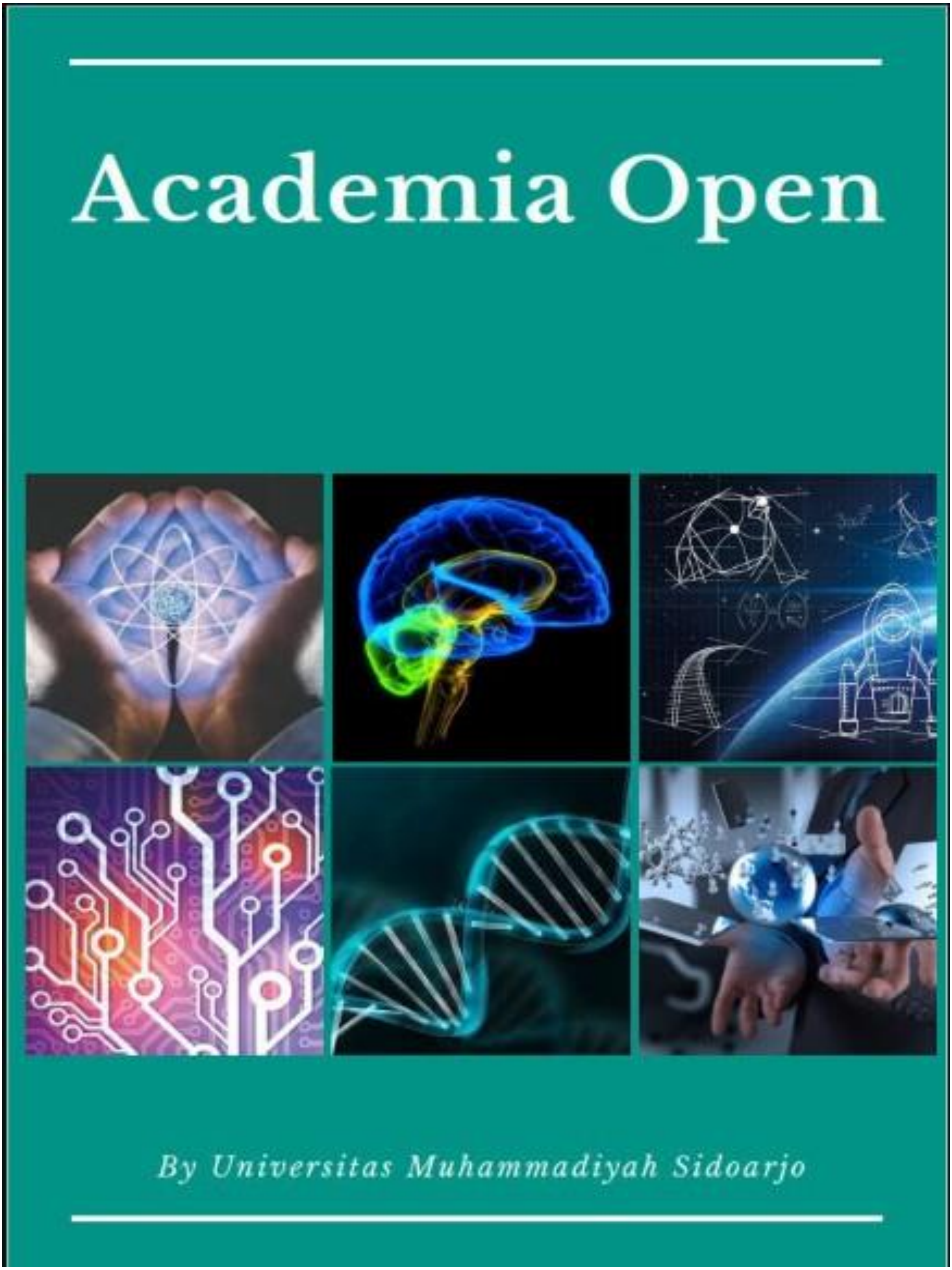
Academia Open

Vol. 10 No. 2 (2025): December
DOI: 10.21070/acopen.10.2025.14788



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Vol. 10 No. 2 (2025): December
DOI: 10.21070/acopen.10.2025.14788

Survey-Based Competitiveness Assessment of Tourism Transport Enterprises in Uzbekistan

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Abstract

General Background: Tourism transport enterprises play a crucial role in supporting destination accessibility, visitor mobility, and overall tourism system performance. **Specific Background:** Evaluating transport enterprise competitiveness requires consideration of multiple operational dimensions, including punctuality, safety, service quality, and route coverage. **Knowledge Gap:** Existing competitiveness assessment approaches provide limited frameworks that explicitly account for the inverse nature of safety incidents within tourism transport performance evaluation. **Aims:** This study aims to develop and demonstrate a survey-based competitiveness assessment framework for tourism transport enterprises using benchmark normalization and a weighted integral-index approach. **Results:** The application of the framework to eight tourism transport enterprises revealed substantial variation in competitiveness scores. Safetyperformance emerged as acriticaldeterminant of rankings, particularly when incident counts differed significantly among enterprises. The findings also showed that enterprises achieving balanced performance across multiple indicators obtained stronger overall competitiveness scores. **Novelty:** The study introduces an inverse-normalization treatment for safety indicators within a transparent competitiveness benchmarking framework. **Implications:** The proposed method provides destination management organizations and transport operators with a practical tool for competitiveness assessment and supports future benchmarking initiatives using larger and more representative datasets.

Keywords: Tourism Transport, Enterprise Competitiveness, Safety Performance, Benchmark Normalization, Integral Index

Key Findings Highlights

Safety records produced substantial differences in enterprise rankings.

Balanced operational performance generated stronger composite scores.

Route-based comparison procedures were recommended for future applications.

Published date: 2025-12-19

Academia Open
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1. Introduction

Tourism transport enterprises — coach operators, shuttle services, and tour-vehicle providers — perform a connective function across the visitor journey, linking accommodation, attractions, and points of entry. Reliability and safety performance in this sector carry consequences beyond individual passenger experience, since transport failures can disrupt multi-stop itineraries and affect destination reputation more broadly than a single underperforming hotel or restaurant typically would.

Despite this connective importance, competitiveness measurement for tourism transport enterprises has received comparatively little attention relative to accommodation and food service. This article addresses that gap by presenting a structured survey instrument for tourism transport enterprises and applying a benchmark-normalization, weighted integral-index method — adapted with an inverse-normalization treatment for safety — to convert survey responses into a single integral competitiveness index per enterprise.

The purpose of this article is fourfold: (1) to present a survey instrument tailored to tourism transport enterprises; (2) to map survey-derived indicators onto four operational criteria — punctuality, an inverted safety indicator, customer satisfaction, and load factor; (3) to illustrate the method, including the inverse-safety-normalization step, using an eight-enterprise sample; and (4) to discuss the policy implications of the results, including the sensitivity of inverse normalization to outlying incident counts.

2. Literature Review

2.1. Transport Reliability in Tourism

The United Nations World Tourism Organization's guidance on tourism transport [1] identifies punctuality and service reliability as core determinants of visitor satisfaction with ground-transport components of a trip, a finding consistent with broader transport-economics literature linking schedule adherence to perceived service quality.

2.2. Safety as a Competitiveness Criterion

Unlike the other criteria used in this and companion studies, safety carries non-uniform polarity: more incidents indicate worse, not better, performance, requiring an inverse-normalization treatment rather than the direct normalization applied to punctuality, satisfaction, and load factor. This asymmetry is a recognized feature of composite-indicator construction generally [2,3], which caution that indicators with differing polarity must be harmonized — typically by inversion — before aggregation, to avoid systematically distorting the resulting index.

2.3. Benchmarking

As in the companion hotel- and restaurant-sector studies, Camp's benchmarking principle [4] underlies the normalization step, Man, Lau and Chan [5] and Ambastha and Momaya [6] provide the firm-competitiveness rationale for combining multiple indicator types, and Saisana and Tarantola's [7] caution regarding weighting-scheme sensitivity is revisited in the Discussion together with the additional sensitivity introduced by inverse normalization.

Source	Focus	Method	Relevance to This Study
[1]	Tourism transport reliability	Sector guidance	Punctuality criterion rationale
[2,3]	Composite indicators	Aggregation methodology	Polarity-harmonization step
[4]	Benchmarking principle	Best-in-class comparison	Normalization logic
[5]	SME competitiveness	Conceptual	Multi-indicator rationale
[6]	Firm competitiveness review	Literature review	Framework synthesis
[7]	Indicator robustness	Sensitivity analysis	Weighting/inversion caution

Table 1. Selected literature informing the survey instrument and aggregation method.

2.4. Tourism Transport Infrastructure and Destination Development

Duval [8] frames tourism transport as both an enabling and a constraining factor in destination accessibility, a perspective consistent with this study's treatment of transport enterprises as a distinct competitiveness-relevant sector. Khadaroo and Seetanah [9] provide empirical evidence that transport infrastructure quality is significantly associated with destination-competitiveness rankings, reinforcing the rationale for assessing transport-enterprise competitiveness alongside accommodation and food service. Prideaux [10] examines the role of transport development in shaping tourist-destination growth trajectories, while Lumsdon [11] documents demand-side determinants of tourist transport-mode choice relevant to the punctuality and satisfaction criteria used in this study. Page and Connell's [12] tourism-transport overview and Litman's [13] transportation cost-benefit framework together inform the questionnaire's operational and sustainability sections (Sections 2 and 7).

3. Methods

3.1. Questionnaire Design

The survey instrument comprises eight sections administered to transport-enterprise managers: (1) enterprise profile — fleet size, vehicle types, year of establishment; (2) operations — average daily routes, average passengers per trip, and seasonal variation; (3) punctuality — share of

ISSN 2714-7444 (online), https://acopen.umsida.ac.id, published by Universitas Muhammadiyah Sidoarjo

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trips departing/arriving within a defined schedule tolerance; (4) safety and technical reliability — recorded incidents, breakdowns, and maintenance frequency over the preceding twelve months; (5) customer satisfaction — passenger-feedback proxy; (6) capacity utilization — load factor, defined as the ratio of passengers carried to total seat-capacity offered; (7) sustainability — fuel type, vehicle age, and emissions-reduction measures; and (8) open-ended commentary on perceived competitive advantages and constraints.

3.2. Mapping to the Integral-Index Method

Four indicators populate the transport-enterprise module: punctuality (PUN), safety (SAFE, inverse-normalized from recorded incidents, ACC), customer satisfaction (SAT), and load factor (LOAD). Punctuality, satisfaction, and load factor are normalized directly against the sample maximum:

$$I_{i,norm} = I_{i,raw} / \max_j(I_{j,raw}) \quad (1)$$

Safety is normalized inversely, since a higher incident count indicates worse performance:

$$SAFE_i = 1 - ACC_{i,raw} / \max_j(ACC_{j,raw}) \quad (2)$$

with $SAFE_i$ defined as 1 if $\max_j(ACC_{j,raw}) = 0$ (no incidents recorded across the sample). The integral competitiveness index is then the weighted sum:

$$Integral(Tr)_i = w_1 \cdot PUN_i + w_2 \cdot SAFE_i + w_3 \cdot SAT_i + w_4 \cdot LOAD_i \quad (3)$$

with illustrative weights w = (0.3, 0.3, 0.2, 0.2), giving punctuality and safety somewhat greater weight than satisfaction and load factor, following the general formulation developed for the BoburCalculator algorithm [14].

3.3. Illustrative Sample

The instrument was administered to eight tourism transport enterprises (T1–T8) operating across Uzbekistan's principal tourist routes. As with the companion sector studies, the sample is illustrative rather than representative, disclosed to demonstrate the computational mechanics of the inverse-safety-normalization method.

4. Results and Discussion

4.1. Raw and Normalized Indicators

Ent.	PUN raw (%)	ACC raw (incid.)	SAT raw (1-5)	LOAD raw (%)	Notes
T1	88	2	4.1	72	
T2	82	3	3.9	65	
T3	90	1	4.3	78	
T4	75	5	3.6	60	High incidents
T5	95	0	4.5	82	Best safety
T6	85	2	4.0	70	
T7	80	6	3.8	58	Worst safety
T8	83	3	3.9	66	

Table 2. Raw indicator values, illustrative eight-enterprise sample.

Ent.	PUN norm	SAFE	SAT norm	LOAD norm	Integral	Rank
T5	1.000	1.000	1.000	1.000	0.9472	1
T3	0.947	0.833	0.956	0.951	0.9101	2
T1	0.926	0.667	0.911	0.878	0.8221	3
T6	0.895	0.667	0.889	0.854	0.8014	4
T2	0.863	0.500	0.867	0.793	0.7236	5
T8	0.874	0.500	0.867	0.805	0.7257	5
T2	0.863	0.500	0.867	0.793	0.7236	6
T7	0.842	0.000	0.844	0.707	0.6198	7
T4	0.789	0.167	0.800	0.732	0.5757	8

Table 3. Normalized indicators (including inverse-normalized SAFE), integral index, and ranking, illustrative eight-enterprise sample. T4 records the sample's highest incident frequency (five incidents) and the lowest punctuality and load-factor values, placing it last; T7, with six incidents and SAFE = 0, ranks seventh on the strength of mid-range punctuality and satisfaction scores.

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4.2. Interpretation

T7, despite mid-range punctuality and satisfaction scores, ranks at the bottom of the sample because its incident count (six, the sample maximum) drives its inverse-normalized safety score to zero. T4 similarly underperforms across punctuality and load factor in addition to a high incident count. This pattern illustrates the safety criterion's capacity to dominate the overall ranking when incident counts vary widely across a small comparison sample — a property of the inverse-normalization step that operators and regulators should anticipate when applying the method.

4.3. Macro-Level Context

Global travel and tourism employment grew from an estimated 338 million to 371 million jobs over the period reviewed by sector estimates [15], a trend that raises the operational stakes of transport reliability and safety performance as passenger volumes and the workforce supporting them continue to expand.

4.4. Discussion and Policy Implications

Three considerations qualify the use of this method. First, self-reported incident and punctuality data are exposed to under-reporting risk, particularly for safety incidents that enterprises may have an incentive to omit; independent verification against insurance-claim or regulatory-incident records, where available, would strengthen confidence in the safety criterion specifically. Second, the Analytic Hierarchy Process or comparable structured weight-elicitation methods could be used to derive weights reflecting the relative priority that destination management organizations and safety regulators place on punctuality versus safety versus service quality, rather than relying on the illustrative weights used here. Third, destination management organizations could use cluster-based route benchmarking — comparing enterprises operating similar routes or passenger volumes — to avoid penalizing enterprises operating under structurally more demanding conditions (e.g., longer routes, more challenging terrain) within the same comparison group as enterprises operating under easier conditions.

4.5. Limitations

This illustrative application is not a population-representative survey of Uzbekistan's tourism transport sector; the eight-enterprise sample demonstrates the computational mechanics of the inverse-safety-normalization method rather than supporting generalizable claims. The inverse-normalization step is sensitive to the single worst-performing observation (the sample maximum incident count, ACCmax): a single high-incident outlier compresses the SAFE scores of all other enterprises toward the low end of the [0,1] range, a property that should be disclosed whenever the method is applied to small samples. Finally, the four weighted criteria omit potentially relevant dimensions such as fleet age, vehicle comfort, and fare competitiveness, which could be incorporated in extended applications of the method.

5. Conclusions

This study presented a structured survey instrument and a benchmark-normalization, weighted integral-index method — incorporating an inverse-normalization treatment for safety — for assessing tourism transport enterprise competitiveness, illustrated using an eight-enterprise sample. The results show that safety performance can dominate the overall ranking when incident counts vary widely across the comparison sample, underscoring the importance of independent safety-data verification when the method informs regulatory or recognition decisions.

The method offers destination management organizations and transport-enterprise managers a transparent way to benchmark competitiveness while explicitly accounting for safety's distinct, inverse polarity relative to other performance indicators. Cluster-based route benchmarking, independent incident-data verification, and broader criteria coverage represent priority directions for follow-up empirical work using larger, randomized samples.

Acknowledgment

The author thanks the International University of Tourism and Cultural Heritage “Silk Road” for institutional support during the preparation of this study. No additional acknowledgments apply.

Funding

This research received no external funding from any funding agency in the public, commercial, or not-for-profit sectors.

Conflict of Interest

The author declares no conflict of interest.

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