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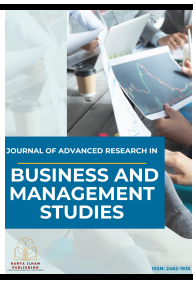

Estimating the Spatial Transport Revenue Contribution of Muslim Tourists to Malaysia

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ABSTRACT

This paper estimates Malaysia's transport sector revenue generated by Muslim inbound tourism and maps its spatial distribution across modes and entry gateways from 2019 to 2024. The analysis covers six principal source markets, Singapore, Indonesia, China, Thailand, Brunei, and India. Muslim arrivals are approximated using origin country Muslim population shares and converted into transport receipts using national expenditure parameters. Direct Muslim transport revenue reached RM4.09 billion in 2024, exceeding RM3.07 billion in 2019. The recovery is corridor based and increasingly concentrated in surface mobility and Johor gateways. Land transport contributed 66.1 percent of total transport revenue in 2024, while Tambak Johor accounted for 37.1 percent as the largest single gateway share. Extending direct demand using input output coefficients, Muslim transport activity supported RM8.29 billion in total output in 2024, including RM4.20 billion in indirect upstream production. Policy should prioritise throughput and reliability at Johor Singapore checkpoints and maintain airport efficiency for medium haul markets..

1. Introduction

Malaysia's tourism recovery has shifted from cyclical rebound to macroeconomically material growth. In 2025, international visitor arrivals rose to about 42.2 million, up roughly 11.2 percent from 2024, reinforcing tourism's role as a core export of services [5]. This strength is visible in external accounts: travel activities recorded a net inflow of RM49.2 billion in 2025, up from RM37.4 billion in 2024, reflecting the widening gap between inbound travel receipts and outbound travel spending [26]. These patterns matter for development policy because tourism demand is not confined to

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hotels and attractions; it is transmitted through transport systems and supplier networks that determine how much value is retained domestically and how widely it is distributed across places.

National accounts evidence supports tourism's large economy-wide footprint. Malaysia's Tourism Satellite Account reports that tourism generated RM291.9 billion in 2024 and contributed 15.1 percent to the economy, with inbound expenditure expanding strongly; within spending composition, passenger transport is a major component alongside shopping and accommodation [8]. In Malaysia, transport therefore functions as more than an enabling infrastructure: it is a revenue-generating economic subsystem that converts arrivals into observable receipts at airports, land checkpoints, rail terminals, and associated urban and intercity mobility services. Because these transport purchases draw on fuel, maintenance, wholesale and retail inputs, finance and insurance, and other business services, the initial shock to transport demand can propagate upstream through inter-industry linkages, producing multiplier effects that are central to any claim about "total economic contribution".

This linkage is especially salient for Islamic tourism, where Malaysia is widely positioned as a leading Muslim-friendly destination and continues to attract sizeable Muslim travel demand [18]. A reported benchmark indicates about 4.5 million Muslim tourist arrivals in 2023 generating around RM14.7 billion in revenue, signalling meaningful scale for targeted segment analysis [17]. Yet, empirical work on Muslim-friendly tourism has tended to prioritise governance, certification, and destination competitiveness, leaving a more limited evidence base on how Muslim tourist mobility translates into transport revenue across space and, crucially, how that direct transport demand maps into upstream production via multipliers.

Against this background, this study estimates the spatial transport-revenue contribution associated with Muslim tourist arrivals from Malaysia's principal source markets, integrating demographic scaling, expenditure-based transport modelling, modal allocation, entry-gateway decomposition, and an inter-industry linkage approach to capture multiplier-driven upstream effects. By treating gateways and corridors as the nodes where tourism demand is monetised and transmitted into supply chains, the analysis clarifies how Muslim tourism supports transport receipts, where those receipts concentrate geographically, and how the resulting demand ripple extends beyond the transport sector into the wider economy.

The paper is structured as follows. Section 2 reviews the literature on Islamic tourism, the tourism–transport nexus, and the use of multiplier-based approaches to capture indirect economic effects. Section 3 explains the study's methodology and data, including the estimation of Muslim visitor flows, the expenditure-based transport revenue model, the gateway and modal decomposition, and the inter-industry linkage framework used to derive upstream impacts. Section 4 presents the results and discussion, focusing on the level and recovery trajectory of Muslim-tourist transport revenues, their spatial concentration across entry corridors, modal patterns, and the implied multiplier-driven spillovers to the wider economy. Section 5 concludes by summarising the main findings and contributions. Section 6 outlines policy implications for transport planning, border and gateway management, and Muslim-friendly tourism strategy. Section 7 discusses limitations and directions for future research.

2. Research Questions

1. What is the estimated contribution of Muslim tourist arrivals to Malaysia's transport sector revenue from 2019 to 2024?
2. What spatial and modal patterns characterise the distribution of Muslim tourist transport revenue across Malaysia's main entry gateways?

3. What are the total output and indirect economic effects associated with Muslim tourist transport demand in Malaysia under the input–output framework?

3. Literature Review

Tourism recovery in the post pandemic period is increasingly framed as a reorganisation of mobility patterns rather than a straightforward return to pre crisis conditions. Comparative evidence shows that COVID 19 restrictions abruptly interrupted international travel, followed by uneven recovery shaped by deferred travel demand, capacity constraints, and changes in market composition [22]. Mobility studies using high frequency movement data similarly indicate that recovery often involves redistribution of travel flows across routes and gateways, with some corridors rebounding faster than others depending on friction, capacity, and travel purpose [28].

Within Islamic and halal tourism research, recent synthesis work indicates that the field has moved beyond definitional debates toward implementation, governance, trust and loyalty, and post COVID policy issues. Systematic reviews and science mapping studies describe halal tourism as a differentiated market where ecosystem quality and policy clarity influence destination competitiveness and traveller experience [1] , [14], [15]. In Malaysia, institutional efforts to strengthen Muslim friendly tourism have also been reinforced through ecosystem development and benchmarking initiatives [13].

Tourism and transport dependency theory views tourism demand as dependent on mobility systems, where travel is realised through accessibility, cost, speed, and reliability, while transport investment is often justified using tourism flows. Recent literature emphasises that tourism outcomes depend not only on destination attributes but also on how effectively destinations connect through gateways such as airports, land checkpoints, and ports, and on how concentrated flows become in dominant entry points. Antolini (2023) argued that tourism competitiveness is closely tied to transport functionality and network performance. Work on multimodal accessibility further suggests that corridor dependent destinations benefit when policies improve integration across modes and manage congestion and peak demand through coordinated mobility measures [4]. This perspective supports a spatial approach that examines how transport related economic outcomes cluster around specific entry points.

Aviation economics links tourism connectivity to airline cost structures, network strategy, and volatility, recognising that air transport is highly sensitive to shocks and is frequently reconfigured during disruption and recovery. Post 2021 literature commonly describes recovery as uneven restoration of capacity and routes, influenced by yield expectations, operational constraints, and the hub role of major airports [6]. Reviews of COVID era aviation research show how border policies and traveller confidence disrupted flight supply and passenger movement, accelerating adjustments in operations and market behaviour [24]. Evidence also shows that rebound trajectories differ across routes and markets, implying that air connectivity cannot be assumed stable over time [25]. Airline finance perspectives add that liquidity conditions and financing constraints can shape fleet and route decisions during recovery [21].

Cross border mobility research treats borders as systems that shape movement through filtering, administrative processes, and varying degrees of friction, rather than as passive boundaries. Mau (2022) describes borders as sorting systems where procedures and infrastructure influence how smoothly people move. Related work emphasises that mobility patterns are produced through interactions between policy, infrastructure, and local practices, often forming corridor specific regimes [7]. In the Malaysia-Singapore context, phased reopening arrangements and the resumption of cross border services illustrate how policy decisions and operational capacity translate directly into

realised mobility [16]. This supports analysing land gateways such as Tambak Johor and Gelang Patah as corridor points where governance and operational conditions can redistribute flows and associated economic outcomes across entry points [11].

Taken together, recovery and mobility studies motivate interpreting post pandemic travel as a reallocation of flows across networks, while halal tourism reviews justify the strategic relevance of Muslim travel demand. To the best of our knowledge, this is the first study to quantify Muslim inbound demand into transport sector revenue and map its spatial distribution across gateways and corridors in Malaysia.

4. Conceptual Framework

This paper conceptualises Muslim tourism transport revenue as an economic outcome that emerges when three components interact. The first is tourism demand from major source markets, which determines the volume of inbound movements and the potential base for transport spending. The second is the structure of the transport system, defined by the configuration of modes and gateways. Whether visitors arrive by air, land, rail, or sea shapes where revenue is realised, because each mode is anchored in specific entry gateways such as airports and land border crossings. The third is cross border mobility conditions, particularly along the Malaysia Singapore corridor, where border governance, congestion, processing capacity, and service reliability can shift flows between alternative entry routes and gateways.

The framework is supported by three complementary strands of literature. Tourism transport dependency emphasises that tourism performance is contingent on accessibility and gateway functionality. Aviation economics highlights that air connectivity is shaped by network strategy and is highly sensitive to shocks and recovery phases. Cross border mobility regimes focus on how border governance and corridor capacity channel flows into particular entry points. Taken together, these perspectives imply two expectations. First, tourism linked transport revenue is likely to be spatially concentrated in dominant gateways and corridors. Second, during recovery phases and policy transitions, flows may reallocate across modes and entry routes, altering the spatial distribution of realised transport revenue [2], [6], [7] and [25].

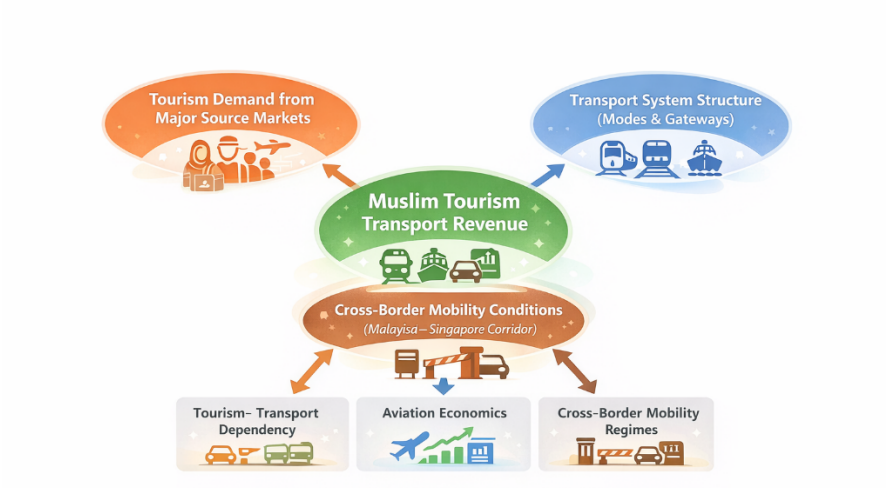

Fig. 1. Conceptual framework for Muslim tourism transport revenue

5. Methodology

5.1 Data and Scope

The analysis combines officially reported international tourist arrivals by origin market and year with national level tourism expenditure parameters, namely average spend per visitor and the transport share of total spend, to estimate Muslim travel linked transport revenue and its distribution across transport modes and entry points over 2019 to 2024. Arrival statistics are taken from Tourism Malaysia's administrative compilation produced in cooperation with the Immigration Department of Malaysia. Muslim population shares used for market sizing are sourced from Pew Research Center estimates. Inter industry linkage coefficients are derived from Malaysia's Input Output Tables 2021 published by the Department of Statistics Malaysia.

The estimation follows a sequential accounting approach linking demand measurement, expenditure allocation, mode decomposition, and gateway assignment.

5.2 Estimated Muslim arrivals

Official arrival statistics do not record traveller religion. Muslim arrivals are therefore approximated using origin country Muslim population shares as a market sizing proxy. For each country *c* and year *t*:

$$MuslimArrivals_{c,t} = Ariivals_{c.t} \text{ X } MuslimShare_c$$

This procedure is consistent with segmentation approaches in halal tourism research that treat Muslim travel as a differentiated market for planning and ecosystem development, while recognising that the proxy does not represent verified religious identity at the individual traveller level [1], [14], [15], [13].

5.3 Muslim transport revenue estimation

Transport related receipts associated with Muslim arrivals are estimated by combining average spend per visitor with the transport share of spending for each year *t*:

$$TransportPerVisitors_t = AvgSpend_t \text{ X } TransportShare_t$$

Annual Muslim transport revenue is then estimated as:

$$MuslimTransportRevenue_t = MuslimArrivals_t \text{ X } TransportPerVisitor_t$$

This design directly links tourism demand to transport-sector revenue, consistent with transport being a derived demand from tourism activity (Antolini, 2023).

5.4 Transport mode allocation

To capture structural reallocation across modes in the recovery period, annual Muslim transport revenue is decomposed into land, air, sea, and rail using mode shares $ModeShare_{m,t}$:

$$RevenueMode_{m,t} = MuslimTransportRevenue_t \text{ X } ModeShare_{m,t}$$

This aligns with aviation economics in treating air as strategically significant yet shock-sensitive, while land corridors may exhibit different recovery dynamics depending on proximity and border operations [6], [21] , [24], [25].

5.5 Spatial allocation by entry point

Mode linked revenue is then allocated across entry points, including Tambak Johor, Gelang Patah, KLIA, KLIA2, rail, jetties, and an others category, using observed entry point shares $GatewayShare_{m,t}$:

$$RevenueGateway_{g,t} = MuslimTransportRevenue_t \text{ X } GatewayShare_{m,t}$$

This produces entry point revenue totals and structural contribution shares, enabling identification of corridor dependence and gateway concentration consistent with mobility regime and gateway perspectives [20], [7], [4].

5.6 Inter industry linkage estimation using input output coefficients

To extend from direct transport receipts to broader upstream production effects, sector specific Type I output coefficients are derived from Malaysia's Input Output Tables 2021 published by the Department of Statistics Malaysia. The 2021 technical coefficients are treated as a constant technology reference to propagate transport demand shocks for the recovery period 2022 to 2024. Total output effects are computed by applying Type I coefficients, defined as direct plus indirect effects, to the estimated direct Muslim transport revenue by mode. Sea related expenditure is mapped to the water transport sector, while rail expenditure is conservatively mapped to land transport in the absence of a standalone rail coefficient in the available sector aggregation. The linkage results are used for scenario interpretation rather than causal attribution and are reported separately from direct transport revenue [9].

6. Results

6.1 International arrivals by source market, 2019 to 2024

Table 1 presents international arrivals to Malaysia from six major source markets across three distinct phases: the pre-pandemic benchmark year 2019, the disruption period 2020 to 2021, and the recovery phase from 2022 to 2024. The series indicates a clear structural break. Arrivals in 2021 reflect an operational minimum under stringent mobility restrictions and therefore function as a near-zero reference point rather than a conventional comparator. Interpretation is consequently anchored on level shifts and reopening trajectories from 2022 to 2024, where observed changes more credibly represent demand normalisation alongside corridor-specific performance.

Across the six markets, total arrivals increased from 20.74 million in 2019 to 32.09 million in 2024, implying that the recovery culminated in an inbound volume regime that surpassed the pre-pandemic benchmark. The rebound is primarily regional in character. In 2024, Singapore accounted for 18.86 million arrivals, representing about 58.8 percent of the six-market total, and reinforcing the dominance of proximity-driven, high-frequency cross-border travel. Indonesia and China formed a second tier of contributors, at 4.15 million and 3.73 million arrivals respectively. Thailand, Brunei, and India supplied additional volumes, with arrivals of 2.27 million, 1.73 million, and 1.37 million respectively. Overall, the distribution aligns with recovery dynamics that prioritise short-haul markets and repeat visitation, consistent with lower generalised travel costs through reduced time burdens, lower monetary costs, and diminished corridor uncertainty.

Table 1
International arrivals to Malaysia by selected source markets, 2019–2024

Year	Singapore	Indonesia	China	Thailand	Brunei	India	Total
2019	10,163,882	3,623,277	3,114,257	1,884,306	1,216,123	735,309	**20,737,154**
2020	–	–	–	–	–	–	–
2021	16,308	11,025	7,701	59,607	773	3,916	**99,330**
2022	5,222,991	1,481,739	212,603	715,528	301,757	324,548	**8,259,166**
2023	8,308,230	3,108,165	1,474,114	1,551,282	811,833	671,846	**15,925,470**
2024	18,855,680	4,145,127	3,725,894	2,268,182	1,732,119	1,365,387	**32,092,389**

Note: 2021 is a near-zero base due to pandemic-related travel restrictions; growth rates using 2021 as a denominator can be misleading and are therefore not used as the primary indicator of market performance

6.2 Estimated Muslim tourist arrivals as a segmentation layer

To approximate the scale of Muslim tourism demand by origin, the analysis applies a demographic share-based segmentation using fixed Muslim population proportions for each source market. The assumed shares are 87.0 percent for Indonesia, 82.2 percent for Brunei, 4.5 percent for Thailand, 16.1 percent for Singapore, 15.8 percent for India, and 1.8 percent for China. Table 4.2 reports the resulting estimates for 2019 and the recovery years 2022 to 2024, together with post-reopening growth metrics for 2023 relative to 2022 and 2024 relative to 2023. This procedure does not attempt to infer traveller religiosity at the individual level. Instead, it introduces a consistent and transparent estimation layer that supports comparative planning, market sizing, and scenario construction across origins.

The estimated Muslim segment increased from 2.47 million in 2022 to 4.91 million in 2023 and 8.45 million in 2024, thereby exceeding the pre-pandemic benchmark of 6.05 million in 2019. The distribution of this segment is strongly concentrated in proximate markets with Muslim-majority or Muslim-significant populations. In 2024, Indonesia contributed an estimated 3.61 million Muslim arrivals and Singapore 3.04 million, together accounting for 78.6 percent of the total estimated Muslim segment. Brunei added a further 16.8 percent. In combination, Indonesia, Singapore, and Brunei explain roughly 95 percent of estimated Muslim tourist volume, indicating a corridor-based structure in which regional connectivity and border performance are likely to be decisive determinants of realised demand.

Recovery-phase growth shows rapid scaling alongside differentiated momentum across markets. Singapore exhibits the strongest acceleration in 2024, consistent with intensified short-break and repeat cross-border mobility. Indonesia continues to expand but with a more moderated marginal growth profile than the immediate post-reopening surge, a pattern that is compatible with normalisation dynamics and potential supply-side frictions such as capacity constraints, pricing pressures, or corridor-specific travel costs. Brunei records large increases in both recovery intervals, suggesting a swift reactivation of a culturally aligned market. China and Thailand display high percentage growth rates from a low base but remain small in absolute Muslim-segment volumes under the fixed-share assumption, indicating that their contribution is more substantial in overall arrivals than in the estimated Muslim segment.

Table 2
Estimated Muslim tourist arrivals by source market, 2019 and 2021–2024 (million)

Country	2019	2021	2022	2023	2024	Growth 23/22	Growth 24/23
Singapore	1,636,385	2,626	840,902	1,337,625	3,035,765	+59.1%	+127.0%
Indonesia	3,152,251	9,592	1,289,113	2,704,104	3,606,260	+109.8%	+33.4%
China	56,057	139	3,827	26,534	67,066	+593.4%	+152.7%
Thailand	84,794	2,682	32,199	69,808	102,068	+116.8%	+46.2%
Brunei	999,653	635	248,044	667,327	1,423,802	+169.0%	+113.4%
India	116,179	619	51,279	106,152	215,731	+107.0%	+103.2%
Total	**6,045,319**	**16,293**	**2,465,364**	**4,911,550**	**8,450,692**	**+99.2%**	**+72.1%**

Note: Fixed Muslim shares applied—Indonesia (87.0%), Brunei (82.2%), Thailand (4.5%), Singapore (16.1%), India (15.8%), China (1.8%). 2021 values are extremely low due to mobility restrictions.

Taken together, Tables 1 and 2 show that Malaysia's post-pandemic inbound recovery is structurally anchored in regional markets. Singapore dominates overall arrivals, while Indonesia, Singapore, and Brunei jointly account for the overwhelming share of the estimated Muslim segment. This concentration suggests that the recovery trajectory is likely to be more responsive to transport corridor performance than to global travel conditions alone.

6.3 Transport expenditure intensity and revenue yield from Muslim tourism

Table 3 summarises the estimated transport-related expenditure attributable to Muslim tourist arrivals in Malaysia, reported as transport spending per visitor and as aggregate Muslim transport revenue. Two findings are central. First, aggregate transport revenue is largely volume-driven. Total Muslim arrivals rose from 2.465 million in 2022 to 8.451 million in 2024, raising estimated transport revenue from RM1.01 billion to RM4.09 billion. Second, per-visitor yield varies meaningfully across years, reflecting changes in average expenditure levels and the implied transport share of total tourist spending.

The restriction period displays a pronounced distortion. In 2021, the estimated transport share reaches 39.2 percent and transport spending per visitor peaks at RM695. This outcome is consistent with crisis-period reweighting of the tourism consumption basket. When discretionary components such as attractions, shopping, and leisure activities are suppressed, transport can mechanically constitute a larger share of a smaller overall spending base. As such, the 2021 values should be interpreted as an outlier shaped by exceptional conditions rather than as a stable behavioural benchmark. During the recovery phase from 2022 to 2024, the transport share normalises to the mid-teens, ranging from 14.6 percent to 17.2 percent.

Although transport spending per visitor in 2024, at RM483.82, remains slightly below the 2019 level of RM508, aggregate Muslim transport revenue reaches RM4.09 billion in 2024, exceeding the RM3.07 billion recorded in 2019. This indicates that the restoration of transport revenue has been achieved primarily through expanded visitor volumes rather than through higher per-capita transport yield. From a tourism–transport nexus perspective, the pattern reinforces the proposition that post-pandemic Muslim tourism demand is concentrated along high-throughput regional corridors, such that capacity, reliability, and friction at key nodes, including border processing and gateway connectivity, can materially influence realised revenue outcomes.

Table 3

Estimated Muslim Tourist Transport Expenditure and Revenue in Malaysia, 2019–2024

Year	Muslim Arrivals (mil)	Average Spend (RM)	Transport Share (%)	Transport per Visitor (RM)	Muslim Transport Revenue (RM million)
2019	6.045	3,299	15.4	508.00	3,070.9
2021	0.016	1,772	39.2	695.00	11.1
2022	2.465	2,803	14.6	409.24	1,008.8
2023	4.912	2,565	14.8	379.66	1,864.9
2024	8.451	2,813	17.2	483.82	4,088.8

Notes: Transport per visitor = Avg spend × Transport share. Aggregate Muslim transport revenue = Muslim arrivals × Transport per visitor. Values are estimates and should be interpreted as planning-oriented outputs rather than direct observations. Figures may not sum exactly to totals due to rounding of displayed values.

6.4 Market concentration in Muslim transport revenue by source country

Table 4 decomposes estimated Muslim transport revenue by source market. Two findings are consistently evident. First, the revenue base is highly concentrated in proximate regional markets. In 2024, Indonesia and Singapore generated RM1,744.6 million and RM1,469.3 million respectively, totalling RM3,213.9 million, which represents 78.6 percent of the overall RM4,088.7 million. When Brunei is included at RM688.6 million, the concentration rises to 95.4 percent. This confirms that Muslim transport revenue is structurally anchored in a small set of neighbouring markets with dense mobility ties to Malaysia.

Second, recovery dynamics vary across markets in a pattern that is consistent with corridor-based rebound. Between 2022 and 2023, total Muslim transport revenue increased by 84.8 percent, followed by a further 119.3 percent increase in 2024. Singapore records the sharpest acceleration in 2024, expanding by 189.3 percent, which points to a material strengthening in corridor throughput rather than per-capita yield alone. Indonesia also grows strongly, rising by 70.0 percent in 2024, but with a steadier growth profile consistent with a large market transitioning from reopening-led rebound to consolidation. Brunei exhibits sustained high growth, increasing by 171.7 percent in 2024, reinforcing its role as a high-intensity regional contributor despite smaller absolute scale than Indonesia and Singapore.

Table 5 compares estimated Muslim transport revenue across four modes: land, air, sea, and rail. The results point to a persistent hierarchy in which land transport dominates in all non-crisis years, followed by air, while sea and rail contribute only marginal shares. This modal configuration is consistent with a recovery regime anchored in proximate regional markets and corridor-based mobility, where cross-border movements and domestic surface travel comprise a substantial component of the transport expenditure basket.

In level terms, total Muslim transport revenue rises from RM1,009.1 million in 2022 to RM1,864.5 million in 2023 and RM4,088.7 million in 2024. The 2024 level exceeds the pre-pandemic benchmark of RM3,071.0 million in 2019, indicating that transport-linked earnings have not only recovered but expanded beyond the baseline.

Table 4
Estimated Muslim Tourist Transport Revenue by Source Market, Malaysia (RM million), 2019–2024

Country	2019	2021	2022	2023	2024	Growth 23/22	Growth 24/23
Singapore	831.3	1.8	344.2	507.9	1,469.3	+47.6%	+189.3%
Indonesia	1,601.3	6.7	527.6	1,026.3	1,744.6	+94.5%	+70.0%
China	28.5	0.1	1.6	10.1	32.4	+531.3%	+220.8%
Thailand	43.1	1.9	13.2	26.5	49.4	+100.8%	+86.4%
Brunei	507.8	0.4	101.5	253.4	688.6	+149.7%	+171.7%
India	59.0	0.4	21.0	40.3	104.4	+91.9%	+159.1%
TOTAL	**3,071.0**	**11.3**	**1,009.1**	**1,864.5**	**4,088.7**	**+84.8%**	**+119.3%**

Note: 2021 reflects crisis-era travel constraints and constitutes a near-zero baseline. Interpretation of recovery dynamics therefore emphasises 2022–2024 comparisons. *Figures may not sum to totals due to rounding.*

6.5 Spatial–modal structure of Muslim transport revenue by mode, 2019 to 2024

The rebound is driven disproportionately by land-based revenue growth. Land revenue increases from RM475.3 million in 2022 to RM1,115.0 million in 2023 and RM2,702.6 million in 2024, representing 66.1 percent of total transport revenue in 2024. Air revenue also expands materially in absolute terms, rising from RM493.4 million in 2022 to RM1,181.6 million in 2024, but its relative contribution falls to 28.9 percent as land grows more rapidly. Sea and rail remain small in absolute magnitude, at RM143.1 million and RM61.3 million respectively in 2024, and together account for roughly 5.0 percent of total revenue.

The crisis year 2021 again constitutes an outlier, characterised by sharply depressed totals and a temporary compression of modal differences. For inference and policy interpretation, the post-reopening years from 2022 to 2024 provide the more informative benchmark. The dominance and accelerating share of land-based revenue implies that Muslim tourism-linked transport earnings are especially sensitive to surface corridor performance, including border processing efficiency, road network reliability, intercity coach connectivity, and last-mile integration, rather than being determined by air connectivity alone.

Table 5
Estimated Muslim Tourist Transport Revenue by Mode (RM million), Malaysia, 2019–2024

Year	Land	Air	Sea	Rail	Total
2019	1,744.3	1,129.1	150.5	46.1	**3,071.0**
2021	5.4	5.8	0.1	0.0	**11.3**
2022	475.3	493.4	34.3	6.1	**1,009.1**
2023	1,115.0	645.1	70.9	33.6	**1,864.5**
2024	2,702.6	1,181.6	143.1	61.3	**4,088.7**

Note: 2021 reflects crisis-era mobility constraints and constitutes a near-zero baseline; interpretation emphasises 2022–2024 recovery dynamics. F*igures may not sum exactly to totals due to rounding*

6.5 Decomposition of Muslim transport revenue by entry point

Table 6 decomposes estimated Muslim transport revenue by entry point and indicates a clear post-pandemic reconcentration of revenue toward the Johor–Singapore land gateways. Two results

are particularly evident. First, Tambak Johor or BSI, becomes the dominant revenue gateway in the recovery phase. Its share increases from 26.6 percent in 2019 to 37.1 percent in 2024, equivalent to RM1,517.9 million in 2024. When combined with Gelang Patah, KSAB, which contributes RM355.7 million and 8.7 percent in 2024, the Johor land gateways jointly account for 45.8 percent of total Muslim transport revenue in 2024. The pattern is consistent with recovery dynamics anchored in short-haul, high-frequency cross-border mobility, where realised demand is highly responsive to corridor frictions, including border processing time, road network reliability, interchange quality, and last-mile connectivity.

Second, air gateways assume a relatively smaller structural role over time, despite rising in absolute revenue terms. KLIA and KLIA2 together contribute 27.7 percent in 2019, increase temporarily during early reopening to 40.0 percent in 2022 when aviation connectivity normalised earlier than some land movements, and subsequently decline to 22.9 percent in 2024, comprising 12.0 percent for KLIA and 10.9 percent for KLIA2. This trajectory suggests an evolution from an initial reactivation phase, in which air transport carried a larger share of reopening flows, toward a corridor-driven regime in which land gateways dominate.

The "Others" category remains substantial in level terms at RM1,151.2 million in 2024, but its share declines from 36.6 percent in 2022 to 28.2 percent in 2024, indicating progressive concentration into the principal gateways as mobility stabilised. The crisis year 2021 should be treated as a near-zero baseline, and proportional shares for that year are not informative because small denominators can mechanically distort relative contributions.

Table 6
Estimated Muslim Transport Revenue by Entry Point, Malaysia, 2019–2024 (RM million and % share)

Entry point	2019	2021	2022	2023	2024
Tambak Johor	816.9 (26.6)	0.4 (3.2)	140.3 (13.9)	496.6 (26.6)	1,517.9 (37.1)
Gelang Patah (KSAB)	544.2 (17.7)	0.0 (0.1)	67.6 (6.7)	152.9 (8.2)	355.7 (8.7)
KLIA	476.2 (15.5)	4.8 (42.8)	225.0 (22.3)	272.2 (14.6)	490.6 (12.0)
KLIA2	374.2 (12.2)	0.7 (6.1)	178.6 (17.7)	242.4 (13.0)	445.7 (10.9)
Woodlands Train	44.5 (1.4)	0.0 (0.0)	4.0 (0.4)	44.7 (2.4)	61.3 (1.5)
Pasir Gudang Jetty	22.7 (0.7)	0.0 (0.2)	10.2 (1.0)	7.6 (0.4)	20.0 (0.5)
Stulang Laut	43.9 (1.4)	0.0 (0.3)	14.4 (1.4)	24.4 (1.3)	45.8 (1.1)
Others	748.4 (24.4)	5.3 (47.2)	369.0 (36.6)	624.0 (33.5)	1,151.2 (28.2)
TOTAL	**3,071.0 (100.0)**	**11.3 (100.0)**	**1,009.1 (100.0)**	**1,864.5 (100.0)**	**4,088.7 (100.0)**

Note: Values are in RM million. Figures in parentheses indicate the structural contribution as a percentage of total Muslim transport revenue for the corresponding year.

6.6 Inter-industry linkages of Muslim transport demand: input–output multiplier results

Table 7 extends direct Muslim transport revenue into inter-industry output effects using Type I multipliers from Malaysia's Input–Output Tables 2021 as a constant-technology benchmark. The implied weighted output multiplier is tightly bounded between 2.028 and 2.100 across 2019 and the recovery years 2022 to 2024. This stability indicates that, under fixed 2021 inter-industry coefficients, each ringgit of Muslim transport demand is associated with roughly one additional ringgit of upstream production through indirect linkages. Year-to-year changes in total output supported are therefore driven primarily by the scale of direct demand rather than by shifts in propagation strength. Consistent with this, the post-pandemic expansion in economy-wide output supported is predominantly scale-driven. Direct Muslim transport revenue increases from RM1.009 billion in 2022 to RM4.089 billion in 2024, while the corresponding Type I total output effect rises from RM2.119 billion to RM8.292 billion. Relative to the 2019 benchmark of RM6.321 billion, the 2024 estimate implies that the transport-linked economic footprint of this segment has expanded beyond pre-pandemic levels under the same coefficient structure. The indirect component also grows substantially, from RM1.110 billion in 2022 to RM4.203 billion in 2024, capturing the upstream production supported outside the transport sector as transport operators expand intermediate purchases along their supply chains. In input–output terms, higher final demand for passenger transport requires greater inputs from fuel and energy supply, maintenance and repair services, wholesale and retail trade, finance and insurance, business and administrative services, ICT and communications, and operational support activities associated with terminals and checkpoints.

The modest decline in the weighted multiplier from 2.100 in 2022 to 2.028 in 2024 is consistent with compositional change in the transport demand basket rather than structural change in technology. Because air transport typically exhibits a higher output multiplier than land transport in the input–output structure, a recovery increasingly dominated by land-based revenues would mechanically lower the weighted multiplier even while aggregate output supported rises sharply through higher direct revenues. In this sense, the multiplier extension complements the modal and gateway decompositions by showing that a corridor-anchored rebound in Muslim transport revenue translates into substantial upstream production support, while remaining sensitive to the modal composition of transport demand.

Table 7
Trend in direct Muslim transport revenue and Type I total output effects, Malaysia (2019; 2022–2024)

Year	Direct Muslim transport revenue (RM bil)	Type I total output effect (RM bil)	Indirect effect (RM bil)	Implied weighted output multiplier
2019	3.071	6.321	3.250	2.058
2022	1.009	2.119	1.110	2.100
2023	1.865	3.821	1.956	2.049
2024	4.089	8.292	4.203	2.028

Notes: (i) Type I multipliers are based on DOSM Malaysia Input–Output Tables 2021 (constant-technology benchmark). (ii) Rail expenditure is mapped to the land transport multiplier due to aggregated sectoring. (iii) 2021 is excluded as a near-zero baseline under mobility restrictions.

Two interpretive cautions apply. First, the estimates are Type I effects, covering direct and indirect output only, and exclude induced household-consumption effects, which would require a SAM or household-endogenised specification. Second, applying 2021 coefficients to 2022 to 2024

assumes stable production technology and input structures; the results should therefore be interpreted as benchmark propagation magnitudes suitable for comparative planning rather than as year-specific national accounts replication.

The patterns in Tables 4.1 to 4.7 align with the literature that frames post-pandemic recovery as a reconfiguration of mobility rather than a return to pre-crisis equilibrium. The 2024 rebound is accompanied by strong concentration by market, mode, and gateway, indicating that recovery operates through selective redistribution across corridors and nodes, where lower-friction routes and repeat-demand markets normalise faster than more distant or constrained connections [22], [28]. In Malaysia's case, this is reflected in the dominance of regional markets and the reconcentration of revenue toward the Johor–Singapore land gateways, consistent with the argument that tourism competitiveness is tightly coupled with transport functionality and corridor performance [2], [4].

The modal and gateway decompositions further suggest that the recovery regime is increasingly surface-corridor based. While air-related revenues recover in absolute terms, their relative role diminishes as land corridors expand more rapidly, which is compatible with evidence that aviation networks restore unevenly and do not necessarily revert to pre-pandemic composition [6], [21], [24], [25]. Interpreting borders as mobility regimes also helps explain why corridor governance and operational conditions can reallocate tourism-linked revenues across entry nodes within a single destination [20], [7], [16].

Within halal and Islamic tourism research, transport is often treated as a facilitating condition rather than an economic subsystem with quantifiable returns [1], [15]. By translating estimated Muslim arrivals into transport revenue, and decomposing that value across modes and gateways, this study offers an infrastructure-relevant operationalisation of Muslim mobility. The multiplier extension complements this contribution by showing that corridor-anchored transport demand supports substantial upstream production through inter-industry linkages under a constant-technology benchmark [13].

7. Conclusion

This study estimated the spatial transport-revenue contribution of Muslim tourist arrivals from Malaysia's six principal source markets over 2019 to 2024 by integrating demographic segmentation, expenditure-based transport modelling, modal allocation, and entry-point decomposition. The evidence indicates a strong post-pandemic rebound in Muslim travel demand and transport-linked earnings, with direct Muslim transport revenue reaching RM4.09 billion in 2024 and exceeding the 2019 benchmark. The recovery is structurally concentrated by market and corridor, with Indonesia and Singapore dominating the revenue base and the Johor–Singapore land gateways, particularly the Causeway, absorbing an increasing share of revenue. The modal profile reinforces this corridor dependence, as land transport accounts for the largest and fastest-expanding component during 2022 to 2024. The input–output extension further indicates that these direct revenues translate into substantial upstream production through inter-industry linkages under a constant-technology benchmark, with a stable implied Type I output multiplier of approximately 2.03 to 2.10 across 2019 and the recovery years.

Policy implications

Given the concentration of Muslim transport revenue in high-throughput regional corridors, policy should prioritise performance improvements where marginal reductions in generalised travel cost can generate disproportionate returns. For the Johor–Singapore gateways, this implies investments

and operating reforms that raise throughput and reliability, including border-processing capacity, queue and incident management, road-network reliability, and seamless interchange and last-mile connections around checkpoints; cross-border rail and coordinated intermodal integration can be justified as corridor resilience upgrades that stabilise performance during peak surges. At the same time, aviation remains a large absolute contributor and is critical for medium-haul markets, so KLIA and KLIA2 should prioritise reliability and peak handling through passenger-processing capacity, turnaround efficiency, and ground-access integration, while route restoration and bilateral air-service engagement should be aligned to realistic demand and network profitability constraints. Finally, halal-friendly transport should be operationalised as measurable service standards at dominant nodes and corridors, including prayer and ablution access, clear wayfinding, and family-friendly waiting environments, shifting the emphasis from branding to transport-system quality in the channels where demand is converted into revenue and upstream production.

Limitations

Three limitations apply. First, Muslim arrivals are estimated using fixed origin-country Muslim population shares, which provides a consistent segmentation layer but does not identify traveller religiosity at the individual level. Second, 2021 represents a near-zero baseline under mobility restrictions, so proportional changes involving 2021 are not informative measures of underlying demand dynamics. Third, the multiplier extension applies Malaysia's Input–Output Tables 2021 as a constant-technology benchmark and reports Type I effects only, covering direct and indirect output while excluding induced household-consumption effects; the results should therefore be interpreted as benchmark propagation magnitudes rather than year-specific national accounts identities without a SAM-based specification.

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Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

The authors are responsible for the study conception, research design, data collection, data analysis, result interpretation and manuscript drafting.

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