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Hub dependency: airport polarisation and the illusion of territorial diversification in Malagasy tourism

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Abstract: Official communication in Madagascar presented autumn 2025 as evidence of « growing territorial diversification », regional airports having overtaken Ivato-Antananarivo in arrivals for the first time, and the first half of 2026 as a « consolidation of the recovery », with 0.5 % growth. This article tests both claims against monthly ministerial data, central-bank half-year statistics and sectoral indicators on investment and capacity, within a framework combining tourism geography (discontinuity, transferred centrality, typologies of tourist places) and transport economics (nodality, hub-and-spoke structures, node vulnerability). Three results emerge. First, the Malagasy tourism system is monocentric: Ivato concentrates 51.9 % of all entries and 59.1 % of air entries, and regional airports do not substitute for the hub but co-vary with it (r = +0.81 across 2025, excluding October). Second, the October 2025 suspension of long-haul services operates as a quasi-experiment: Ivato traffic falls by 36.8 %, regional entries exceed by 6,002 the level predicted by their relationship with the hub (standardised residual +2.58), and the hierarchy is restored the following month. The observed « diversification » is an artefact of node failure, not a shift in demand. Third, the near-stagnation of the first half of 2026 conceals a recomposition between subsystems of highly unequal unit value: air arrivals rise 15.6 % while cruise arrivals fall 53.8 %, with an estimated net effect on receipts of about +15 %. The binding constraint is nodal rather than capacity-related, since implied hotel occupancy lies between 21 % and 40 %, and gateway diversification is better understood as territorial insurance than as spatial planning.

Keywords: Tourism geography; Transport economics; Nodality; Airport hub; Polarisation; Territorial diversification; Cruise tourism; Madagascar; Sub-Saharan Africa

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1. Introduction

On 6 August 2026, the Madagascar National Tourism Board announced 151,532 non-resident visitor arrivals for the first half of the year, against 150,757 a year earlier, and read this 0.5 % increase as the « consolidation of the recovery under way in recent years ». Six days later, the Central Bank of Madagascar published, in its analysis of the services balance, a non-cruise arrivals statistic up 15.6 % over the same half-year. Both figures are accurate and arithmetically compatible. Released separately, they license two opposing narratives about one and the same reality.

A few months earlier, the dashboard of the Ministry of Tourism and Handicrafts had accompanied the October 2025 data with a comment of a different nature: regional airports having recorded 13,887 arrivals against 12,120 for Ivato-Antananarivo, the institution saw in this the « sign of growing territorial diversification ». The fact was accurate; the inference, however, committed the ministry to a geographical thesis, that of a durable redistribution of flows among the country's gateways, at the precise moment when the capital's long-haul services were interrupted by a political crisis.

These two episodes are not statistical anecdotes. They raise a question of direct interest to the tourism geography of peripheral island spaces: what does a national arrivals indicator measure when the system it describes is spatially polarised? The hypothesis defended here is that, in a destination organised around a dominant node, a national aggregate conceals two determining properties of the system: its vulnerability, since the entire flow transits through a single point, and its internal heterogeneity, composed of territorial subsystems whose seasonal regimes and unit values differ by an order of magnitude. The consequence is that variations in the aggregate are systematically misread: a supply shock at the node is read as a diversification of demand, and a value-creating recomposition is read as stagnation.

This question echoes a long-standing intuition in tourism geography. As early as 1997, the Mobilités, Itinéraires, Territoires research team observed, with reference to Palma de Mallorca, that tourism nodality escapes the ordinary metrics of air traffic: « a map of the main international air passenger flows represents Palma de Mallorca airport very marginally, next to a dominant Barcelona […] whereas the situation is the reverse once one takes into account, alongside scheduled flights, the charter flights that make Palma the second Spanish airport » (Knafou et al., 1997, p. 196, note 5). The Malagasy case presents a symmetrical and inverse configuration: it is not the transport metric that renders tourism nodality invisible, but the tourism metric that renders transport nodality invisible.

The literature devoted to Malagasy tourism is sparse and heterogeneous in nature. The World Bank sector study (Christie and Crompton, 2003) provides the first comprehensive diagnosis; the doctoral thesis of Ranaivosoa-Rabemananjara (2013) proposes an approach through local economic effects based on a regional case; Mamiarisoa et al. (2021) establish the macroeconomic framing on secondary data. None of these works mobilises the territorial breakdown of flows, which has been either unavailable or unexploited until now. It is this entry point that we propose.

The article proceeds in five stages. The second section builds the analytical framework by articulating tourism geography and transport economics around the notion of hub dependency. The third sets out the data, the commensurability controls and the quasi-experimental protocol. The fourth establishes the monocentric character of the system and distinguishes three territorial subsystems. The fifth exploits the October 2025 shock to test the diversification claim. The sixth analyses the recomposition of the first half of 2026 and its consequences in value terms. The discussion examines what hub dependency implies for the geography of tourism investment and for public targets set for 2028.

2. Analytical framework: tourism nodality and hub dependency

2.1 Tourism as discontinuity and the peripheral location of tourist places

French-language tourism geography was built around a simple proposition: tourism rests on a displacement that « produces a discontinuity allowing another mode of dwelling devoted solely to recreation » (Knafou et al., 1997, p. 198). A direct spatial consequence follows from this definition: « the space of tourism must in one way or another escape the influence of the place of departure; this is why it most often has a peripheral location » (ibid., p. 199). Madagascar is, in this respect, a limiting case: an island of 587,000 km² located more than 8,000 kilometres from its principal source market, the destination realises, in the sense Gay (1995) gives to spatial discontinuity, tourism discontinuity in its most costly form. Roger Brunet observed, in response to that same dossier, that « tourism lies precisely at the

intersection of recreation and travel » (Brunet, 1997, p. 204): it is the second term, travel, that insularity renders decisive here.

That same tradition has shown that tourist places escape the classical laws of hierarchical diffusion: « places situated very low in the urban hierarchy thus possessed attributes proper to the centrality of very large cities » (ibid., p. 196), which the authors interpret as a transfer of centrality, the tourist, « a fundamentally urban individual and inhabitant of the "centre" », remaining « a bearer of centrality » in his displacement (ibid.). The observation is decisive for our object: it implies that there is no a priori reason for a tourist flow to be distributed in accordance with the urban hierarchy of the host country. If, in Madagascar, the principal gateway coincides with the political and demographic capital, this is not an effect of urban centrality but an effect of the structure of the air network.

The classical models of tourist space describe, moreover, a progressive diffusion from one or a few initial poles, followed by differentiation and then saturation of places (Miossec, 1977; Butler, 1980). They therefore presuppose a trajectory, which makes all the more problematic the inference of a spatial redistribution from a single point observation, a point to which section 5 returns.

The typology proposed by the same team, taken up and systematised by Équipe MIT (2002), finally provides the categories needed to distinguish tourism subsystems within a single national territory. The tourist site « is a place characterised solely by practices of passage on the part of tourists »; the resort « is defined by the primacy of tourist activity in the place » and « is characterised by the presence of a permanent population »; the tourist enclave, finally, « is also defined by the primacy of tourist activity, but it is a place created ex nihilo to receive tourists for two or three days, one or two weeks », and « it is common for this type of place to be enclaved, as a holiday village may be » (ibid., p. 200). This distinction is not nominal: it governs the capacity of a place to retain the value produced by visitation.

2.2 From airport nodality to hub dependency

Transport economics approaches the same configuration through network structure. A hub-and-spoke network concentrates flows on a restricted number of nodes in order to exploit economies of density; the result is a gain in efficiency but heightened exposure to node failure (O'Kelly, 1998). This property, well documented for transport networks and whose tourism implications have been underlined by Duval (2013), takes on a particular significance when the node is not merely a connecting point but the sole gateway to a territory: network vulnerability then becomes territorial vulnerability. We propose to term hub dependency the configuration in which the tourist visitation of a territory is, in essence, a function of the air services of a single airport, so that any disturbance affecting that point is transmitted in full and immediately to the national aggregate.

The tourism geography literature reaches the same conclusion by another route. Describing the Chamonix valley, the MIT team notes that « part of the international flow of tourists always arrives through the city, thanks to the airport. It is henceforth via Geneva-Cointrin that the itinerary of Japanese visitors in Europe stops over in the valley » (Knafou et al., 1997, p. 202). The airport gateway thus durably structures access to a tourist space of which it is not itself part. In the Malagasy case, the relationship is stronger still: Ivato is not only the gateway to the tourist places of the Highlands, it is the gateway to the country.

For an island destination, this dependency has a material foundation that the literature states without circumlocution: « without the aeroplane, many tropical islands would fall outside the range of resources exploited by the market » (Ndayisenga, 2026, p. 18). Accessibility is not an attribute of the destination; it is the condition of its economic existence. Yet Malagasy air accessibility is doubly constrained: by distance and by price. Air fares to Madagascar « are not competitive relative to the other islands of the Indian Ocean » and « are even among the highest in the world », on account of « limited capacity and [a] lack of competition » (Mamiarisoa et al., 2021, p. 373). Hub dependency is therefore at once a dependency on a place and a dependency on a small number of operators.

2.3 Unit value, territorial anchoring and the status of the same-day visitor

The third element of the framework concerns the value heterogeneity of flows. International statistical recommendations distinguish the visitor who spends at least one night in the territory from the one who does not stay overnight (United Nations, 2010); national statistics, for their part, most often aggregate the two. Yet the tourism economics literature establishes that the economic contribution of these two categories is of an altogether different order. Analysing the Martinican case, where same-day visitors account for 26 % of flows, Logossah and Célimène show through simulation that « the bulk of the impact of an increase in the overall number of tourists on the economy operates through the influence of staying tourists » (2007, § 38). The same authors document the decoupling between volume and value: over the period studied, arrivals grow by 4.8 % per year and receipts by only 4 % (ibid., § 13).

This decoupling stems from the very nature of the statistical recording of tourism, whose receipts pass through the « travel » item of the balance of payments rather than through a measure of production (Caccomo, 2007), and from the structure of spillover effects, whose magnitude depends on indirect and induced effects more than on the physical flow of visitors (Vellas, 2011).

This asymmetry is compounded by a territorial asymmetry. UNCTAD observes that « foreign investors, international tour operators and foreign airlines tend to capture the greater part of the value added in the tourism sector » (2013, § 22), leakage representing « between 40 and 50 % of gross tourism receipts in the majority of developing countries » (ibid., § 36). What the territory retains depends less on the volume of expenditure than on its structure: « discretionary expenditure generally benefits the poor […] in a far higher proportion than the major expenditure items such as accommodation, tour operators and international travel » (ibid., § 31). The cruise passenger, who incurs neither an overnight stay nor domestic transport, sits at the least favourable point of this scale.

It should finally be noted that the extreme concentration of the cruise industry, organised around « 3 global giants that manage the seasonality of their activity across the four corners of the world better than small local operators » (Torre, 2025, p. 4), confers on the maritime segment a volatility of exogenous origin: the number of port calls results from global deployment decisions over which the destination has no purchase. A territorial subsystem whose volume is decided elsewhere behaves, from the destination's point of view, as a random variable.

2.4 Hypotheses

Three testable hypotheses follow from this framework.

H1: The Malagasy tourism system is organised around a dominant node; secondary gateways do not constitute functional alternatives to the hub but dependencies of it. Prediction: flows through regional airports co-vary positively with those through Ivato.

H2: An overtaking of the hub by secondary gateways, where it occurs during a supply shock affecting the hub, is a transitory artefact and not evidence of structural recomposition. Predictions: the overtaking is explained principally by the collapse of the hub and not by growth at the secondary gateways; it does not persist beyond the shock; it appears as an outlier in the relationship that ordinarily links the two subsystems.

H3: Since territorial subsystems have highly unequal unit values, a recomposition of their relative weights alters the value created without appreciably altering the arrivals aggregate, and conversely. Prediction: over a half-year of apparent stagnation, the estimated variation in receipts departs markedly from the variation in arrivals.

3. Data, commensurability of sources and protocol

3.1 Sources

The analysis rests on four sets of data. The first is the 2025 monthly series of the Statistics and Studies Department of the Ministry of Tourism and Handicrafts, which breaks non-resident visitor arrivals down into three entry channels, Ivato air, regional air and maritime, and constitutes, to our knowledge, the only published territorial breakdown of the Malagasy tourist flow. The second is the 2026 half-year statistic released by the National Tourism Board. The third is the non-cruise arrivals statistic published by the Central Bank in its analysis of the services balance. The fourth brings together the sectoral indicators of the ministry and of the Economic Development Board of Madagascar for 2025: approved investment, employment, rooms created and cumulative room stock.

These sources emanate from distinct institutions and their joint use presupposes that their coverage coincides. Five controls were carried out to that end. They constitute the reliability foundation of all the results presented here and deserve to be made explicit, since they are made explicit in none of the source publications.

***Table 1**. Cross-source commensurability controls.*

Control	Test	Result	Status
C1	Additivity of the 2025 monthly table, by month and for the year	330,909	Validated
C2	Sum of January to June 2025 compared with the published first half	150,757	Validated
C3	Sum of January to June 2025 excluding maritime compared with the Central Bank statistic	117,978	Validated
C4	Sum of January to March 2025 compared with the « +12 % » announced for the first quarter of 2026	+11.99 %	Validated
C5	Sum of January to November 2025 compared with the published eleven-month cumulative total	299,434	Validated

***Sources:** MTA, ONTM, BCM; author's calculations.*

Control C3 deserves emphasis. The exact equality between the sum of non-maritime arrivals for the first half of 2025 computed from the ministerial series (117,978) and the Central Bank's « excluding cruise » statistic establishes that the two institutions work on the same coverage. This equality, signalled nowhere, authorises an operation without which the analysis in section 6 would be impossible: deriving by difference the number of cruise passengers in the first half of 2026, a quantity that no source publishes.

3.2 The quasi-experimental protocol

The test of H2 rests on the exploitation of an exogenous shock. Following the political crisis of late September 2025, Air France suspended its Paris-Charles-de-Gaulle service to Antananarivo from 11 October, while Air Austral and Corsair maintained their rotations, notably to Nosy Be. The shock displays the three properties that make a quasi-experiment valuable: it is exogenous to the tourism system, since it proceeds from an aviation-security decision and not from a movement in demand; it is spatially differentiated, since it affects the long-haul services of Ivato and not the regional services; and it is bounded in time.

The protocol consists in estimating, over the eleven unaffected months of 2025, the relationship that ordinarily links regional entries to entries through Ivato, and then comparing the October observation with the out-of-sample prediction. The gap measures the magnitude of the redeployment attributable to the shock; its subsequent decay measures the persistence of the phenomenon. This protocol has the advantage of presupposing no interpretation: it confronts the official diversification claim with the statistical structure of the relationship between the two subsystems alone.

3.3 Limitations

Four limitations must be made explicit. First, the 2025 data are described as provisional by their producer and no revision schedule is published; the orders of magnitude established here are robust, the decimals are not. Second, the breakdown of the 118,728 arrivals by individual regional airport is not published: we reason on an aggregate, which precludes any fine-grained analysis of the internal hierarchy of secondary gateways. Third, Madagascar no longer produces a regular border survey; average length of stay and expenditure by source market must be treated as parameters, which we do by systematically presenting sensitivity ranges rather than point values. Fourth, the accessible 2019 monthly series is not commensurable with the figure of 486,000 arrivals usually cited for that year, whose published monthly sum is close to 306,000: this break in series, undocumented by the source, leads us to mobilise 2019 only for qualitative perspective and never in a calculation.

4. A monocentric tourism system

4.1 The hierarchy of gateways

The breakdown of the year 2025 reveals a strongly polarised structure. Of 330,909 arrivals, 171,631 pass through Ivato, 118,728 through regional airports as a whole and 40,550 by sea. The Herfindahl concentration index computed over these three gateways stands at 0.413, against 0.333 under a uniform distribution.

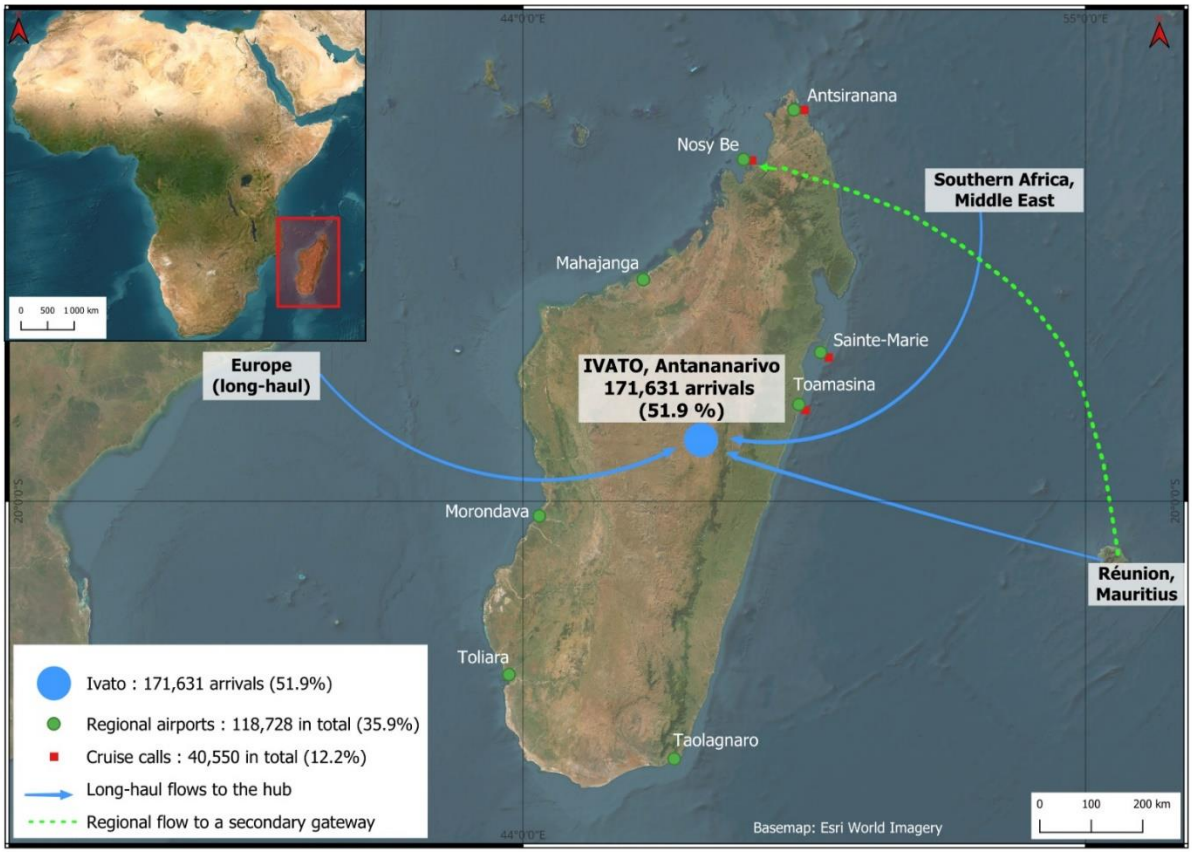


Figure 1. *Nodal structure of non-resident visitor arrivals in Madagascar (2025).*
Note. *Regional airports and cruise calls are represented by conventional point symbols. Geographic flows are represented by aggregated routing arrows by entry category, as the source data does not publish detailed origin-destination breakdowns for each individual site. Projection: Lambert Azimuthal Equal-Area, centered on 19° S and 47° E.*
Sources: *Madagascar Tourism Authority (MTA) and Esri World Imagery (basemap); data processing and cartographic design: the author, 2026.*

Two features stand out. The first is the weight of Ivato: 51.9 % of all entries, and 59.1 % of air entries alone. The second is the functional asymmetry among gateways. Ivato receives the bulk of long-haul

services; regional airports, Nosy Be foremost among them, are served essentially from neighbouring Indian Ocean islands; cruise calls are distributed along the northern and eastern seaboards. These three gateways serve neither the same source markets nor the same tourist practices.

There follows a proposition that the remainder of the article verifies: tourist visitation to Madagascar is, in essence, a function of the long-haul connectivity of a single airport. It is in this precise sense that we speak of hub dependency, and not by metaphor.

4.2 Three territorial subsystems, two inverse seasonal regimes

The national aggregate conceals the coexistence of opposing seasonal regimes. The air subsystem peaks in July, with a seasonality index of 1.48, and the months of July to September concentrate 33.5 % of its annual flow. The maritime subsystem follows a strictly inverse calendar: it reaches its maximum in January, with an index of 3.67, and falls to zero entirely from June to August.

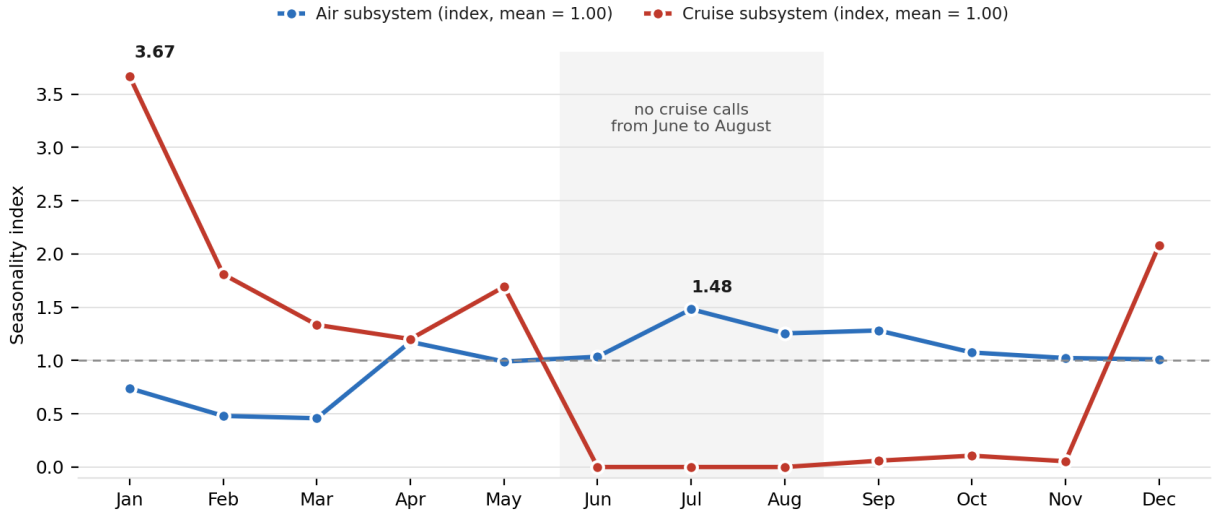
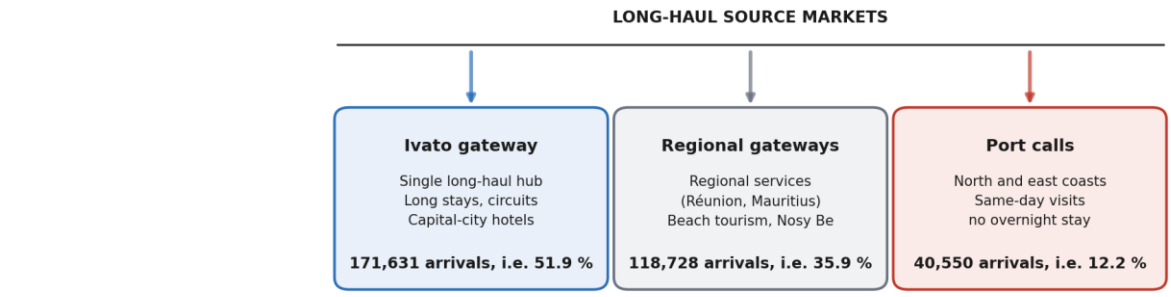


Figure 2. *Comparative seasonal regimes of the air and maritime subsystems, 2025 (monthly indices, subsystem mean = 1.00).*
Sources: *MTA; author's calculations.*

The anticorrelation is statistically established: the Pearson correlation coefficient between the two monthly series is −0.599 (p = 0.040) and the Spearman coefficient −0.732 (p = 0.007). The two subsystems differ not only in volume and geography: they occupy complementary temporal slots. The maritime segment mechanically smooths the annual profile and sustains activity in the northern ports during the austral trough, a function that its contraction, examined in section 6, precisely removes.

The third dimension of differentiation is unit value. With 2025 tourism receipts estimated at 780.6 million dollars, and imputing to the cruise passenger an expenditure of 80 dollars, an international order of magnitude for a day call, the maritime segment absorbs 3.2 million dollars, that is 0.42 % of receipts for 12.25 % of arrivals. The residual average expenditure of the air visitor then works out at 2,677 dollars. The ratio between the two unit values is of the order of 1 to 33.



Seasonal regime	Peak from July to September	Peak from July to September	Peak in January, nil from June to August
Estimated unit expenditure	USD 2,677	USD 2,677	USD 80 (assumption)
Share of 2025 receipts	**99.6 % for the air segment**		0.4 %
Change H1 2026	**+15.6 % for the air segment**		−53.8 %
Effect of the October 2025 shock	−36.8 % on September	+17.4 % on September	near nil, off season

Reading: the three gateways differ less in volume than in seasonality, unit value and exposure to risk.

Figure 3. *The three Malagasy tourism subsystems: volumes, regimes, unit values and exposure to the shock.*
Sources: *MTA, BCM, ONTM; calculations and design by the author.*

The maritime subsystem thus falls, in the sense of the MIT team's typology, under the tourist site: « one does not reside in a tourist site, one visits it » (Knafou et al., 1997, p. 200). The cruise call produces visitation without an overnight stay, without domestic transport and without accommodation consumption, that is, without the three items through which tourist expenditure ordinarily anchors itself in a territorial economy. This is not, however, to reinstate the reading of such places as pure « enclaves of international tourism », a reading that Gay (2018, p. 99) has shown most often misapprehends the density of local uses: what is at stake is not the social impermeability of the call site, but the temporal structure of the expenditure it captures.

5. The October 2025 quasi-experiment

5.1 The fact and its official interpretation

In October 2025, regional airports recorded 13,887 arrivals against 12,120 for Ivato. This is the first inversion of the hierarchy of air gateways in the available series, and the ministry reads in it the « sign of growing territorial diversification ». The statement commits the ministry to three implicit propositions: that the movement originates in a regional dynamic, that it is durable, and that it reflects an evolution in demand. We examine them in turn.

5.2 First test: the origin of the crossover

Relative to September, an undisturbed reference month, traffic at regional airports rises by 17.4 % while that of Ivato falls by 36.8 %. The magnitude of the hub's collapse is more than twice that of the regional increase. The crossing of the two curves therefore proceeds principally from the collapse of the dominant node.

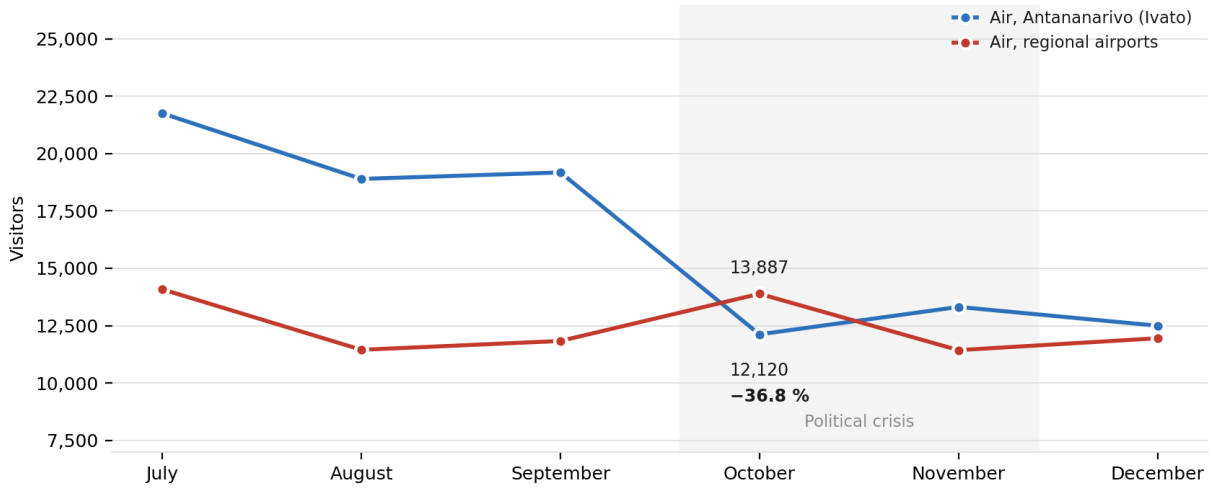


Figure 4. *Air arrivals by point of entry, July to December 2025.*
Sources: *MTA; author's calculations.*

5.3 Second test: persistence

Territorial diversification is, by construction, a structural phenomenon: it endures. Yet the inversion lasted only one month. From November onwards, Ivato (13,315) moves back ahead of regional airports (11,430), and does so even though the hub remains 30.6 % below its September level. In other words, the territorial hierarchy is restored before Antananarivo's traffic has recovered its pre-crisis level. This result is hard to reconcile with the hypothesis of a durable shift of demand towards secondary gateways: had these captured a new clientele, their advantage would have survived the hub's partial convalescence.

5.4 Third test: the relationship between subsystems

The most discriminating test consists in examining the relationship that ordinarily links the two air subsystems. Over the eleven unaffected months of 2025, this relationship is strong and positive: the regression of regional entries on entries through Ivato yields a coefficient of 0.691, a coefficient of determination of 0.658 and a correlation of +0.811 ($p = 0.002$).

Regional airports therefore do not substitute for the hub: they co-vary with it. An increase of one thousand arrivals at Ivato is accompanied on average by an increase of nearly seven hundred arrivals at regional airports. This positive covariation is the exact opposite of what territorial diversification would imply, since the latter would presuppose substitution, hence a null or negative relationship. H1 is verified.

Applied to October, this relationship predicts 7,885 regional arrivals. The observed level, 13,887, exceeds it by 6,002 units, a standardised residual of +2.58, the largest outlier of the year. October 2025 is therefore not a point on the ordinary relationship between the two subsystems: it is a one-off rupture of that relationship.

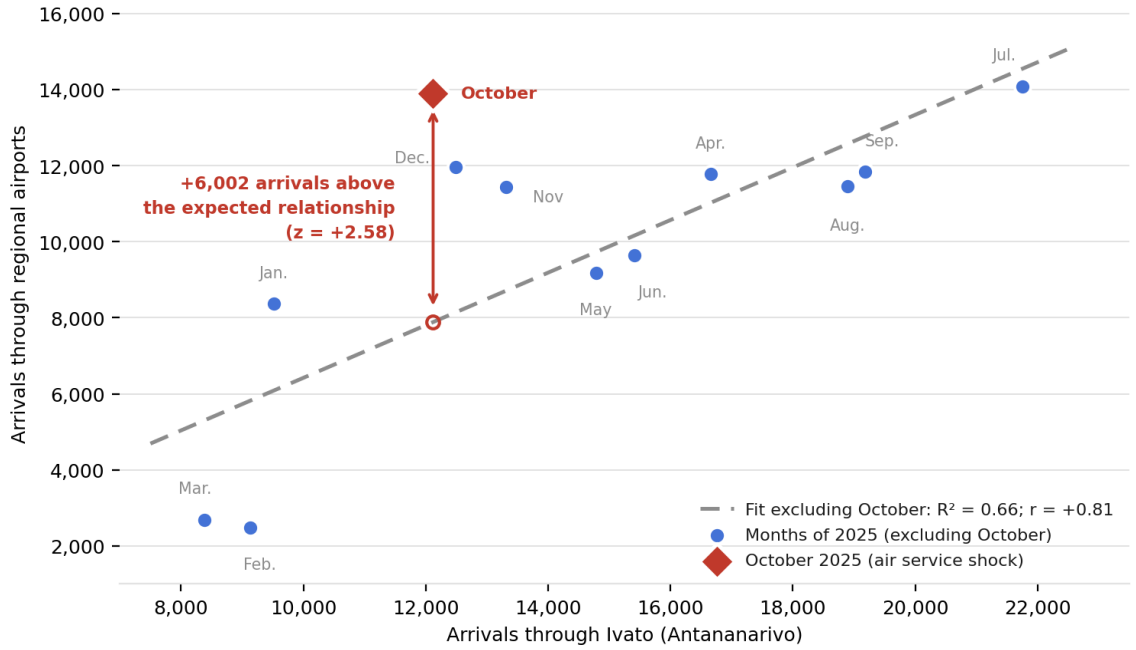


Figure 5. *Relationship between entries through Ivato and entries through regional airports, 2025.*
Note. *The fit is estimated excluding October; the October value is compared with the out-of-sample prediction.*
Sources: *MTA; calculations and design by the author.*

The residual then falls back to +1.17 in November and +1.64 in December: it remains positive, which suggests a persistence of the redeployment, but it no longer crosses the threshold of statistical aberration. The phenomenon attenuates as long-haul services are restored, without disappearing immediately. What is at issue is an itinerary adjustment, part of the visitors whose entry through Ivato was compromised having substituted a regional entry, mainly via Nosy Be served from Réunion, and not a conquest of market share.

5.5 The production of the artefact

The three tests converge: the October 2025 overtaking is an artefact of the interruption of Ivato's long-haul services. H2 is verified. It remains to understand how such a statement could be produced, for the mechanism is instructive beyond the Malagasy case.

The error proceeds from a cross-sectional comparison between two subsystems, where the phenomenon invoked, diversification, is by nature a property of trajectory. Comparing 13,887 with 12,120 for a given month says nothing about the redistribution of flows: to establish that, one would need to observe the evolution of each gateway's share over several years, at comparable supply structures. Yet Ivato's share of air entries in 2025 stands at 59.1 %, and nothing in the published data allows one to establish that it is declining. The artefact arises from substituting an instantaneous rank for a trend.

This confusion is not neutral. If it informs the allocation of promotional and investment resources, it directs them towards a phenomenon that did not occur. It should be added, to avoid any misunderstanding, that the potential for diversification is real: the share of regional airports, at 35.9 % of the annual total, attests to it, and the objective is legitimate. It is precisely for this reason that its attainment should not be dated to a month of crisis, for an objective believed to have been reached ceases to be pursued.

6. The recomposition of the first half of 2026 and the volume-value dissociation

6.1 Decomposition

The reconciliation of sources validated in section 3 permits the decomposition that neither the ministry, nor the National Tourism Board, nor the Central Bank has published. Cruise passengers for the first half of 2026 are obtained as the difference between total arrivals and non-cruise arrivals.

Table 2. *Decomposition of first-half arrivals by subsystem.*

Subsystem	H1 2025	H1 2026	Change	Rate
Non-cruise arrivals (air)	117,978	136,378	+18,400	+15.6 %
Cruise arrivals	32,779	15,154	−17,625	−53.8 %
Total	**150,757**	**151,532**	**+775**	**+0.5 %**

Note. *The « cruise » line is derived by difference; the other two are published data.*
Sources: *ONTM, BCM; author's calculations.*

The two subsystems move in opposite directions with almost identical amplitudes: the air segment contributes +12.21 points to half-year growth, the maritime segment −11.69 points. Their sum, +0.52 point, constitutes the entirety of the reported increase. The maritime share of half-year arrivals collapses correspondingly from 21.7 % to 10.0 %.

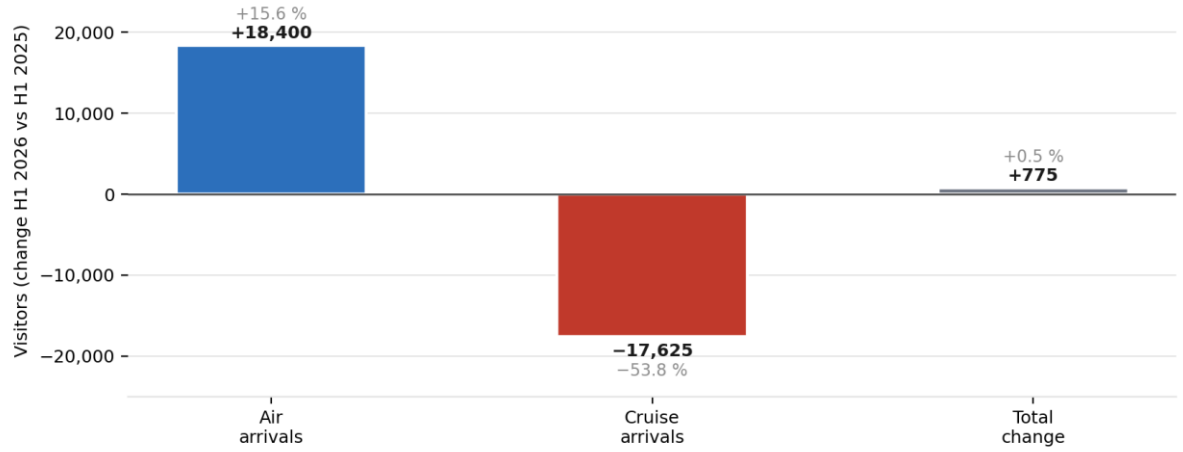


Figure 6. *Decomposition of the change in arrivals, first half of 2026 relative to the first half of 2025.*
Sources: *ONTM, BCM; author's calculations.*

A break of this magnitude in the structure of a tourist flow cannot result from a movement in demand: it reflects a contraction in the supply of port calls. This reading is consistent with the exogenous character of cruise fleet deployment recalled in section 2.3, but it cannot be formally established in the absence of published port statistics, a limitation we signal rather than circumvent.

6.2 The intra-annual profile

The quarterly decomposition adds an element that the half-year reading conceals. The first quarter of 2026 grows by 12.0 % (71,190 against 63,567), which largely reflects the catch-up of bookings cancelled during the crisis of the fourth quarter of 2025. The second quarter, by contrast, contracts by 7.9 % (80,342 against 87,190). The recovery dynamic therefore did not extend beyond the catch-up, an inflection invisible in communication that reasons only in half-year cumulative terms.

6.3 The value effect

Analysis in volume terms leads to a diagnosis of stagnation; analysis in value terms leads to the opposite diagnosis. Applied to the half-year variations, the expenditure structure established in section 4.2 implies a gain of 49.3 million dollars for the air segment against a loss of 1.4 million for the maritime segment, that is a net effect of +47.9 million on half-year receipts estimated at 318 million, an increase of approximately 15.0 %.

This result is robust to calibration. Varying the average expenditure of the cruise passenger from 50 to 250 dollars, an amplitude of one to five, shifts the net effect only from 48.5 to 44.4 million and the estimated growth in receipts only from 15.2 % to 13.8 %. The conclusion therefore does not depend on the assumption adopted: it follows from the sole asymmetry, structural and considerable, between the unit values of the two subsystems. H3 is verified.

By communicating on the number of arrivals, the sectoral authorities announced near-stagnation at a time when the economic performance of the half-year was in all likelihood the best since the recovery began. The symmetrical remark applies: in a year in which the cruise segment rebounded, the same indicator would produce a flattering increase for almost no value creation. The problem is not the direction of the error, but the fact that an arrivals counter aggregated over heterogeneous territorial subsystems does not measure what tourism policy seeks to maximise.

7. Discussion: the territorial consequences of hub dependency

7.1 A nodal rather than a capacity constraint

The Malagasy tourism room stock numbered 34,365 rooms at the end of 2025, following the creation of 4,973 rooms during the year, an increase of 16.9 % in the stock, to be compared with 7.3 % growth in arrivals, a ratio of 2.3 to 1 between the dynamics of supply and of demand. The magnitude of this divergence is measured by the implied occupancy rate. Taking the average lengths of stay documented for Madagascar, which range from sixteen to twenty-three days depending on the year, with a maximum of twenty-four days reached in 2013 (Mamiarisoa et al., 2021, p. 372), the average occupancy rate of the stock is as follows.

Table 3. *Implied average occupancy rate of the room stock by length of stay and occupancy per room, 2025.*

Persons per room	16-day stay	20-day stay	24-day stay	Range
1.6	26.4 %	33.0 %	39.6 %	13.2 pts
1.8	23.5 %	29.3 %	35.2 %	11.7 pts
2.0	21.1 %	26.4 %	31.7 %	10.6 pts

Source*: Lengths of stay after Mamiarisoa et al. (2021); room stock and arrivals after MTA/EDBM; author's calculations.*

Under the nine configurations considered, the occupancy rate remains between 21 % and 40 %, whereas the usual break-even threshold for a hotel establishment lies between 45 % and 60 %. Even allowing for the limitations of this aggregate indicator, which distinguishes neither seasons, nor categories, nor rooms actually operable, the gap is too large to be attributed to these imprecisions alone.

The Malagasy case falls here under what Dewailly terms mise en tourisme, that is « programmed development », as opposed to touristification understood as « relatively spontaneous development » (Greffier, 2010, § 9, reviewing Dewailly, 2006): capacity is produced there by investment decisions and administrative approval, not by adjustment to observed visitation. This is what permits the durable gap between supply and demand measured in Table 3. That gap carries a social cost: under-occupancy sustains the predominance of « casual, temporary, seasonal and part-time » jobs, associated with « insecurity, relatively low wages and limited career prospects » (ILO, 2019, p. 10).

The consequence is directly geographical. In a hub-dependent system, adding capacity does not create visitation: capacity is not the limiting variable, air service is. Capital invested in rooms that connectivity does not allow to be filled becomes dormant capital, and price competition among under-occupied establishments erodes their capacity for maintenance and upgrading. This configuration extends, in a less spectacular form, what Ndayisenga (2026, p. 31) describes, borrowing from Cazes (1992) the notion of the « hotel shell », as those tropical shoreline hotels « calibrated to turn over, each week, the few hundred tourists brought in by charter »: dependency on a flow whose volume and calendar the place controls neither.

7.2 The cost of hub dependency

The fourth quarter of 2025 allows the cost of a node failure to be estimated. The ratio of the fourth to the third quarter stands at 0.850, whereas the 2019 seasonal profile would lead one to expect it in the neighbourhood of 1.05: the shortfall works out at between 14,600 and 19,500 visitors for an episode of a few weeks, an order of magnitude consistent with the losses of one hundred million dollars and the 80 % cancellation rate reported by operators. Related to the unit expenditure estimated in section 4.2, this shortfall represents between 39 and 52 million dollars of receipts.

This vulnerability is not peculiar to Madagascar, but it is amplified there by the conjunction of three factors: the concentration of traffic on a single gateway, dependency on a restricted number of long-haul carriers, and the level of fares, which makes the destination substitutable for its Indian Ocean neighbours (Mamiarisoa et al., 2021, p. 373). The regional subsystem did admittedly play a buffering role in October, and this is the reading that may legitimately be drawn from the residual of +6,002 arrivals, but a buffer is not an alternative: the covariation of +0.81 established in section 5.4 indicates that secondary gateways depend, under ordinary conditions, on the same determinants as the hub.

There follows a public policy proposition that spatial analysis allows to be formulated with precision: the diversification of gateways and air services belongs less to a policy of territorial planning than to a policy of macroeconomic insurance. Its justification is not, in the first instance, territorial equity, but the reduction of the variance of an export receipt representing, in 2025, of the order of 4.5 % of gross domestic product.

7.3 The 2028 target tested against nodality

Public communication allows three targets for 2028 to coexist: 600,000 visitors announced at the twelfth ITM fair, one million in ministerial documents, three million in certain press accounts. A one-to-five ratio between the official objectives of a single policy is in itself a result, and the first to be recorded: in the absence of a quantified and dated strategy document, no ex post evaluation is possible. Nodal analysis nevertheless allows them to be ranked.

Table 4. *Conditions for achieving the three public targets.*

Parameter	600,000	1,000,000	3,000,000
Required multiplier (2028/2025)	1.81	3.02	9.07
Required average annual growth	21.9 %	44.6 %	108.5 %
Gap with observed pace (7.3 %)	+14.6 pts	+37.2 pts	+101.2 pts
Required annual air seats	658,500	1,097,500	3,292,500
Rooms required (45 % occupancy)	28,412	47,353	142,060
Rooms to be created	stock sufficient	+12,988	+107,695

Note. *Room requirements computed under the assumptions of a fourteen-day stay, 1.8 persons per room and a target occupancy rate of 45 %; air seats under the assumptions of an 87.8 % air share and an 80 % load factor. Author's calculations.*

The three million target would require visitation to be multiplied by nine in three years and the country's entire air traffic to be tripled: it does not belong to the realm of planning. The one million target requires an annual growth rate of 44.6 %, six times the observed pace, and above all a move to 1.1 million annual seats, in a context where one of the few long-haul carriers suspended its flights a few months earlier. The 600,000 target, by contrast, presents an entirely different constraint profile: the existing stock would suffice to accommodate it at an occupancy rate of 45 %, precisely the level that would make the sector profitable, and the room requirement would be nil.

In other words, none of the three targets runs up against a capacity constraint: the only one that is attainable requires no additional room, and the one that would require rooms is out of reach for reasons of connectivity. The nodal diagnosis thus reorders the hierarchy of policies: what limits Malagasy tourism

lies upstream of the territory, in the number of long-haul seats available and in the price at which they are sold.

7.4 Scope and limits of generalisation

The configuration described here is not peculiar to Madagascar. It potentially characterises any peripheral destination whose access depends on a single airport and a small number of carriers, a frequent situation in sub-Saharan Africa, where long-haul service is often provided by two or three European or Gulf carriers. It extends, by spatialising it, the question of the tourism specialisation of small island developing economies and of its sustainability (Logossah and Maupertuis, 2007). Three conditions appear necessary for hub dependency to produce the effects analysed here: a share of the principal node above half of all entries; a low elasticity of demand with respect to the price of transport, which precludes substitution by a more costly alternative service; and the absence of a public breakdown of flows by gateway, which renders the artefact statistically undetectable to the ordinary observer.

Two reservations must be stated. The first concerns sample size: the tests in section 5 rest on twelve monthly observations, which permits an outlier to be established but not a modal shift model to be estimated. The second concerns the fact that the estimation of the value effect rests on a hypothetical expenditure structure, in the absence of a border survey. The sensitivity test conducted in section 6.3 establishes that the qualitative conclusion does not depend on the calibration, but the quantified magnitude must be handled as an order of magnitude. These two reservations point to the same gap and the same priority: the reconstruction of an observation system that breaks flows down by gateway and documents expenditure by segment.

8. Conclusion

This article establishes three results. The Malagasy tourism system is monocentric: Ivato concentrates 51.9 % of entries and 59.1 % of air entries, and secondary gateways co-vary with the hub ($r = +0.81$) instead of substituting for it. The inversion of hierarchy in October 2025, presented as the sign of territorial diversification, is an artefact of node failure: it proceeds from a 36.8 % collapse of the hub, appears as the largest outlier of the year in the relationship between subsystems, and is resolved from the following month onwards. Finally, the near-stagnation of the first half of 2026 conceals a recomposition between subsystems of opposing unit values, whose effect on receipts is of the order of +15 %.

These results converge on a single proposition: in a spatially polarised system, the national arrivals aggregate is a poor instrument of observation, not because it is inaccurate, but because it adds together quantities that are heterogeneous in volume, in calendar, in value and in exposure to risk. The two interpretive errors examined here, a supply shock read as a shift in demand and a value creation read as stagnation, are not accidents of communication: they are the regular products of a metric blind to the spatial structure of the phenomenon it measures.

None of the results presented rests on data that the sectoral authorities do not possess. All follow from elementary operations conducted on published statistics. This is perhaps the most significant finding: the gap between the official diagnosis and the one established here does not stem from a deficit of information, but from a deficit in the exploitation of available information and, more fundamentally, from the absence of a spatial framework within which to interpret it.

Three implications follow for statistical observation. No aggregate arrivals statistic should be published without its breakdown by gateway, which should be detailed by airport and by port. A value indicator, foreign exchange receipts, average expenditure or bed-nights, should replace volume as the principal indicator of sectoral performance, and the 2028 target should be expressed in receipts rather than in visitors. Finally, a regular border survey, whose cost bears no comparison with the value of the trade-offs it would illuminate, conditions the implementation of the two preceding measures.

There remains a question that this article opens without settling. If the constraint is nodal, tourism policy belongs in essence to transport policy, that is to the negotiation of traffic rights, the taxation of jet fuel and competition on long-haul routes. Yet these instruments are, in Madagascar as in most peripheral island economies, neither held nor steered by the tourism administration. Hub dependency is therefore not only a property of the network: it is also an institutional configuration, in which the party accountable for performance does not command the levers that determine it.

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APPENDIX

Monthly series of arrivals by gateway, 2025

MONTH	IVATO	REGIONAL AIRPORTS	MARITIME	TOTAL	IVATO SHARE (AIR)
JANUARY	9,512	8,364	12,387	30,263	53.2 %
FEBRUARY	9,137	2,472	6,113	17,722	78.7 %
MARCH	8,382	2,692	4,508	15,582	75.7 %
APRIL	16,656	11,770	4,057	32,483	58.6 %
MAY	14,782	9,168	5,714	29,664	61.7 %
JUNE	15,406	9,637	0	25,043	61.5 %
JULY	21,754	14,081	0	35,835	60.7 %

AUGUST	18,895	11,446	0	30,341	62.3 %
SEPTEMBER	19,177	11,831	199	31,207	61.8 %
OCTOBER	12,120	13,887	360	26,367	46.6 %
NOVEMBER	13,315	11,430	182	24,927	53.8 %
DECEMBER	12,495	11,950	7,030	31,475	51.1 %
TOTAL 2025	**171,631**	**118,728**	**40,550**	**330,909**	**59.1 %**

Source: *Ministry of Tourism and Handicrafts, Statistics and Studies Department (provisional data). The last column relates entries through Ivato to the air total alone.*