

Article

An Index of Municipal Tourist Attractiveness: A Possible Methodological Approach Applied to Portugal

Ricardo de Moraes e Soares ¹, Alexandre Morais Nunes ^{2,*},
João Ricardo Catarino ², Ana Catarina Kaizeler ³, Vanda Martins ¹

¹ School of Business and Administration, Universidade Politécnica de Setúbal, Campus do IPS, Estefanilha, Setúbal 2910-761, Portugal; ricardo.soares@esce.ips.pt (RdMeS); vanda.martins@esce.ips.pt (VM)

² CAPP—Centre for Public Administration and Public Policies, Institute of Social and Political Sciences, Universidade de Lisboa, Rua Almerindo Lessa, Lisboa 1300-663, Portugal; jccatarino@iscsp.ulisboa.pt (JRC)

³ SOCIUS—Research Centre in Economic and Organizational Sociology, School of Economics and Management, Universidade de Lisboa, Rua do Quelhas, nº 6, Lisboa 1200-781, Portugal; catarina.kaizeler@tecnico.ulisboa.pt (ACK)

* Correspondence: Alexandre Morais Nunes, Email: anunes@iscsp.ulisboa.pt

ABSTRACT

The study aims to define a composite indicator capable of assessing the ability of municipalities to attract tourists to their territories, considering a series of factors related to tourism. The proposed index integrates variables such as tourist infrastructure, the cultural and tourist offer, the flow of tourists, environmental sustainability, and quality of life in healthcare, with the aim of providing a comprehensive measure of municipal tourist attractiveness. The analysis is based on quantitative data from official sources such as the National Statistics Institute (INE). To define the index, statistical methods were applied and specific weights defined for each of the components, according to their relevance to tourist attractiveness. The index was calculated using a weighted sum of the normalised values, allowing comparison between municipalities. In addition, a sensitivity analysis was carried out to test the robustness of the index and assess the consistency of the results. The index introduces a practical tool for assessing and comparing the capacity of municipalities to attract tourists, guiding public policies and sustainable development strategies in the tourism sector.

KEYWORDS: attractiveness; index; municipalities; sustainability; tourism

ABBREVIATIONS

IMAT, Tourism Attractiveness Index; INE, National Statistics Institute

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INTRODUCTION

In the Portuguese context, tourism is seen as one of the most important socio-economic development factors and currently occupies a prominent place in the national economy [1,2]. Portugal is one of the most visited countries, and the tourism sector accounts for an exceptional share of Portugal's GDP [3,4] and plays a key role in job creation and regional development [5,6]. On the other hand, the sector has served as a tool for promoting countries [7,8]. However, the ability of municipalities to effectively attract and retain tourists is still far from uniform [9,10]. While municipalities such as Lisboa, Porto and Funchal boast high levels of tourists, many others, more rural and less developed, struggle with lower levels of tourism development. This disparity in the level of development between municipalities emphasises the need to produce a method for measuring the factors that stimulate tourist attractiveness [11,12].

In Portugal, the concept of tourist attractiveness is multifaceted and encompasses both traditional factors (infrastructure, networks and access) and modern factors (cultural and historical offerings, environmental sustainability and quality of life in healthcare). A municipality's ability to attract tourists is moulded by an intricate web of elements, with varying levels of relevance and intrinsically dependent on municipal and regional characteristics [13,14]. In other words, urban municipalities tend to prioritise infrastructure, access and entertainment options [15,16], while rural municipalities seek to emphasise landscape features, sustainability and cultural offerings [17,18]. However, despite the relevance of some of these factors, municipalities in Portugal lack an inclusive and standardised tool for assessing the tourism potential of each municipality [19,20]. The gap is particularly visible in less visited regions, where local authorities often need information [21,22] and timely guidelines for identifying and capitalising on tourism assets.

Studies on the competitiveness and attractiveness of tourism have contributed to a broad understanding of the factors that influence tourists' destinations. Hassan [23] and Munir et al. [24] in their studies, emphasised the role of infrastructure, access and economic performance in determining municipal attractiveness. Munar and Ooi [25] and Dugulan et al. [26] emphasise the importance of cultural and heritage offerings in tourism competitiveness, claiming that municipalities with higher levels of historical assets are those that exhibit better conditions for attracting visitors.

Gössling and Peters [27] and Baloch et al. [28] who defend the importance of environmental sustainability as an essential factor in tourism and emphasise the need for municipalities to adopt ecological preservation and the best practices of responsible tourism as factors in developing the competitiveness and attractiveness of regions, highlight another relevant factor. In terms of the tourist attractiveness of municipalities, tourists' perceptions are essential [29,30], and theory tends to treat the factors that attract tourists individually and in isolation [31,32],

rather than examining them in a broader and more interconnected way. In Portugal, where the dynamics of the tourism sector can vary significantly between municipalities, the adoption of fragmented approaches has not been able to provide a broad and rigorous analysis of municipalities' levels of tourist attractiveness [33,34].

One of the most prominent problems with tourism indices is that most of the indicators were developed with the purpose of producing assessments at the national level [35,36] and without the detail needed to carry out analyses at the municipal level [37,38]. Although the indices assess indicators such as the number of tourists, available beds and overnight stays, they often neglect other aspects such as environmental sustainability [39,40] or quality of life in healthcare [41,42], which are increasingly recognised as essential for attracting tourists [43,44]. In doctrine, the indices undervalue regional diversity [45,46] and the unique characteristics of municipalities [47,48], which produces a significant gap in the ability to comprehensively analyse and compare municipal tourist attractiveness.

The study aims to address the methodological gap and suggest a probable tourism attractiveness index, specifically designed for municipalities. By integrating various dimensions of tourist attractiveness, including infrastructure, access, cultural and recreational offerings, tourism heritage, environmental sustainability and quality of life in healthcare, the index provides a holistic tool for assessing the level of attractiveness of municipalities in attracting tourists. According to the literature, attractiveness factors should be selected based on their relevance to the country's context [49,50]. The index should provide a standardised methodology [51,52] and be based on statistical data [53,54] that allows tourism performance to be compared and municipal tourism strategies to be improved.

The study's contribution is twofold. Firstly, because it suggests a practical index for political actors and agents in the sector, supporting the process of evaluating tourist attractiveness and the possible identification of areas for intervention. Secondly, the study reveals an innovative proposal for synthesising the various factors that influence municipal tourism, providing a more rigorous measure of attractiveness. The index also contributes to the development of the literature on the attractiveness of tourism in Portuguese municipalities.

By offering a more demanding analysis, the study contributes to the discourse on the levels of tourist attractiveness of municipalities, especially those located in rural or less visited areas. By incorporating environmental sustainability and quality of life in healthcare, the study emphasises the need to adopt more balanced models for tourism development, which take into account the socio-economic development of local communities.

Finally, the study aims to develop a comprehensive tourism attractiveness index based on statistical data, capable of estimating the

capacity of Portuguese municipalities to attract tourists and which will serve as a decision-making tool, helping municipalities to identify their strengths and weaknesses and to devise more targeted strategies for increasing tourist attraction.

MATERIALS AND METHODS

The approach consists of a case study, with a quantitative methodological framework, through the analysis of the available tourist offer in the municipalities (infrastructure, available services and municipal expenditure) and excluding demand (individual perceptions and tastes of tourists), with the aim of verifying the possibility of constructing a possible tourist attractiveness index for Portuguese municipalities. The starting point is to verify which municipalities are most efficient in terms of tourism offerings. The index aims to measure and compare the potential capacity of municipalities to attract tourists through the available offer.

The analysis is based on secondary data collected from national and institutional sources. The primary source of the data was the National Institute for Statistics (INE), supplemented by data from PORDATA. The reference interval for the data is 2020–2024, selected due to the availability of information. The study covers all municipalities in Portugal.

To define the Index of Municipal Tourist Attractiveness (IMAT), five main dimensions were defined, and each dimension includes a set of indicators that reflect the different aspects of the attractiveness of a given municipality, all of which are standardised and weighted equally.

The indicators were selected through a literature review and validated based on their availability, relevance and alignment with the context of the Portuguese tourism sector. The dimensions defined and the indicators selected were as follows:

1. Supply and Expenditure on Tourism Infrastructure. Centred on the installed capacity of municipalities to receive tourists and the investments made in structures (tourist accommodation establishments (no.); tourist accommodation capacity (no.); and average income per room (€));
2. Cultural and Heritage Supply and Expenditure. Evaluates the diversity and density of available cultural resources (cultural immovable property (no.); art galleries and other temporary exhibition spaces (uni.); zoological, botanical and aquarium gardens (uni.); museums (uni.); and expenditure on cultural heritage (€));
3. Supply and Expenditure on Cultural Activities. Analyses the supply of cultural and artistic activities (entertainment venues (uni.); cinemas (uni.); and expenditure on performing arts (€));
4. Infrastructure offer. This looks at the payment services available to tourists and the existence of medical infrastructures (banks and savings banks (uni.) and hospitals (uni.));

5. Environmental Supply and Expenditure. This includes elements that can contribute to the ecological attractiveness of territories and looks at investments and actions linked to the sustainability and preservation of the environment (bathing waters (uni.); drinking water quality (%); surface area of protected areas (ha); and environmental expenditure (€)).

To enable inter-municipal comparability between variables with different scales and units, min-max normalisation was applied:

$$x'_{ij} = \frac{x_{ij} - \min(x_j)}{\max(x_j) - \min(x_j)} \quad (1)$$

Where x'_{ij} is the composite score of indicator j for municipality i and x_{ij} is the value of the municipality's indicator. The index is analysed and interpreted using a scale between 0 and 1. In terms of weights, each indicator contributes equally to the index score.

The tourist attractiveness index for each municipality was obtained using the following weighted linear aggregation method:

$$\text{Tourism Attractiveness Index} = \sum_{j=1}^n w_j \cdot x'_{ij} \quad (2)$$

Where w_j translates the weight given to each of the j indicators in the final composition of the index. The weights vary between 0 and 1, and the sum of all is equal to 1 ($\sum w_j = 1$), in order to ensure that all the indicators contribute proportionally.

Finally, in order to analyse the robustness of the index, the study includes a sensitivity analysis of the results with the aim of assessing the influence of municipal options and the consistency of the conclusions. For this purpose, the analysis was carried out with the limits (0, 1) for the year 2024, using the following expression:

$$S = \sum_{j=1}^n w_j \cdot x'_{ij} \cdot [(\beta - \alpha) + \alpha] \quad (3)$$

Where parameters α and β represent the lower and upper limits of the new analysis intervals. In preparing the index, we chose to assign identical weights to all indicators. This model is adopted in the literature when there is insufficient empirical evidence and/or theoretical consensus regarding the relative importance of indicators, ensuring neutral and transparent weighting [55,56].

The index calculations were all carried out using Excel.

RESULTS

This section aims to present and analyse the results obtained from the construction of a Composite Index of Tourist Attractiveness (IMAT), applied to all Portuguese municipalities and based on data for the period 2020–2024. The index was developed to enable a comparison of the tourist attractiveness of the different municipalities, using standardised statistical indicators aggregated in a weighted manner.

The IMAT was developed using secondary data from the INE and PORDATA. The indicators included were selected through a literature review, taking into account their relevance to tourism and the availability of information at the municipal level.

In 2020, the results obtained suggest that the level of attractiveness of the municipalities varies between 0.894% (Corvo municipality) and 48.216% (Lisboa municipality), with an average attractiveness of 4.269%. The results reflect an asymmetrical distribution of the tourist offer, activities and facilities, with a very small number of municipalities concentrating quite high levels of tourist attractiveness and the majority showing significantly lower levels.

As can be seen from Table 1 and Figure 1, the 10 municipalities with the best levels of tourist attractiveness, both due to their tourist offer and the availability of assets and environmental awareness, were Lisboa, Porto, Coimbra, Évora, Sintra, Funchal, Setúbal, Cascais, Almada and Santarém. These municipalities are well above the population average ($\mu > 4.269\%$) and are mainly located in the Lisboa area, which reflects a strong concentration of tourism assets, infrastructures, accessibility and local tourism enhancement policies.

Conversely, the results show that the 10 municipalities with the lowest levels of attractiveness are Santa Cruz Graciosa, Machico, Povoação, Castanheira de Pêra, Santana, Lagoa, Lajes das Flores, Corvo, Ribeira Brava and Nordeste, which are below the population average ($\mu < 4.269\%$) and have a lower tourism offer, notoriety, population density, cultural, environmental and heritage facilities and a municipal policy of low tourism value.

In 2021, the data suggests that the level at which municipalities attract tourists varies between 0.892% (municipality of Nordeste) and 48.039% (municipality of Lisboa), with an average attractiveness of 4.494%. The estimated levels thus reflect an asymmetrical distribution of the tourist offer throughout the territory. This means that there is a high concentration in a very small number of municipalities of tourism assets, available infrastructures and accessibility, and municipal policies for tourism development. On the other hand, the majority of municipalities have significantly low levels of tourist attractiveness.

By reading Table 2 and Figure 1, it is possible to analyse the 10 municipalities with the best levels of tourist attractiveness, as they provide the best range of tourism assets, equipment, access and environmental awareness: Lisboa, Porto, Coimbra, Évora, Sintra, Funchal, Almada, Cascais, Setúbal and Vila Nova de Gaia. These municipalities are well above the population average ($\mu > 4.494\%$) and are particularly located in the Lisboa metropolitan area, which reflects a strong concentration of the available tourist offer.

Conversely, the 10 municipalities with the lowest levels of tourism offer are Vila Nova da Barquinha, Valpaços, Arruda dos Vinhos, Murtosa, Santa Cruz da Graciosa, Vila Franca do Campo, Ribeira Brava, Castanheira de

Pêra, Corvo and Nordeste. These, in turn, are situated below the population average ($\mu < 4.494\%$), and have a lower tourism offer, renown, population density, cultural, environmental and heritage assets and policies of reduced valorisation.

In 2022, the results suggest a level of tourist attractiveness that varies between 1.675% (municipality of Nordeste) and 52.354% (municipality of Lisboa), for an average national attractiveness of 4.975%. The figures reflect an asymmetrical distribution of the tourist offer. As can be seen, the data shows a high concentration of tourism in a very small number of municipalities. Due to the limited supply of tourism assets, infrastructure and accessibility, most municipalities have relatively low levels of attractiveness.

According to the data (Table 3 and Figure 1), the 10 municipalities with the best levels of tourism offer were Lisboa, Porto, Coimbra, Sintra, Almada, Évora, Funchal, Lagoa, Vila Nova de Gaia and Aveiro, as they have the best tourism offer and are well above the population average ($\mu > 4.975\%$). These municipalities are located in the Lisboa metropolitan area and reflect a strong concentration of the available tourist offer.

On the other hand, the 10 municipalities with the lowest levels of tourism offer are Vila Nova de Poiares, Carregal do Sal, Paços de Ferreira, Lajes das Flores, Vila Nova da Barquinha, Santa Cruz da Graciosa, Arruda dos Vinhos, Corvo, Ribeira Brava and Nordeste. These municipalities are situated below the population average ($\mu < 4.975\%$) and have, in comparison to the others, a lower tourism offer, relevance in the sector, heritage and cultural assets and local policies of low tourism appreciation.

In 2023, the estimated results suggest a level of tourist attractiveness that ranges between 1.131% (municipality of Corvo) and 62.615% (municipality of Lisboa), for an average national attractiveness of 5.280%. The figures reflect an asymmetrical distribution of the tourist offer. The results show a marked asymmetry in the distribution of the tourist offer, demonstrating a high concentration in a very small number of municipalities. The majority of municipalities have low levels of tourist attractiveness due to the lack of relevant tourist assets, adequate infrastructure and accessibility conditions that favour the development of the sector.

The data shows that the 10 municipalities with the best tourism offers are Lisboa, Porto, Coimbra, Sintra, Almada, Funchal, Vila Nova de Gaia, Ponta Delgada, Loulé and Cascais. This territorial concentration of tourist attractiveness demonstrates a marked spatial asymmetry, reflecting the high centralisation of tourist activity in a very small number of municipalities.

Conversely, according to the methodology, the 10 municipalities with the lowest levels of tourist attractiveness were Santa Cruz da Graciosa, Penalva do Castelo, Alpiarça, Vila Nova da Barquinha, Murtosa, Lajes das Flores, Santa Comba Dão, Salvaterra de Magos, Arruda dos Vinhos and Corvo (Table 4 and Figure 1). The municipalities are distributed below the

population average ($\mu < 5.280\%$) and have, in comparison with the others, a lower tourism offer, relevance in the sector, heritage and cultural assets and local policies to increase tourism.

In 2024, the estimated results show that the 10 most attractive municipalities for tourists are Lisboa, Porto, Coimbra, Sintra, Almada, Funchal, Vila Nova de Gaia, Ponta Delgada, Loulé and Cascais. The municipalities are above the population average ($\mu > 5.334\%$), and the situation shows the existence of high levels of tourist attractiveness, an effect of the availability of tourist facilities, infrastructures and accessibility. These inequalities between municipalities pose a challenge for the planning and balanced development of the tourism sector at the national level (Table 5 and Figure 1).

Conversely, the 10 least attractive municipalities for tourism were Santa Cruz da Graciosa, Penalva do Castelo, Alpiarça, Vila Nova da Barquinha, Murtosa, Lajes das Flores, Santa Comba Dão, Salvaterra de Magos, Arruda dos Vinhos and Corvo. These municipalities are below the population average ($\mu < 5.334\%$) and have a lower tourism offer and availability.

Table 1. Results of the municipal tourism attractiveness indicator for the year 2020.

Municipalities	IMAT	Rank	Municipalities	IMAT	Rank	Municipalities	IMAT	Rank	Municipalities	IMAT	Rank	Municipalities	IMAT	Rank	Municipalities	IMAT	Rank
Lisboa	48.216%	1	Odemira	5.703%	52	Sabugal	4.274%	103	Campo Maior	3.574%	154	Valença	2.866%	205	Ansião	2.342%	257
Porto	24.225%	2	Vila Real Santo António	5.599%	53	Alijó	4.270%	104	Mação	3.572%	155	Freixo Espada à Cinta	2.853%	206	Celorico de Basto	2.332%	258
Coimbra	18.064%	3	Belmonte	5.584%	54	Alter do Chão	4.269%	105	Figueira Castelo Rodrigo	3.566%	156	Ribeira de Pena	2.845%	207	Felgueiras	2.308%	259
Évora	15.864%	4	Seixal	5.570%	55	Porto de Mós	4.260%	106	Avis	3.565%	157	Câmara de Lobos	2.828%	208	Cabeceiras de Basto	2.302%	260
Sintra	14.748%	5	Montemor-o-Novo	5.484%	56	Peniche	4.254%	107	Montalegre	3.545%	158	Lourinhã	2.825%	209	Cartaxo	2.297%	261
Funchal	13.661%	6	Caldas da Rainha	5.483%	57	Torres Novas	4.250%	108	Mogadouro	3.538%	159	Gavião	2.819%	210	Tábua	2.290%	262
Setúbal	10.772%	7	Silves	5.439%	58	Porto Santo	4.163%	109	Moura	3.515%	160	Oleiros	2.814%	211	Almeirim	2.289%	263
Cascais	10.552%	8	Olhão	5.412%	59	Aljezur	4.142%	110	Santa Maria da Feira	3.495%	161	Vidigueira	2.809%	212	Santa Cruz	2.286%	264
Almada	10.275%	9	Covilhã	5.403%	60	Barreiro	4.141%	111	Vila Viçosa	3.486%	162	Viana do Alentejo	2.804%	213	Vagos	2.271%	265
Santarém	9.705%	10	Oliveira do Hospital	5.346%	61	Miranda Douro	4.137%	112	Aljustrel	3.452%	163	São João Madeira	2.803%	214	Oliveira de Frades	2.261%	266
Vila Nova de Gaia	9.523%	11	Torres Vedras	5.339%	62	Sines	4.134%	113	Gouveia	3.452%	164	Torre de Moncorvo	2.794%	215	Figueiró dos Vinhos	2.250%	267
Leiria	9.387%	12	Melgaço	5.286%	63	Mira	4.124%	114	Fafe	3.428%	165	Sátão	2.785%	216	Resende	2.249%	268
Loulé	8.855%	13	Sabrosa	5.246%	64	Espinho	4.119%	115	Bombarral	3.406%	166	Trofa	2.784%	217	Pinhel	2.248%	269
Seia	8.779%	14	Terras de Bouro	5.233%	65	Alenquer	4.106%	116	Penacova	3.400%	167	Santa Comba Dão	2.772%	218	Oliveira do Bairro	2.244%	270
Braga	8.430%	15	Alcobaça	5.146%	66	Paredes de Coura	4.074%	117	Vieira do Minho	3.386%	168	Alpiarça	2.761%	219	Pedrogão Grande	2.206%	271
Alcácer do Sal	8.062%	16	Mirandela	5.118%	67	Alandroal	4.061%	118	Ourique	3.385%	169	Boticas	2.755%	220	Armamar	2.197%	272
Viseu	7.927%	17	Lamego	5.051%	68	Arouca	4.055%	119	Condeixa-a-Nova	3.379%	170	Ponta do Sol	2.722%	221	Castelo de Paiva	2.196%	273
Barcelos	7.909%	18	Castelo de Vide	5.044%	69	Ferreira do Zêzere	4.048%	120	Miranda do Corvo	3.379%	171	Sobral Monte Agraço	2.719%	222	Murça	2.139%	274
Aveiro	7.812%	19	Pampilhosa da Serra	5.000%	70	Alcanena	4.041%	121	Vale de Cambra	3.378%	172	Lousada	2.714%	223	Azambuja	2.110%	275
Matosinhos	7.606%	20	Ponte de Lima	4.998%	71	Óbidos	4.033%	122	Marco de Canaveses	3.369%	173	Fronteira	2.714%	224	Lajes do Pico	2.071%	276
Estremoz	7.480%	21	Mafra	4.991%	72	Arganil	4.014%	123	Ferreira do Alentejo	3.357%	174	Trancoso	2.707%	225	Vizela	2.060%	277
Tarouca	7.193%	22	Sertão	4.952%	73	Idanha-a-Nova	4.000%	124	Almeida	3.345%	175	Mourão	2.699%	226	Penalva do Castelo	2.056%	278
Esposende	7.074%	23	Elvas	4.952%	74	Constância	3.988%	125	Horta	3.340%	176	Alvito	2.698%	227	Penedono	2.052%	279
Fundão	7.072%	24	Borba	4.906%	75	Lousã	3.946%	126	Carraceda de Ansiães	3.304%	177	Mortágua	2.696%	228	Cinfães	2.045%	280
Ponta Delgada	6.972%	25	Salvaterra de Magos	4.900%	76	Pombal	3.937%	127	Paredes	3.299%	178	Vila do Bispo	2.694%	229	Velas	2.022%	281
Albufeira	6.928%	26	Beja	4.893%	77	São Brás Alportel	3.936%	128	Almodôvar	3.284%	179	Cuba	2.668%	230	Vendas Novas	2.002%	282
Castelo Branco	6.903%	27	Ovar	4.889%	78	Tondela	3.930%	129	Ponte da Barca	3.269%	180	Golegã	2.648%	231	Vila Nova de Poiares	1.985%	283
Bragança	6.777%	28	Barrancos	4.867%	79	Vila Velha Ródão	3.906%	130	Crato	3.262%	181	Rio Maior	2.634%	232	Moimenta da Beira	1.974%	284
Faro	6.774%	29	Maia	4.862%	80	Ponte de Sor	3.893%	131	Macedo de Cavaleiros	3.254%	182	Alcochete	2.631%	233	Sernancelhe	1.948%	285
Tavira	6.693%	30	Tomar	4.858%	81	Montijo	3.841%	132	Batalha	3.153%	183	Vila Nova de Paiva	2.626%	234	Santa Cruz Flores	1.930%	286
Angra do Heroísmo	6.639%	31	Póvoa de Varzim	4.856%	82	Peso da Régua	3.837%	133	Alvaiázere	3.143%	184	Vila de Rei	2.626%	235	Calheta	1.920%	287
Figueira da Foz	6.547%	32	Oliveira de Azeméis	4.810%	83	Vinhais	3.834%	134	Gondomar	3.141%	185	Sever do Vouga	2.625%	236	Vila do Porto	1.914%	288
Abrantes	6.544%	33	Mértola	4.776%	84	Marinha Grande	3.797%	135	Vila Nova de Cerveira	3.123%	186	Alfândega da Fé	2.624%	237	Murtosa	1.884%	289
Oeiras	6.509%	34	Monção	4.772%	85	Estarreja	3.782%	136	Nazaré	3.115%	187	Baião	2.611%	238	Paços de Ferreira	1.859%	290
Vila Nova Famalicão	6.462%	35	Anadia	4.740%	86	Góis	3.745%	137	Cadaval	3.091%	188	Vouzela	2.582%	239	Vila Franca Campo	1.859%	291
Lagoa	6.443%	36	Águeda	4.738%	87	Monchique	3.734%	138	Amares	3.088%	189	Soure	2.544%	240	Madalena	1.842%	292
Guarda	6.414%	37	Manteigas	4.711%	88	São Pedro do Sul	3.728%	139	Celorico da Beira	3.084%	190	Amarante	2.544%	241	Vila Nova Barquinha	1.810%	293
Palmela	6.377%	38	Serpa	4.699%	89	Vila Flor	3.703%	140	Mangualde	3.061%	191	Penela	2.500%	242	Mesão Frio	1.805%	294
Guimarães	6.359%	39	Penamacor	4.636%	90	Cantanhede	3.697%	141	Caminha	3.031%	192	Castro Daire	2.495%	243	Valpaços	1.798%	295
Lagos	6.289%	40	Sesimbra	4.557%	91	Ribeira Grande	3.672%	142	Mêda	3.021%	193	Coruche	2.494%	244	Vila da Praia Vitória	1.791%	296
Portimão	6.117%	41	Nelas	4.527%	92	Vila Pouca Aguiar	3.669%	143	Entroncamento	2.996%	194	Mondim de Basto	2.473%	245	Arruda dos Vinhos	1.786%	297
Vila Real	6.104%	42	Vila do Conde	4.479%	93	Penafiel	3.665%	144	Castro Verde	2.980%	195	Tabuaço	2.469%	246	Porto Moniz	1.765%	298
Grândola	6.040%	43	Arraiolos	4.422%	94	Valongo	3.655%	145	Sousel	2.974%	196	Montemor-o-Velho	2.455%	247	Santa Cruz Graciosa	1.761%	299
Ourém	6.035%	44	Santiago do Cacém	4.400%	95	Moita	3.654%	146	Calheta	2.973%	197	Santa Marta Penaguião	2.397%	248	Machico	1.697%	300
Loures	6.032%	45	Marvão	4.383%	96	Vila Nova Foz Côa	3.652%	147	Proença-a-Nova	2.933%	198	Vimioso	2.383%	249	Povoação	1.655%	301
Viana do Castelo	6.014%	46	Reguengos Monsaraz	4.369%	97	Redondo	3.652%	148	Sardoal	2.932%	199	Fornos Algodres	2.381%	250	Castanheira de Pêra	1.551%	302
Amadora	6.009%	47	Ílhavo	4.351%	98	Benavente	3.641%	149	Portel	2.922%	200	Albergaria-a-Velha	2.379%	251	Santana	1.538%	303
Vila Franca de Xira	5.861%	48	Odivelas	4.346%	99	Alcoutim	3.633%	150	Póvoa de Lanhoso	2.899%	201	Vila Verde	2.375%	252	Lagoa	1.489%	304
Castro Marim	5.831%	49	Arcos de Valdevez	4.340%	100	São João Pesqueira	3.626%	151	Mora	2.897%	202	Chamusca	2.374%	253	Lajes das Flores	1.386%	305
Portalegre	5.795%	50	Nisa	4.298%	101	Monforte	3.605%	152	Santo Tirso	2.878%	203	Carregal do Sal	2.363%	254	Corvo	1.292%	306
Chaves	5.757%	51	Aguaiar da Beira	4.288%	102	Mealhada	3.579%	153	Arronches	2.870%	204	São Roque do Pico	2.349%	255	Ribeira Brava	1.169%	307
												São Vicente	2.348%	256	Nordeste	0.894%	308

Source: Own elaboration.

Table 2. Results of the municipal tourism attractiveness indicator for the year 2021.

Municipalities	IMAT	Rank	Municipalities	IMAT	Rank	Municipalities	IMAT	Rank	Municipalities	IMAT	Rank	Municipalities	IMAT	Rank	Municipalities	IMAT	Rank
Lisboa	48.039%	1	Amadora	6.120%	52	Alter do Chão	4.589%	103	Alcoutim	3.796%	154	Povoação	2.966%	205	Chamusca	2.522%	257
Porto	24.221%	2	Viana do Castelo	6.078%	53	Vidigueira	4.569%	104	Horta	3.794%	155	Fronteira	2.965%	206	Resende	2.498%	258
Coimbra	18.109%	3	Vila Franca de Xira	5.929%	54	Ílhavo	4.562%	105	Vale de Cambra	3.793%	156	Portel	2.955%	207	Cabeceiras de Basto	2.484%	259
Évora	16.451%	4	Ourém	5.866%	55	Vila do Conde	4.539%	106	Ponta do Sol	3.790%	157	Valença	2.953%	208	Lourinhã	2.478%	260
Sintra	15.642%	5	Mirandela	5.858%	56	Campo Maior	4.503%	107	Penafiel	3.767%	158	Macedo de Cavaleiros	2.949%	209	Cartaxo	2.477%	261
Funchal	13.829%	6	Castro Marim	5.847%	57	Moura	4.501%	108	Benavente	3.759%	159	Sousel	2.917%	210	Sever do Vouga	2.476%	262
Almada	12.200%	7	Belmonte	5.828%	58	Alenquer	4.488%	109	Estarreja	3.717%	160	Celorico da Beira	2.914%	211	Oliveira de Frades	2.457%	263
Cascais	11.432%	8	Odemira	5.828%	59	Pombal	4.477%	110	Figueira Castelo Rodrigo	3.711%	161	Monchique	2.901%	212	Santa Cruz das Flores	2.440%	264
Setúbal	10.892%	9	Caldas da Rainha	5.813%	60	Aguiar da Beira	4.468%	111	Marco de Canaveses	3.708%	162	Santana	2.895%	213	Vila Nova de Paiva	2.436%	265
Vila Nova de Gaia	10.226%	10	Loures	5.713%	61	Ferreira do Zêzere	4.454%	112	Arronches	3.653%	163	Santo Tirso	2.890%	214	Madalena	2.417%	266
Loulé	10.032%	11	Sabrosa	5.558%	62	Santa Maria Feira	4.438%	113	Vila Nova de Cerveira	3.647%	164	Gavião	2.883%	215	Oleiros	2.409%	267
Santarém	9.351%	12	Covilhã	5.497%	63	Óbidos	4.436%	114	Vila Viçosa	3.604%	165	Freixo Espada à Cinta	2.875%	216	Tábua	2.408%	268
Valongo	8.774%	13	Pampilhosa da Serra	5.482%	64	Espinho	4.425%	115	Monforte	3.601%	166	São João da Madeira	2.852%	217	Santa Marta Penaguião	2.400%	269
Leiria	8.536%	14	Torres Vedras	5.479%	65	Montijo	4.424%	116	Condeixa-a-Nova	3.597%	167	Batalha	2.844%	218	Albergaria-a-Velha	2.367%	270
Ponta Delgada	8.149%	15	Marvão	5.456%	66	Câmara de Lobos	4.403%	117	Moita	3.595%	168	Trancoso	2.829%	219	Castro Daire	2.362%	271
Braga	8.090%	16	Melgaço	5.438%	67	Peniche	4.398%	118	Cantanhede	3.531%	169	Vila do Porto	2.822%	220	Tarouca	2.351%	272
Viseu	8.070%	17	Mesão Frio	5.327%	68	Porto de Mós	4.390%	119	Góis	3.523%	170	Vouzela	2.821%	221	Ansião	2.348%	273
Matosinhos	7.947%	18	Ponte de Lima	5.301%	69	Barreiro	4.353%	120	Vila Pouca de Aguiar	3.509%	171	Alpiarça	2.809%	222	Porto Moniz	2.318%	274
Aveiro	7.867%	19	Oliveira do Hospital	5.293%	70	Peso da Régua	4.336%	121	Mourão	3.494%	172	Rio Maior	2.795%	223	Carregal do Sal	2.311%	275
Alcácer do Sal	7.788%	20	Ovar	5.232%	71	Barrancos	4.329%	122	Almeida	3.488%	173	Golegã	2.792%	224	Vila da Praia Vitória	2.308%	276
Lagos	7.775%	21	Tomar	5.217%	72	Arraiolos	4.285%	123	Aljustrel	3.477%	174	Entroncamento	2.785%	225	Vagos	2.287%	277
Angra do Heroísmo	7.696%	22	Borba	5.198%	73	Idanha-a-Nova	4.279%	124	Almodôvar	3.475%	175	Alcochete	2.782%	226	Alfândega da Fé	2.282%	278
Seia	7.443%	23	Reguengos de Monsaraz	5.185%	74	Oliveira de Azeméis	4.268%	125	Montalegre	3.470%	176	Santa Cruz	2.770%	227	Oliveira do Bairro	2.265%	279
Estremoz	7.416%	24	Sertã	5.159%	75	Marinha Grande	4.217%	126	Bombarral	3.464%	177	Alvito	2.767%	228	Cinfães	2.246%	280
Castelo Branco	7.413%	25	Sines	5.155%	76	Arouca	4.180%	127	Vieira do Minho	3.454%	178	Viana do Alentejo	2.759%	229	Murça	2.237%	281
Lagoa	7.396%	26	Porto Santo	5.136%	77	Torres Novas	4.173%	128	Fafe	3.452%	179	Pinhel	2.759%	230	Vimioso	2.230%	282
Fundão	7.313%	27	Sabugal	5.043%	78	Serpa	4.172%	129	Ponte da Barca	3.451%	180	Tabuaço	2.748%	231	Penedono	2.200%	283
Tavira	7.162%	28	Anadia	5.037%	79	Vila Nova Foz Côa	4.148%	130	Ourique	3.443%	181	Vila de Rei	2.736%	232	Mêda	2.177%	284
Chaves	7.096%	29	Terras de Bouro	5.028%	80	Lousã	4.108%	131	Miranda do Corvo	3.407%	182	Montemor-o-Velho	2.725%	233	Figueiró dos Vinhos	2.166%	285
Albufeira	7.070%	30	Montemor-o-Novo	5.021%	81	Avis	4.100%	132	Ferreira do Alentejo	3.402%	183	Penela	2.718%	234	Calheta	2.154%	286
Bragança	6.972%	31	Nelas	5.013%	82	Vila Velha de Ródão	4.098%	133	Azambuja	3.352%	184	Santa Comba Dão	2.699%	235	Sernancelhe	2.101%	287
Vila Nova Famalicão	6.956%	32	Alcanena	5.009%	83	Mira	4.082%	134	Crato	3.344%	185	Trofa	2.678%	236	Armamar	2.089%	288
Faro	6.887%	33	Póvoa de Varzim	4.991%	84	Sesimbra	4.044%	135	Nazaré	3.333%	186	Sátão	2.674%	237	Celorico de Basto	2.048%	289
Barcelos	6.810%	34	Elvas	4.985%	85	Mogadouro	4.040%	136	Paredes	3.293%	187	Cuba	2.663%	238	Castelo de Paiva	2.047%	290
Grândola	6.781%	35	Manteigas	4.976%	86	Tondela	4.024%	137	Lousada	3.259%	188	Penacova	2.644%	239	Vizela	2.014%	291
Portimão	6.734%	36	Salvaterra de Magos	4.959%	87	Constância	4.015%	138	São Vicente	3.258%	189	Soure	2.642%	240	Vendas Novas	1.951%	292
Abrantes	6.727%	37	Mértola	4.948%	88	São João Pesqueira	4.002%	139	Ribeira de Pena	3.252%	190	Felgueiras	2.640%	241	Moimenta da Beira	1.940%	293
Vila do Bispo	6.672%	38	Beja	4.945%	89	Ponte de Sor	3.976%	140	Fornos de Algodres	3.246%	191	Mora	2.638%	242	Lagoa	1.939%	294
Olhão	6.624%	39	Águeda	4.929%	90	Miranda do Douro	3.965%	141	Cadaval	3.230%	192	Baião	2.623%	243	Lajes das Flores	1.927%	295
Guimarães	6.604%	40	Maia	4.899%	91	Caminha	3.963%	142	Castro Verde	3.199%	193	Mortágua	2.618%	244	Vila Nova de Poiares	1.926%	296
Figueira da Foz	6.556%	41	Seixal	4.866%	92	Monção	3.952%	143	Paredes de Coura	3.191%	194	Sobral Monte Agraço	2.616%	245	Penalva do Castelo	1.910%	297
Oeiras	6.550%	42	Castelo de Vide	4.827%	93	São Brás de Alportel	3.935%	144	Proença-a-Nova	3.175%	195	Póvoa de Lanhoso	2.616%	246	Paços de Ferreira	1.900%	298
Palmela	6.505%	43	Odivelas	4.817%	94	Mação	3.928%	145	Gouveia	3.139%	196	Velas	2.616%	247	Vila Nova Barquinha	1.899%	299
Vila Real Santo António	6.424%	44	Ribeira Grande	4.775%	95	Alandroal	3.916%	146	Amares	3.133%	197	Mondim de Basto	2.606%	248	Valpaços	1.838%	300
Guarda	6.353%	45	Nisa	4.770%	96	São Pedro do Sul	3.909%	147	Carraceda de Ansiães	3.130%	198	Lajes do Pico	2.583%	249	Arruda dos Vinhos	1.833%	301
Portalegre	6.317%	46	Arcos de Valdevez	4.735%	97	Vila Flor	3.890%	148	Gondomar	3.127%	199	São Roque do Pico	2.582%	250	Murtosa	1.829%	302
Vila Real	6.282%	47	Santiago do Cacém	4.725%	98	Arganil	3.838%	149	Vila Verde	3.092%	200	Pedrogão Grande	2.570%	251	Santa Cruz Graciosa	1.781%	303
Alcobaça	6.272%	48	Redondo	4.672%	99	Alijó	3.834%	150	Alvaiázere	3.085%	201	Torre de Moncorvo	2.567%	252	Vila Franca Campo	1.760%	304
Esposende	6.149%	49	Amarante	4.620%	100	Vinhais	3.833%	151	Sardoal	2.998%	202	Machico	2.558%	253	Ribeira Brava	1.618%	305
Silves	6.148%	50	Mafra	4.610%	101	Mealhada	3.828%	152	Mangualde	2.987%	203	Coruche	2.555%	254	Castanheira de Pêra	1.551%	306
Lamego	6.131%	51	Penamacor	4.597%	102	Aljezur	3.824%	153	Calheta	2.974%	204	Almeirim	2.539%	255	Corvo	1.333%	307
												Boticas	2.532%	256	Nordeste	0.892%	308

Source: Own elaboration.

Table 3. Results of the municipal tourism attractiveness indicator for the year 2022.

Municipalities	IMAT	Rank	Municipalities	IMAT	Rank	Municipalities	IMAT	Rank	Municipalities	IMAT	Rank	Municipalities	IMAT	Rank	Municipalities	IMAT	Rank
Lisboa	52.354%	1	Vila Nova de Famalicão	6.841%	52	Borba	5.044%	103	São Brás de Alportel	4.170%	154	Póvoa de Lanhoso	3.432%	205	Mondim de Basto	2.677%	257
Porto	27.208%	2	Bragança	6.631%	53	Terras de Bouro	5.039%	104	Vila Viçosa	4.164%	155	Cuba	3.417%	206	Armamar	2.664%	258
Coimbra	19.945%	3	Chaves	6.583%	54	Valongo	5.030%	105	Vinhais	4.156%	156	Mangualde	3.401%	207	Baião	2.659%	259
Sintra	18.018%	4	Viana do Castelo	6.475%	55	Mesão Frio	4.991%	106	Alter do Chão	4.155%	157	Cabeceiras de Basto	3.399%	208	Santana	2.658%	260
Almada	17.765%	5	Vila Franca de Xira	6.411%	56	Peso da Régua	4.921%	107	Porto Moniz	4.136%	158	Miranda do Corvo	3.394%	209	Gavião	2.644%	261
Évora	15.248%	6	Odemira	6.400%	57	Amarante	4.911%	108	Vila Velha de Ródão	4.104%	159	Fronteira	3.369%	210	Mêda	2.633%	262
Funchal	14.427%	7	Castro Marim	6.300%	58	Óbidos	4.863%	109	Povoação	4.102%	160	Freixo Espada à Cinta	3.310%	211	Montemor-o-Velho	2.630%	263
Lagoa	12.057%	8	Sabrosa	6.273%	59	Benavente	4.824%	110	Crato	4.100%	161	Gouveia	3.305%	212	Paredes de Coura	2.623%	264
Vila Nova de Gaia	11.786%	9	Mirandela	6.142%	60	Sabugal	4.818%	111	Entroncamento	4.097%	162	Batalha	3.302%	213	Resende	2.620%	265
Aveiro	11.696%	10	Ponta do Sol	6.085%	61	Nisa	4.761%	112	Condeixa-a-Nova	4.084%	163	Bombarral	3.295%	214	Castro Daire	2.604%	266
Santarém	11.541%	11	Pampilhosa da Serra	6.055%	62	Espinho	4.760%	113	São Vicente	4.084%	164	Vila Verde	3.265%	215	Santa Comba Dão	2.570%	267
Setúbal	11.489%	12	Elvas	6.006%	63	Redondo	4.755%	114	Barrancos	4.072%	165	Sousel	3.239%	216	Santa Marta Penaguião	2.570%	268
Matosinhos	11.324%	13	Caldas da Rainha	5.956%	64	Sesimbra	4.711%	115	Olhão	4.071%	166	Valença	3.185%	217	Madalena	2.565%	269
Cascais	11.132%	14	Belmonte	5.933%	65	Castelo de Vide	4.680%	116	Alcoutim	4.022%	167	Lousada	3.173%	218	Mortágua	2.535%	270
Loulé	10.561%	15	Maia	5.924%	66	Torres Novas	4.677%	117	Cantanhede	3.982%	168	Cinfães	3.141%	219	Penedono	2.491%	271
Sines	9.751%	16	Amadora	5.915%	67	Idanha-a-Nova	4.669%	118	Monforte	3.969%	169	Celorico da Beira	3.134%	220	Sever do Vouga	2.484%	272
Ponta Delgada	9.291%	17	Porto Santo	5.898%	68	Ferreira do Zêzere	4.668%	119	Estarreja	3.929%	170	Sobral Monte Agraço	3.109%	221	Boticas	2.476%	273
Leiria	8.969%	18	Ourém	5.831%	69	Montijo	4.665%	120	Macedo de Cavaleiros	3.922%	171	Sátão	3.096%	222	Santa Cruz das Flores	2.475%	274
Lagos	8.679%	19	Câmara de Lobos	5.803%	70	Vila Nova Cerveira	4.654%	121	Aljezur	3.908%	172	Proença-a-Nova	3.083%	223	Cartaxo	2.449%	275
Castelo Branco	8.613%	20	Arcos de Valdevez	5.799%	71	Serpa	4.649%	122	Oliveira de Azeméis	3.889%	173	Vouzela	3.065%	224	Vila do Porto	2.434%	276
Braga	8.561%	21	Marvão	5.771%	72	Alandroal	4.647%	123	Gondomar	3.833%	174	Moita	3.050%	225	Calheta	2.419%	277
Viseu	8.129%	22	Ponte de Lima	5.759%	73	Aljustrel	4.636%	124	Marco de Canaveses	3.828%	175	Alcochete	3.047%	226	Rio Maior	2.410%	278
Loures	8.085%	23	Anadia	5.757%	74	Odivelas	4.630%	125	Arganil	3.826%	176	Tarouca	3.039%	227	Oleiros	2.391%	279
Seia	8.075%	24	Póvoa de Varzim	5.721%	75	Arraiolos	4.609%	126	Alvaiázere	3.785%	177	Ansião	3.037%	228	Ribeira de Pena	2.381%	280
Estremoz	8.028%	25	Reguengos Monsaraz	5.690%	76	Aguaiar da Beira	4.585%	127	Ferreira do Alentejo	3.760%	178	Golegã	2.996%	229	Oliveira do Bairro	2.373%	281
Vila do Bispo	7.985%	26	Manteigas	5.684%	77	Mira	4.577%	128	Constância	3.732%	179	Arronches	2.957%	230	Penalva do Castelo	2.366%	282
Figueira da Foz	7.950%	27	Esposende	5.683%	78	Avis	4.561%	129	Castro Verde	3.724%	180	Azambuja	2.941%	231	Murça	2.365%	283
Barcelos	7.882%	28	Penafiel	5.569%	79	Montalegre	4.541%	130	Vila Pouca de Aguiar	3.720%	181	Vale de Cambra	2.935%	232	Pinhel	2.360%	284
Portalegre	7.741%	29	Ovar	5.541%	80	Monção	4.528%	131	Vila Flor	3.703%	182	Soure	2.928%	233	Vimioso	2.359%	285
Tavira	7.680%	30	Santiago do Cacém	5.533%	81	Porto de Mós	4.512%	132	Cadaval	3.679%	183	Alvito	2.924%	234	Vila Franca do Campo	2.355%	286
Grândola	7.660%	31	Vila do Conde	5.493%	82	Vila Nova Foz Côa	4.466%	133	Almodôvar	3.668%	184	Portel	2.920%	235	Alpiarça	2.315%	287
Abrantes	7.583%	32	Águeda	5.459%	83	São João Pesqueira	4.418%	134	Lourinhã	3.668%	185	Chamusca	2.916%	236	Castanheira de Pêra	2.252%	288
Alcobaça	7.553%	33	Montemor-o-Novo	5.404%	84	Monchique	4.403%	135	Trancoso	3.656%	186	Trofa	2.915%	237	Vizela	2.241%	289
Oeiras	7.546%	34	Mértola	5.377%	85	São Pedro do Sul	4.388%	136	Almeirim	3.612%	187	Lajes do Pico	2.909%	238	Oliveira de Frades	2.238%	290
Alcácer do Sal	7.530%	35	Moura	5.290%	86	Miranda do Douro	4.376%	137	Mourão	3.604%	188	Albergaria-a-Velha	2.882%	239	Moimenta da Beira	2.229%	291
Portimão	7.452%	36	Marinha Grande	5.288%	87	Pombal	4.360%	138	Ponte de Barca	3.602%	189	Velas	2.868%	240	Salvaterra de Magos	2.219%	292
Seixal	7.401%	37	Lagoa	5.267%	88	Tondela	4.350%	139	Ourique	3.599%	190	Pedrógão Grande	2.861%	241	Tábua	2.211%	293
Fundão	7.361%	38	Sertão	5.255%	89	Fafe	4.349%	140	Santo Tirso	3.599%	191	Sernancelhe	2.844%	242	Vendas Novas	2.125%	294
Silves	7.349%	39	Ribeira Grande	5.244%	90	Ponte de Sor	4.308%	141	Santa Cruz	3.574%	192	Penacova	2.810%	243	Murtosa	2.115%	295
Vila Real	7.323%	40	Mafra	5.243%	91	Campo Maior	4.306%	142	Vieira do Minho	3.542%	193	Calheta	2.802%	244	Valpaços	2.101%	296
Guimarães	7.299%	41	Horta	5.201%	92	Alijó	4.304%	143	Alfândega da Fé	3.534%	194	Tabuaco	2.778%	245	Celorico de Basto	2.069%	297
Lamego	7.298%	42	Beja	5.169%	93	Mogadouro	4.272%	144	Góis	3.518%	195	Mora	2.767%	246	Castelo de Paiva	2.047%	298
Faro	7.293%	43	Covilhã	5.158%	94	Arouca	4.264%	145	Carraceda de Ansiães	3.490%	196	Machico	2.766%	247	Vila Nova de Poiares	2.031%	299
Palmela	7.245%	44	Torres Vedras	5.138%	95	Penamacor	4.253%	146	Viana do Alentejo	3.489%	197	Vagos	2.749%	248	Carregal do Sal	1.998%	300
Barreiro	7.239%	45	Ílhavo	5.136%	96	Santa Maria Feira	4.245%	147	Nazaré	3.488%	198	São João da Madeira	2.748%	249	Paços de Ferreira	1.956%	301
Vila Real Santo António	7.167%	46	Oliveira do Hospital	5.121%	97	Lousã	4.245%	148	Vila da Praia da Vitória	3.472%	199	Vila Nova de Paiva	2.747%	250	Lajes das Flores	1.921%	302
Albufeira	7.155%	47	Caminha	5.074%	98	Amares	4.218%	149	Almeida	3.454%	200	Figueiró dos Vinhos	2.744%	251	Vila Nova da Barquinha	1.851%	303
Angra do Heroísmo	7.140%	48	Nelas	5.074%	99	Mealhada	4.217%	150	Sardoal	3.452%	201	Penela	2.740%	252	Santa Cruz Graciosa	1.851%	304
Alcanena	6.975%	49	Peniche	5.073%	100	Paredes	4.214%	151	Vila de Rei	3.451%	202	Fornos de Algodres	2.729%	253	Arruda dos Vinhos	1.791%	305
Tomar	6.951%	50	Alenquer	5.068%	101	Vidigueira	4.177%	152	Figueira Castelo Rodrigo	3.439%	203	Torre de Moncorvo	2.728%	254	Corvo	1.760%	306
Guarda	6.859%	51	Melgaço	5.062%	102	Mação	4.170%	153	Coruche	3.437%	204	Felgueiras	2.691%	255	Ribeira Brava	1.724%	307
												São Roque do Pico	2.689%	256	Nordeste	1.675%	308

Source: Own elaboration.

Table 4. Results of the municipal tourism attractiveness indicator for the year 2023.

Municipalities	IMAT	Rank	Municipalities	IMAT	Rank	Municipalities	IMAT	Rank	Municipalities	IMAT	Rank	Municipalities	IMAT	Rank	Municipalities	IMAT	Rank
Lisboa	62.615%	1	Alcobaça	7.377%	52	Beja	5.364%	103	Vila Nova de Foz Côa	4.215%	154	Baião	3.422%	205	Fornos de Algodres	2.693%	257
Porto	30.993%	2	Vila Nova de Famalicão	7.263%	53	Manteigas	5.312%	104	Campo Maior	4.211%	155	Mação	3.389%	206	Bombarral	2.686%	258
Coimbra	21.886%	3	Silves	7.252%	54	Ílhavo	5.306%	105	Alcoutim	4.182%	156	São Roque do Pico	3.382%	207	Sobral Monte Agraço	2.682%	259
Sintra	19.116%	4	Vila Real Santo António	7.200%	55	Alcácer do Sal	5.298%	106	Penamacor	4.166%	157	Lajes do Pico	3.373%	208	Castelo de Paiva	2.665%	260
Almada	16.402%	5	Mértola	7.183%	56	Vila Nova Cerveira	5.284%	107	Arganil	4.144%	158	Nelas	3.361%	209	Celorico de Basto	2.638%	261
Funchal	16.362%	6	Fundão	7.160%	57	Miranda do Douro	5.260%	108	Mealhada	4.120%	159	Valença	3.357%	210	Vila do Porto	2.623%	262
Vila Nova de Gaia	13.404%	7	Figueira da Foz	7.140%	58	Montalegre	5.241%	109	Redondo	4.115%	160	Arronches	3.345%	211	Santa Cruz das Flores	2.614%	263
Ponta Delgada	12.550%	8	Reguengos Monsaraz	7.047%	59	Oliveira do Hospital	5.224%	110	Pampilhosa da Serra	4.108%	161	Penacova	3.334%	212	Moimenta da Beira	2.595%	264
Loulé	12.404%	9	Ourém	7.039%	60	Estremoz	5.212%	111	Benavente	4.102%	162	Alter do Chão	3.334%	213	Santana	2.595%	265
Cascais	12.360%	10	Câmara de Lobos	6.994%	61	Sesimbra	5.152%	112	Paredes de Coura	4.094%	163	Machico	3.314%	214	Fronteira	2.591%	266
Aveiro	11.513%	11	Vila do Conde	6.979%	62	Penafiel	5.116%	113	Vila Flor	4.072%	164	Sátão	3.309%	215	Mortágua	2.591%	267
Santarém	11.480%	12	Castro Marim	6.791%	63	São Vicente	5.111%	114	Póvoa de Lanhoso	4.031%	165	Felgueiras	3.254%	216	Montemor-o-Velho	2.584%	268
Évora	11.445%	13	Palmela	6.722%	64	Lousã	5.102%	115	Almeirim	4.022%	166	Ansião	3.239%	217	Paços de Ferreira	2.575%	269
Braga	11.253%	14	Elvas	6.708%	65	Peso da Régua	5.097%	116	Tondela	3.974%	167	Torre de Moncorvo	3.233%	218	Figueiró dos Vinhos	2.575%	270
Setúbal	11.129%	15	Caldas da Rainha	6.696%	66	Moura	5.081%	117	Vila Pouca de Aguiar	3.974%	168	Monforte	3.200%	219	Mêda	2.573%	271
Lagos	11.060%	16	Esposende	6.659%	67	Povoação	5.078%	118	Castro Verde	3.950%	169	Madalena	3.195%	220	Mondim de Basto	2.570%	272
Matosinhos	10.555%	17	Vila Franca de Xira	6.642%	68	Avis	5.063%	119	Carraceda de Ansiães	3.938%	170	Freixo Espada à Cinta	3.191%	221	Sever do Vouga	2.555%	273
Tavira	10.485%	18	Ribeira Grande	6.541%	69	Marinha Grande	5.048%	120	Vinhais	3.905%	171	Tabuaço	3.153%	222	Ourique	2.534%	274
Lagoa	10.341%	19	Abrantes	6.492%	70	Arouca	4.988%	121	Mangualde	3.900%	172	Pedrogão Grande	3.151%	223	Trofa	2.508%	275
Leiria	9.912%	20	Caminha	6.468%	71	Fafe	4.984%	122	Cantanhede	3.870%	173	Sernancelhe	3.143%	224	Boticas	2.505%	276
Portimão	9.454%	21	Terras de Bouro	6.398%	72	Seixal	4.933%	123	Alenquer	3.848%	174	Almodôvar	3.134%	225	Valpaços	2.493%	277
Bragança	9.453%	22	Horta	6.368%	73	Santa Cruz	4.898%	124	Vila da Praia da Vitória	3.840%	175	Santo Tirso	3.129%	226	Ribeira de Pena	2.442%	278
Barcelos	9.437%	23	Mirandela	6.273%	74	Marvão	4.883%	125	Ribeira Brava	3.835%	176	Armamar	3.121%	227	Oliveira do Bairro	2.440%	279
Grândola	9.403%	24	Mesão Frio	6.236%	75	Porto Moniz	4.852%	126	São Brás de Alportel	3.823%	177	Alfândega da Fé	3.114%	228	Vila Nova de Paiva	2.438%	280
Albufeira	9.322%	25	Lagoa	6.225%	76	Odivelas	4.820%	127	Cadaval	3.802%	178	Ponte de Sor	3.091%	229	Calheta	2.434%	281
Odemira	9.297%	26	Covilhã	6.175%	77	Vila Viçosa	4.796%	128	Cinfães	3.785%	179	Golegã	3.058%	230	Gavião	2.409%	282
Viseu	8.982%	27	Peniche	6.114%	78	Nisa	4.771%	129	Alandroal	3.776%	180	Portel	3.054%	231	Vizela	2.403%	283
Lamego	8.947%	28	Óbidos	6.026%	79	São Pedro do Sul	4.768%	130	Cabeceiras de Basto	3.760%	181	Alvito	3.025%	232	Santa Marta Penaguião	2.399%	284
Sines	8.920%	29	Sabrosa	5.996%	80	Torres Novas	4.718%	131	Vila Velha de Ródão	3.743%	182	Celorico da Beira	3.022%	233	Vila Franca do Campo	2.389%	285
Castelo Branco	8.875%	30	Idanha-a-Nova	5.995%	81	Vieira do Minho	4.717%	132	Lourinhã	3.742%	183	Castro Daire	3.017%	234	Vimioso	2.342%	286
Angra do Heroísmo	8.793%	31	Águeda	5.958%	82	Anadia	4.709%	133	Tarouca	3.738%	184	Batalha	3.016%	235	Nordeste	2.326%	287
Faro	8.774%	32	Amarante	5.950%	83	Aljustrel	4.681%	134	Aguiar da Beira	3.733%	185	Tábua	3.004%	236	Castanheira de Pêra	2.317%	288
Viana do Castelo	8.507%	33	Porto Santo	5.895%	84	Oliveira de Azeméis	4.654%	135	Vila Verde	3.725%	186	Resende	2.977%	237	Alcochete	2.279%	289
Ponte de Lima	8.469%	34	Monção	5.894%	85	São João Pesqueira	4.653%	136	Goís	3.690%	187	Chamusca	2.966%	238	Vagos	2.274%	290
Guimarães	8.434%	35	Ovar	5.882%	86	Mogadouro	4.559%	137	Sertão	3.683%	188	Azambuja	2.960%	239	Oliveira de Frades	2.262%	291
Póvoa de Varzim	8.357%	36	Montemor-o-Novo	5.790%	87	Mira	4.545%	138	Estarreja	3.665%	189	Miranda do Corvo	2.948%	240	Carregal do Sal	2.259%	292
Tomar	8.269%	37	Belmonte	5.786%	88	Espinho	4.543%	139	Velas	3.649%	190	Sardoal	2.947%	241	Murça	2.251%	293
Santiago do Cacém	8.185%	38	Aljezur	5.751%	89	Gondomar	4.530%	140	Porto de Mós	3.642%	191	Cuba	2.893%	242	Vila Nova de Poiares	2.234%	294
Arcos de Valdevez	8.162%	39	Melgaço	5.716%	90	Castelo de Vide	4.497%	141	Alvaiázere	3.638%	192	Penedono	2.887%	243	Mora	2.203%	295
Vila Real	8.051%	40	Santa Maria da Feira	5.700%	91	Pombal	4.421%	142	Gouveia	3.612%	193	Almeida	2.878%	244	Cartaxo	2.182%	296
Vila do Bispo	7.984%	41	Amares	5.537%	92	Nazaré	4.398%	143	Crato	3.590%	194	Viana do Alentejo	2.866%	245	Vendas Novas	2.170%	297
Loures	7.938%	42	Valongo	5.531%	93	Montijo	4.373%	144	Ferreira do Zêzere	3.560%	195	Barrancos	2.856%	246	Sousel	2.075%	298
Portalegre	7.908%	43	Monchique	5.519%	94	Condeixa-a-Nova	4.369%	145	Borba	3.553%	196	São João da Madeira	2.839%	247	Santa Cruz Graciosa	2.071%	299
Barreiro	7.743%	44	Amadora	5.508%	95	Ferreira do Alentejo	4.350%	146	Vidigueira	3.552%	197	Rio Maior	2.830%	248	Penalva do Castelo	2.047%	300
Chaves	7.724%	45	Sabugal	5.475%	96	Calheta	4.335%	147	Vale de Cambra	3.549%	198	Moita	2.809%	249	Alpiarça	1.958%	301
Oeiras	7.605%	46	Alijó	5.465%	97	Paredes	4.317%	148	Figueira Castelo Rodrigo	3.518%	199	Prouença-a-Nova	2.796%	250	Vila Nova da Barquinha	1.929%	302
Guarda	7.605%	47	Ponte da Barca	5.461%	98	Marco Canaveses	4.301%	149	Vouzela	3.512%	200	Oleiros	2.766%	251	Murtosa	1.818%	303
Olhão	7.603%	48	Mafra	5.458%	99	Mourão	4.279%	150	Vila de Rei	3.511%	201	Coruche	2.754%	252	Lajes das Flores	1.803%	304
Seia	7.558%	49	Maia	5.457%	100	Lousada	4.243%	151	Trancoso	3.491%	202	Soure	2.743%	253	Santa Comba Dão	1.758%	305
Ponta do Sol	7.551%	50	Serpa	5.449%	101	Arraiolos	4.223%	152	Entroncamento	3.454%	203	Albergaria-a-Velha	2.731%	254	Salvaterra de Magos	1.727%	306
Alcanena	7.460%	51	Torres Vedras	5.382%	102	Macedo Cavaleiros	4.219%	153	Constância	3.454%	204	Penela	2.727%	255	Arruda dos Vinhos	1.655%	307
												Pinhel	2.705%	256	Corvo	1.131%	308

Source: Own elaboration.

Table 5. Results of the municipal tourism attractiveness indicator for the year 2024.

Municipalities	IMAT	Rank	Municipalities	IMAT	Rank	Municipalities	IMAT	Rank	Municipalities	IMAT	Rank	Municipalities	IMAT	Rank	Municipalities	IMAT	Rank
Lisboa	63.076%	1	Alcobaça	7.471%	52	Beja	5.404%	103	Campo Maior	4.246%	154	Baião	3.452%	205	Sobral Monte Agraço	2.709%	257
Porto	31.169%	2	Vila Nova de Famalicão	7.351%	53	Ílhavo	5.388%	104	Alcoutim	4.234%	155	Mação	3.415%	206	Bombarral	2.702%	258
Coimbra	22.056%	3	Silves	7.315%	54	Manteigas	5.376%	105	Macedo de Cavaleiros	4.233%	156	Lajes do Pico	3.404%	207	Fornos de Algodres	2.684%	259
Sintra	19.326%	4	Vila Real Santo António	7.304%	55	Vila Nova Cerveira	5.371%	106	Penamacor	4.223%	157	São Roque do Pico	3.399%	208	Castelo de Paiva	2.679%	260
Almada	16.682%	5	Mértola	7.268%	56	Alcácer do Sal	5.337%	107	Redondo	4.171%	158	Nelas	3.392%	209	Celorico de Basto	2.663%	261
Funchal	16.437%	6	Fundão	7.209%	57	Miranda do Douro	5.318%	108	Mealhada	4.161%	159	Valença	3.388%	210	Vila do Porto	2.649%	262
Vila Nova de Gaia	13.532%	7	Figueira da Foz	7.203%	58	Montalegre	5.285%	109	Benavente	4.160%	160	Arronches	3.387%	211	Santa Cruz das Flores	2.648%	263
Ponta Delgada	12.665%	8	Reguengos de Monsaraz	7.140%	59	Oliveira do Hospital	5.263%	110	Pampilhosa da Serra	4.158%	161	Penacova	3.378%	212	Mortágua	2.617%	264
Loulé	12.561%	9	Ourém	7.125%	60	Estremoz	5.261%	111	Arganil	4.158%	162	Alter do Chão	3.370%	213	Moimenta da Beira	2.609%	265
Cascais	12.440%	10	Câmara de Lobos	7.118%	61	Sesimbra	5.223%	112	Paredes de Coura	4.132%	163	Machico	3.347%	214	Fronteira	2.601%	266
Aveiro	11.695%	11	Vila do Conde	7.071%	62	São Vicente	5.180%	113	Vila Flor	4.093%	164	Sátão	3.330%	215	Santana	2.601%	267
Santarém	11.632%	12	Castro Marim	6.888%	63	Penafiel	5.170%	114	Almeirim	4.077%	165	Felgueiras	3.284%	216	Mondim de Basto	2.599%	268
Évora	11.552%	13	Palmela	6.809%	64	Moura	5.160%	115	Póvoa de Lanhoso	4.075%	166	Ansião	3.271%	217	Montemor-o-Velho	2.593%	269
Braga	11.313%	14	Elvas	6.784%	65	Povoação	5.158%	116	Vila Pouca de Aguiar	4.034%	167	Torre de Moncorvo	3.244%	218	Paços de Ferreira	2.593%	270
Setúbal	11.239%	15	Esposende	6.753%	66	Peso da Régua	5.156%	117	Castro Verde	4.004%	168	Monforte	3.226%	219	Figueiró dos Vinhos	2.589%	271
Lagos	11.218%	16	Caldas da Rainha	6.737%	67	Lousã	5.151%	118	Tondela	4.002%	169	Madalena	3.221%	220	Mêda	2.581%	272
Matosinhos	10.661%	17	Vila Franca de Xira	6.703%	68	Avis	5.134%	119	Carrazeda de Ansiães	3.954%	170	Freixo Espada à Cinta	3.210%	221	Sever do Vouga	2.561%	273
Tavira	10.637%	18	Ribeira Grande	6.633%	69	Marinha Grande	5.120%	120	Vinhais	3.933%	171	Pedrógão Grande	3.192%	222	Ourique	2.561%	274
Lagoa	10.502%	19	Caminha	6.559%	70	Fafe	5.038%	121	Mangualde	3.921%	172	Tabuaço	3.170%	223	Trofa	2.531%	275
Leiria	10.019%	20	Abrantes	6.549%	71	Arouca	5.029%	122	Ribeira Brava	3.903%	173	Sernancelhe	3.170%	224	Boticas	2.527%	276
Portimão	9.558%	21	Horta	6.438%	72	Seixal	5.000%	123	Vila da Praia da Vitória	3.887%	174	Almodôvar	3.156%	225	Valpaços	2.505%	277
Bragança	9.543%	22	Terras de Bouro	6.430%	73	Santa Cruz	4.969%	124	Cantanhede	3.885%	175	Santo Tirso	3.155%	226	Ribeira de Pena	2.480%	278
Barcelos	9.531%	23	Mesão Frio	6.341%	74	Porto Moniz	4.934%	125	Alenquer	3.876%	176	Alfândega da Fé	3.151%	227	Calheta	2.469%	279
Grândola	9.524%	24	Lagoa	6.338%	75	Marvão	4.924%	126	São Brás de Alportel	3.854%	177	Armamar	3.141%	228	Vila Nova de Paiva	2.463%	280
Odemira	9.383%	25	Mirandela	6.315%	76	Odivelas	4.876%	127	Cadaval	3.845%	178	Ponte de Sor	3.125%	229	Oliveira do Bairro	2.453%	281
Albufeira	9.367%	26	Covilhã	6.226%	77	Vila Viçosa	4.841%	128	Cinfães	3.821%	179	Golegã	3.086%	230	Gavião	2.432%	282
Lamego	9.087%	27	Peniche	6.181%	78	Nisa	4.822%	129	Alandroal	3.809%	180	Portel	3.079%	231	Vila Franca do Campo	2.429%	283
Viseu	9.078%	28	Óbidos	6.095%	79	São Pedro do Sul	4.812%	130	Cabeceiras de Basto	3.800%	181	Alvito	3.065%	232	Vizela	2.422%	284
Sines	9.078%	29	Sabrosa	6.081%	80	Vieira do Minho	4.776%	131	Tarouca	3.784%	182	Celorico da Beira	3.041%	233	Santa Marta Penaguião	2.413%	285
Castelo Branco	8.985%	30	Idanha-a-Nova	6.074%	81	Aljustrel	4.773%	132	Lourinhã	3.783%	183	Batalha	3.034%	234	Vimioso	2.357%	286
Faro	8.867%	31	Águeda	6.056%	82	Anadia	4.764%	133	Aguiar da Beira	3.776%	184	Castro Daire	3.026%	235	Nordeste	2.354%	287
Angra do Heroísmo	8.855%	32	Amarante	6.020%	83	Torres Novas	4.754%	134	Vila Verde	3.757%	185	Tábua	3.025%	236	Castanheira de Pêra	2.351%	288
Viana do Castelo	8.576%	33	Monção	5.957%	84	São João Pesqueira	4.718%	135	Vila Velha de Ródão	3.755%	186	Chamusca	2.998%	237	Alcochete	2.296%	289
Ponte de Lima	8.536%	34	Ovar	5.951%	85	Oliveira de Azeméis	4.714%	136	Góis	3.724%	187	Azambuja	2.996%	238	Vagos	2.293%	290
Guimarães	8.504%	35	Porto Santo	5.946%	86	Mogadouro	4.604%	137	Sertã	3.714%	188	Resende	2.995%	239	Oliveira de Frades	2.280%	291
Póvoa de Varzim	8.488%	36	Belmonte	5.860%	87	Espinho	4.589%	138	Velas	3.700%	189	Sardoal	2.982%	240	Carregal do Sal	2.270%	292
Tomar	8.371%	37	Montemor-o-Novo	5.849%	88	Mira	4.578%	139	Estarreja	3.696%	190	Miranda do Corvo	2.978%	241	Murça	2.264%	293
Santiago do Cacém	8.270%	38	Aljezur	5.793%	89	Gondomar	4.567%	140	Porto de Mós	3.677%	191	Penedono	2.934%	242	Vila Nova de Poiares	2.259%	294
Arcos de Valdevez	8.233%	39	Santa Maria da Feira	5.772%	90	Castelo de Vide	4.533%	141	Alvaiázere	3.675%	192	Cuba	2.925%	243	Mora	2.224%	295
Vila Real	8.143%	40	Melgaço	5.748%	91	Pombal	4.476%	142	Gouveia	3.641%	193	Barrancos	2.916%	244	Cartaxo	2.194%	296
Vila do Bispo	8.091%	41	Monchique	5.607%	92	Nazaré	4.435%	143	Crato	3.636%	194	Almeida	2.905%	245	Vendas Novas	2.187%	297
Loures	8.022%	42	Amares	5.598%	93	Condeixa-a-Nova	4.418%	144	Ferreira do Zêzere	3.618%	195	Viana do Alentejo	2.898%	246	Sousel	2.092%	298
Portalegre	7.973%	43	Valongo	5.593%	94	Montijo	4.395%	145	Vidigueira	3.597%	196	Rio Maior	2.856%	247	Santa Cruz Graciosa	2.085%	299
Barreiro	7.865%	44	Amadora	5.548%	95	Ferreira do Alentejo	4.384%	146	Borba	3.596%	197	São João da Madeira	2.852%	248	Penalva do Castelo	2.051%	300
Chaves	7.819%	45	Maia	5.528%	96	Paredes	4.364%	147	Vale de Cambra	3.585%	198	Moita	2.840%	249	Alpiarça	1.975%	301
Olhão	7.706%	46	Serpa	5.527%	97	Calheta	4.344%	148	Figueira Castelo Rodrigo	3.550%	199	Proença-a-Nova	2.815%	250	Vila Nova da Barquinha	1.934%	302
Ponta do Sol	7.682%	47	Sabugal	5.525%	98	Mourão	4.343%	149	Vouzela	3.545%	200	Oleiros	2.797%	251	Murtosa	1.827%	303
Oeiras	7.676%	48	Mafra	5.509%	99	Marco Canaveses	4.342%	150	Vila de Rei	3.545%	201	Soure	2.780%	252	Lajes das Flores	1.812%	304
Guarda	7.663%	49	Ponte da Barca	5.502%	100	Trancoso	4.291%	151	Lousada	3.523%	202	Coruche	2.774%	253	Santa Comba Dão	1.767%	305
Seia	7.604%	50	Alijó	5.498%	101	Arraiolos	4.266%	152	Constância	3.503%	203	Albergaria-a-Velha	2.755%	254	Salvaterra de Magos	1.742%	306
Alcanena	7.588%	51	Torres Vedras	5.409%	102	Vila Nova Foz Côa	4.261%	153	Entroncamento	3.496%	204	Penela	2.747%	255	Arruda dos Vinhos	1.666%	307
												Pinhel	2.714%	256	Corvo	1.154%	308

Source: Own elaboration.

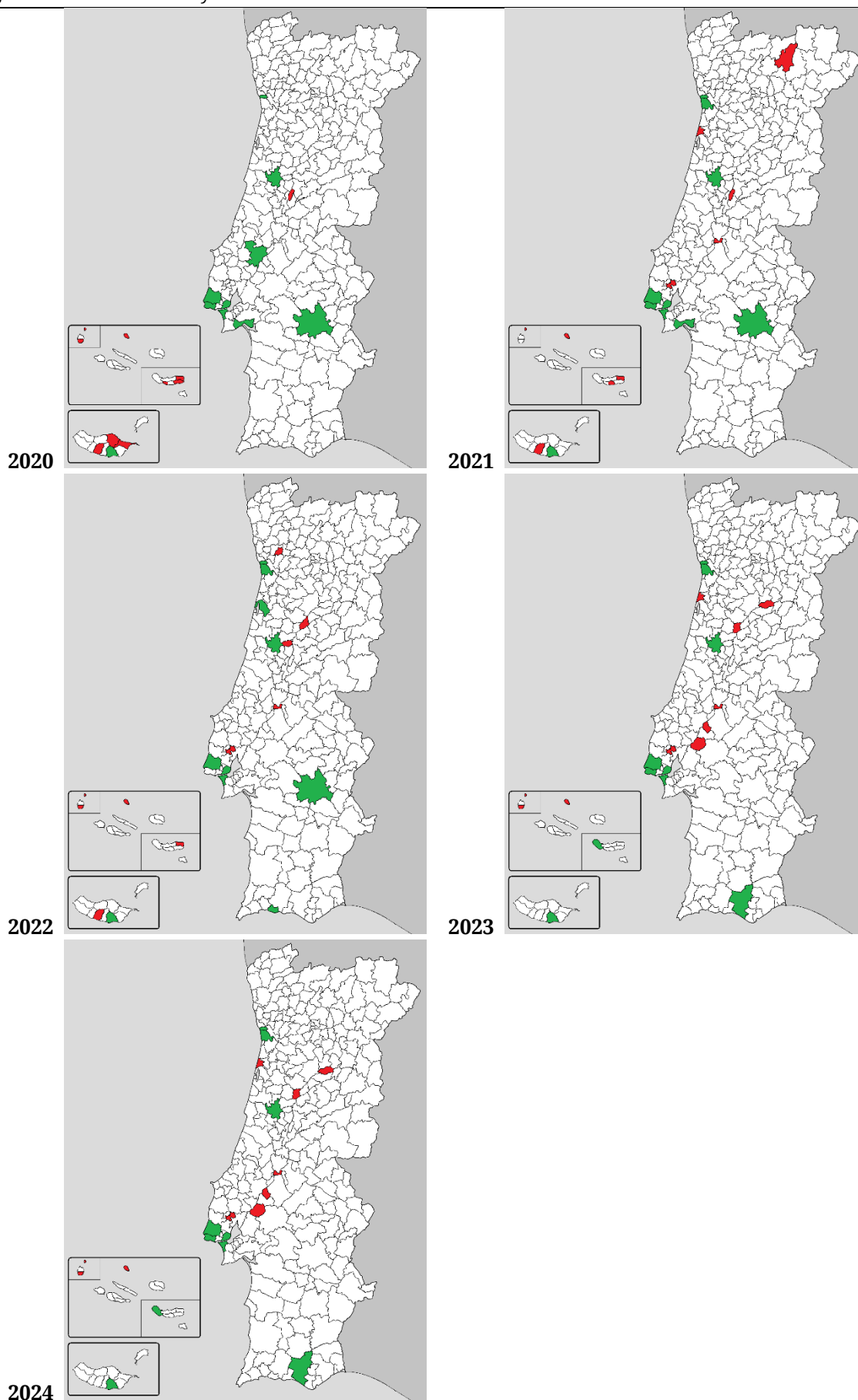


Figure 1. The 10 municipalities with the best (green) and lowest (red) levels of tourist attractiveness (2020–2024); Source: Own elaboration.

In order to observe the robustness of the index and validate the results, a sensitivity analysis was performed with the aim of analysing the effects of changes in municipal choices of tourist offerings for the interval (0, 1), i.e., if a given city has an $S > 0.5$, its level of attractiveness is closer to that of the pivot municipality (the city with the highest level of attractiveness); conversely, if the city has an $S < 0.5$, its level of attractiveness is closer to that of the municipality with the lowest levels of tourist attractiveness.

The sensitivity analysis of the attractiveness index results for 2020, carried out for the interval (0, 1), suggests that there are significant differences in the levels of attractiveness of tourism offerings between Portuguese municipalities. The analysis confirms the municipality of Lisbon as the reference point ($S = 1$), which corroborates, for the national context, the city's dominant position in terms of relative attractiveness. At the opposite extreme, the municipality of Nordeste represents the point with the lowest level of relative attractiveness ($S = 0$) and assumes the lower limit position on the scale.

In the national context, it can be observed that most cities are below $S = 0.2$, such as Santarém ($S = 0.18619$), Vila Nova de Gaia ($S = 0.18235$) and Leiria ($S = 0.17948$), which fall within the range of municipalities with low relative attractiveness. The distribution suggests that as tourists move away from urban centres, the levels of attractiveness of the tourist offer decrease sharply (Table 6).

From the point of view of sensitivity analysis, it should be noted that small changes in attractiveness levels (pre-normalisation) can cause fluctuations in the relative positions of municipalities with very similar values, as can be seen between Setúbal ($S = 0.20874$) and Cascais ($S = 0.20410$) in relation to the transition from 2020 to 2021.

In 2020, the sensitivity analysis suggests a notable polarisation of the attractiveness of tourism in Portugal, concentrated especially in Lisbon, a second tier of municipalities with intermediate attractiveness (Porto, Coimbra, Évora and Sintra) and a large group of municipalities whose relative attractiveness is quite low (Figure 2).

For 2021, the sensitivity analysis for the interval (0, 1), carried out on all 308 Portuguese municipalities, shows that the municipality of Lisbon is the reference point ($S = 1$), while the municipality of Nordeste represents the city with the lowest levels of tourist supply ($S = 0$), assuming the lower limit of the distribution scale (Table 7).

The results show a strong territorial polarisation, with a very small group of municipalities having high levels of tourism supply while the majority have low levels. The

municipality of Lisbon stands out as the benchmark ($S = 0.10000$), followed by the municipalities of Porto ($S = 0.49481$) and Coimbra ($S = 0.36518$). The results attest to the presence of decreasing levels of attractiveness, markedly asymmetrical, between the city of Lisbon and the other municipalities. Municipalities such as Évora ($S = 0.33000$), Sintra ($S = 0.31286$) and Funchal ($S = 0.27439$) consolidate important positions in 2021 but remain particularly distant from the municipality of Lisbon. Larger urban municipalities such as Almada ($S = 0.23986$), Cascais ($S = 0.22355$) and Setúbal ($S = 0.21210$) confirm and reinforce the doctrine's view of a high metropolitan concentration of levels of attractiveness of the tourist offer.

The vast majority of Portuguese municipalities have indices below $S = 0.10$, which reflects a reduced tourism offer when compared to the dominant urban centres. The pattern of tourism offers confirms the existence of high inter-municipal heterogeneity and a distribution of attractiveness characterised by high dispersion and positive asymmetry between municipalities (Figure 2).

With regard to sensitivity analysis, we highlight that municipalities with approximate values between the intervals ($0.03 \leq S \leq 0.09$) are those most exposed to marginal changes in ordering due to variations in municipal supply and choice (variations in index parameters). However, the structural hierarchy between Lisbon, the larger urban centres and the peripheral municipalities remains stable, suggesting the methodological robustness of the proposed approach.

In 2021, the distribution of results reveals a clear concentration of attractiveness in the municipality of Lisbon and in some urban centres, which contrasts with the situation in most municipalities (low tourist attractiveness). The results reinforce the notion of urban macrocephaly in Portugal and reveal the relevance of sensitivity analysis to validate the consistency and stability of the observed hierarchies.

With regard to 2022, the results of the sensitivity analysis achieved using the min–max normalisation method, between the interval (0, 1), suggest the municipality of Lisbon as the reference point ($S = 1$), while the municipality of Nordeste is the municipality with the lowest tourist offer available ($S = 0$), i.e., it corresponds to the lower end of the scale.

With regard to the distribution of levels of attractiveness of tourist offerings, the data reveal a distinct territorial asymmetry, with the municipality of Lisbon standing out in a dominant position and as a centre of gravity. In contrast, the municipalities of Porto ($S = 0.50382$) and Coimbra ($S = 0.36050$), although close in terms of the attractiveness of their tourist offer, remain notably distant from Lisbon's offer. This

disparity reinforces the perspective of concentration of tourist attractiveness around the capital, with the other municipalities, even the larger ones, having levels of attractiveness below $S = 0.50$, which accentuates urban macrocephaly.

The distribution suggests the existence of a second line of urban centres consisting of the cities of Sintra ($S = 0.32249$), Almada ($S = 0.31750$), Évora ($S = 0.26783$) and Funchal ($S = 0.25162$), which play important roles in the tourist network but remain structurally distant from the reference municipality. Other municipalities, such as Vila Nova de Gaia, Aveiro, Setúbal and Braga, have tourism supply levels between ($0.10 \leq S \leq 0.20$), which translates into important sub-regional hubs, but whose performance still remains far from the levels observed in the city of Lisbon.

In the national context, the vast majority of municipalities have tourism attractiveness indices below $S = 0.10$, which reflects the low levels of tourism supply and attests to the existence of high inter-municipal heterogeneity. The results show that the distribution of supply is remarkably uneven and suggest that as potential tourists move away from large urban centres, the relative attractiveness of tourism supply decreases sharply (Figure 2).

From the point of view of sensitivity analysis, it should be noted that municipalities with similar values in small intervals ($0.03 \leq S \leq 0.09$) are particularly susceptible to marginal changes in standardisation parameters, which can cause fluctuations in relative ranking. However, the hierarchy of relative attractiveness levels, marked by the primacy of the city of Lisbon, followed by the main regional urban centres and the vast periphery of municipalities with low attractiveness, is stable, which attests to the methodological soundness of the approach.

The results for 2022 attest to the persistence of urban macrocephaly in Portugal, characterised by the centralisation of the attractiveness of the tourist offer in the capital and the presence of a considerable number of secondary hubs (Table 8).

From a methodological point of view, the sensitivity analysis confirms two key points: (i) the structural soundness of the urban hierarchy, since the municipalities of Lisbon, Porto and Coimbra retain their top positions, regardless of variations; and (ii) the competitive fragility of most cities, whose relative position changes little and remain largely distant from the major demographic and economic centres.

With reference to 2023, the sensitivity analysis suggests the persistence of an extensively hierarchical structure in the levels of attractiveness of the tourist offer available in

Portuguese municipalities. As in previous periods, the city of Lisbon once again retains its position as the benchmark municipality ($S = 1$) and consolidates its position as the national benchmark, while the municipality of Corvo ($S = 0$) occupies the bottom position on the scale, representing the minimum limit of the index and reflecting the city with the lowest tourism offer (Table 9).

The municipality of Porto, after Lisbon, is the second most relevant urban area ($S = 0.48569$), despite the material difference in relation to the capital, not reaching half the levels of Lisbon's tourist offer. The municipalities of Coimbra ($S = 0.33756$), Sintra ($S = 0.029252$), Almada ($S = 0.24836$) and Funchal ($S = 0.24773$) are also important centres of tourist attraction but are clearly below the levels of the two main urban centres.

Among medium-sized municipalities, we highlight Vila Nova de Gaia ($S = 0.19960$), Ponta Delgada ($S = 0.18573$), Loulé ($S = 0.18334$) and Cascais ($S = 0.18263$), which consolidate the attractiveness levels of regional tourism. However, the sensitivity values of these municipalities remain far from the Lisbon-Porto core, attesting to the high concentration of attractiveness around the largest metropolitan areas.

The vast majority of Portuguese municipalities have indices below $S = 0.10$, which reveals the presence of reduced relative attractiveness and confirms a high spatial asymmetry in the national tourism offer. Municipalities such as Alcobaça, Vila Nova de Famalicão, Silves and Vila Real de Santo António are at the upper limit of the range ($0.09 \leq S \leq 0.10$), but the vast majority of territorial units, especially small and medium-sized ones, are below the range, which attests to the reduced competitive capacity of municipalities (Figure 2).

At the methodological level, the 2023 results suggest that small changes in the standardisation parameters may marginally alter the relative position of municipalities in the range ($0.03 \leq S \leq 0.07$).

However, in the national context, marked by the hegemony of the municipality of Lisbon, followed by Porto, and the existence of a vast set of regional hubs, the positions of tourism supply levels have remained stable, thus ensuring the validity of the analysis.

With regard to 2024, sensitivity analysis in the range (0, 1) suggests that the municipality of Lisbon is the pivotal municipality ($S = 1$), while the municipality of Corvo represents the municipality with the lowest tourism supply ($S = 0$) and, at the same time, represents the lower end of the scale.

The analysis of the interval ($0 \leq S \leq 1$) confirms the existence of serious disparities between the levels of attractiveness of the tourist offer among Portuguese municipalities and points to the city of Lisbon as the reference point, consolidating its hegemonic position

over the other municipalities (Table 10). The municipality of Lisbon is the most attractive to tourists, as it also offers the widest range of tourist assets.

In terms of the distribution of the attractiveness of the offer, the results suggest the existence of a notable territorial asymmetry, with the city of Lisbon standing out as the dominant position and reference point. On the other hand, the municipalities of Porto ($S = 0.48473$) and Coimbra ($S = 0.33756$) are also very important urban centres, but they are still relatively far from the levels of tourist offer in the city of Lisbon. This disparity reinforces the view that Lisbon's tourist appeal is highly concentrated in comparison with other Portuguese municipalities. The data show that the other larger municipalities also have levels of tourist appeal below $S = 0.50$, which reflects a genuine urban macrocephaly.

In fact, the distribution for 2024 suggests the existence of a second tier of cities consisting of the municipalities of Sintra ($S = 0.29347$), Almada ($S = 0.25077$) and Funchal ($S = 0.24682$), which also play important roles in the local tourism sector but still remain considerably below the levels of the reference municipality. Other municipalities, such as Vila Nova de Gaia ($S = 0.19990$), Ponta Delgada ($S = 0.18591$), Loulé ($S = 0.18423$), Cascais ($S = 0.18227$) and Aveiro ($S = 0.17024$), have tourism supply levels in the range ($0.10 \leq S \leq 0.20$) and correspond to relevant regional hubs, but their performance still remains far from Lisbon's levels.

Most municipalities, in the national context, exhibit levels of attractiveness below $S = 0.10$, which reflects reduced levels of tourism asset availability and attests to the presence of high inter-municipal heterogeneity. In fact, the distribution of supply is uneven, and levels of disparity tend to increase as active demand tends to move away from large urban centres (Figure 2).

It is worth mentioning, in terms of sensitivity analysis, that municipalities with very similar levels, in the range ($0.03 \leq S \leq 0.09$), are susceptible to marginal fluctuations in relative ranking, resulting from small variations in supply parameters. However, the classification of relative attractiveness, marked by the primacy of Lisbon, followed by the main urban centres and the vast periphery of municipalities with low attractiveness, remains stable, which ensures the robustness of the model.

The 2024 data thus attest to the persistence of urban macrocephaly, marked by the centralisation of tourist attractiveness in the capital and a vast number of marginal hubs. From a methodological point of view, the analysis highlights two central points: (i) the solidity of the urban hierarchy, since the municipalities of Lisbon, Porto and Coimbra maintain their top positions, regardless of marginal variations; and (ii) the competitive fragility of the vast majority of municipalities, whose relative position is irrelevant, remaining largely distant from the major demographic and economic centres.

Table 6. Sensitivity analysis (S) to min-max normalisation intervals applied to the year 2020.

Municipalities	S	Municipalities	S	Municipalities	S	Municipalities	S	Municipalities	S	Municipalities	S
Lisboa	1.00000	Odemira	0.10163	Sabugal	0.07143	Campo Maior	0.05664	Valença	0.04166	Ansião	0.03061
Porto	0.49303	Vila Real de Santo António	0.09941	Alijó	0.07133	Mação	0.05659	Freixo de Espada à Cinta	0.04140	Celorico de Basto	0.03039
Coimbra	0.36283	Belmonte	0.09910	Alter do Chão	0.07131	Figueira de Castelo Rodrigo	0.05646	Ribeira de Pena	0.04123	Felgueiras	0.02987
Évora	0.31635	Seixal	0.09881	Porto de Mós	0.07114	Avis	0.05644	Câmara de Lobos	0.04086	Cabeceiras de Basto	0.02976
Sintra	0.29276	Montemor-o-Novo	0.09700	Peniche	0.07100	Montalegre	0.05602	Lourinhã	0.04081	Cartaxo	0.02965
Funchal	0.26980	Caldas da Rainha	0.09697	Torres Novas	0.07092	Mogadouro	0.05587	Gavião	0.04068	Tábua	0.02949
Setúbal	0.20874	Silves	0.09604	Porto Santo	0.06909	Moura	0.05538	Oleiros	0.04058	Almeirim	0.02948
Cascais	0.20410	Olhão	0.09548	Aljezur	0.06863	Santa Maria da Feira	0.05496	Vidigueira	0.04046	Santa Cruz	0.02942
Almada	0.19824	Covilhã	0.09529	Barreiro	0.06862	Vila Viçosa	0.05477	Viana do Alentejo	0.04036	Vagos	0.02910
Santarém	0.18619	Oliveira do Hospital	0.09407	Miranda do Douro	0.06853	Aljustrel	0.05406	São João da Madeira	0.04034	Oliveira de Frades	0.02889
Vila Nova de Gaia	0.18235	Torres Vedras	0.09393	Sines	0.06847	Gouveia	0.05404	Torre de Moncorvo	0.04014	Figueiró dos Vinhos	0.02866
Leiria	0.17948	Melgaço	0.09282	Mira	0.06824	Fafe	0.05354	Sátão	0.03997	Resende	0.02862
Loulé	0.16822	Sabrosa	0.09197	Espinho	0.06815	Bombarral	0.05308	Trofa	0.03994	Pinhel	0.02860
Seia	0.16663	Terras de Bouro	0.09169	Alenquer	0.06788	Penacova	0.05296	Santa Comba Dão	0.03968	Oliveira do Bairro	0.02853
Braga	0.15925	Alcobaça	0.08986	Paredes de Coura	0.06719	Vieira do Minho	0.05267	Alpiarça	0.03945	Pedrógão Grande	0.02773
Alcácer do Sal	0.15146	Mirandela	0.08926	Alandroal	0.06691	Ourique	0.05264	Boticas	0.03933	Armamar	0.02753
Viseu	0.14862	Lamego	0.08785	Arouca	0.06681	Condeixa-a-Nova	0.05251	Ponta do Sol	0.03863	Castelo de Paiva	0.02751
Barcelos	0.14824	Castelo de Vide	0.08770	Ferreira do Zêzere	0.06664	Miranda do Corvo	0.05250	Sobral de Monte Agraço	0.03857	Murça	0.02631
Aveiro	0.14620	Pampilhosa da Serra	0.08676	Alcanena	0.06651	Vale de Cambra	0.05249	Lousada	0.03847	Azambuja	0.02569
Matosinhos	0.14184	Ponte de Lima	0.08672	Óbidos	0.06632	Marco de Canaveses	0.05230	Fronteira	0.03846	Lajes do Pico	0.02486
Estremoz	0.13918	Mafra	0.08657	Arganil	0.06592	Ferreira do Alentejo	0.05204	Trancoso	0.03831	Vizela	0.02463
Tarouca	0.13311	Sertã	0.08576	Idanha-a-Nova	0.06564	Almeida	0.05180	Mourão	0.03815	Penalva do Castelo	0.02456
Esposende	0.13059	Elvas	0.08574	Constância	0.06539	Horta	0.05169	Alvito	0.03812	Penedono	0.02448
Fundão	0.13056	Borba	0.08479	Lousã	0.06450	Carrizada de Ansiães	0.05092	Mortágua	0.03807	Cinfães	0.02432
Ponta Delgada	0.12844	Salvaterra de Magos	0.08464	Pombal	0.06431	Paredes	0.05081	Vila do Bispo	0.03804	Velas	0.02383
Albufeira	0.12750	Beja	0.08451	São Brás de Alportel	0.06427	Almodôvar	0.05051	Cuba	0.03749	Vendas Novas	0.02341
Castelo Branco	0.12698	Ovar	0.08443	Tondela	0.06415	Ponte da Barca	0.05019	Golegã	0.03706	Vila Nova de Poiares	0.02306
Bragança	0.12431	Barrancos	0.08395	Vila Velha de Ródão	0.06364	Crato	0.05003	Rio Maior	0.03676	Moimenta da Beira	0.02282
Faro	0.12424	Maia	0.08386	Ponte de Sor	0.06338	Macedo de Cavaleiros	0.04986	Alcochete	0.03670	Sernancelhe	0.02226
Tavira	0.12254	Tomar	0.08377	Montijo	0.06227	Batalha	0.04774	Vila Nova de Paiva	0.03659	Santa Cruz das Flores	0.02190
Angra do Heroísmo	0.12140	Póvoa de Varzim	0.08373	Peso da Régua	0.06219	Alvaiázere	0.04752	Vila de Rei	0.03659	Calheta	0.02168
Figueira da Foz	0.11946	Oliveira de Azeméis	0.08275	Vinhais	0.06212	Gondomar	0.04748	Sever do Vouga	0.03657	Vila do Porto	0.02155
Abrantes	0.11940	Mértola	0.08202	Marinha Grande	0.06133	Vila Nova de Cerveira	0.04711	Alfândega da Fé	0.03655	Murtosa	0.02092
Oeiras	0.11865	Monção	0.08195	Estarreja	0.06103	Nazaré	0.04693	Baião	0.03629	Paços de Ferreira	0.02039
Vila Nova de Famalicão	0.11765	Anadia	0.08127	Góis	0.06024	Cadaval	0.04642	Vouzela	0.03568	Vila Franca do Campo	0.02039
Lagoa	0.11726	Águeda	0.08124	Monchique	0.06001	Amares	0.04637	Soure	0.03487	Madalena	0.02003
Guarda	0.11665	Manteigas	0.08066	São Pedro do Sul	0.05988	Celorico da Beira	0.04627	Amarante	0.03486	Vila Nova da Barquinha	0.01935
Palmela	0.11586	Serpa	0.08039	Vila Flor	0.05936	Mangualde	0.04579	Penela	0.03393	Mesão Frio	0.01926
Guimarães	0.11547	Penamacor	0.07908	Cantanhede	0.05922	Caminha	0.04515	Castro Daire	0.03383	Valpaços	0.01909
Lagos	0.11401	Sesimbra	0.07741	Ribeira Grande	0.05870	Mêda	0.04495	Coruche	0.03381	Vila da Praia da Vitória	0.01895
Portimão	0.11037	Nelas	0.07678	Vila Pouca de Aguiar	0.05864	Entroncamento	0.04441	Mondim de Basto	0.03336	Arruda dos Vinhos	0.01884
Vila Real	0.11010	Vila do Conde	0.07575	Penafiel	0.05855	Castro Verde	0.04408	Tabuaço	0.03329	Porto Moniz	0.01840

Grândola	0.10873	Arraiolos	0.07455	Valongo	0.05834	Sousel	0.04396	Montemor-o-Velho	0.03298	Santa Cruz da Graciosa	0.01832
Ourém	0.10865	Santiago do Cacém	0.07408	Moita	0.05832	Calheta	0.04393	Santa Marta de Penaguião	0.03175	Machico	0.01696
Loures	0.10858	Marvão	0.07374	Vila Nova de Foz Côa	0.05828	Proença-a-Nova	0.04308	Vimioso	0.03145	Povoação	0.01607
Viana do Castelo	0.10820	Reguengos de Monsaraz	0.07344	Redondo	0.05827	Sardoa	0.04306	Fornos de Algodres	0.03142	Castanheira de Pera	0.01389
Amadora	0.10809	Ílhavo	0.07304	Benavente	0.05806	Portel	0.04285	Albergaria-a-Velha	0.03138	Santana	0.01361
Vila Franca de Xira	0.10496	Odivelas	0.07295	Alcoutim	0.05787	Póvoa de Lanhoso	0.04237	Vila Verde	0.03130	Lagoa	0.01258
Castro Marim	0.10433	Arcos de Valdevez	0.07281	São João da Pesqueira	0.05773	Mora	0.04231	Chamusca	0.03128	Lajes das Flores	0.01039
Portalegre	0.10357	Nisa	0.07193	Monforte	0.05729	Santo Tirso	0.04192	Carregal do Sal	0.03103	Corvo	0.00841
Chaves	0.10276	Aguiar da Beira	0.07171	Mealhada	0.05675	Arronches	0.04176	São Roque do Pico	0.03074	Ribeira Brava	0.00580
								São Vicente	0.03073	Nordeste	0.00000

Source: Own elaboration.

Table 7. Sensitivity analysis (S) to min-max normalisation intervals applied to the year 2021.

Municipalities	S	Municipalities	S	Municipalities	S	Municipalities	S	Municipalities	S	Municipalities	S
Lisboa	1.00000	Amadora	0.11089	Alter do Chão	0.07842	Alcoutim	0.06161	Povoação	0.04399	Chamusca	0.03458
Porto	0.49481	Viana do Castelo	0.10999	Vidigueira	0.07800	Horta	0.06156	Fronteira	0.04397	Resende	0.03407
Coimbra	0.36518	Vila Franca de Xira	0.10683	Ílhavo	0.07784	Vale de Cambra	0.06153	Portel	0.04376	Cabeceiras de Basto	0.03377
Évora	0.33000	Ourém	0.10550	Vila do Conde	0.07736	Ponta do Sol	0.06147	Valença	0.04372	Lourinhã	0.03364
Sintra	0.31286	Mirandela	0.10533	Campo Maior	0.07660	Penafiel	0.06098	Macedo de Cavaleiros	0.04363	Cartaxo	0.03362
Funchal	0.27439	Castro Marim	0.10510	Moura	0.07656	Benavente	0.06082	Sousel	0.04296	Sever do Vouga	0.03360
Almada	0.23986	Belmonte	0.10470	Alenquer	0.07627	Estarreja	0.05993	Celorico da Beira	0.04289	Oliveira de Frades	0.03319
Cascais	0.22355	Odemira	0.10469	Pombal	0.07604	Figueira de Castelo Rodrigo	0.05979	Monchique	0.04262	Santa Cruz das Flores	0.03284
Setúbal	0.21210	Caldas da Rainha	0.10438	Aguiar da Beira	0.07586	Marco de Canaveses	0.05973	Santana	0.04248	Vila Nova de Paiva	0.03275
Vila Nova de Gaia	0.19799	Loures	0.10226	Ferreira do Zêzere	0.07555	Arronches	0.05856	Santo Tirso	0.04237	Madalena	0.03235
Loulé	0.19387	Sabrosa	0.09896	Santa Maria da Feira	0.07520	Vila Nova de Cerveira	0.05844	Gavião	0.04223	Oleiros	0.03218
Santarém	0.17943	Covilhã	0.09768	Óbidos	0.07518	Vila Viçosa	0.05753	Freixo de Espada à Cinta	0.04206	Tábua	0.03215
Valongo	0.16718	Pampilhosa da Serra	0.09737	Espinho	0.07495	Monforte	0.05746	São João da Madeira	0.04158	Santa Marta de Penaguião	0.03198
Leiria	0.16213	Torres Vedras	0.09729	Montijo	0.07492	Condeixa-a-Nova	0.05738	Batalha	0.04140	Albergaria-a-Velha	0.03129
Ponta Delgada	0.15393	Marvão	0.09680	Câmara de Lobos	0.07446	Moita	0.05733	Trancoso	0.04109	Castro Daire	0.03118
Braga	0.15267	Melgaço	0.09643	Peniche	0.07436	Cantanhede	0.05598	Vila do Porto	0.04093	Tarouca	0.03096
Viseu	0.15225	Mesão Frio	0.09408	Porto de Mós	0.07420	Góis	0.05581	Vouzela	0.04093	Ansião	0.03089
Matosinhos	0.14964	Ponte de Lima	0.09353	Barreiro	0.07341	Vila Pouca de Aguiar	0.05550	Alpiarça	0.04066	Porto Moniz	0.03026
Aveiro	0.14795	Oliveira do Hospital	0.09336	Peso da Régua	0.07305	Mourão	0.05519	Rio Maior	0.04037	Carregal do Sal	0.03011
Alcácer do Sal	0.14627	Ovar	0.09206	Barrancos	0.07291	Almeida	0.05507	Golegã	0.04030	Vila da Praia da Vitória	0.03004
Lagos	0.14599	Tomar	0.09174	Arraiolos	0.07198	Aljustrel	0.05482	Entroncamento	0.04015	Vagos	0.02959
Angra do Heroísmo	0.14431	Borba	0.09133	Idanha-a-Nova	0.07184	Almodôvar	0.05480	Alcochete	0.04010	Alfândega da Fé	0.02948
Seia	0.13894	Reguengos de Monsaraz	0.09105	Oliveira de Azeméis	0.07162	Montalegre	0.05468	Santa Cruz	0.03984	Oliveira do Bairro	0.02913
Estremoz	0.13838	Sertão	0.09051	Marinha Grande	0.07052	Bombarral	0.05455	Alvito	0.03977	Cinfães	0.02873
Castelo Branco	0.13831	Sines	0.09042	Arouca	0.06975	Vieira do Minho	0.05434	Viana do Alentejo	0.03960	Murça	0.02853
Lagoa	0.13796	Porto Santo	0.09003	Torres Novas	0.06959	Fafe	0.05430	Pinhel	0.03960	Vimioso	0.02839
Fundão	0.13620	Sabugal	0.08804	Serpa	0.06956	Ponte da Barca	0.05428	Tabuaço	0.03937	Penedono	0.02776
Tavira	0.13299	Anadia	0.08792	Vila Nova de Foz Côa	0.06907	Ourique	0.05410	Vila de Rei	0.03912	Mêda	0.02725
Chaves	0.13159	Terras de Bouro	0.08773	Lousã	0.06822	Miranda do Corvo	0.05334	Montemor-o-Velho	0.03888	Figueiró dos Vinhos	0.02702
Albufeira	0.13105	Montemor-o-Novo	0.08759	Avis	0.06804	Ferreira do Alentejo	0.05324	Penela	0.03874	Calheta	0.02677

Bragança	0.12897	Nelas	0.08741	Vila Velha de Ródão	0.06799	Azambuja	0.05219	Santa Comba Dão	0.03832	Sernancelhe	0.02565
Vila Nova de Famalicão	0.12863	Alcanena	0.08732	Mira	0.06767	Crato	0.05201	Trofa	0.03788	Armamar	0.02539
Faro	0.12715	Póvoa de Varzim	0.08695	Sesimbra	0.06687	Nazaré	0.05177	Sátão	0.03779	Celorico de Basto	0.02452
Barcelos	0.12552	Elvas	0.08682	Mogadouro	0.06676	Paredes	0.05094	Cuba	0.03756	Castelo de Paiva	0.02450
Grândola	0.12492	Manteigas	0.08662	Tondela	0.06644	Lousada	0.05020	Penacova	0.03716	Vizela	0.02379
Portimão	0.12392	Salvaterra de Magos	0.08627	Constância	0.06623	São Vicente	0.05018	Soure	0.03711	Vendas Novas	0.02247
Abrantes	0.12376	Mértola	0.08602	São João da Pesqueira	0.06596	Ribeira de Pena	0.05006	Felgueiras	0.03708	Moimenta da Beira	0.02223
Vila do Bispo	0.12261	Beja	0.08596	Ponte de Sor	0.06541	Fornos de Algodres	0.04994	Mora	0.03704	Lagoa	0.02220
Olhão	0.12157	Águeda	0.08563	Miranda do Douro	0.06518	Cadaval	0.04959	Baião	0.03672	Lajes das Flores	0.02195
Guimarães	0.12115	Maia	0.08498	Caminha	0.06515	Castro Verde	0.04894	Mortágua	0.03661	Vila Nova de Poiares	0.02194
Figueira da Foz	0.12013	Seixal	0.08430	Monção	0.06491	Paredes de Coura	0.04877	Sobral de Monte Agraço	0.03657	Penalva do Castelo	0.02159
Oeiras	0.12000	Castelo de Vide	0.08347	São Brás de Alportel	0.06454	Proença-a-Nova	0.04842	Póvoa de Lanhoso	0.03657	Paços de Ferreira	0.02138
Palmela	0.11905	Odivelas	0.08324	Mação	0.06440	Gouveia	0.04767	Velas	0.03657	Vila Nova da Barquinha	0.02136
Vila Real de Santo António	0.11734	Ribeira Grande	0.08237	Alandroal	0.06414	Amares	0.04754	Mondim de Basto	0.03635	Valpaços	0.02006
Guarda	0.11582	Nisa	0.08226	São Pedro do Sul	0.06399	Carrazeda de Ansiães	0.04747	Lajes do Pico	0.03587	Arruda dos Vinhos	0.01997
Portalegre	0.11506	Arcos de Valdevez	0.08151	Vila Flor	0.06359	Gondomar	0.04740	São Roque do Pico	0.03586	Murtosa	0.01989
Vila Real	0.11432	Santiago do Cacém	0.08129	Arganil	0.06249	Vila Verde	0.04666	Pedrógão Grande	0.03559	Santa Cruz da Graciosa	0.01887
Alcobaça	0.11411	Redondo	0.08018	Alijó	0.06241	Alvaiázere	0.04651	Torre de Moncorvo	0.03553	Vila Franca do Campo	0.01842
Esposende	0.11150	Amarante	0.07908	Vinhais	0.06238	Sardoal	0.04468	Machico	0.03533	Ribeira Brava	0.01540
Silves	0.11147	Mafra	0.07887	Mealhada	0.06228	Mangualde	0.04445	Coruche	0.03528	Castanheira de Pêra	0.01399
Lamego	0.11112	Penamacor	0.07859	Aljezur	0.06220	Calheta	0.04417	Almeirim	0.03494	Corvo	0.00935
								Boticas	0.03480	Nordeste	0.00000

Source: Own elaboration.

Table 8. Sensitivity analysis (S) to min-max normalisation intervals applied to the year 2022.

Municipalities	S	Municipalities	S	Municipalities	S	Municipalities	S	Municipalities	S	Municipalities	S
Lisboa	1.00000	Vila Nova de Famalicão	0.10194	Borba	0.06647	São Brás de Alportel	0.04922	Póvoa de Lanhoso	0.03467	Mondim de Basto	0.01976
Porto	0.50382	Bragança	0.09778	Terras de Bouro	0.06637	Vila Viçosa	0.04912	Cuba	0.03438	Armamar	0.01952
Coimbra	0.36050	Chaves	0.09685	Valongo	0.06619	Vinhais	0.04895	Mangualde	0.03405	Baião	0.01940
Sintra	0.32249	Viana do Castelo	0.09470	Mesão Frio	0.06542	Alter do Chão	0.04894	Cabeceiras de Basto	0.03401	Santana	0.01939
Almada	0.31750	Vila Franca de Xira	0.09345	Peso da Régua	0.06405	Porto Moniz	0.04857	Miranda do Corvo	0.03392	Gavião	0.01912
Évora	0.26783	Odemira	0.09323	Amarante	0.06385	Vila Velha de Ródão	0.04793	Fronteira	0.03341	Mêda	0.01890
Funchal	0.25162	Castro Marim	0.09126	Óbidos	0.06290	Povoação	0.04789	Freixo de Espada à Cinta	0.03226	Montemor-o-Velho	0.01885
Lagoa	0.20485	Sabrosa	0.09073	Benavente	0.06213	Crato	0.04785	Gouveia	0.03215	Paredes de Coura	0.01871
Vila Nova de Gaia	0.19952	Mirandela	0.08813	Sabugal	0.06202	Entroncamento	0.04780	Batalha	0.03211	Resende	0.01865
Aveiro	0.19773	Ponta do Sol	0.08701	Nisa	0.06090	Condeixa-a-Nova	0.04754	Bombarral	0.03196	Castro Daire	0.01833
Santarém	0.19467	Pampilhosa da Serra	0.08642	Espinho	0.06087	São Vicente	0.04753	Vila Verde	0.03137	Santa Comba Dão	0.01767
Setúbal	0.19364	Elvas	0.08545	Redondo	0.06078	Barrancos	0.04730	Sousel	0.03086	Santa Marta de Penaguião	0.01766
Matosinhos	0.19040	Caldas da Rainha	0.08447	Sesimbra	0.05991	Olhão	0.04727	Valença	0.02979	Madalena	0.01755
Cascais	0.18661	Belmonte	0.08401	Castelo de Vide	0.05928	Alcoutim	0.04630	Lousada	0.02956	Mortágua	0.01697
Loulé	0.17534	Maia	0.08384	Torres Novas	0.05923	Cantanhede	0.04552	Cinfães	0.02892	Penedono	0.01610
Sines	0.15936	Amadora	0.08366	Idanha-a-Nova	0.05907	Monforte	0.04527	Celorico da Beira	0.02878	Sever do Vouga	0.01596
Ponta Delgada	0.15027	Porto Santo	0.08333	Ferreira do Zêzere	0.05905	Estarreja	0.04447	Sobral de Monte Agraço	0.02829	Boticas	0.01580
Leiria	0.14392	Ourém	0.08201	Montijo	0.05899	Macedo de Cavaleiros	0.04433	Sátão	0.02803	Santa Cruz das Flores	0.01577

Lagos	0.13819	Câmara de Lobos	0.08146	Vila Nova de Cerveira	0.05877	Aljezur	0.04405	Proença-a-Nova	0.02778	Cartaxo	0.01526
Castelo Branco	0.13690	Arcos de Valdevez	0.08137	Serpa	0.05869	Oliveira de Azeméis	0.04368	Vouzela	0.02742	Vila do Porto	0.01497
Braga	0.13587	Marvão	0.08082	Alandroal	0.05865	Gondomar	0.04258	Moita	0.02714	Calheta	0.01469
Viseu	0.12736	Ponte de Lima	0.08059	Aljustrel	0.05842	Marco de Canaveses	0.04249	Alcochete	0.02706	Rio Maior	0.01450
Loures	0.12649	Anadia	0.08054	Odivelas	0.05830	Arganil	0.04244	Tarouca	0.02691	Oleiros	0.01413
Seia	0.12628	Póvoa de Varzim	0.07983	Arraiolos	0.05788	Alvaiázere	0.04164	Ansião	0.02687	Ribeira de Pena	0.01392
Estremoz	0.12535	Reguengos de Monsaraz	0.07923	Aguiar da Beira	0.05743	Ferreira do Alentejo	0.04114	Golegã	0.02605	Oliveira do Bairro	0.01377
Vila do Bispo	0.12450	Manteigas	0.07910	Mira	0.05727	Constância	0.04058	Arronches	0.02530	Penalva do Castelo	0.01364
Figueira da Foz	0.12382	Esposende	0.07908	Avis	0.05694	Castro Verde	0.04042	Azambuja	0.02499	Murça	0.01360
Barcelos	0.12247	Penafiel	0.07684	Montalegre	0.05656	Vila Pouca de Aguiar	0.04035	Vale de Cambra	0.02487	Pinhel	0.01351
Portalegre	0.11969	Ovar	0.07629	Monção	0.05629	Vila Flor	0.04001	Soure	0.02472	Vimioso	0.01350
Tavira	0.11848	Santiago do Cacém	0.07612	Porto de Mós	0.05597	Cadaval	0.03953	Alvito	0.02464	Vila Franca do Campo	0.01342
Grândola	0.11810	Vila do Conde	0.07533	Vila Nova de Foz Côa	0.05507	Almodôvar	0.03932	Portel	0.02456	Alpiarça	0.01263
Abrantes	0.11658	Águeda	0.07466	São João da Pesqueira	0.05411	Lourinhã	0.03931	Chamusca	0.02448	Castanheira de Pera	0.01139
Alcobaça	0.11598	Montemor-o-Novo	0.07359	Monchique	0.05384	Trancoso	0.03909	Trofa	0.02447	Vizela	0.01117
Oeiras	0.11584	Mértola	0.07305	São Pedro do Sul	0.05353	Almeirim	0.03821	Lajes do Pico	0.02435	Oliveira de Frades	0.01110
Alcácer do Sal	0.11554	Moura	0.07132	Miranda do Douro	0.05330	Mourão	0.03807	Albergaria-a-Velha	0.02381	Moimenta da Beira	0.01093
Portimão	0.11398	Marinha Grande	0.07130	Pombal	0.05298	Ponte da Barca	0.03802	Velas	0.02354	Salvaterra de Magos	0.01073
Seixal	0.11297	Lagoa	0.07087	Tondela	0.05277	Ourique	0.03797	Pedrógão Grande	0.02341	Tábua	0.01056
Fundão	0.11219	Sertão	0.07064	Fafe	0.05276	Santo Tirso	0.03796	Sernancelhe	0.02307	Vendas Novas	0.00887
Silves	0.11196	Ribeira Grande	0.07042	Ponte de Sor	0.05196	Santa Cruz	0.03747	Penacova	0.02240	Murtosa	0.00867
Vila Real	0.11144	Mafra	0.07040	Campo Maior	0.05192	Vieira do Minho	0.03683	Calheta	0.02224	Valpaços	0.00841
Guimarães	0.11097	Horta	0.06958	Alijó	0.05187	Alfândega da Fé	0.03667	Tabuaço	0.02177	Celorico de Basto	0.00776
Lamego	0.11096	Beja	0.06895	Mogadouro	0.05123	Góis	0.03637	Mora	0.02154	Castelo de Paiva	0.00734
Faro	0.11084	Covilhã	0.06872	Arouca	0.05109	Carraceda de Ansiães	0.03582	Machico	0.02153	Vila Nova de Poiares	0.00703
Palmela	0.10991	Torres Vedras	0.06834	Penamacor	0.05087	Viana do Alentejo	0.03579	Vagos	0.02119	Carregal do Sal	0.00638
Barreiro	0.10980	Ílhavo	0.06829	Santa Maria da Feira	0.05071	Nazaré	0.03578	São João da Madeira	0.02117	Paços de Ferreira	0.00554
Vila Real de Santo António	0.10836	Oliveira do Hospital	0.06798	Lousã	0.05070	Vila da Praia da Vitória	0.03546	Vila Nova de Paiva	0.02115	Lajes das Flores	0.00485
Albufeira	0.10814	Caminha	0.06706	Amares	0.05018	Almeida	0.03510	Figueiró dos Vinhos	0.02109	Vila Nova da Barquinha	0.00347
Angra do Heroísmo	0.10782	Nelas	0.06706	Mealhada	0.05015	Sardão	0.03506	Penela	0.02101	Santa Cruz da Graciosa	0.00347
Alcanena	0.10459	Peniche	0.06705	Paredes	0.05009	Vila de Rei	0.03505	Fornos de Algodres	0.02080	Arruda dos Vinhos	0.00229
Tomar	0.10410	Alenquer	0.06695	Vidigueira	0.04936	Figueira de Castelo Rodrigo	0.03480	Torre de Moncorvo	0.02078	Corvo	0.00168
Guarda	0.10230	Melgaço	0.06682	Mação	0.04923	Coruche	0.03477	Felgueiras	0.02005	Ribeira Brava	0.00096
								São Roque do Pico	0.02000	Nordeste	0.00000

Source: Own elaboration.

Table 9. Sensitivity analysis (S) to min-max normalisation intervals applied to the year 2023.

Municipalities	S	Municipalities	S	Municipalities	S	Municipalities	S	Municipalities	S	Municipalities	S
Lisboa	1.00000	Alcobaça	0.10158	Beja	0.06884	Vila Nova de Foz Côa	0.05015	Baião	0.03726	Fornos de Algodres	0.02539
Porto	0.48569	Vila Nova de Famalicão	0.09973	Manteigas	0.06800	Campo Maior	0.05010	Mação	0.03672	Bombarral	0.02529
Coimbra	0.33756	Silves	0.09955	Ílhavo	0.06790	Alcoutim	0.04961	São Roque do Pico	0.03661	Sobral de Monte Agraço	0.02523
Sintra	0.29252	Vila Real de Santo António	0.09870	Alcácer do Sal	0.06777	Penamacor	0.04936	Lajes do Pico	0.03646	Castelo de Paiva	0.02494
Almada	0.24836	Mértola	0.09842	Vila Nova de Cerveira	0.06755	Arganil	0.04900	Nelas	0.03627	Celorico de Basto	0.02450
Funchal	0.24773	Fundão	0.09806	Miranda do Douro	0.06715	Mealhada	0.04861	Valença	0.03621	Vila do Porto	0.02426
Vila Nova de Gaia	0.19960	Figueira da Foz	0.09772	Montalegre	0.06685	Redondo	0.04852	Arronches	0.03601	Santa Cruz das Flores	0.02412
Ponta Delgada	0.18573	Reguengos de Monsaraz	0.09621	Oliveira do Hospital	0.06657	Pampilhosa da Serra	0.04842	Penacova	0.03583	Moimenta da Beira	0.02381
Loulé	0.18334	Ourém	0.09608	Estremoz	0.06637	Benavente	0.04832	Alter do Chão	0.03582	Santana	0.02380
Cascais	0.18263	Câmara de Lobos	0.09536	Sesimbra	0.06539	Paredes de Coura	0.04818	Machico	0.03550	Fronteira	0.02374
Aveiro	0.16885	Vila do Conde	0.09511	Penafiel	0.06481	Vila Flor	0.04783	Sátão	0.03543	Mortágua	0.02374
Santarém	0.16832	Castro Marim	0.09205	São Vicente	0.06473	Póvoa de Lanhoso	0.04716	Felgueiras	0.03453	Montemor-o-Velho	0.02364
Évora	0.16774	Palmela	0.09092	Lousã	0.06458	Almeirim	0.04702	Ansião	0.03429	Paços de Ferreira	0.02348
Braga	0.16462	Elvas	0.09071	Peso da Régua	0.06451	Tondela	0.04624	Torre de Moncorvo	0.03419	Figueiró dos Vinhos	0.02347
Setúbal	0.16261	Caldas da Rainha	0.09051	Moura	0.06424	Vila Pouca de Aguiar	0.04623	Monforte	0.03364	Mêda	0.02345
Lagos	0.16148	Esposende	0.08991	Povoação	0.06419	Castro Verde	0.04585	Madalena	0.03356	Mondim de Basto	0.02340
Matosinhos	0.15327	Vila Franca de Xira	0.08963	Avis	0.06395	Carrazeda de Ansiães	0.04565	Freixo de Espada à Cinta	0.03349	Sever do Vouga	0.02316
Tavira	0.15213	Ribeira Grande	0.08798	Marinha Grande	0.06370	Vinhais	0.04512	Tabuaço	0.03289	Ourique	0.02281
Lagoa	0.14979	Abrantes	0.08719	Arouca	0.06272	Mangualde	0.04503	Pedrógão Grande	0.03285	Trofa	0.02239
Leiria	0.14282	Caminha	0.08680	Fafe	0.06266	Cantanhede	0.04454	Sernancelhe	0.03272	Boticas	0.02234
Portimão	0.13536	Terras de Bouro	0.08567	Seixal	0.06183	Alenquer	0.04419	Almodôvar	0.03258	Valpaços	0.02215
Bragança	0.13535	Horta	0.08517	Santa Cruz	0.06126	Vila da Praia da Vitória	0.04406	Santo Tirso	0.03249	Ribeira de Pena	0.02132
Barcelos	0.13509	Mirandela	0.08363	Marvão	0.06101	Ribeira Brava	0.04398	Armamar	0.03236	Oliveira do Bairro	0.02129
Grândola	0.13454	Mesão Frio	0.08303	Porto Moniz	0.06052	São Brás de Alportel	0.04378	Alfândega da Fé	0.03225	Vila Nova de Paiva	0.02126
Albufeira	0.13322	Lagoa	0.08284	Odivelas	0.05999	Cadaval	0.04344	Ponte de Sor	0.03187	Calheta	0.02119
Odemira	0.13281	Covilhã	0.08204	Vila Viçosa	0.05961	Cinfães	0.04317	Golegã	0.03134	Gavião	0.02078
Viseu	0.12769	Peniche	0.08104	Nisa	0.05919	Alandroal	0.04302	Portel	0.03127	Vizela	0.02068
Lamego	0.12712	Óbidos	0.07960	São Pedro do Sul	0.05914	Cabeceiras de Basto	0.04275	Alvito	0.03080	Santa Marta de Penaguião	0.02063
Sines	0.12668	Sabrosa	0.07912	Torres Novas	0.05833	Vila Velha de Ródão	0.04248	Celorico da Beira	0.03075	Vila Franca do Campo	0.02045
Castelo Branco	0.12594	Idanha-a-Nova	0.07910	Vieira do Minho	0.05832	Lourinhã	0.04246	Castro Daire	0.03067	Vimioso	0.01969
Angra do Heroísmo	0.12462	Águeda	0.07851	Anadia	0.05819	Tarouca	0.04239	Batalha	0.03065	Nordeste	0.01943
Faro	0.12431	Amarante	0.07837	Aljustrel	0.05773	Aguiar da Beira	0.04231	Tábua	0.03046	Castanheira de Pêra	0.01929
Viana do Castelo	0.11997	Porto Santo	0.07748	Oliveira de Azeméis	0.05729	Vila Verde	0.04218	Resende	0.03002	Alcochete	0.01868
Ponte de Lima	0.11935	Monção	0.07746	São João da Pesqueira	0.05727	Góis	0.04162	Chamusca	0.02984	Vagos	0.01859
Guimarães	0.11878	Ovar	0.07727	Mogadouro	0.05574	Sertã	0.04150	Azambuja	0.02974	Oliveira de Frades	0.01839
Póvoa de Varzim	0.11752	Montemor-o-Novo	0.07577	Mira	0.05552	Estarreja	0.04121	Miranda do Corvo	0.02955	Carregal do Sal	0.01835
Tomar	0.11610	Belmonte	0.07571	Espinho	0.05549	Velas	0.04095	Sardoal	0.02954	Murça	0.01821
Santiago do Cacém	0.11472	Aljezur	0.07514	Gondomar	0.05528	Porto de Mós	0.04083	Cuba	0.02866	Vila Nova de Poiares	0.01794
Arcos de Valdevez	0.11436	Melgaço	0.07457	Castelo de Vide	0.05475	Alvaiázere	0.04078	Penedono	0.02856	Mora	0.01744
Vila Real	0.11254	Santa Maria da Feira	0.07431	Pombal	0.05351	Gouveia	0.04035	Almeida	0.02841	Cartaxo	0.01709
Vila do Bispo	0.11146	Amares	0.07166	Nazaré	0.05313	Crato	0.03999	Viana do Alentejo	0.02821	Vendas Novas	0.01689
Loures	0.11070	Valongo	0.07156	Montijo	0.05272	Ferreira do Zêzere	0.03950	Barrancos	0.02805	Sousel	0.01535
Portalegre	0.11021	Monchique	0.07136	Condeixa-a-Nova	0.05266	Borba	0.03939	São João da Madeira	0.02777	Santa Cruz da Graciosa	0.01528

Barreiro	0.10754	Amadora	0.07118	Ferreira do Alentejo	0.05235	Vidigueira	0.03938	Rio Maior	0.02763	Penalva do Castelo	0.01490
Chaves	0.10722	Sabugal	0.07065	Calheta	0.05211	Vale de Cambra	0.03932	Moita	0.02729	Alpiarça	0.01344
Oeiras	0.10530	Alijó	0.07049	Paredes	0.05182	Figueira de Castelo Rodrigo	0.03882	Proença-a-Nova	0.02708	Vila Nova da Barquinha	0.01298
Guarda	0.10529	Ponte da Barca	0.07043	Marco de Canaveses	0.05156	Vouzela	0.03872	Oleiros	0.02658	Murtosa	0.01118
Olhão	0.10526	Mafra	0.07036	Mourão	0.05119	Vila de Rei	0.03870	Coruche	0.02639	Lajes das Flores	0.01093
Seia	0.10452	Maia	0.07035	Trancoso	0.05061	Lousada	0.03839	Soure	0.02621	Santa Comba Dão	0.01019
Ponta do Sol	0.10442	Serpa	0.07022	Arraiolos	0.05029	Entroncamento	0.03779	Albergaria-a-Velha	0.02603	Salvaterra de Magos	0.00969
Alcanena	0.10293	Torres Vedras	0.06913	Macedo de Cavaleiros	0.05022	Constância	0.03777	Penela	0.02595	Arruda dos Vinhos	0.00852
								Pinhel	0.02559	Corvo	0.00000

Source: Own elaboration.

Table 10. Sensitivity analysis (S) to min-max normalisation intervals applied to the year 2024.

Municipalities	S	Municipalities	S	Municipalities	S	Municipalities	S	Municipalities	S	Municipalities	S
Lisboa	1.00000	Alcobaça	0.10202	Beja	0.06864	Campo Maior	0.04995	Baião	0.03712	Sobral Monte Agraço	0.02511
Porto	0.48473	Vila Nova de Famalicão	0.10008	Ílhavo	0.06839	Alcoutim	0.04975	Mação	0.03652	Bombarral	0.02501
Coimbra	0.33756	Silves	0.09951	Manteigas	0.06819	Macedo de Cavaleiros	0.04974	Lajes do Pico	0.03634	Fornos de Algodres	0.02471
Sintra	0.29347	Vila Real Santo António	0.09933	Vila Nova Cerveira	0.06811	Penamacor	0.04957	São Roque do Pico	0.03626	Castelo de Paiva	0.02463
Almada	0.25077	Mértola	0.09874	Alcácer do Sal	0.06756	Redondo	0.04872	Nelas	0.03615	Celorico de Basto	0.02438
Funchal	0.24682	Fundão	0.09779	Miranda do Douro	0.06725	Mealhada	0.04856	Valença	0.03608	Vila do Porto	0.02414
Vila Nova de Gaia	0.19990	Figueira da Foz	0.09769	Montalegre	0.06672	Benavente	0.04855	Arronches	0.03607	Santa Cruz das Flores	0.02414
Ponta Delgada	0.18591	Reguengos de Monsaraz	0.09668	Oliveira do Hospital	0.06637	Pampilhosa da Serra	0.04852	Penacova	0.03592	Mortágua	0.02364
Loulé	0.18423	Ourém	0.09644	Estremoz	0.06633	Arganil	0.04852	Alter do Chão	0.03579	Moimenta da Beira	0.02350
Cascais	0.18227	Câmara de Lobos	0.09632	Sesimbra	0.06571	Paredes de Coura	0.04811	Machico	0.03542	Fronteira	0.02338
Aveiro	0.17024	Vila do Conde	0.09557	São Vicente	0.06502	Vila Flor	0.04746	Sátão	0.03515	Santana	0.02337
Santarém	0.16922	Castro Marim	0.09261	Penafiel	0.06486	Almeirim	0.04721	Felgueiras	0.03441	Mondim de Basto	0.02334
Évora	0.16792	Palmela	0.09134	Moura	0.06471	Póvoa de Lanhoso	0.04718	Ansião	0.03420	Montemor-o-Velho	0.02325
Braga	0.16406	Elvas	0.09093	Povoação	0.06467	Vila Pouca de Aguiar	0.04652	Torre de Moncorvo	0.03377	Paços de Ferreira	0.02324
Setúbal	0.16288	Esposende	0.09042	Peso da Régua	0.06464	Castro Verde	0.04603	Monforte	0.03348	Figueiró dos Vinhos	0.02319
Lagos	0.16253	Caldas da Rainha	0.09017	Lousã	0.06456	Tondela	0.04599	Madalena	0.03339	Mêda	0.02305
Matosinhos	0.15353	Vila Franca de Xira	0.08962	Avis	0.06427	Carraceda de Ansiães	0.04522	Freixo Espada à Cinta	0.03321	Sever do Vouga	0.02274
Tavira	0.15315	Ribeira Grande	0.08849	Marinha Grande	0.06406	Vinhais	0.04488	Pedrogão Grande	0.03292	Ourique	0.02272
Lagoa	0.15097	Caminha	0.08730	Fafe	0.06273	Mangualde	0.04468	Tabuaço	0.03257	Trofa	0.02225
Leiria	0.14317	Abrantes	0.08714	Arouca	0.06258	Ribeira Brava	0.04440	Sernancelhe	0.03256	Boticas	0.02218
Portimão	0.13572	Horta	0.08534	Seixal	0.06212	Vila da Praia da Vitória	0.04414	Almodôvar	0.03234	Valpaços	0.02183
Bragança	0.13549	Terras de Bouro	0.08522	Santa Cruz	0.06161	Cantanhede	0.04411	Santo Tirso	0.03233	Ribeira de Pena	0.02142
Barcelos	0.13529	Mesão Frio	0.08377	Porto Moniz	0.06106	Alenquer	0.04396	Alfândega da Fé	0.03225	Calheta	0.02125
Grândola	0.13518	Lagoa	0.08372	Marvão	0.06089	São Brás de Alportel	0.04361	Armamar	0.03209	Vila Nova de Paiva	0.02114
Odemira	0.13291	Mirandela	0.08336	Odivelas	0.06012	Cadaval	0.04346	Ponte de Sor	0.03183	Oliveira do Bairro	0.02099
Albufeira	0.13265	Covilhã	0.08192	Vila Viçosa	0.05955	Cinfães	0.04307	Golegã	0.03121	Gavião	0.02064
Lamego	0.12811	Peniche	0.08119	Nisa	0.05924	Alandroal	0.04288	Portel	0.03109	Vila Franca do Campo	0.02060
Viseu	0.12798	Óbidos	0.07980	São Pedro do Sul	0.05908	Cabeceiras de Basto	0.04275	Alvito	0.03086	Vizela	0.02049
Sines	0.12797	Sabrosa	0.07957	Vieira do Minho	0.05851	Tarouca	0.04248	Celorico da Beira	0.03049	Santa Marta Penaguião	0.02034

Castelo Branco	0.12647	Idanha-a-Nova	0.07946	Aljustrel	0.05845	Lourinhã	0.04247	Batalha	0.03037	Vimioso	0.01943
Faro	0.12457	Águeda	0.07917	Anadia	0.05831	Aguiar da Beira	0.04236	Castro Daire	0.03024	Nordeste	0.01938
Angra do Heroísmo	0.12437	Amarante	0.07860	Torres Novas	0.05815	Vila Verde	0.04204	Tábua	0.03022	Castanheira de Pêra	0.01935
Viana do Castelo	0.11986	Monção	0.07758	São João Pesqueira	0.05756	Vila Velha de Ródão	0.04202	Chamusca	0.02978	Alcochete	0.01844
Ponte de Lima	0.11923	Ovar	0.07748	Oliveira de Azeméis	0.05749	Góis	0.04151	Azambuja	0.02975	Vagos	0.01840
Guimarães	0.11870	Porto Santo	0.07739	Mogadouro	0.05573	Sertã	0.04135	Resende	0.02974	Oliveira de Frades	0.01820
Póvoa de Varzim	0.11845	Belmonte	0.07600	Espinho	0.05548	Velas	0.04113	Sardoal	0.02953	Carregal do Sal	0.01802
Tomar	0.11655	Montemor-o-Novo	0.07583	Mira	0.05529	Estarreja	0.04106	Miranda do Corvo	0.02946	Murça	0.01793
Santiago do Cacém	0.11492	Aljezur	0.07492	Gondomar	0.05513	Porto de Mós	0.04075	Penedono	0.02876	Vila Nova de Poiares	0.01784
Arcos de Valdevez	0.11432	Santa Maria da Feira	0.07458	Castelo de Vide	0.05457	Alvaiázere	0.04072	Cuba	0.02861	Mora	0.01729
Vila Real	0.11287	Melgaço	0.07420	Pombal	0.05365	Gouveia	0.04017	Barrancos	0.02846	Cartaxo	0.01681
Vila do Bispo	0.11203	Monchique	0.07193	Nazaré	0.05299	Crato	0.04009	Almeida	0.02828	Vendas Novas	0.01669
Loures	0.11091	Amares	0.07177	Condeixa-a-Nova	0.05272	Ferreira do Zêzere	0.03980	Viana do Alentejo	0.02817	Sousel	0.01515
Portalegre	0.11013	Valongo	0.07169	Montijo	0.05234	Vidigueira	0.03946	Rio Maior	0.02749	Santa Cruz Graciosa	0.01505
Barreiro	0.10839	Amadora	0.07097	Ferreira do Alentejo	0.05216	Borba	0.03944	São João da Madeira	0.02743	Penalva do Castelo	0.01450
Chaves	0.10764	Maia	0.07065	Paredes	0.05184	Vale de Cambra	0.03926	Moita	0.02723	Alpiarça	0.01327
Olhão	0.10582	Serpa	0.07062	Calheta	0.05153	Figueira Castelo Rodrigo	0.03870	Proença-a-Nova	0.02682	Vila Nova da Barquinha	0.01260
Ponta do Sol	0.10542	Sabugal	0.07059	Mourão	0.05151	Vouzela	0.03862	Oleiros	0.02654	Murtosa	0.01088
Oeiras	0.10534	Mafra	0.07033	Marco Canaveses	0.05148	Vila de Rei	0.03862	Soure	0.02627	Lajes das Flores	0.01063
Guarda	0.10513	Ponte da Barca	0.07023	Trancoso	0.05068	Lousada	0.03827	Coruche	0.02617	Santa Comba Dão	0.00991
Seia	0.10417	Alijó	0.07015	Arraiolos	0.05026	Constância	0.03794	Albergaria-a-Velha	0.02587	Salvaterra de Magos	0.00950
Alcanena	0.10391	Torres Vedras	0.06872	Vila Nova Foz Côa	0.05018	Entroncamento	0.03782	Penela	0.02573	Arruda dos Vinhos	0.00828
								Pinhel	0,02521	Corvo	0,00000

Source: Own elaboration.

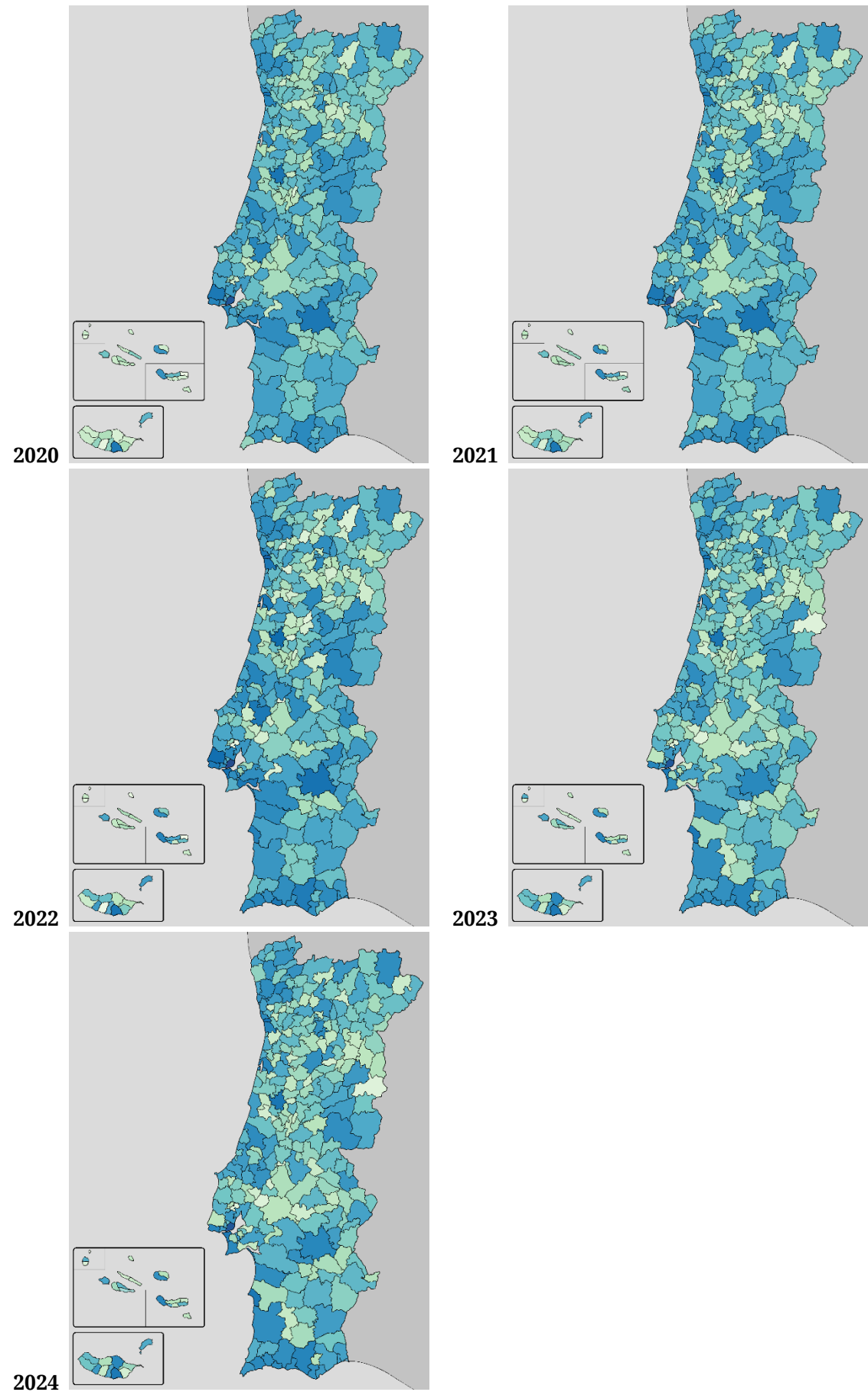


Figure 2. Choropleth maps of the levels of tourist attractiveness of Portuguese municipalities (2020–2024); Source: Own elaboration.

DISCUSSION

The data estimated using the tourist attractiveness index, applied to all Portuguese municipalities between 2020 and 2024, shows considerable territorial inequalities in terms of the ability to attract tourists. The discussion aims to critically interpret the results by relating them to existing literature and exploring the effects on territorial development, suggesting ways forward for the process of formulating public policies and research.

One of the most visible results concerns the concentration of tourist attractiveness in a restricted group of municipalities, namely Lisboa, Porto, Coimbra, Sintra, Almada, Funchal and Cascais. Throughout the five-year series, these municipalities have maintained their leading positions with values significantly above the national average. In contrast, a wide range of municipalities, especially smaller ones located in peripheral and island areas, have consistently shown low levels of attractiveness.

These results corroborate the doctrine that points to the strong centralisation of the tourist offer in large metropolitan areas [57,58]. The concentration of assets, infrastructures, accessibility, tourist services and institutional and environmental promotion in these urban centres develops a strategic advantage [59,60], which strengthens tourist attractiveness. In fact, tourism, as a geographically selective phenomenon, tends to produce territorial asymmetries [61,62]. On the other hand, the fact that the municipality of Lisboa solidly leads the ranking, with the indicator rising from 48.2% in 2020 to 63.1% in 2024, reinforces the prospect of tourist concentration in the major metropolitan centres [63,64]. As the data shows, the capital Lisboa is in fact a central point in the country's tourist network, as it benefits from heritage facilities, access, cultural and artistic services and marketing capacity [65,66].

The factors that explain levels of attractiveness vary between contexts, but the literature tends to emphasise the interaction between tourism assets (heritage, culture, nature), infrastructure, access, quality of services and municipal policies [14,67]. In the case of Portugal, the results suggest that municipalities with a higher level of attractiveness are also those that invest more in tourist facilities, have higher levels of population density and income and better access. On the other hand, the municipalities with the lowest rates, such as Corvo, Santa Cruz da Graciosa, Arruda dos Vinhos and Vila Nova da Barquinha, suffer from structural asymmetries, such as geographical isolation, low population density, a shortage of tourist assets and less notoriety. According to doctrine, these territories are classified as a paradox of unrealised tourism potential [68,69], in which the existence (or not) of a tourism offer does not necessarily translate into attractiveness or an effective tourist flow [70,71].

An essential element in understanding the disparity between municipalities is the role of public policies and local governance. Municipalities that have consistent strategies for valuing, promoting and developing the tourism sector tend to have better levels of attractiveness. In the Portuguese context, Lisboa, Porto and Sintra have organisational units dedicated to tourism management, public-private partnerships and, in some cases, help in developing consolidated territorial brands. Municipalities, on the other hand, often lack the technical and financial capacity to implement policies to attract and retain tourists [72,73].

The period under analysis covers the COVID-19 pandemic crisis, which, between 2020 and 2021, affected the tourism sector and forced the adoption of limitations on mobility, temporary closures of facilities and changes in tourist preferences. However, the results suggest that municipal attractiveness levels have remained relatively stable; even during the most critical years of the pandemic (Tables 1–5). The data attests to the theory that municipalities with consolidated tourism structures and national and international notoriety show greater levels of resilience [74,75]. In the case of the municipality of Lisboa, it can be seen that it has held on to the top spot in all the years analysed, even during periods of a sharp downturn in tourism, such as the pandemic. This resilience is in line with the literature. Studies show that municipalities with a more diversified tourism offer tend to recover more quickly from exogenous shocks [76,77].

Conversely, the results suggest that there has not been a significant increase in the attractiveness of rural and less densely populated municipalities. In fact, the results do not corroborate the view of Brouder [78] or Briedenhann and Wickens [79], who are apologists for the continuous and growing ‘ruralisation of tourism’. According to the doctrine, this is the result of a lack of facilities [80,81], marketing [82,83] and services linked to the tourism sector [84,85], which makes it impossible to attract, captivate and potentially interest a potential demand interested in less mass-market environments.

Over the five-year period, there is a gradual increase in the national average, from 4.269% in 2020 to 5.334% in 2024. This development suggests a strengthening of the tourism sector, probably related to the post-pandemic recovery, the improvement of the tourism offer and investment by municipalities and private agents in tourist destinations. However, the increase has not translated into a territorial redistribution of tourist attractiveness. The difference between the municipality with the highest level of attractiveness and the one with the lowest has increased significantly [86,87], signalling a possible increase in territorial inequalities [88,89].

While in 2020 the difference was 46.9 percentage points, in 2024 it reached 61.9 points. This pattern corroborates the perspective of some authors, who categorise the phenomenon as ‘polarised growth’, in which

municipalities with a consolidated tourism offer tend to expand, while those on the periphery face stagnation [90,91].

The data points to the urgent need for a more balanced and territorially sensitive tourism policy. The excessive concentration of attractiveness in a few municipalities not only limits the development potential of other regions but also creates risks of overtourism [92,93] in destinations such as Lisboa, Porto and Sintra. The results point to the need to promote and implement strategies to deconcentrate tourism demand by investing in emerging destinations with high potential.

The diversification of the offer, the valorisation of heritage, ecotourism and rural and creative tourism are some of the possible ways of promoting a more equitable distribution of tourist flows [94,95]. To this end, greater institutional capacity building is needed in less attractive municipalities through the definition of municipal tourism plans and the creation of collaborative networks between territories. Tourism must be articulated with other sectors (agriculture, culture, and environment) in order to produce economies of scale effects. The concept of smart tourism destinations [96,97] also offers a promising approach by integrating technology, sustainability and social inclusion as pillars of territorial tourism development.

However, its limitations must be recognised. The construction of the index depends above all on the availability and quality of the statistical data available, which can limit the inclusion of relevant indicators [98,99]. The index focuses mainly on potential attractiveness but does not directly capture the number of visitors or their subjective perception of the tourist experience [100,101].

In future studies, we have also noted the relevance of analysing the fiscal effect on attractiveness [102,103], making comparisons with municipalities in other countries [104,105] or carrying out multivariate analyses to isolate the effects of different variables on attractiveness [106,107].

Analysing the index between 2020 and 2024 shows that tourism attractiveness in Portugal is excessively concentrated, reproducing historical patterns of centralisation in metropolitan areas. The most attractive municipalities are those with the highest levels of tourism offers, equipment, notoriety, access and active municipal policies, while the least attractive lack resources, recognition and promotion capacity.

In order to overcome inequalities and foster effective territorial cohesion in the tourism sector, it is crucial that public policies adopt an integrated and inclusive approach [108,109] that takes into account the specificities of the territories [110,111] and promotes the valorisation of local resources.

CONCLUSIONS

This research focuses on the existence of asymmetries in the attractiveness of tourism offerings in Portuguese municipalities. The

results show a clear territorial asymmetry in the levels of tourist attractiveness of municipalities.

According to the data, the concentration of tourist attractiveness in the major urban centres is substantially higher than that observed in peripheral territories with low population density, which confirms the existence of persistent territorial inequality throughout the period from 2020 to 2024.

The municipalities of Lisboa, Porto and other urban centres stand out as the main centres of tourist attraction, maintaining a stable hierarchy that is unlikely to change significantly. This stability suggests that the tourist appeal of these areas stems from a structural concentration of tourist assets and services, which tends to reinforce dominant positions in the national tourism system. In contrast, mobility within the hierarchy is more visible among smaller municipalities, where small investments or fluctuations in supply can lead to more immediate changes in relative position. On the other hand, the peripheral and island regions continue to face serious structural and geographical challenges that limit their capacity for local tourism development, reflected in the low levels of attractiveness. The analysis also shows the resilience of municipalities with consolidated tourism structures, which, even in the face of the COVID-19 pandemic, maintained their relative position, indicating the existence of robust bases capable of mitigating the adverse effects of the economic and social context.

The results also point to the importance of local public policies, institutional capacity and municipal spending as determining factors in maintaining and increasing the tourist attractiveness of municipalities. Although it was possible to observe a positive trend in the national average attractiveness index, showing a slight strengthening of the country's tourist attractiveness, no empirical evidence was identified to support the existence of a significant decentralisation of tourism or the ruralisation of attractiveness.

In summary, the results emphasise the need to adopt and implement specific and distinct strategies that promote the inclusion of peripheral territories in tourism development and, at the same time, that are capable of consolidating the competitive advantages of large urban centres.

As far as future studies are concerned, they could explore in depth the institutional mechanisms and municipal public policies that intensify tourist attractiveness in order to produce the construction of a more balanced model for the tourism sector in Portugal.

DATA AVAILABILITY

The dataset of the study is available from the authors upon reasonable request.

AUTHOR CONTRIBUTIONS

Conceptualization, RdMeS and AMN; Methodology, RdMeS and AMN; Software, RdMeS; Validation, RdMeS, AMN, JRC, ACK and VM; Formal Analysis, RdMeS, AMN, JRC, ACK and VM; Investigation, RdMeS; Resources, RdMeS; Data Curation, RdMeS; Writing—Original Draft Preparation, RdMeS; Writing—Review & Editing, RdMeS, AMN, JRC, ACK and VM; Visualization, JRC, ACK and VM; Supervision, RdMeS; Project Administration, RdMeS and AMN.

CONFLICTS OF INTEREST

The Authors Declare that they have no conflicts of interest.

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