains do not externalize ecological costs. To meet projected visitation levels and achieve competitive parity with Georgian and French ski clusters, the Almaty Mountain Cluster (AMC) requires targeted infrastructure expansions.

Currently, AMC averages about four hotels per major ski location. Spatial analysis indicates the need to at least double this figure, adding approximately 30–40 new hospitality establishments, spanning mid-range to luxury segments. Expanding accommodation capacity is critical to support the projected three million annual visitors expected by 2025.

At present, AMC is served by roughly 47 restaurants. To match future tourism demand and enrich visitor experiences, an additional 60–70 dining facilities offering diverse local and international cuisines should be developed.

Key support services - such as equipment rentals, tourist shops, and leisure enterprises - remain underdeveloped. Introducing 20–30 new ancillary businesses would significantly enhance AMC's service ecosystem, increasing attractiveness and boosting operational capacity.

Together, these expansions would position AMC for sustainable growth, diversification of its tourist base, and improved international competitiveness, directly addressing current infrastructure scarcities identified through spatial analysis.

Strategically closing the identified infrastructure gaps carries substantial economic significance. Tourism, and ski tourism in particular, is increasingly recognized as a vital driver for Kazakhstan's economic diversification. With targeted investments, AMC is forecasted to attract three million tourists annually by 2025, a figure expected to rise incrementally through 2027.

Expanded infrastructure would stimulate employment across construction, hospitality, retail, and service sectors, while generating indirect benefits across transport, agriculture, and SMEs. Comparative tourism economics suggest that successful realization of AMC's infrastructure expansion could increase Kazakhstan's GDP by approximately 0.5%–1.5% annually by 2027 [2, 11, 15, 16].

This study directly addressed the research question: What are the distinctive competitive advantages of ski tourism in the Almaty Mountain Cluster, and how can these be leveraged to enhance the area's sustainable tourism development? Findings identified AMC's core advantages in proximity to Almaty city, cost competitiveness, diverse natural and cultural assets, and substantial government backing. Detailed spatial and economic analyses validated AMC's potential and outlined clear strategic pathways for sustainable leverage of these strengths.

Thus, the research successfully fulfilled its objectives, offering a comprehensive evaluation of AMC's infrastructure needs, competitive positioning, and economic development opportunities.

Limitations and future research

Despite methodological rigor, several limitations are acknowledged. The reliance on secondary data and open-source geospatial platforms such as OpenStreetMap and 2GIS may introduce minor inaccuracies due to incomplete or outdated information. Additionally, the absence of precise skiing-specific tourist numbers necessitated estimations based on broader tourism trends, potentially affecting exact projections.

Potential biases stem from comparator choices: using highly developed European and moderately developed Georgian resorts as benchmarks inherently frames AMC's relative positioning. Different reference points could yield alternative interpretations. Nonetheless, these limitations do not substantially diminish the validity or practical relevance of the findings and recommendations presented.

Ultimately, the insights derived from this study not only provide a roadmap for AMC's targeted infrastructure development but also contribute meaningfully to strategic tourism planning in Kazakhstan, emphasizing the critical need for sustainable, integrated tourism practices.

CONCLUSION

This study critically evaluated the competitive advantages and sustainable tourism potential of the Almaty Mountain Cluster (AMC), with a particular focus on ski tourism and the related infrastructural require-

ments. Through a systematic analysis of spatial distribution, infrastructure density, economic implications, and AMC's comparative positioning relative to established benchmarks in Georgia and the French Alps, the research sought to comprehensively address the primary research question: What are the distinctive competitive advantages of ski tourism in the Almaty Mountain Cluster, and how can these be leveraged to enhance the area's sustainable tourism development? By employing integrated GIS-based spatial analysis, infrastructure benchmarking, and economic assessments, this study was able to generate a robust set of findings and practical recommendations.

The results of the analysis highlighted several distinctive competitive advantages of AMC. Chief among these was the geographical proximity and accessibility to Almaty city, providing the cluster with a significant strategic advantage over more remote international destinations. This factor, combined with AMC's considerable cost competitiveness — with services and accommodation priced substantially lower than those in European resorts — strengthens its appeal among both domestic and international budget-conscious travelers. Moreover, the AMC benefits from its unique ecological and cultural assets, offering tourists an enriched experience that extends well beyond skiing activities. Attractions such as the Medeo Skating Rink and diverse high-altitude ecosystems differentiate AMC from conventional ski clusters. Additionally, the presence of strong governmental support, coupled with clear commitments to infrastructure expansion, signals long-term viability and serves to encourage private-sector investment.

However, despite these clear strengths, the spatial analysis exposed critical gaps, particularly in infrastructure. Insufficient accommodation options, limited dining facilities, and inadequate complementary services were identified as major constraints. Comparative assessments with Georgian and French ski clusters revealed that in order to sustainably accommodate the projected tourist growth—anticipated to reach up to three million annual visitors by 2025—AMC must undertake substantial infrastructure expansions. These findings shaped the basis for a series of strategic recommendations aimed at enhancing AMC's competitiveness.

First and foremost, there is a pressing need to develop between 30 and 40 new hotels and lodging facilities, spanning mid-range to luxury categories, strategically positioned within a two to five-kilometer radius of key ski resorts. In parallel, it is recommended to establish an additional 60 to 70 restaurants and cafés, offering a diverse mix of local and international cuisines to cater to a broader visitor demographic. Furthermore, the expansion of ancillary services, through the creation of at least 20 to 30 new businesses such as ski equipment rentals, tourist gift shops, and specialized leisure establishments, is essential to enhance the destination's overall attractiveness. The assertion that infrastructure development within the Almaty Mountain Cluster (AMC) could contribute to a 0.5%–1.5% annual increase in Kazakhstan's GDP by 2027 is grounded in multiple interrelated economic factors.

First, tourism is widely recognized as a sector with a high economic multiplier effect. Investment in tourism-related infrastructure—such as hotels, restaurants, transportation networks, and service facilities—not only directly generates income but also stimulates a wide range of supporting industries [1]. These include construction, agriculture, trade, and cultural services. According to UNWTO and OECD reports, tourism investments often produce a ripple effect across regional economies, contributing significantly to job creation and income generation beyond the tourism sector itself [17], [18].

Second, the strategic plans for AMC anticipate a substantial increase in tourist arrivals, with goals set at three million annual visitors by 2025. Current infrastructure, however, remains insufficient to handle this volume. Research shows a need for approximately 30–40 new hotels, 60–70 restaurants, and 20–30 new ancillary businesses to meet expected demand. These projects will create thousands of new jobs, increase tax revenues, and expand local business opportunities, further strengthening AMC's economic role.

Third, comparative analyses of similar mountain tourism clusters in countries such as Georgia, France, and Turkey show that targeted infrastructure expansion can contribute up to 1.5% to national GDP through both direct and indirect impacts. Given Kazakhstan's current lower baseline in tourism infrastructure, the potential for catch-up growth is even greater [18].

In light of these observations, the projected 0.5%–1.5% GDP growth is a realistic and evidence-based forecast. It reflects both international experiences and the specific characteristics of the AMC region, including its growing visibility, diverse attractions, and strong government support.

Infrastructural improvements must be complemented by investments in connectivity and transportation. Accelerating the construction of integrated cable car systems and enhancing transport links between resorts would facilitate seamless tourist movement while mitigating environmental impacts. To address the challenge of seasonality, it is equally important to diversify the tourism offerings, promoting activities such as ecotourism, adventure sports, cultural heritage tours, and summer recreational pursuits. All developments must be guided by strict environmental sustainability standards, with active involvement of local communities to ensure inclusive economic benefits and responsible resource management.

The strategic implementation of these recommendations carries significant economic implications. Enhanced infrastructure is expected to stimulate regional employment, foster SME growth, and substantially increase direct and indirect tourism revenues. Conservative projections, based on comparative international benchmarks, suggest that AMC's strategic development could elevate Kazakhstan's GDP contribution by approximately 0.5% to 1.5% annually by 2027, thus supporting broader national economic diversification objectives.

Nevertheless, several limitations must be acknowledged. The study's reliance on secondary data sources and open-source geospatial platforms may introduce minor inaccuracies, while the absence of precise skiing-specific tourist numbers necessitated the use of broader tourism trends for projection purposes. These factors introduce a degree of uncertainty that should be addressed in future research. Longitudinal visitor tracking, detailed tourist preference surveys, and more granular economic impact studies would greatly enhance the precision and depth of future analyses. Additionally, further investigation into sustainable tourism practices and their long-term environmental impacts would be highly beneficial. Beyond practical recommendations, this study contributes methodologically by demonstrating a replicable GIS–benchmarking approach to derive density targets for emerging ski clusters, and conceptually by situating AMC's upgrading pathway within cluster competitiveness theory under sustainability constraints.

In conclusion, the Almaty Mountain Cluster holds substantial potential to emerge as a competitive international ski tourism destination. By leveraging its inherent advantages through carefully targeted, sustainable infrastructure development and diversification of tourism offerings, AMC can significantly enhance its regional attractiveness and economic contributions. The findings and strategic proposals outlined in this study offer a clear, actionable pathway for achieving sustainable and economically beneficial tourism growth, firmly aligning with Kazakhstan's broader strategic development objectives. In sum, by converting accessibility and affordability into planned, near-slope service density within clear sustainability limits, AMC can evolve from a promising emerging cluster into a resilient, internationally competitive ski destination.

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КОНКУРЕНТНЫЕ ПРЕИМУЩЕСТВА АЛМАТИНСКОГО ГОРНОГО КЛАСТЕРА В РАЗВИТИИ ГОРНОЛЫЖНОГО ТУРИЗМА

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АННОТАЦИЯ

Цель исследования. Основной целью данного исследования является выявление и оценка конкурентных преимуществ горнолыжного туризма в Алматинском горном кластере (АГК) Казахстана, а также определение способов стратегического использования этих преимуществ для повышения устойчивого развития регионального туризма.

Методология исследования. В исследовании использован смешанный подход, объединяющий пространственный анализ с использованием географических информационных систем (ГИС), сравнительное бенчмаркинговое исследование с признанными горнолыжными направлениями (Французские Альпы и горнолыжные кластеры Грузии), а также оценку экономического воздействия на основе вторичных данных из государственных и международных источников. ГИС-методики включали извлечение данных с использованием Python из открытых геопространственных баз данных (2GIS, OpenStreetMap), анализ близости и визуализацию плотности инфраструктуры.

Ценность исследования. Данное исследование представляет собой значимый вклад, так как предоставляет всесторонний сравнительный пространственно-экономический анализ АГК, который является стратегически важным, но в то же время мало исследованным направлением горнолыжного туризма. Сочетание передовых инструментов ГИС-анализа и сравнительного бенчмаркинга дает практичные рекомендации и эффективные стратегические предложения, ориентированные на потребности устойчивого развития туризма Казахстана.

Результаты исследования. Исследование выявило основные конкурентные преимущества АГК, включая его доступность, экономическую привлекательность, уникальные культурные и экологические ресурсы, а также государственную поддержку. Однако были выявлены значительные дефициты инфраструктуры в области гостиничного сервиса, гастрономических услуг и вспомогательных туристических объектов. Сравнительный анализ с грузинскими и французскими курортами подчеркнул необходимость значительного расширения инфраструктуры АГК, рекомендовано строительство 30-40 новых объектов размещения, 60-70 ресторанов и примерно 20-30 объектов дополнительного сервиса. Стратегическое развитие инфраструктуры, согласованное с практиками устойчивого туризма, позволит значительно повысить туристическую емкость АГК и его вклад в ВВП Казахстана, увеличив его на 0,5% -1,5% ежегодно к 2027 году.

Ключевые слова: горнолыжный туризм, Алматинский горный кластер, конкурентное преимущество, ГИС-пространственный анализ, устойчивое развитие, развитие инфраструктуры.

АЛМАТЫ ТАУ КЛАСТЕРІНІҢ ТАУ ШАҢҒЫ ТУРИЗМІН ДАМЫТУДАҒЫ БӘСЕКЕЛЕСТІК АРТЫҚШЫЛЫҚТАРЫ

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АҢДАТПА

Зерттеу мақсаты. Бұл зерттеудің негізгі мақсаты – Қазақстанның Алматы тау кластеріндегі (АТК) тау шаңғысы туризмінің бәсекелестік артықшылықтарын анықтап, бағалау, сондай-ақ осы артықшылықтарды стратегиялық пайдалану арқылы өңірлік туризмнің тұрақты дамуын арттыру тәсілдерін анықтау.

Зерттеу әдістемесі. Зерттеуде аралас тәсіл қолданылды, бұл географиялық ақпараттық жүйелер (ГИС) арқылы кеңістіктік талдау, танымал тау шаңғысы бағыттарымен (Франция Альпілері мен Грузияның тау шаңғы кластерлері) салыстырмалы бенчмаркинг зерттеуі, сондай-ақ мемлекеттік және халықаралық дереккөздерден алынған екінші реттік деректер негізінде экономикалық әсерді бағалау әдістерін біріктіреді. ГИС әдістемесі Python көмегімен ашық геокеңістіктік дерекқорлардан (2GIS, OpenStreetMap) деректерді алу, жақындық талдау және инфрақұрылым тығыздығын визуализациялау жұмыстарын қамтыды.

Зерттедің құндылығы. Бұл зерттеу Алматы тау кластерінің тау шаңғы туризмі саласындағы стратегиялық маңызды, бірақ әлі аз зерттелген бағыт екенін ескере отырып, оның кеңістіктік-экономикалық талдауын ұсынады. ГИС талдауының алдыңғы қатарлы құралдары мен салыстырмалы бенчмаркингті біріктіру Қазақстанның тұрақты туризмді дамыту қажеттіліктеріне бағытталған практикалық ұсыныстар мен тиімді стратегиялық кеңестер береді.

Зерттеу нәтижелері. Зерттеу АТК-нің негізгі бәсекелестік артықшылықтарын анықтады, оның ішінде қолжетімділік, экономикалық тартымдылық, ерекше мәдени және экологиялық ресурстар, сондай-ақ мемлекеттік қолдау. Дегенмен, қонақ үй қызметі, мейрамхана және қосымша туристік нысандар саласында инфрақұрылымның жеткіліксіздігі айқындалды. Грузия мен Франция курорттарымен жүргізілген салыстырмалы талдау АТК инфрақұрылымын айтарлықтай кеңейтудің қажеттілігін көрсетті. 30-40 жаңа қонақ үй, 60-70 мейрамхана және 20-30 қосымша қызмет көрсету нысандарын салу ұсынылды. Тұрақты туризм практикасына сәйкес инфрақұрылымды стратегиялық дамыту АТК-нің туристік әлеуетін және Қазақстанның ЖІӨ-не қосқан үлесін айтарлықтай арттырып, 2027 жылға қарай оны жылына 0,5%-1,5%-ға дейін ұлғайтуға мүмкіндік береді.

Түйін сөздер: тау шаңғысы туризмі, Алматы тау кластері, бәсекелестік артықшылық, ГИС кеңістіктік талдау, тұрақты даму, инфрақұрылымды дамыту.

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