UNIVERSITY OF ALGARVE
Faculty of Economics

THE COVID-19 PANDEMIC AND TOURISM IN PORTUGAL: AN EXPLORATORY STUDY OF MUNICIPALITIES RESPONSES AND PERCEPTIONS OF ACCOMMODATION EMPLOYEES

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FARO
2023

Statement of Originality

Object Detection and Recognition in Complex Scenes

Statement of authorship: The work presented in this dissertation is, to the best of my knowledge and belief, original, except as acknowledged in the text. The material has not been submitted, either in whole or in part, for a degree at this or any university.

Candidate:

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(Ogunsola Oluwafemi Lateef)

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DEDICATION

I dedicate this project to Almighty God, my creator who has given me wisdom, knowledge and understanding.

I also dedicated this work to my wife Kehinde Mary Ogunsola who has encouraged me all the way and my children Abiola Daniel, Olaide Esther, Olaitan David. Thank you all!
My love for you can never be quantified. God bless you.

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List of Abbreviations

COVID-19	Coronavirus 2019 disease
DEA	Data Envelopment Analysis
EU	European Union
FIL	Feira Internacional de Lisboa
GDP	Gross Domestic Product
GNI	Gross National Income
GVA	Gross Value Added
HVS	High Velocity Sales
IBM SPSS	IBM Statistical Package of the Social Sciences
IMF	International Monetary Fund
INE	National Office of Statistics of Portugal
ITB	Internationale Tourism-Borse Berlin
LDC	Least Developed Countries
MSME	Micro, small, and medium-sized enterprises
PPC	Products Possibilities Curve
PPS	Purchasing Power Standard
SID	Small Island Developing States
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNESCO	United National Education, Scientific and Cultural Organization
UNWTO	United Nations World Tourism Organization
USA	United States of America
WTO	World Trade Organisation

Abstract:

Before the COVID-19 pandemic, Portugal was one of the most competitive tourist destinations in the world, making the tourism sector a central element of the country's economy. The present dissertation aims to understand impacts of the COVID-19 pandemic on the tourism sector in Portugal, with particular attention to the accommodation sector. Specifically, the study aimed to explore to what extent the economy of Portugal was susceptible to the pandemic, namely the tourism and accommodation sector. The study assessed the impact of the COVID-19 pandemic on the evolution of tourism in Portugal, considering in particular the municipal level; and evaluated the risks perceived by workers in tourist accommodation establishments as a result of the COVID-19 pandemic. To achieve the objectives of the study, secondary data were obtained from the official records of the National Institute of Statistics in Portugal. Additionally, primary data were collected through an online survey to assess the impact of the pandemic on workers in accommodation establishments. Collected data were analysed with SPSS using descriptive statistics for data description; and multivariate statistics. Cluster analysis was adopted to analyse the impact of the COVID-19 pandemic on the evolution of tourism in Portugal, specifically in the most touristic municipalities. The study suggested that the economy of Portugal was highly susceptible to the COVID-19 pandemic, namely in the tourism and accommodation sector. Tourism activity evolved from maximums before the pandemic to minimums after the pandemic in all regions in Portugal. Employees of accommodation establishments in Portugal faced a myriad of risks as a result of the pandemic COVID-19.

Keywords: Tourism, COVID-19, accommodation.

Resumo Alargado:

Antes da pandemia do COVID-19, Portugal era um dos destinos turísticos mais competitivos do mundo, o que tornava o setor do turismo um elemento central da economia do país. O presente estudo tem como objetivo contribuir para o entendimento do impacto da pandemia COVID-19 no setor do turismo em Portugal, com atenção particular ao setor do alojamento. Especificamente, o estudo teve como objetivo explorar em que medida a economia de Portugal esteve suscetível à pandemia, nomeadamente os setores do turismo e do alojamento. Adicionalmente, o estudo avaliou o impacto da pandemia COVID-19 na evolução do turismo em Portugal, considerando em particular o nível municipal; e avaliou os riscos sentidos pelos trabalhadores de estabelecimentos de alojamento turístico, em decorrência da pandemia do COVID-19.

Na revisão da literatura ficou evidenciado que Portugal reunia características que o podiam tornar altamente suscetível à pandemia. A perda no sector do turismo mundial foi na ordem de milhares de milhões de euros em receitas. Não havia maneira de o sector do turismo de Portugal escapar incólume à pandemia. Para esclarecer ainda mais a suscetibilidade de Portugal à pandemia, o número de chegadas de turistas estrangeiros diminuiu 92% no primeiro trimestre de 2020, à medida que as infeções COVID-19 aumentavam rapidamente, segundo dados oficiais do Instituto Nacional de Estatística. A economia portuguesa, altamente dependente do turismo, sofreu por isso uma contração de 3,8% no primeiro trimestre de 2020. Além disso, houve uma queda de 76% nas visitas de estrangeiros durante o primeiro confinamento. Por conseguinte, com estas observações iniciais da revisão da literatura, esperava-se que os impactos fossem de grande magnitude.

Para atingir os objetivos do estudo, foram obtidos dados secundários dos registos oficiais do Instituto Nacional de Estatística em Portugal. Adicionalmente, foram recolhidos dados primários através de um inquérito online para avaliar o impacto da pandemia nos trabalhadores em estabelecimentos de alojamento em Portugal.

Os dados coletados foram analisados com o SPSS utilizando estatística descritiva para uma explicação dos dados e estatística multivariada para aprofundar alguns resultados. Foi adotada a análise de clusters para analisar o impacto da pandemia de COVID-19 na evolução do turismo em Portugal, especificamente nos municípios mais turísticos.

O estudo sugeriu que a economia de Portugal estava altamente suscetível à pandemia de COVID-19, nomeadamente no setor do turismo e do alojamento. A atividade turística evoluiu de máximos antes da pandemia para mínimos depois da pandemia em todas as regiões em Portugal. Os

colaboradores dos estabelecimentos de alojamento em Portugal enfrentaram riscos variados, em consequência da pandemia COVID-19.

A investigação sublinhou a necessidade de a indústria do turismo se tornar mais resiliente aos efeitos negativos da pandemia. No meio da crise pandémica, reside a oportunidade de melhorar a indústria do turismo a médio e a longo prazo. Isto pode ser feito através da digitalização e da melhoria de tecnologias para a sustentabilidade ambiental.

Palavras-chave: Turismo, COVID-19, alojamento.

CHAPTER 1

INTRODUCTION

1.1 Problem of the Study

In 2019, Portugal was the 12th most competitive tourist destination of the 140 countries studied, and the number of international tourist arrivals for the year was around 11,423,000 (Calderwood & Soshkin, 2019). Similarly, in 2016, tourism contributed 6.4% to the gross domestic product (GDP) of Portugal, and direct employment in the sector was about 8.1% of total employment (Sampaio, Hernández-Mogollón & Rodrigues, 2019). Tourism is an important socio-economical activity in Portugal, which has accounted for 16.5% of the country's total exports in 2016 and for 17.8% in 2017 (Moreira, 2018).

If direct and indirect contributions are considered, the tourism sector in Portugal contributed 16.6% to the national GDP and 19.6% to the total employment in Portugal in 2017 (*ibidem*). In the same year, the tourism sector of entire Europe accounted for 10.2% of the total GDP of Europe, while 11.6% is the contribution of the sector to the total employment of Europe (Barišić & Cvetkoska, 2020). Consequently, it can be argued that tourism is pivotal to the economy of Portugal.

The tourism sector is crucial to national economic growth, because it promotes regional development, encourages foreign investment, generates wealth, and creates employment for the local population (Bhuiyan, Siwar & Ismail, 2013). In the last 50 years, in Portugal, tourism has contributed immensely to the economy, inducing social restructuring and cultural transformation. In 2017, the World Travel Awards awarded Portugal as the top destination spot for tourist, because the number of foreign tourists that visited the country increased by 12% to 12.7 million (World Travel Awards, 2022).

By the year 2018, direct contributions of the sector to Portugal's economy had increased significantly and amounted to 8.2% of the total GDP, and sustaining more than four hundred and twenty-one thousand jobs in the country (Statista, 2022). Furthermore, the Lisbon region in Portugal, for instance, before the COVID-19 pandemic, benefited immensely from the steady growth of the global tourism industry (Ferreira, Ramos & Lahr, 2020). Lisbon benefits from strong local and regional demand driven by rich natural endowments combined with a good access, authentic brand, and a positive reputation (Esteves, 2015).

The emergence of the COVID-19 pandemic has negatively impacted the tourism industry worldwide, due to travel restrictions and lock-downs (Ozili & Arun, 2020). According to Liang et al. (2021), the travel restrictions introduced by countries in the attempt to contain the spread of the virus has negatively affected their economy, including the tourism sector, which depends on the free and unrestricted movement of people. The pandemic caused many countries and regions to impose entry bans, quarantines, or other restrictions on their citizens, travellers, and tourists.

According to UNCTAD (2021), planned travels in many countries were reduced by between 80% and 90%. The travel restrictions impeded the visit of many tourists to destinations and attraction sies, like amusement parks, museums, and sports venues (Kang et al., 2021). UN (2022) reported that there was a 60% drop in the total air passenger travel worldwide, and the global airline industry lost US$370 billion. Similarly, the UNCTAD (2022) report, estimated that the global economy could lose over US$4 trillion as a result of the pandemic.

In Portugal, foreign tourist arrivals slumped by 92% in the first quarter of 2020 as COVID-19 infections surged (Statistics Portugal, 2021a). The Statistics Portugal (2021b) stated that Portugal's economy, which is dependent on tourism, contracted by 3.8% in the first quarter of 2020. According to Statistics Portugal (2021c), the tourism sector of the country, which accounted for almost 15% of GDP and 8.5% of national Gross Value Added (GVA) before the pandemic, had its worst results since the mid-1980s in 2020. Furthermore, the number of foreign tourists reduced by 76% to just under 4 million after a record in 2019 (Statistics Portugal, 2021c).

Many travellers were unwilling to visit foreign destinations for safety reasons (Gursoy & Chi, 2020), and this has continued to affect the global tourism sector, including Portugal's during 2021. According to Zenker & Kock (2020), the pandemic in the long-term may cause the decline of business travels, and international conferencing. However, the COVID-19 pandemic has equally increased the adoption of virtual and online equivalents of conferencing (Woolston, 2020).

1.2 Relevance of the Problem

The tourism sector is of great importance to the economy of Portugal as it contributes majorly to the total Gross Domestic Product (GDP) of the country (Moreira, 2018; Sampaio, Hernández-Mogollón & Rodrigues, 2019). According to Carvalho et al. (2014), it is the major employer of labour, when the direct and indirect contributions of the sector is factored in. The sector was estimated to have

contributed 9% to the GDP of Portugal in 2011 (Serra, Correia & Rodrigues, 2014), and was projected to rise by 1.6% per annum, with the contribution to employment expected to grow 1.0% per annum (Andraz & Rodrigues, 2016).

At the heart of the tourism sector in Portugal is Lisbon, which was ranked as one of the leading city destinations in Europe (Akande et al., 2019). Before the COVID-19 pandemic, the European Hotel Valuation Index by HVS (2019) stated that, in Europe, Lisbon's hotel market was the fastest-growing market in 2017 and 2018 in terms of value with a yearly growth of 1% in occupancy rate. However, the overwhelming effect of the pandemic on the tourism has led to a significant drop in government revenue from 91.01 billion Euro in 2019 to 81.73 billion Euro in 2020 (Statista, 2022). Consequently, the Gross National Income (GNI) of Portugal decreased by 5.5% in 2020, after growing by 4.3% in 2019 (Statistics Portugal, 2021a).

As many as 100 million direct tourism jobs worldwide are at risk, including sectors associated with tourism (Škare, Soriano & Porada-Rochoń, 2021). Furthermore, labour-intensive accommodation and food services industries that provide employment for 144 million workers worldwide are also threatened by the restrictions and lock-downs caused by the pandemic (Şengül & Eryılmaz, 2021). Additionally, small businesses, which form the bulk of the global tourism sector are particularly vulnerable (Škare, Soriano & Porada-Rochoń, 2021).

This study aims to evaluate the impact of the COVID-19 pandemic on Portugal’s tourism sector, with specific focus on the impacts in Portuguese municipalities and accommodation employees.

1.3 Objectives of the Study

The central objective of this research is to contribute to the comprehension of the impacts of COVID-19 pandemic on tourism industry in Portugal. In particular, the study will pay attention to different levels of tourism activities, particularly the national aggregated performance, the local level, and the individual level of employees in accommodation establishments. To achieve this goal, the following objectives are formulated:

- Investigate the extent to which the economy of Portugal was susceptible to the pandemic, particularly tourism.
- Examine the impact of COVID-19 pandemic on the evolution of the tourism in Portugal, specifically at municipal level.

- Debate the risks, in accommodation establishments, perceived by employees, as a result of the COVID-19 pandemic.

1.4 Research Methods

To achieve the objectives of the study, secondary data will be obtained from the official records of national office of statistics in Portugal (INE). Economic and tourism indicators, mainly at national, and municipal levels, will be gathered to provide insights on the evolution of the economy in general and the tourism sector in particular. Additionally, primary data will be collected through an online survey to assess the impact of the pandemic on risks perceived by accommodation employees.

Furthermore, the secondary data from Statistics Portugal will be analysed to identify territorial profiles concerning the impacts in tourism. Finally, a descriptive analysis will be used to analyse the primary data collected on employees.

1.5 Limitations of the Study

This dissertation suffers from several limitations. The main problem regards the scope of the dissertation. We were interested in providing a general vision of the impacts of the COVID-19 in tourism but also in the employees. These are two aspects, that are interrelated are not easy to immediately connect, as they represent different levels of analysis. Anyway, we believe that both analyses contribute to an informed vision on the impacts of the pandemic.

Also, the empirical studies had problems. The secondary data were difficult to select and to find. The secondary data that will be used for this study is collected from the official website of the Portuguese INE, however, it was difficult the review of relevant and pertinent indicators and other statistical sources. The availability of relevant data, in particular in more disaggregated levels is not yet with the necessary depth or availability. Finally, the researcher felt difficulties to carry out this study, including the organisation of data and selection of indicators.

In terms of the primary data the dissertation suffered from different problems. Generally, online surveys suffer from the methodological limitation of accurately describing the population of the respondents (Groves et al., 2011). According to Boddy (2016), research is of value only when the findings from a sample can be generalized to a meaningful population, therefore, it is a major

concern if the sample of respondents does not accurately represent the target population. In this case, the sample is not probabilistic and, in this way, it has limitations concerning its representativeness. Furthermore, it is difficult to verify the authenticity and accuracy of the responses to questions asked in an online survey (Groves et al., 2011). This research was heavily limited by the time available to collect appropriate amount of data, and to carry out, design and implement the online survey.

1.6 Dissertation Structure

This document is divided in five chapters. The second chapter contains the literature review. The third chapter comprises the research methodology to be used. The fourth chapter includes the empirical studies of the impact of COVID-19 on the tourism sector of Portugal. The final chapter is the conclusion. It summarizes main findings, limitations, future research and some recommendations to mitigate the risks that the pandemic poses to the tourism sector in Portugal and the world at large.

CHAPTER 2

LITERATURE REVIEW

2.1 Tourism in Portugal: A Short Overview

The tourism sector worldwide has evolved for hundreds of years to reach the present level (Telfer, 2002). The sector emerged from the interactions of humans with the environment, and has transformed in various stages. The growth of leisure time, and improved living standards, increased the demand for tourism worldwide (Schubert, Brida & Risso, 2011). Overtime, leisure time has been re-evaluated, including the reduction of working time, to generate new forms of consumption such as tourism.

In Portugal, tourism developed due to the concerted effort of the public and private sector, and benefited from the establishment of airports and the entry of low-cost air travels, among other tactical decisions and events (Silva et al., 2015; Franco & Estevão, 2010; Santos, 2018; Moreira, 2018). The industry contributes immensely to the internationalisation of the Portuguese economy. According to Moreira (2018), the tourism sector in the country has evolved to become an important socio-economical activity, as it accounted for 16.5% of the country's total exports in 2016. In the same year, tourism contributed 6.4% to the gross domestic product (GDP) of Portugal, and direct employment in the sector was about 8.1% of total employment (Sampaio, Hernández-Mogollón & Rodrigues, 2019). Furthermore, in 2017, the sector accounted for 17.8% of Portugal's total exports of goods and services (Santos & Moreira, 2021).

A major contributor to the growth of the tourism industry in Portugal in the 1960s, was the growth of commercial air travel as the number of tourists seeking holidays in Portugal increased marginally (Swarbrooke & Horner, 2007). As commercial flights grew in this period, various international tourists, especially those from the United Kingdom (UK), increasingly demanded holidays in Portugal (Santos & Moreira, 2021). Further, the influx of foreigners into Portugal benefited hotel establishments the most, according to Ferreira, Ramos & Lahr (2020).

The establishment of international airports across Portugal in the 1940s, and the creation of the national airline of Portugal (TAP Air Portugal), in 1945, cumulated in the early growth of the tourism sector of the country (Costa & Vieira, 2014). Various professions, including tourists, could easily navigate in and out of Portugal with these airports (Costa & Vieira, 2012). In present times,

Portugal has 14 airports, three of which are international airports (Lisbon, Porto, and Faro); and series of aerodromes to aid regional traffic (Deutsche Bahn, 2008). The Lisbon airport, was the first to be built in mainland Portugal, and was opened to traffic in 1942 (Pessoa, Sequeira & Blokpoel, 2000). The airport handles most of the traffic coming into Portugal, and it caters for about 50% of the total passengers (Tucki et al., 2019).

Other essential airports in Portugal are in Porto, built in 1945 (Freiria & Antunes, 2020); Porto Santo, built in 1960 (Duić & da Graça Carvalho, 2004); and Madeira, built in 1964 (Almeida, 2016). The development of these airports was pivotal to the internationalisation of tourist demand in Portugal, including the growth of the industry across Portugal (Costa, Almeida & Conceição, 2017). It is worth stating that, the Faro airport, purposed to serve non-regular international flights, was built in 1965 (Jimenez, Claro & de Sousa, 2012). Similarly, in 1945, the Santa Maria airport was inaugurated (Airports Worldwide, 2022), and on the island of São Miguel, the Ponta Delgada international airport was inaugurated in 1969 (Costa, 2021). The Horta airport was established on the island of Faial in 1971 (Coutinho et al., 2010), and the airport on Flores was established in 1972.

The advent of cheap low-cost airlines in the 1990s, drastically increased the number of tourists in Portugal (Álvarez-Díaz, González-Gómez & Otero-Giráldez, 2019). Almeida (2011) stated that in 1996, the Faro airport was the first national airport to benefit from low-cost airlines. In 2007, the Madeira airport benefited from the entry of EasyJet, and this translated into a rise in the number of passengers navigating the airport. In 2004, Air Berlin introduced low-cost air travel to the Porto airport (Carballo-Cruz & Costa, 2014); and in March 2015, low-cost airlines began operating in the Azores (Silva et al., 2015). The Open Skies Agreement between the USA and the European Union (EU) in 2007, allowed American Airlines to easily navigate European skies, and vice visa (Christidis, 2016; Havel & Mulligan, 2012).

Before the 1990s, Portugal had a small number of suitable venues to stage small sporting, cultural, and trade events (Guerra, 2018). However, a number of facilities were later built to accommodate big events such as: the Feira das Indústrias in 1952 (da Silva Matos & Pinto, 2018), and the Feira Internacional de Lisboa (FIL) in 1999 (Pinto, Brandão & Costa, 2021). The EXPONOR–Feira Internacional do Porto in Matosinhos was built in 1987 (Carvalho, 2019). The largest private exhibition centre in Iberia, the ExpoSalão in Batalha was built in 1992 (Moreira, 2018); and the Centro Cultural de Belém was built in 1992 (Eusébio, 2017).

In Santa Maria da Feira, the Europarque was built in 1995 (Gavina, 2015); the Altice Arena in Lisbon was built in 1998 (Araya et al., 2022), and the Serralves Museum of Contemporary Art in Porto was built in 1999 (Shamash, 1999). According to Tempolivre (2022), the Multiusos de Guimarães was built in 2001, the Casa da Música in Porto was built in 2005 (Simas, 2022), and the Convention Centre and Cultural Space of Convento São Francisco in Coimbra was built in 2015 (João, 2019).

These are examples of investments that enabled Portugal to host more and bigger events. By 2016, Portugal was among the top countries in the world that have hosted major global events, including Euro 2004 (Andraz & Rodrigues, 2016). In the same year, Lisbon was ranked 9th in the world, among cities that had hosted international events; while Porto was ranked 31st (Almeida, Silva & Amoêdo, 2019).

Similarly, in 2016, 2017, and 2018, Lisbon hosted the Web Summit, a worldwide tech conferences (Web Summit, 2022a; Web Summit, 2022b; Irish Times, 2022). According to Web Summit (2022a), the 2016 event was attended by over 53,056 participants from 166 countries, while the 2017 event was attended by 59,115 participants from 170 countries (Web Summit, 2022b), and the 2018 event was attended by 70,000 participants (Irish Times, 2022). According to Domingues & Nunes (2018), all these events had a direct economic impact on the economy of Portugal.

According to Baker & Cameron (2008), it is essential to brand a tourist destination, its identity, its image, its values, and its reputation. Further, the quality of tourist experience is pivotal to the brand image of the destination (Manhas, Manrai & Manrai, 2016). Consequently, there are various efforts to boost the image of tourism in Portugal. The first international promotional campaign to promote Portugal tourism took place in London in 1974, after the fall of Portugal's dictatorship (McTeigue et al., 2021). The slogan for the campaign was “Portugal feel free”, as a reference to the freedom that Portugal was offering.

Thereafter, in 1976, the Direção Geral do Turismo developed a marketing campaign (“Going to Portugal”) to promote a modern image of Portugal (Milheiro, 2017). In 1986, a government agency, the Instituto de Promoção Turística, was created to promote Portugal as a tourism destination (Ramos & Costa, 2017). Likewise, in 1992, according to Teixeira (2006), the Instituto das Empresas para os Mercados Externos, an agency responsible for the management of foreign trade, invested in this promotion.

As from 1994, Portugal's promotional campaigns for tourism has been consistent, because of the outcome of previous campaigns (Ramos & Costa, 2017). According to Contrim (2009), the two major campaigns of the 1990s were “Portugal: the thrill of discovery”, which ran between 1994 and 1998; and the “Portugal: the choice” campaign that ran in 1999 (Ramos & Costa, 2017). These campaigns were a major success as it drew attention to the quality of the products and services that Portugal has to offer. In 2003, just before Euro 2004, there was tactical campaign with the slogan “Take a break”, and this campaign promoted Portugal as a safe destination (Ferreira, Caraban & Karapanos, 2014).

In 2004, the European Football Championship began in Portugal with visitors all over the world, and the competition alone, promoted Portugal as a tourism destination (Boyle & Monteiro, 2005). It is worth stating that 8 different cities in Portugal hosted games and people (Sealy & Wickens, 2008). Portugal ran a repositioning campaign tagged: “Europe’s West Coast” between 2007 and 2009 of Portugal (Figueiredo et al., 2014). This campaign was launched at the time of the Treaty of Lisbon, which sets Portugal apart from Southern Europe and the Mediterranean (Moreira et al., 2018). Additionally, the Treaty aided the “Europe’s West Coast” campaign, because it presented Lisbon as an Atlantic destination. The Atlantic offer tourists the opportunity for cruise tourism, thalassotherapy, and nautical sports and leisure.

In 2013, Portugal’s promotional campaigns became more digital, on YouTube, Google, Facebook, and some specific websites that tourists visit (Cunha, 2014). The following year, the www.visitportugal.com website was created, and it significantly left an impression on potential visitors to Portugal (Visit Portugal, 2022).

The Turismo de Portugal, in 2017, launched a digital campaign that is targeted at international tourists from Spain, the UK, and the US, among other countries (Pereira, 2017; Turismo de Portugal, 2022). The campaign had the tag-line: “Can’t Skip Portugal”. The campaign ran until 2018, and has four films that showcased the lesser-known aspects of Portugal (Turismo de Portugal, 2022). These films, shot during the winter, portrayed Portugal as a destination that is not only meant for the summers (Gruber, 2017; Pereira, 2017).

In general, according to Moreira (2018), external promotional campaigns had always been targeted at central and western European tourists, which include UK, Netherlands, Germany, France, and Ireland; southern European tourists, comprising Spain and Italy; and eastern European tourists: Russia and Poland. The Nordic countries, that include Denmark, Finland and Sweden, are also

targeted by promotional campaigns. The market outside Europe includes the USA and Brazil (Pereira, 2013).

Andraz & Rodrigues (2016) noted that tourism flows from the UK, Germany, and the Netherlands are highly sensitivity to economic cycles and visits are declining. Further, the empirical evidence study by these authors noticed that six of the major international tourists that visit Portugal are from Europe, and their visits have consistently decreased since 2000. However, the study indicated this countrywide observation is not homogeneous at the regional level, because the results from seven tourism regions: Lisbon, Alentejo, Madeira, Algarve, Azores, Centre, and North. To broaden the origin of tourists, Portugal stepped up campaigns to attract more tourists from not only the USA and Brazil, but also from China, Russia, and, the Scandinavian countries (Norway, Denmark, and Sweden) (Santos & Moreira, 2021). To attract the Scandinavia market, Completo & Gustavo (2014) stated that campaigns have focused on golfing in Portugal, and nautical tourism.

The resultant outcome of efforts to promote tourism in Portugal earned the country consecutive awards as the World's Leading Destination (Loureiro, Sarmento & do Rosário, 2019). Similarly, Portugal was the first country to be awarded the Accessible Tourism Destination Award by the World Tourism Organisation (WTO) in 2019. The award recognised the effort of the Portuguese government to promote accessibility for all tourists and Portuguese (Natalia et al., 2019). In the same year, Portugal won the ITB (Internationale Tourismus-Börse Berlin) Earth Award for the Best European Sustainable Destination for tourists (Lima, 2021).

2.2. Impact of the COVID-19 Pandemic in Portugal

On 11 March 2020, the COVID-19 disease was declared a pandemic by the World Health Organisation (2022) after cases of the disease were discovered in more than 100 countries. By May 2020, 6 million people had been infected with the virus globally, and the death toll as a result of complications from COVID-19 stood at 350,000. As at 24 December 2022, the statistical data from Worldometer (2022) suggests that in 223 countries and territories around the world, the total number of confirmed cases of COVID-19 was 661,071,083 and the death toll was 6,684,234. The recovered cases were 633,855,427.

According to UN ESCAP (2020), the economic and social disruption caused by the pandemic is devastating, as tens of millions of people are at the risk of falling into extreme poverty and depression. Among the most affected sectors is the travel and tourism sector as it experienced

massive fall of international demand amid global restrictions on travels, and lockdowns. International tourists fell by 72% between January to October 2020; because the world was preoccupied with the curbing of the spread of the virus (Kumar et al., 2021). Relative to the number of international tourists in 2019, that World Tourism Organisation (2020) stated that, there has been a drop of over 900 million tourists in the first ten months of 2020.

Before the COVID-19 pandemic, ICAO (2019) estimated that tourism would account for 11.5% of the global GDP by 2029, and by 2030, the number of tourists worldwide would have grown to 1.8 billion (UN, 2022). The loss to the world tourism sector was about US$935 billion in export revenues (Forbes, 2022). This loss is about 10 time the loss recorded in 2009 from the impact of the global financial crisis. In the Americas and Europe, the number of international arrivals declined by 68%, while in Asia and in the Pacific, there was an 82% decrease in arrivals (UNWTO, 2022). The Middle East had a 73% decline, while Africa recorded a 69% drop in the first ten months of 2020.

In Portugal, foreign tourist arrivals slumped by 92% in the first quarter of 2020 as COVID-19 infections surge sharply and governments enforced lock downs and restrictions (Statistics Portugal, 2021a). Statistics Portugal (2021b) stated that Portugal's economy, which is dependent on tourism, contracted by 3.8% in the first quarter of 2020. Similarly, the tourism sector of the country, which accounted for almost 15% of GDP and 8.5% of national Gross Value Added (GVA) before the pandemic, had its worst results since the mid-1980s in 2020 (Statistics Portugal, 2021c). Furthermore, the number of foreign tourists reduced by 76% to just under 4 million after a record number of visitors in 2019 (Statistics Portugal, 2021c).

According to Smith et al. (2021), the negative effect of the pandemic poses a grave danger to the conservation of biodiversity in developing countries as it has been deprived of funding. The reduced presence of tourists and staffs has increased the poaching, looting, and the consumption of bushmeat, which endanger the wildlife sub-sector of tourism (Verma & Prakash, 2020; Smith et al., 2021). Giddy & Rogerson (2021) stated that wildlife tourism accounts for 80% of the entire tourism sector in many African countries, and revenue generated from tourists are partly used to conserve the wildlife. Therefore, the sub-sector is endangered in many Small Island Developing States (SIDS) and Least Developed Countries (LDC), stated Bishop et al. (2021).

In addition, there is increased pressure on the conservation of heritage sites that generate revenue through tourism, because the social fabric of the local communities, including the indigenous people and ethnic groups, is threatened by the negative impact of the pandemic (Caruana et al.,

2021; Silberman, 2020). Caruana et al. (2021) stated that many cultural heritage practices like traditional festivals and gatherings have been postponed or halted due to lockdowns and restrictions imposed by governments of states. In addition, local markets, which sells indigenous artefacts and other products, and generate revenue especially for women were shutdown to reduce the spread of the virus (Jones, Bui & Ando, 2020). According to UNESCO (2022), in 2020, 90% of countries who host World Heritage Sites, were forced to close-down those sites as infections increased. A similar proactive measure was taken in 90% of museums around the world, stated Pagano, Romagnoli & Vannucci (2021).

The UN (2020) estimated that over 100 million tourism jobs are at risk from the negative impact of the global pandemic, which is the first pandemic in an interconnected world. According to Mihailescu & Rinaldi (2021), many micro, small, and medium-sized enterprises (MSMEs), that generate high percentages of the global tourism employment, might retrench their workforce to adapt to the reduced revenue generated from travels and tourism. Countries that depend on tourism, like Portugal, might face the negative impacts of the crisis for much longer than other economies (Škare, Soriano & Porada-Rochoń, 2021).

Global tourism continues to reflect weak demand for outbound travel (Iastremska & Kononova, 2021), but some large markets such as the United States, Germany and France have shown some shy signs of recovery in the recent months (International Monetary Fund, 2021). However, according to Boto-García & Mayor (2022), the demand for domestic tourism has continued to rise. Additionally, the demand for domestic air travel has returned to pre-COVID-19 levels, stated Arbulú et al. (2021).

2.3. Mitigation Strategies for the Negative Impacts of the Pandemic

As countries gradually lift travel restrictions, and the tourism sector restarts in many parts of the world, it is essential that health and safety precautions are adopted to protect the local communities and workers (Dupeyras, Haxton & Stacey, 2020). Strict health protocols and measures must be adhered, to mitigate the spread of the virus (Popovici & Popovici, 2021). The year 2022 showed a sharp revovery in terms of tourism figures worldwide and also in Portugal. But what have the tourism sector learnt from this pandemic crisis?

The pandemic crisis presents the opportunity to rethink the way tourism interacts with the society, natural resources and ecosystems, and the economic sectors (Everingham & Chassagne, 2020).

Repositioning the tourism should improve the management of the impact of the pandemic. Further, this might ensure a fair distribution of benefits obtained from tourism, and transition the sector towards a more resilient and sustainable trajectory (Sigala, 2020).

It is essential to mitigate the socioeconomic impacts of the COVID-19 pandemic on the dependents of the tourism sector, and ensure their economic security (Debata, Patnaik & Mishra, 2020). Chin & Pehin Dato Musa (2021) and Wongmonta (2021) suggest that the tourism industry should diversify its revenue generating sources to build resilience and the boost the competitiveness of the sector. Furthermore, Mensah & Boakye (2021) suggested that domestic and regional tourism should be promoted in countries that are short of international tourists. A conducive business environment should be made available for MSMEs in countries that depend heavily on the tourism sector (Leonidova, 2020).

Lee, Hunter & Chung (2020) stated that the tourism sector should make attempts to infuse advance digital and technological innovations in its operations. Promotional campaigns should be reinvented to attract the domestic market, and adequate investments should be made in digital skills acquisition and training for job seekers and temporary workers (Toubes, Araújo Vila & Fraiz Brea, 2021). Umar et al. (2021) suggested that the industry should foster sustainability and encourage green growth that is less capital intensive. Campaigns that cost huge sums are not encouraged as revenue generated has reduced.

Furthermore, the tourism industry should attempt to make the sector more resilient to the present negative effects of the pandemic (Toubes, Araújo Vila & Fraiz Brea, 2021). Resources connected to the sector should be efficiently utilized to improve productivity. According to Lee, Hunter & Chung (2020), investments in the tourism sector should be green by targeting protected areas, smart buildings, renewable energy sources, among other opportunities that would promote green growth. Wijesinghe (2021) emphasised that new partnerships should be initiated to restart, and transform the sector. Furthermore, tourism should put people first to accelerate the recovery and growth of the industry (Kumar & Nafi, 2020).

Furthermore, tourism dependent destinations should work to finance a broad range of measures that will reduce the impact of the pandemic on the revenues of the industry (González-Torres, Rodríguez-Sánchez & Pelechano-Barahona, 2021). Governments are encouraged to give grants, tax relief, cash transfers, payroll support, and loans to MSMEs in the tourism sector (Barkas, Honeck &

Rubio, 2020). Similarly, local and international banks should be stimulated to give debt reliefs to sectors that are severely impacted by the pandemic (Ozili, 2020).

Only through a collective action and transborder cooperation will it be possible to transform the tourism sector (Lee, Hunter & Chung, 2020). To Bakhtiyorovna (2021), to meet the United Nations World Tourism Organisation (UNWTO) 2030 Agenda, it is essential that the industry adopts carbon-neutral innovations and digitalisation. The industry should increase the participation of the local population, and create decent job opportunities for everyone without exclusions.

In the midst of every crisis, lies great opportunity, stated Albert Einstein. According to Abuhussein, Barham & Al-Jaghoub (2021), the crisis created by COVID-19 pandemic presents the opportunity to improve the tourism industry in the medium and long term with better digitalisation, improved technology, and environmental sustainability. Furthermore, Sigala (2020) suggests that workers are trained on modern techniques of collecting, storing, and analysing data. It is essential that the tourism sector harnesses data analytics, big data, and artificial intelligence (Jiang & Wen, 2020). The recovery process of the industry should be leveraged to improve its efficiency of managing waste, usage of green energy and water, and improve the sustainability of sourcing for food (Filimonau, 2021).

To make the tourism sector more competitive, countries should approve programs that will permit tourists from lower risk countries, and set up special quarantine programs to protect its local population (Wongmonta, 2021). Countries that depend on Coastal tourism should allow tourists quarantine at sea, before disembarking from their yacht (Fiji Travel, 2022). Carey (2021) suggested that visitors submit a negative COVID-19 test that is not more than seven days before arrival. COVID-19 vaccination should be mandatory for all tourists, stated Wang, Kunasekaran & Rasoolimanesh (2021). Regional agreements could be signed among countries to give tourists from the same region free movement, without COVID-19 testing and quarantine (Benton et al., 2021).

Countries can allow new long-term permits that allow tourists to work remotely, while spending in the local economy (CNBC, 2022). The International Monetary Fund (IMF) (2022) recommends that governments relax visa requirements to attract tourists, and draw them away from urban centres to the least populated regions. Additionally, these efforts should be complemented with improvements to tourism infrastructure and labour resources.

The report by Wyman (2020) suggests that countries should encourage domestic travels, and promote outdoor destinations. Furthermore, promotional campaigns should target less risk averse travellers and tourists, including early adopters, adventure travellers, and backpackers (Li et al., 2020). According to Isaac & Keijzer (2021), leisure travel will lead the comeback in the travel and tourism sector; and business travel, which is a crucial source of revenue for hotels and airlines (Gustafson, 2012), may come back slowly as tourism recovers (Rwigema, 2021). To Kim, Seo & Choi (2021), the recovery of the tourism sector will depend on the personal decision of people to weigh the risk and reward associated to travels.

The private sector needs the support and backing of governments to help mitigate the economic impact of the pandemic (Abate, Christidis & Purwanto, 2020). Additionally, rapid COVID-19 testing techniques should be adopted in airports for tourists to promote travels and tourism. According to Dupeyras, Haxton & Stacey (2020), efforts should be made to improve public assurance in travels and tourism to accelerate the recovery process.

2.4 Chapter Summary

This chapter has attempted to review the evolution of the Portuguese tourism and hospitality sector, introduce the impact of the COVID-19 pandemic in tourism, particularly in Portugal, and present some ideas to mitigate the negative impacts of the pandemic. The next chapter presents the main methodological considerations to frame the empirical studies.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Methodological Options and Clarifications

This dissertation is based in a quantitative approach to examine the impact of COVID-19 pandemic on tourism industry in Portugal. The chapter describes the methodology used to achieve the research objectives. The chapter is divided into five sections, and this is the first section. The second section is about the research approach. The third regards data collection, the fourth is about the data analysis. The fifth section is on data organisation and analysis ethics & limitations of the study. The final section is a small summary of the chapter.

This study adopts an empirical approach, advocating those scientific studies should be conducted searching for factual knowledge, quantitative and qualitative measurement, and observation (Holden & Lynch, 2004). The researcher is required to seek and interpret data objectively. In addition, conclusions of the study are based on observations and not the mere opinions of the researcher. The findings of the research are usually quantifiable and observable. The data retrieved and collected for this study will be quantified and analysed statistically.

3.2 Research Approach

The study adopts the inductive research approach to plan the assessment of the impact of COVID-19 pandemic on the Portuguese tourism industry. The inductive research approach establishes research questions for the study. Furthermore, aims and objectives are developed to answer the research questions. Unlike a deductive research approach that starts a specific hypothesis to develop a broader theory, the inductive research approach starts with broad research questions or theory to develop specific statements (Soiferman, 2010).

Accordingly, the research questions of this dissertation, asked to better understand the impact of COVID-19 pandemic on the Portuguese tourism industry, are:

- To what extent is the economy of Portugal susceptible to the pandemic, particularly tourism?
- What is the impact of COVID-19 pandemic on the evolution of the tourism in Portugal, specifically in the number of tourists at municipal levels?
- What are the perceptions of the COVID-19 pandemic consequences for employees in accommodation establishments?

Furthermore, the research strategy is a quantitative survey research strategy, as it uses questionnaires to retrieve quantitative primary data. The questionnaire items for this study of employees are closed-ended as the researcher only permitted the respondent to answer all questions with a Likert scale, either Strongly Disagree as "Discordo Totalmente" (DT), Disagree as "Discordo" (D), Uncertain as "Incerto" (I), Agree as "Concordo" (C), or Strongly Agree as "Concordo Fortemente" (CF).

Additionally, this study depends on secondary data from the official records. The time horizon is mainly cross-sectional. The sources of the secondary data used are: the official records of national office of statistics in Portugal (INE) and Eurostat.

Instrumentation are the tools used in the data collection process to measure variables (Shea et al., 2001). Instrumentation relates to the tools used in the research design, selection, construction, and assessment, but includes the conditions and environment under which the instruments were administered. The instruments used to achieve the objectives of the study are:

- Google Translate

  Google Translate is a free service from Google to instantly translates phrases, words, and web pages between over 100 languages in the world (Google Translate, 2022).

- Google Forms

  Google Forms is a free app created by Google to administer survey online (Google Forms, 2022). The tool also includes web-based document editor, menu search, limiting responses for each person, questions shuffle for each respondent, URLs shortener, and custom themes. Furthermore, the app permits users to create and edit surveys online, as

well as real-time collaboration with other users. Responses can be downloaded as a CSV or spreadsheet file.

- SPSS

  SPSS is a software that offers advanced statistical analysis, machine learning algorithms libraries, and text analysis (IBM, 2022). It can be easily extended with open-source packages and integrate big data. SPSS can also be deployed as a secondary application in other applications. Currently, it has a brand name IBM SPSS Statistics. The software name originally stood for Statistical Package for the Social Sciences (SPSS), but now stands for Statistical Product and Service Solutions.

The limitations of the study arise from the data retrieved from secondary sources and with the survey. Indicators selected could be misleading or not the best options to frame the subject. The responses from participants might also be inaccurate, perhaps the respondent has an agenda to mislead the researcher. It is also possible that participants skip or decide not to answer some questions in the questionnaire. Furthermore, some respondents, because of their educational background, might have issues understanding or interpreting the questions. Questionnaires are unable to capture the feelings, body language, and emotions of the respondent (Adams & Cox, 2008); which could give more information to achieve the objectives of the study.

3.3 Data Collection

For the study of municipalities, data used comes from the official sources, namely the periodical INE Survey on Guests Stays on Hotels and Other Accommodation Establishments. These data provide information from the 23 municipalities where the number of tourists is higher, and an aggregated value for the rest of municipalities.

For the study of accommodation employees, a survey was implemented. The sampling strategy was a simple random sampling strategy, due to the simplicity of the strategy (Turner, 2003). The respondents will be selected by chance, and every member of the population (employees in the

Portuguese accommodation sector) has a random chance of being among the sample. The strategy is straightforward and gives provision for the identification of possible respondents. Thus, with the social media, the study intended to collect sample data from over 50 employees from the population.

The questionnaire was written in Portuguese with the aid of Google Translate. The participants were directed to a consent form (Appendix A) to the questionnaire, which is hosted on Google Forms. The responses were then downloaded as Comma-Separated Values (CSV) file from Google Forms. The survey participants will be employees that voluntary decided to participate in the survey, after acknowledging the receipt of an invitation message, which includes a consent form.

The method of collecting responses of employees maintains anonymity and confidentiality, and comes with no cost. The online channel used, allows the researcher, executive administrator, managers, and employees to communicate freely. Additionally, the researcher did not make payment for travel costs or loose time to travelling.

3.4 Data Analysis

Data analysis entails the collection, inspection, cleaning, transformation, modelling, and analysing of data to retrieve vital information, and making informed conclusions or decisions (Vassakis, Petrakis & Kopanakis, 2018). There are multiple facets and approaches to data analysis, and these approaches encompass diverse techniques with various names.

The analytical approach adopted for this study is quantitative. Specifically, the study applies the descriptive statistics to assess the extent to which the tourism and the accommodation sectors of Portugal is susceptible to the COVID-19 pandemic. Further, cluster analysis is used to describe the impact of COVID-19 pandemic on the evolution of the tourism at municipal levels of Portugal. Finally, the study applies the exploratory analysis to assess the risks faced by accommodation employees in Portuguese establishments, as a result of the COVID-19 pandemic.

Descriptive statistics is used to simply summarise observations and describe the basic features about a population or its sample (Fisher & Marshall, 2009). The summary consists a set of descriptive figures that characterize the input data or population. The summary can include a quantitative summary of the population or input data.

Unlike inferential statistics, descriptive statistics aims to summarise the sample, instead of using the data to understand the population or the sample that the data represents. Inferential statistics uses the input data to learn about the population, which the data represents. Generally, descriptive statistics are not developed on the basis of probability theory, and frequently utilise data that are assumed to emanate from models (Faber, 2012).

The study also developed an exploratory factor analysis to the employee data. Factor analysis is a powerful data reduction technique that investigates concepts that cannot be easily measured directly (Kline, 2014). The technique reduces a large number of variables into a number of comprehensible factors (Yong & Pearce, 2013). Furthermore, it aims to make data easier to understand, and useful for a comprehensive analysis. Factor analysis helps the researcher to spot trends faster, and see themes in the datasets (Ryan & Bernard, 2003), which enables a clear understand of the data. The technique, unlike regression analysis, does not require the variables to be defined (Kline, 2014). According to Yong & Pearce (2013), factor analysis is commonly used to describe the relationship among all the variables in a data. To Ryan & Bernard (2003), the analytical method helps to definitively understand the number of factors that are needed to explain common themes among a set of variables.

The main types of factor analysis used for different kinds of analysis and market research are: exploratory factor analysis, structural equation modelling, and confirmatory factor analysis (Mooi, Sarstedt & Mooi-Reci, 2018). According to Treiblmaier & Filzmoser (2010), exploratory factor analysis is used to measure the factors that influence the variables in a data without setting any established structure to the outcome. On the other hand, confirmatory factor analysis is used to confirm or reconfirm the effects and correlation of an existing set of established factors and variables that affect the target factors (Floyd & Widaman, 1995). Sadly, the results of this

exercise were not clear, and we put them in Appendix but did not consider them in the main part of the document.

In the study we developed a cluster analysis of main tourism municipalities. According to Figueiredo Filho et al. (2014), cluster analysis is a statistical method that is used to classify similar objects. Furthermore, it is sometimes referred to as clustering, segmentation analysis, or taxonomy analysis (Chang & Chen, 2018; Bhatia & Vaswani, 2013). Cluster analysis aims to sort various data points or objects into groups or classifications in such a manner that the degree of association among classified or clustered objects is high, and low in relation to other objects in other clusters or groups (Chang & Chen, 2018).

Like factor analysis, cluster analysis differs from many other statistical analytical techniques, because it is used to understand the relationship among variables without defining the variables (Newby & Tucker, 2004). According to Figueiredo Filho et al. (2014), researchers use the technique to understand the data, and lay the foundation for further research. The analysis is exploratory in nature without defining the dependent and independent variables, instead, it attempts to discover structures in the data without explanation or interpretation. Simply, cluster analysis attempts to discover structures in the data without explaining why those structures exist (Wierzchoń & Kłopotek, 2018).

Clustering helps researchers define patterns within a data, and this definition is then used to identify and map structures, which were not apparent, but might give significant meaning to the data (Halkidi, Batistakis & Vazirgiannis, 2001). Further, a clearly defined data aid informed decision-making.

The three primary methods used to perform cluster analysis are: Hierarchical, K-means, and Two-step cluster analyses (Kim et al., 2019). Hierarchical clustering creates a series of models in which one cluster solution implies that all variables are in one cluster, and an “n” cluster solution implies that variables are grouped into “n” clusters or classes (Yim & Ramdeen, 2015). Furthermore, Kroonenberg (2021) stated that hierarchical clustering can group variables together like factor analysis, and the clustering method can handle ordinal, nominal, and scale data.

According to Lai, Huang & Liaw (2009), K-Means clustering is a fast-clustering technique that is used to cluster large data. Generally, the K-means technique requires that the number of clusters is defined before the analysis is performed (Kodinariya & Makwana, 2013). The clustering technique is best used for models that the number of clusters is known.

The Two-step clustering uses an algorithm to identify classes, by first performing a pre-clustering of variables, then a hierarchical clustering is subsequently performed (Hong et al., 2021). Like the K-means clustering technique, Two-step clustering is best for large data that would take long to cluster through hierarchical methods. Basically, two-step cluster analysis is a combination of k-means and hierarchical cluster analytical methods (Radovic, Ghonima & Schumacher, 2017).

Different methods of clustering can produce different results for the same data (Sanders, 1997). Further, the results of some clustering methods can be affected by the order of the variables. Factor analysis is limited by accuracy of the factors that emerge from the data, and if they truly represent the data (Yong & Pearce, 2013).

The approach used in the Municipal study was a hierarchical cluster analysis with the Ward's Method, which attempts to generate clusters to minimise the within-cluster variance. The method computes the means of all continuous variables, and for each item, the squared Euclidean distance to the cluster's mean was calculated.

3.5 Chapter Summary

This chapter attempted to discuss the methodology of the study, presenting briefly the two empirical moments of the dissertation, a study of the municipality's responses and a study of perceptions of accommodation employees about the COVID-19 consequences. The options of the research and the methods used were clarified. The next chapter will report and present the results of the analyses.

CHAPTER 4

RESULTS

4.1 Chapter Introduction

This chapter presents the results of the empirical analyses conducted to achieve the aims and objectives of the study. To understand the impact of the COVID-19 pandemic on Portugal's tourism sector, with specific focus on the accommodation market; the study explores key statistics to scrutinise the extent to which the economy of Portugal is susceptible to the pandemic, particularly tourism and the accommodation sectors. A hierarchical cluster analysis is adopted to examine the impact of COVID-19 pandemic on the evolution of the tourism in Portugal, specifically at the municipal level. Exploratory statistical analysis is used to assess the risks faced by the accommodation establishments, as a result of the COVID-19 pandemic.

The chapter is divided into five sections. This is the chapter introduction (the first section), the second section is the descriptive statistics of the economic data of Portugal. The third section presents the results of the hierarchical cluster analysis of the tourism data of the tourism municipalities in Portugal. The fourth section presents an exploratory analysis of the questionnaire obtained from employees in the Portuguese accommodation sector. The final section is a summary of this chapter.

4.2 Statistics on the Portuguese Economy with the Pandemic

This section presents key economic figures of Portugal, to investigate the susceptibility of the economy to the COVID-19 pandemic. The economic data used varies from 1995 to 2020, and it includes the gross domestic product (GDP) at the current market prices of Portugal, the gross value added at the current market prices of Portugal, the employment data of Portuguese, gross domestic product per inhabitant of Portugal (Per Capita GDP), apparent productivity of work of Portuguese, the GDP per capita in Purchasing Power Standards (PPS) expressed in relation to the European Union (EU) average set to 100, and the real GDP evolution of Portugal.

The Gross domestic product (GDP) of Portugal at the current market prices is a measure of the economic output of the country at the current market prices. Generally, countries with larger GDPs generate a greater amount of goods and services relative to those with smaller GDPs, which can translate to a general higher standard of living. Consequently, the GDP of a country is seen as an important measure of the country's success, and it is often referred as economic growth or GDP growth.

Figure 4.1: The GDP data of Portugal from 1995 to 2020 (Data sourced from: Statistics Portugal, 2021e)

Figure 4.1 shows the GDP data of Portugal from 1995 to 2020. The graph indicates the GDP of Portugal has consistently grown since 1995, but with a sharp decline in 2020. This marks the period of the COVID-19 pandemic.

Gross value added (GVA) is defined as the output, at basic prices, less the intermediate consumption, at purchaser prices. It is the sum of the value added in the industry, agriculture, and services sectors. The added value of these sectors is calculated at the purchaser values. GVA is calculated by subtracting net product taxes from the GDP, which is a balancing item of the production account of the national accounts. The GVA from all sectors of the national economy is the addition of the GVA from each sector.

The GDP can be derived by adjusting the GVA with taxes and subsidies. The higher the GVA the stronger the economy of the country.

Figure 4.2: The GVA data of Portugal from 1995 to 2020 (Data sourced from: Statistics Portugal, 2021e)

Figure 4.2 shows that the GVA data of Portugal follows a similar trend as the GDP, since GVA is adjusted GDP from the impact of taxes, tariffs, and subsidies of products and services. The GVA data of Portugal shows that the amount of goods and services minus all the cost of inputs and raw materials has consistent increased from 1995, except the COVID-19 period of 2019-20 and after the great recession that affected the country in 2011-12.

Employment data used regards the total number of individuals gainfully employed in the country. These persons contribute immensely to the GDP and GVA of the country. Employment provides individuals the opportunity to garner various skills, which promotes self-positive and self-reliant, and reduces crime. The higher the number of employed hands in a country, the more meaningful impact they can exert on the economy of the country.

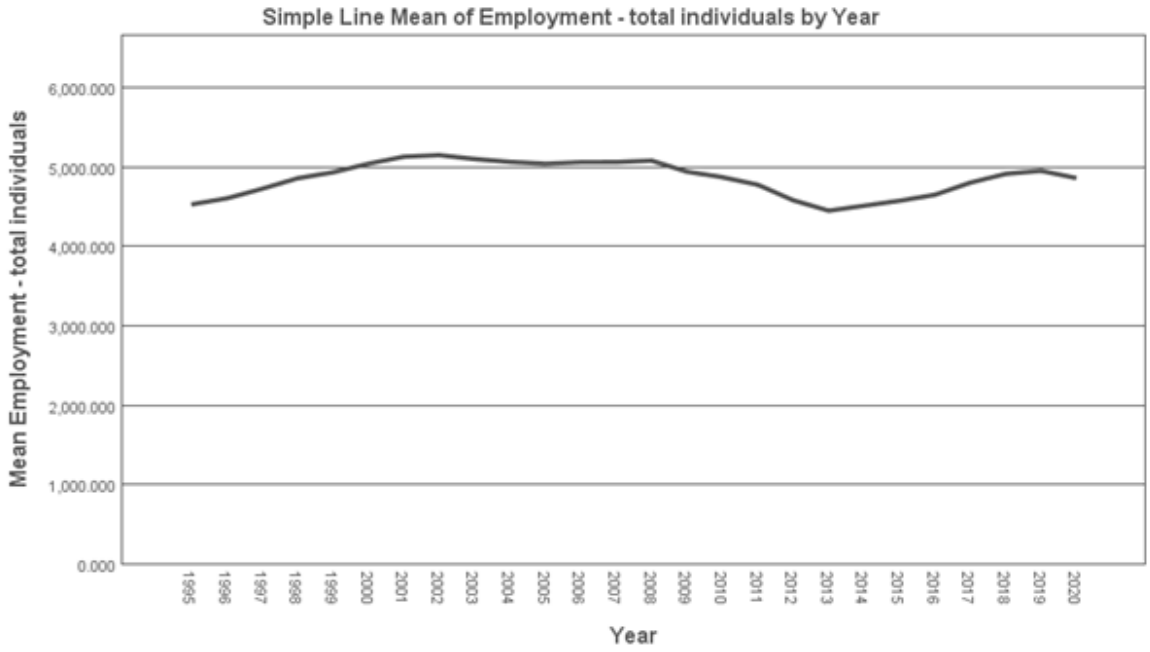

Figure 4.3: The Employment data of Portugal from 1995 to 2020 (Data sourced from: Statistics Portugal, 2021e)

Figure 4.3 suggests that the employment data of Portugal has remained fairly stable despite the COVID-19 pandemic. A slight reduction in employment was experienced between 2019 and 2020, as the number employed Portuguese reduced from 4952.8 (thousands of individuals) to 4,861.096 (thousands of individuals) respectively. However, the total employment in Portugal as at 2020 was higher than the all-time low of 4,450.167 (thousands of individuals), which was recorded in 2013.

Gross domestic product per inhabitant measures the GDP of a country per individual in the country. It is calculated by dividing the GDP of the country by its population, and it is also known as the Real GDP per capita. The higher the GDP per inhabitant the stronger the economy of the country.

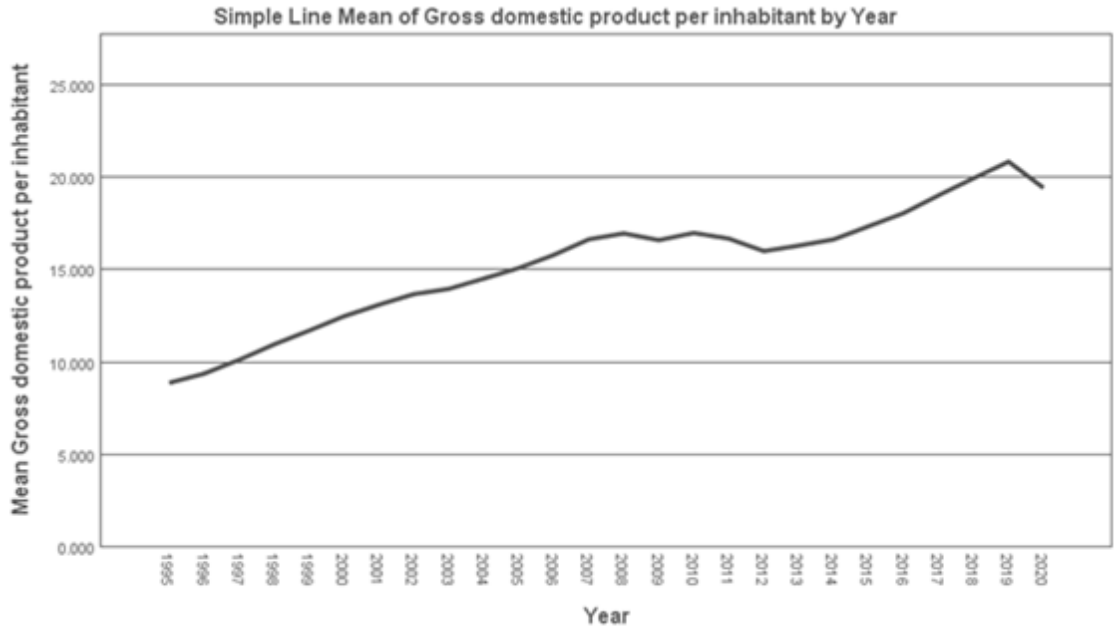

Figure 4.4: The Gross domestic product per inhabitant data of Portugal from 1995 to 2020 (Data sourced from: Statistics Portugal, 2021e)

Figure 4.4 shows that the trend of the gross domestic product per inhabitant in Portugal is similar to those of the GDP and GVA of the country within the same period observed. The sharp decrease between 2019 and 2020 is also observed in this performance indicator. Portugal experienced a decrease in the real productivity of its population in 2020, and this might be a result of the impact of the COVID-19 pandemic.

The Apparent Productivity of Work factors labour as the only resource used for productivity. It is a measure of the amount of value added per individual employed in a country. The higher the productivity of the labour force, the higher the apparent productivity of work for the country. The higher the apparent productivity of individuals, the more productive impact they can make on the economy of the country.

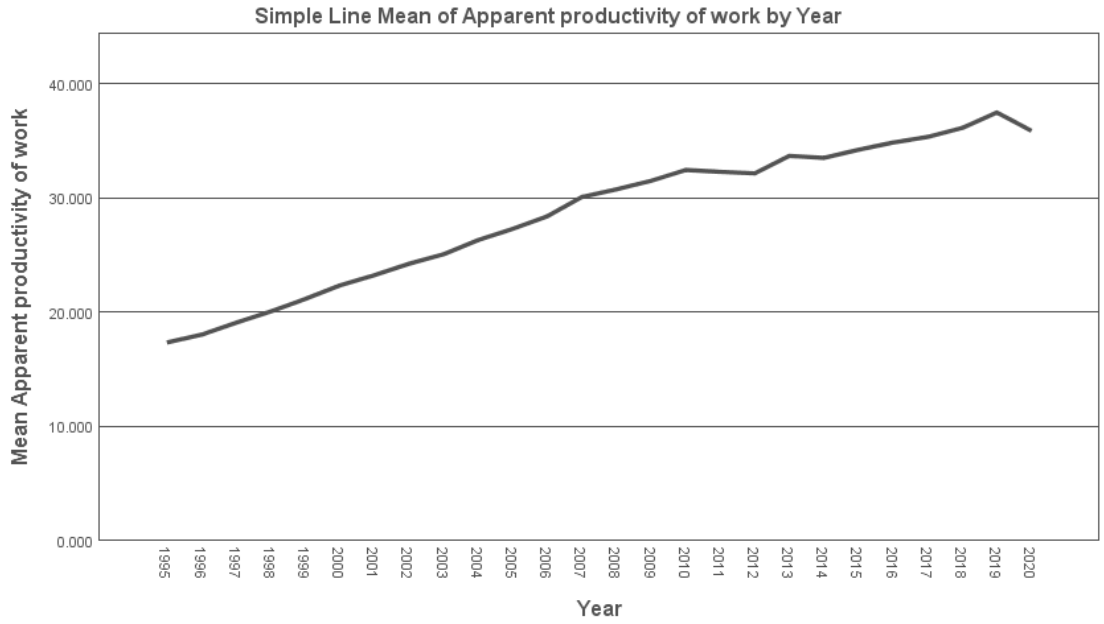

Figure 4.5: The Apparent productivity of work data of Portugal from 1995 to 2020 (Data sourced from: Statistics Portugal, 2021e)

The apparent productivity of work in Portugal nosedived in 2020 from a high in 2019, which might be due to the impact of the pandemic.

The GDP per capita in Purchasing Power Standards (PPS), expressed in relation to EU average, set at 100; is the value of all goods and services produced minus the value of the inputs. It is calculated by the GDP expressed in purchasing power standards, divided by total population of the country. The higher the GDPpc PPS the stronger the economy of the country.

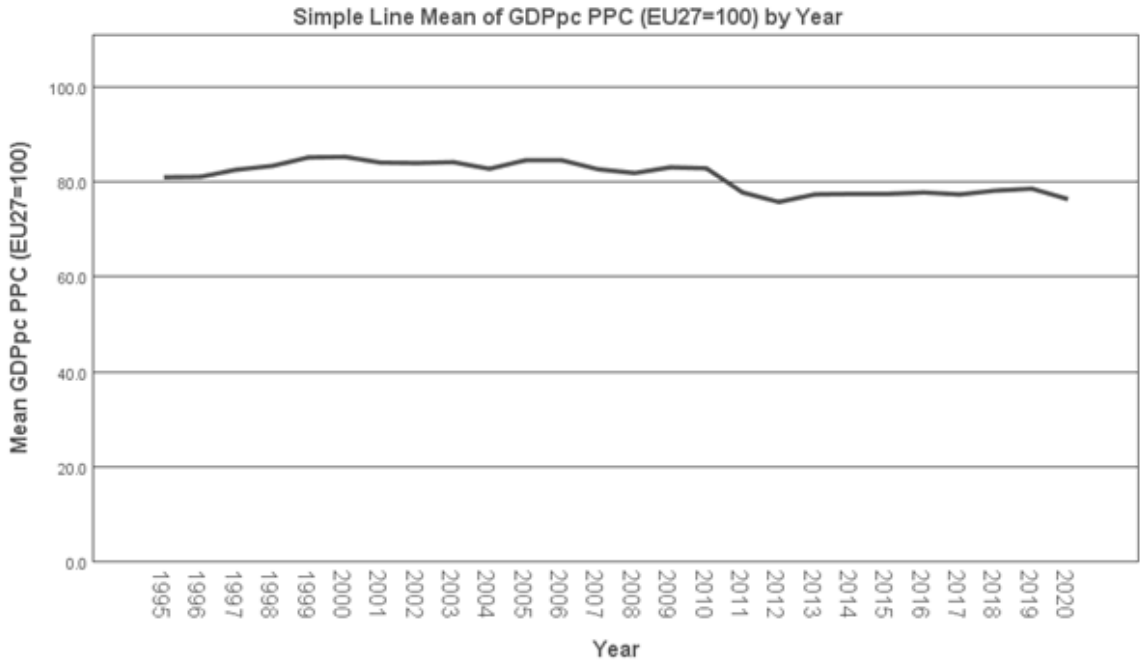

Figure 4.6: The GDPpc PPC data of Portugal from 1995 to 2020 (Data sourced from: Statistics Portugal, 2021e)

Figure 4.6 indicates that the GDPpc PPC of Portugal in the years under review has remained relatively stagnant. It is worth nothing that prior to the COVID-19 period, the GDPpc PPC of Portugal has reduced consistently, compared with the EU average during the crisis in 2011-12. Also, in 2020 a decrease can be noticed in this indicator.

The evolution of the real GDP is the growth rate of the real GDP per capita of the country. A performing economy will have an increasing real GDP per capita. As the real GDP per capita of a country increase, there is a considerable increase in the standard of living of the inhabitants. A growing real GDP per capita implies that the country generates a greater amount of goods and services, in successive years.

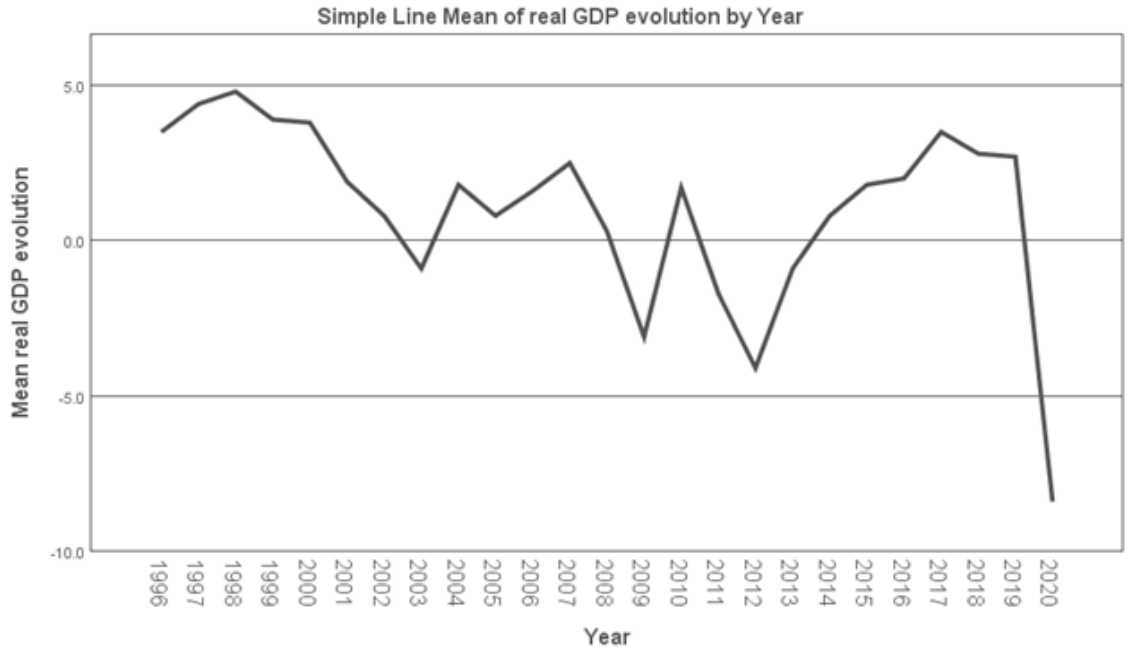

Figure 4.7: The Real GDP evolution data of Portugal from 1995 to 2020 (Data sourced from: Statistics Portugal, 2021e)

Figure 4.7 indicates that the real GDP evolution of Portugal has been erratic. Before the new bottom in 2020, the real GDP of the country dropped to -4.1% in 2012, and then rose to 3.5% in 2017. In 2019, the real GDP evolution of Portugal was 2.7%, and in 2020 at the peak of the pandemic, the real growth of the GDP declined to -8.4%. This is the lowest growth rate for the period under review.

4.3 Types of Tourism Responses in the Portuguese Municipalities

The empirical study in this section is inspired by a branch of regional studies that focus resilience (Gong et al., 2020; Sutton & Arku, 2020). Resilience is the ability of a system to resist, recover, adapt or renew it self in the face of adversity (cf. Pinto, 2018) This study is particularly inspired in a recent exercise, from Ferrão et al. (2023), about the territorial vulnerabilities in Portuguese municipalities and its capacity to cope with the pandemic crisis. Using indicators to characterize the susceptibility and exposure, these authors found different groups of municipalities. according to the degree and nature of resilience they present. Particularly relevant for this dissertation was the fact that the cluster of municipalities defined as "Dependence on Tourism" showed clear structural weaknesses with an enormous volatility of the unemployment during the pandemic period. Also, the cluster with the main metropolitan municipalities showed smaller resilience to the pandemic. Also, the study of Martinho (2021a, 2021b) was relevant to motivate the specific approach of tourism impacts at municipal level.

This empirical study can be considered a zoom in in the behaviour of the more touristic municipalities. It selected a database from INE with the Overnights in the more touristic municipalities as defined by this public organism. The hierarchical cluster analysis was performed in municipalities in Portugal, with the continuous variables by the change in the total Overnight stays in tourist accommodation establishments between 2019 and 2020, and 2019 and 2021. We calculated the variation of overnight stays, between two periods: July 2019 to July 2020, and July 2019 to July 2021. These periods reflect the month of the high season in the year before the pandemic and the same months.

The dendogram (Figure 4.8) shows the different clusters and the option for selecting 4 groups of municipalities.

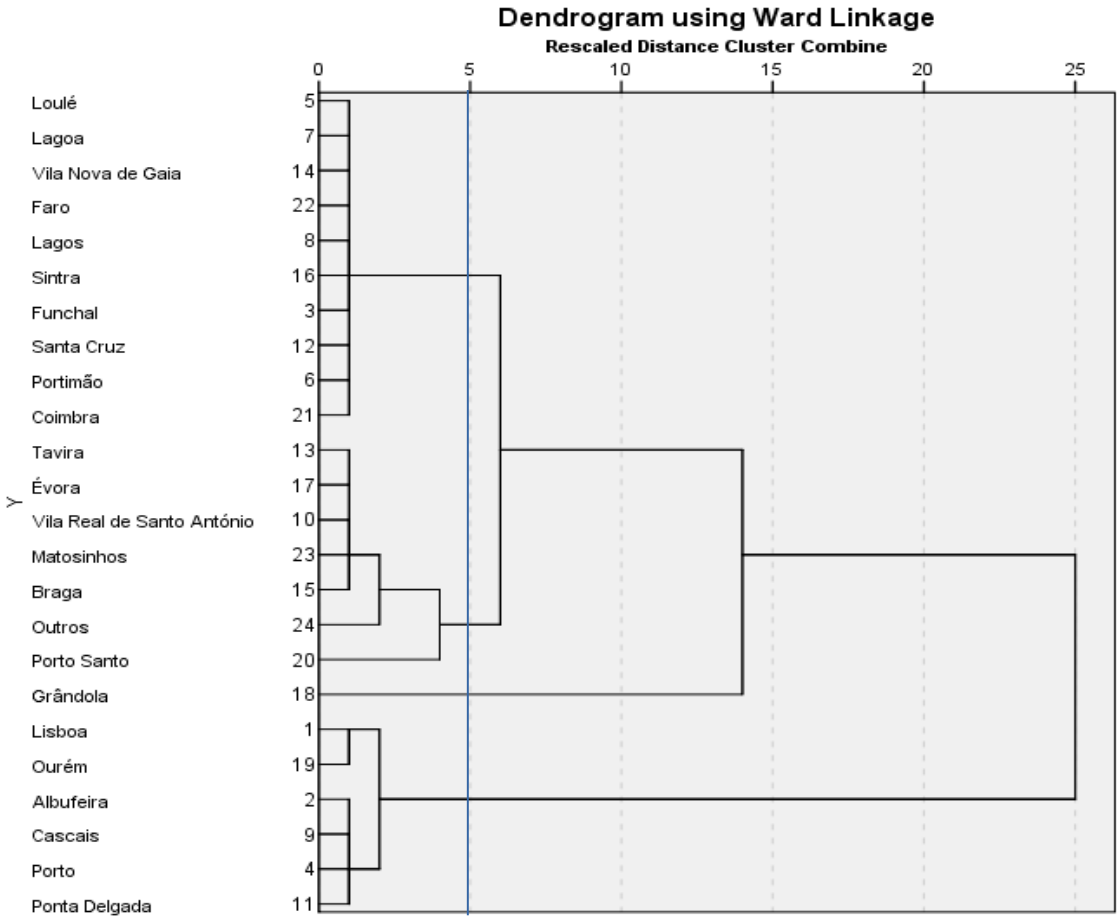

Figure 4.8: Dendrogram of the Hierarchical Cluster

Source: Own elaboration.

We retained 4 clusters as described in the table below

Table 4.1: The means of the changes in the total Overnight stays in tourist accommodation (Data sourced from: Statistics Portugal, 2021f)

		N	Mean	Std. Deviation	Std. Error
% of change 2021-2019	1	6	-.57	,059	,024
	2	10	-.44	,033	,010
	3	7	-.35	,080	,030
	4	1	-.13	.	.
	Total	24	-.44	,117	,024
% of change 2020-2019	1	6	-.73	,039	,016
	2	10	-.63	,029	,009
	3	7	-.55	,053	,020
	4	1	-.35	.	.
	Total	24	-.62	,097	,020

Source: Own elaboration.

Results from Table 4.1 suggest that the members of Cluster 1 were most impacted by the pandemic, as the percentage mean changes in the total overnight stays of tourists were highest. The percentage mean changes between 2019 and 2021 was -.57; and the percentage mean change between 2020 and 2021 was -.73. The second most affected by the pandemic were members of Cluster 2, recording percentage mean change between 2019 and 2021 of -.44; and the percentage mean change between 2020 and 2021 of -.63. The third most impacted were members of Cluster 3, as the cluster recorded a percentage mean change between 2019 and 2021 of -.35; and the percentage mean change between 2020 and 2021 of -.55. The members of Cluster 4 were the least impacted by the pandemic, with the percentage mean change between 2019 and 2021 was -.13; and the percentage mean change between 2020 and 2021 was -.35.

Table 4.2: The clusters' membership (Data sourced from: Statistics Portugal, 2021f)

Clusters	**Members (Municipalities)**
Cluster 1	"Big hit" Metropolitan municipalities and main tourism-based municipalities - Lisboa, Albufeira, Porto, Cascais, Ponta Delgada, and Ourém
Cluster 2	"Strong impact" highly touristified municipalities, dominated by foreign tourist and stabilised tourism products, sun and sand and urban, Funchal, Loulé, Portimão, Lagoa, Lagos, Santa Cruz, Vila Nova de Gaia, Sintra, Coimbra, and Faro
Cluster 3	"Moderate consequences", smaller municipalities, with tourism product combining other complementary products, historical and transborder visitants, SVila Real de Santo António, Tavira, Braga, Évora, Porto Santo and Matosinhos
Cluster 4	"Negligible effects", a municipality in the proximity of Lisbon, with tourism based in natural resources

Source: Own elaboration.

Cluster 1, which is mostly affected by the pandemic, includes Lisboa, Albufeira, Porto, Cascais, Ponta Delgada, and Ourém. Cluster 2 is the second most affected cluster, and includes Funchal, Loulé, Portimão, Lagoa, Lagos, Santa Cruz, Vila Nova de Gaia, Sintra, Coimbra, and Faro. Cluster 3 also presents average values in this context, even with negative reductions in terms of Overnight numbers, there were the group less bad, with Vila Real de Santo António, Tavira, Braga, Évora, Porto Santo and Matosinhos. The case "Others" that include the average values for the remaining municipalities was included here. Cluster 4 is constituted by Grandola, an outlier, that suffered the least reduction.

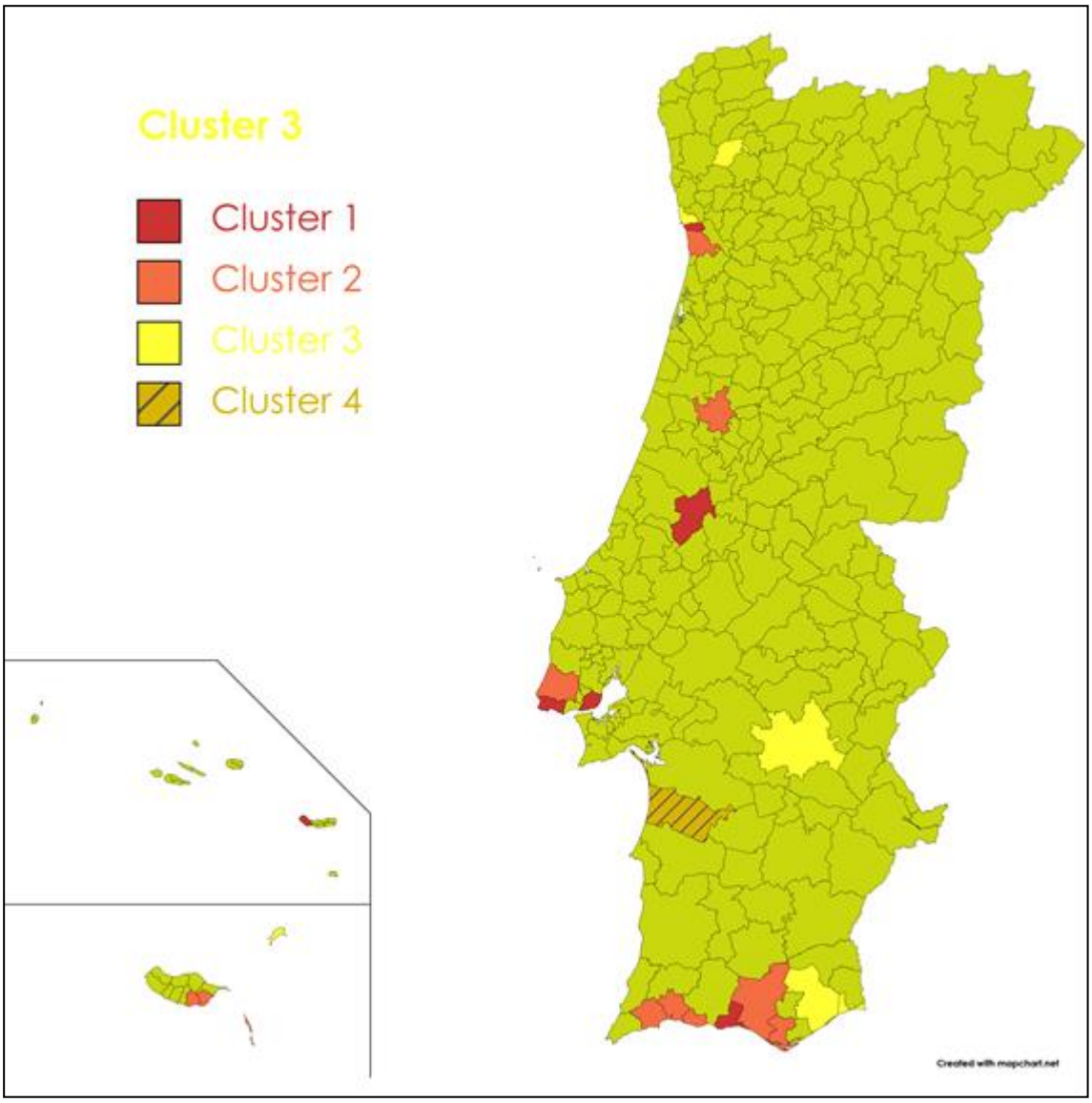

Figure 4.8: Clusters of the changes in the total overnight stays in tourist accommodation (Data sourced from: Statistics Portugal, 2021f)

[Note: Cluster 1 - Lisboa, Albufeira, Porto, Cascais, Ponta Delgada, and Ourém; Cluster 2 - Funchal, Loulé, Portimão, Lagoa, Lagos, Santa Cruz, Vila Nova de Gaia, Sintra, Coimbra, and Faro; Cluster 3 - Vila Real de Santo António, Tavira, Braga, Évora, Porto Santo and Matosinhos; Cluster 4 - Grandola]

Source: Own elaboration.

4.4 Challenges for Employees in Accommodation

In this section we presented an exploratory study implemented to employees in the accommodation sector. The study is inspired by the branch of social and psychological studies dealing with the impacts of the pandemic at the individual level (cf. Viseu et al., 2022 or Park et al, 2022). The study of Cheng et al. (2022) was particularly important by showing that employees' emotional state was critical not only to operate tourism related services during the pandemic but also to think about the new normal for tourism industry.

We selected employees from one of the municipalities that was part of cluster 1, and suffered the most, Lisbon. The study received 53 valid responses from participants. An exploratory analysis was conducted to summarise the main characteristics of the responses of accommodation employees in Portugal.

Table 4.3: Age distribution of responses (Sourced from primary data)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	19-24	20	37,7	37,7	37,7
	25-30	21	39,6	39,6	77,4
	31-40	12	22,6	22,6	100,0

Source: Own elaboration.

Table 4.3 indicates that the age distribution of the respondents, and twenty of them where between the ages of 19 and 24 years. The accommodation employees between ages 25 and 30 years, who participated in the survey were twenty-one. Twelve of the respondents were between the ages of 31 and 40 years.

Table 4.4: Age distribution of responses (Sourced from primary data)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	32	60,4	60,4	60,4
	Male	21	39,6	39,6	100,0

Source: Own elaboration.

In Table 4.4, the gender distribution of the participants indicates that thirty-two female accommodation employees participated in the survey, while twenty-one male employees.

Table 4.5: Marital status distribution of responses (Sourced from primary data)

	Frequency	Cases	Valid Percent
Valid	Married	25	47,2
	Single	28	52,8

Source: Own elaboration.

In Table 4.5, the marital status distribution shows that twenty-five of the participants in the survey were married, and twenty-eight of the respondents were single.

Table 4.6: Education level distribution of responses (Sourced from primary data)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bachelor	28	52,8	52,8	52,8
	Master	12	22,6	22,6	75,5
	Polytechnic	9	17,0	17,0	92,5
	Secondary Education	4	7,5	7,5	100,0

Source: Own elaboration.

Table 4.6 indicates that the education distribution of the respondents, and nineteen of the accommodation employees had Bachelor of Science degree as the highest education qualification. Twelve of the participants in the survey have a Master's degree, while nine had Polytechnic qualification. Those with secondary education were four.

Figure 4.10 shows that the first question, which seeks to assess the impact of the fear of contracting the COVID-19 virus on job performance, was responded mainly with "strongly agree", "agree", and "undecided." The second question, which assessed the drop in employee performance as a result of the fear to contract the virus was mainly responded with "strongly agree", "agree", and "undecided." Similarly, questions 3, 4, 5, 6, 9, and 10 were responded mainly with "strongly agree", "agree", and "undecided" (Figure 4.10). Questions 7 and 8, which assessed the fear damage to reputation and pedigree at work in relation to the COVID-19 virus, and the fear of working overtime as a result of COVID-19, were responded mainly with "agree", "undecided", and "disagree." Table 4.7 shows the mean value for the same questions.

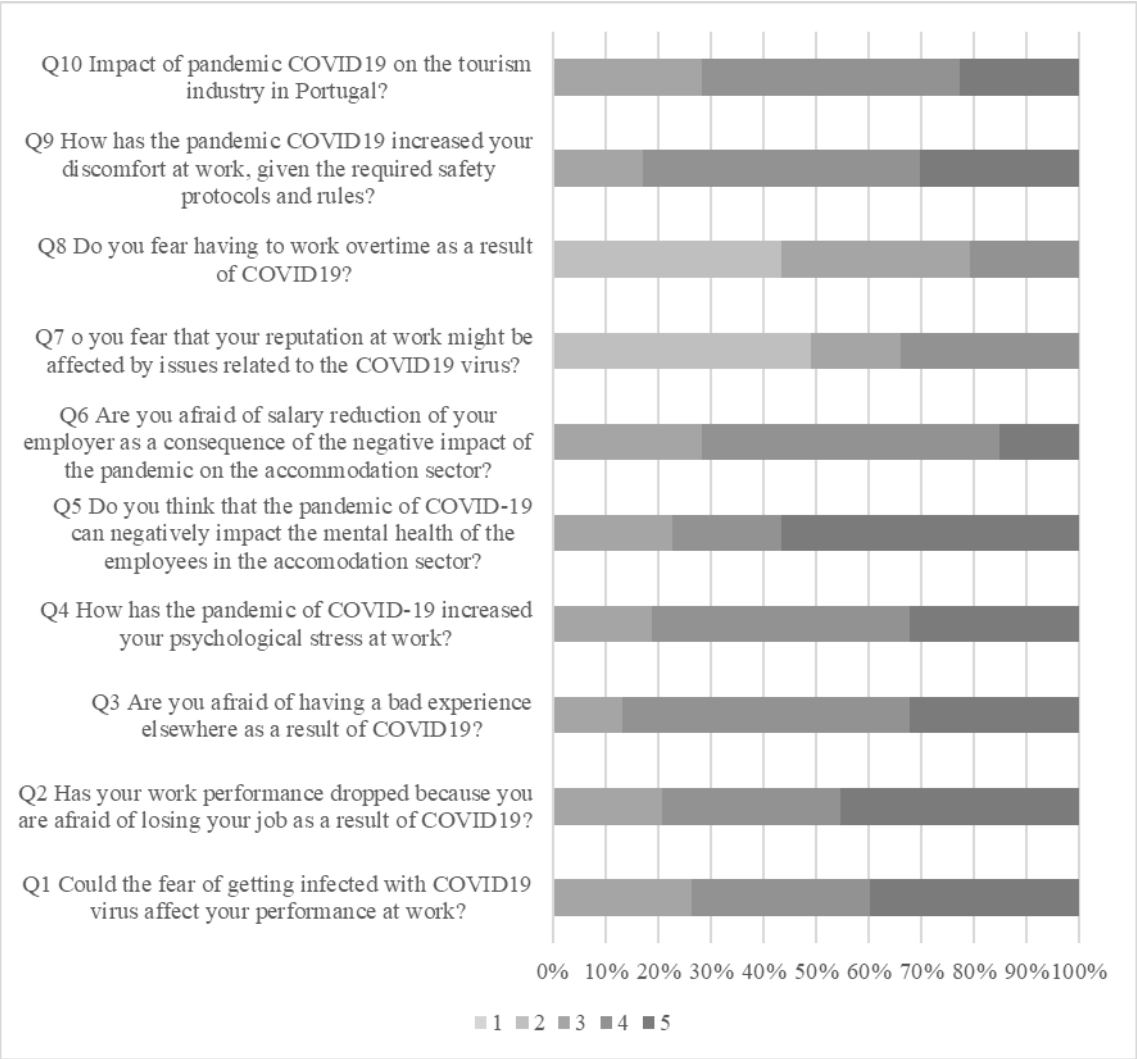

Figure 4.10: Percentage of answers by risks felt (Likert scale)

Source: Own elaboration.

Table 4.7: Descriptive statistics (Sourced from primary data)

	N	Mean	Std. Deviation
Q1	53	4,1321	0,80950
Q2	53	4,2453	0,78215
Q3	53	4,1887	0,65212
Q4	53	4,1321	0,70813
Q5	53	4,3396	0,83074
Q6	53	3,8679	0,65156
Q7	53	2,8491	0,90716
Q8	53	2,7736	0,77563
Q9	53	4,1321	0,68043
Q10	53	3,9434	0,71831

Source: Own elaboration.

The responses suggest that accommodation employees were generally scared of the virus, as contracting COVID-19 has negative consequences on employee performance and productivity. Many of the respondents recognised and feared the repercussion of getting infected with the virus, as there is likelihood of poor work performance or cause the loss of employment. In addition, the responses suggest that these employees are generally scared of having a bad experience elsewhere, resulting from infection with the COVID-19 virus.

The chances of developing psychological stress at work is also increased, according to the results obtained. This might be due to the inability of employees to combine their duties and responsibilities at work with the fear of the care outcome of the COVID-19 infection. Furthermore, the results of the survey suggest that employees are likely to develop mental health challenges.

The fear of wage or salary reduction was acknowledged by the respondents, as a result of absence from work, a consequence of the COVID-19 infection. Employers are likely cut or hold back wages for employees that are in isolation or hospital after contracting the virus. However, the respondents were mainly undecided about having their reputation at work impacted by issues related to the COVID-19 virus. Similarly, they were less concerned about working overtime due to the days missed from work as a result of the COVID-19 infection. The respondents were generally distressed by the increased discomfort at work caused by the required safety protocols and rules to mitigate the spread of the virus. Additionally, the participants in the survey recognised and acknowledged the impact of the COVID-19 pandemic on the tourism industry in Portugal.

4.5 Chapter Summary

This chapter presented the results of empirical studies conducted to achieve the objectives of this dissertation, focusing the understanding of the impacts of the pandemic in the Portuguese economy, the variation of tourists in the municipalities, and risks perceived by accommodation employees with the pandemic crisis. The next chapter will further discuss the findings of this chapter, and make conclusion on the study.

CHAPTER 5

CONCLUSION

5.1 Introduction

This dissertation aimed to assess the impact of the COVID-19 pandemic on the tourism sector of Portugal. Specifically, it explored the extent to which the economy of Portugal was susceptible to the pandemic, particularly tourism and the accommodation sectors. Additionally, the empirical study intended to evaluated the impact of COVID-19 pandemic on the evolution of the tourism in Portugal, specifically at the most touristic municipalities. Finally, another empirical study aimed to comprehend risks felt by accommodation establishments' employees, as a result of the COVID-19 pandemic.

This chapter has seven sections. This is the first, and the second is the summary of the results obtained from the analyses of the previous chapter. The third section is the discussion of the research questions. The fourth section contains the recommendations derived from the findings of this research, and the fifth is the limitations associated to the study. The sixth section details suggestions for future related research, and the final section is the summary of the conclusion of the study.

5.2 Summary of the Results

Generally, economic figures of Portugal suggested that the country performed poorly in the COVID-19 period of 2019-20 (cf section 4.2). The gross domestic product (GDP) at the current market prices, the gross value added (GVA) at the current market prices of Portugal, the GDP per inhabitant, and the apparent productivity of work of Portugal declined in 2020 from a high in 2019. Similarly, the real GDP evolution of Portugal crashed to -8.4% in 2020 from 2.7% in 2019. The GDPpc PPC of Portugal in the years observed remained relatively stagnant, decreasing in the periods of the crisis 2011-12 and in the pandemic period.

The Hierarchical cluster analyses on the municipalities in Portugal indicated that tourism activity in the country were mostly impacted in two groups of municipalities:

Cluster 1 (Lisboa, Albufeira, Porto, Cascais, Ponta Delgada, and Ourém) and Cluster 2 (Funchal, Loulé, Portimão, Lagoa, Lagos, Santa, Cruz, Vila Nova de Gaia, Sintra, Coimbra, and Faro municipalities).

The exploratory analysis of the responses of accommodation employees in Portugal suggested that they were severely impacted by the pandemic, as the average mean score for questions 1, 2, 3, 4, 5, 6, 9, and 10 were above 3.5 (refer Table 4.7 and Figure 4.10). These questions were responded mainly with "strongly agree", "agree", and "undecided." Questions 7 and 8, which assessed the fear damage to reputation at work in relation to the COVID-19 virus, and the fear of working overtime as a result of COVID-19, were responded mainly with "agree", "undecided", and "disagree."

5.3 Discussion

To achieve the aim of the study, the following research questions were asked:

- To what extent was the economy of Portugal susceptible to the pandemic, particularly tourism?
- What was the impact of COVID-19 pandemic on the evolution of the tourism in Portugal, specifically in the number of tourists at municipal levels?
- What were the perceptions of the COVID-19 pandemic consequences for employees in accommodation establishments?

5.3.1 The Economy of Portugal and the COVID-19 Pandemic

The economic data of Portugal suggested that the economy of the country performed poorly due to the impact of the COVID-19 pandemic. According to Statistics Portugal (2021b), Portugal's economy is dependent on tourism, and contracted by 3.8% in the first quarter of 2020. Tourism sector of the country, accounting for almost 15% of GDP and 8.5% of national Gross Value Added (GVA) before the pandemic, had its worst results since the mid-1980s in the first year of the pandemic (Statistics Portugal, 2021c). The number of foreign tourists was reduced by 76% to just under 4 million after a record number of visitors in 2019 (Statistics Portugal, 2021).

The economic environment of the world is bleak as many countries are experiencing economic depression or recession, or recovering from one; or battling inflation due to the impact of the pandemic (Junior, Garcia-Cintado & Junior, 2021; Anyanwu & Salami, 2021). In 2020, Portugal's economy contracted, as the pandemic negatively impacted all socio-economic activities (Statistics Portugal, 2021a; Statistics Portugal, 2021d; Santos & Moreira, 2021). Furthermore, the most affected sector was the country's travel and tourism sector. The GDP of the country, according to Statistics Portugal (2021d), contracted by 7.6% in 2020. In the same year, Spain's GDP fell by 10.8% (Reuters, 2022).

It is worth stating that the negative impact of the pandemic is not isolated to Portugal alone. The COVID-19 pandemic has severely impacted major segments of the world tourism sector, which are major contributors to the revenue of countries, as international business travel, events, and festivals have been halted (UNCTAD, 2022; Liang et al., 2021; Škare, Soriano & Porada-Rochoń, 2021; Şengül & Eryılmaz, 2021). There are major disruptions in the air travel operations, which liquidated some airlines, while others are struggling to survive. For instance, Air Italy ceased operations on 11 February 2020 (CNN, 2022), and the AtlasGlobal, a Turkish airline, collapsed on 12 February 2020 (Aviation 24, 2022). The British airline Flybe, which was struggling before the pandemic, became insolvent on 5 March 2020 amid the negative impact of the pandemic (The Guardian, 2022). Similarly, Virgin Australia was forced to cut its workforce by 80% from 10,000 to 8,000 employees. Also, the TAP faced a constant turmoil, surely influenced by the pandemic disruption, that lasts until this day.

The COVID-19 pandemic is not the first pandemic to hit the world, but its impact has been most felt (Uğur & Akbıyık, 2020). The present world is different from those of the past; because of the positive impact of technology, which has connected the world more. Therefore, there is no reference to similar crisis in the past. Furthermore, the perception of people on travel and tourism is at a low for health and safety reasons; and it is a major obstacle impeding the recovery of the tourism sector from the pandemic (Orîndaru et al., 2021). Consequently, the industry is experiencing low levels of demand, which has slowed the restart of the world tourism sector (Uğur & Akbıyık, 2020; International Monetary Fund, 2022; Sigala, 2020).

Additionally, unemployment has reached new highs, because many MSMEs were severely impacted by the pandemic. Companies that are still afloat are uncertain about the next phase of the pandemic, and are cautious in making projections and investments (Orîndaru et al., 2021). Another threat faced by the industry is the unavailability of vaccines for developing countries, which jeopardizes the health safety of the world (Irfan et al., 2021).

5.3.2 Municipalities and Tourism Evolution during the COVID-19 Pandemic

Before the pandemic, tourism activities in the Lisboa, Albufeira, Funchal, and Porto municipalities were relatively high, with the Lisboa airport handling about 50% of the total passengers in Portugal (Tucki et al., 2019). Therefore, these municipalities were among those severely impacted by the lock-downs and restrictions enforced in Portugal at the outbreak of the COVID-19 virus. These municipalities benefited immensely from the steady growth of the global tourism industry (Ferreira, Ramos & Lahr, 2020). In specific, the Lisbon region benefited from strong local and regional demand driven by rich natural endowments combined with a good access, authentic brand, and a positive reputation; making it a leading city destination in Europe (Akande et al., 2019). The emergence of the COVID-19 pandemic caused a significant drop in government revenue from 91.01 billion Euro in 2019 to 81.73 billion Euro in 2020 (Statista, 2022). Consequently, the Gross National Income (GNI) of Portugal decreased by 5.5% in 2020, after growing by 4.3% in 2019 (Statistics Portugal, 2021a).

According to Our World in Data (2022), tourism activity grounded to a halt after the state of emergency enacted by the Portugal government between March and April 2020. The President of Portugal, in March and April 2020, instituted state of emergency, as the number of confirmed infections and deaths from the COVID-19 virus increased rapidly in few days (Rödl & Partner, 2022). The reported cases of COVID-19 infections had skyrocketed above 1,000 in this period and all economic activity were halted throughout the country. The lock-down and restriction was aimed to checkmate the further spread of the virus.

Aside the restrictions, the declaration of state of emergency allowed the Government of Portugal to compulsively confine people in their homes. The government could make requisition of private property to be used as confinement centres. Further, the government had the powers to the obligatory opening, closing and functioning of businesses; use the workers of public or private institutions as required and necessary; impose sanity controls to restrict the movement of people; grant extra powers to security forces and tighten controls on public demonstrations, meetings, and gatherings; restrict air traffic in and out of the country.

However, the findings of the previous chapter suggest that tourism activity in Portugal is recovering (cf. section 4.3). According to the International Monetary Fund (2021), some large tourism markets such as the United States, Germany and France have shown some shy signs of recovery in the recent months after the peak of the pandemic, but global tourism continues to reflect weak demand for outbound travel, according to Iastremska & Kononova (2021). Similarly, Boto-García & Mayor (2022) suggests that the demand for domestic tourism has continued to rise, and the demand for domestic air travel has returned to pre-COVID-19 levels (Arbulú et al., 2021). The year 2022 showed signs of recovery in the tourism sector and 2023 is expected to be better (UNWTO, 2023).

5.3.3 Risks for Employees in the Accommodation Sector during the COVID-19 Pandemic

The study observed that the COVID-19 pandemic has increased the psychological stress of employees of the accommodation sector in Portugal, and that the fear of contracting the virus affects their performance at work. Further, the study deduced that these employees dread working extra hours, because of the constraints caused by COVID-19, and that they fear their reputation and pedigree at work can be affected by issues that relate to the COVID-19 virus.

These results are aligned with other studies. Amicucci et al. (2021) suggested that insomnia and anxiety were commonly observed in primary care centres following disasters. Pfeiffer et al. (2021) agrees that people can be fearful about death or being ill, become unemployed, getting stressed, losing loved ones, and being socially excluded

and separated from friends and families. Accordingly, anxiety can arise due to fear and worry of getting infected. Further, social distancing measures can disrupt the social supports and daily routines, leading to substance abuse (Svärd et al., 2021). The fear of contracting the virus, subjective risk perception and anxiety, and dysfunctional safety behaviour were elevated in participants with multiple health challenges, stated Sigdel et al. (2020). The increased need for security and the adherent to dysfunctional safety measures heightens the fear in people.

According to the UN (2020), over 100 million tourism jobs were at risk with the impact of the global pandemic, which is the first pandemic in an interconnected world. Many micro, small, and medium-sized enterprises (MSMEs) that employ a high number of women might retrench their workforce to adapt to the reduced revenue generated from tourism and travels (Mihailescu & Rinaldi, 2021). Countries that depend on tourism, like Portugal, might face the negative consequences of the crisis for much longer than other economies.

Teng et al. (2020) attempt to explore the relation of COVID-19 pandemic with anxiety, stress, depression among quarantined hotel employees in China suggested that 43.5% of the participants reported moderate to extreme severe symptoms to depression. Of the respondents, 68.2% reported moderate to extremely severe anxiety symptoms, and 8.2% of the participants indicated moderate to extremely severe stress symptoms. The cross-sectional study adopted the convenience sampling method to collect data from 170 quarantined hotel employees in Xiamen, Fujian Province, China; between May 20 and June 10, 2020. The analytical methods are descriptive statistics, chi-squared test, and the binary logistic regression to examine the socio-demographic variables associated with anxiety, depression, and stress levels during the COVID-19 pandemic. Furthermore, the study observed that quarantined hotel employees with higher level of education were less likely to experience anxiety, while those with higher income level were less likely to experience depression.

5.4 Recommendations

The COVID-19 pandemic gives the tourism sector the opportunity to rethink the tourism dominant business models. The crisis created by the pandemic has proven to all

stakeholders in the tourism sector that the present business model is deficient (Brouder, 2020). Thus, it has presented the tourism sector with the opportunity to innovate and digitise its operations. With the lift of travel restrictions and restart of the global tourism sector in many parts of the world, it is essential that health and safety precautions are adopted to protect the local communities and workers (Dupeyras, Haxton & Stacey, 2020). Strict health protocols and measures must be adhered, to mitigate the spread of the virus (Popovici & Popovici, 2021).

Domestic tourism can be a buffer for the industry to maintain its competitiveness, and adapt to the new normal (Boto-García & Mayor, 2022). The industry has to improve and implement safety and hygiene protocols, for increased security and confidence in the industry (Allaberganov, Preko & Mohammed, 2021). Furthermore, Mensah & Boakye (2021) suggested that domestic and regional tourism should be promoted in countries that are short of international tourists. A conducive business environment should be made available for MSMEs in countries that depend heavily on the tourism sector (Leonidova, 2020). The tourism sector can ensure that trips are closer to home, for domestic and neighbouring tourists (Sharma, Thomas & Paul, 2021). The tourism industry should ensure tourists get value for their money, to boost the patronage of repeat consumers. Partnerships between stakeholders in the tourism sector and governments should be encouraged and promoted.

Lee, Hunter & Chung (2020) suggested that the tourism sector make attempts to infuse advance digital and technological innovations in its operations. Promotional campaigns should be reinvented to attract the domestic market, and adequate investments should be made in digital skills acquisition and training for job seekers and temporary workers. Future investments in the tourism sector should be green by targeting protected areas, smart buildings, renewable energy sources, among other opportunities that would promote green growth. Wijesinghe (2021) emphasised that new partnerships should be initiated to restart and transform the sector.

Governments are encouraged to give grants, tax relief, cash transfers, payroll support, and loans to MSMEs in the tourism sector (Barkas, Honeck & Rubio, 2020). Similarly, local and international banks should be encouraged to give debt reliefs to sectors that are severely impacted by the pandemic (Ozili, 2020).

5.5 Limitations of the Study

On the one hand, the first study is limited by the reliance on secondary data, as the researcher could not obtain more detailed and variegated data for the quantitative analyses. The observations made in the study may be imprecise, if the true state of the total overnight stays in tourist accommodation establishments in Portugal is misrepresented.

The second study might be limited by the structure of the questionnaire, as the researcher gave the respondents limited options of responses. Further, the researcher was unable to verify the accuracy of the responses of the participants. The inability of the researcher to control the environment where the participants gave answers to the questionnaire might have caused wrong responses to questions (Razavi, 2001), limiting the accuracy of the results.

The choice of cluster and factor analyses to achieve the objectives of the study might not be optimal, as other cluster algorithms and factor analytical methods might produce more accurate results. According to Garcia-Dias et al. (2020), different methods of clustering can give different results. Thus, the results obtained in this study might be different, if other factor and cluster analytical methods are adopted. Finally, the analyses in the study might be inaccurate, due to the limited knowledge of the researcher on statistical analyses and incomplete interpretation of the results.

5.6 Suggestions for Future Research

Different lines of research can be developed from this study.

Relevant research in the view of the author is the analysis the efficiency of tourism in Portugal. The study can use the non-parametric method of data envelopment analysis (DEA) to analyse the number of outputs achieved with specific inputs. The inputs can be the capital investment in Portugal's tourism and tourism consumption in Portugal; while the outputs can be the contribution of the tourism sector to the GDP of Portugal and the employment rate of sector in Portugal.

Another study can investigate the impact of online marketplace for lodging, homestays, and holiday rentals on tourism in Portugal. The study would assess the correlation between the rise of online housing rentals in Portugal with the revenue generated by the tourism sector. Furthermore, extensive research can be conducted on the impact of the COVID-19 pandemic on tourism employees in Portugal.

Similar approaches could also be implemented in other countries, to compare the pandemic impacts on different tourism destinations with the Portuguese results. Also the approach can be deepened. Both the studies, on municipalities and employees, would benefit from considering a larger set of socioeconomic indicators.

5.7 Final Note

The tourism industry in Portugal has come a long way, and as show resilience in overcoming various challenges. Unlike other challenges, the COVID-19 pandemic hit the industry at its peak, as it performed brilliantly in 2017, 2018, and 2019.

The findings of study suggest that the pandemic has had a significant impact on the tourism industry in Portugal, and more generally the entire economic of the country. In addition, employees in the industry are affected directly and indirectly by the pandemic. Specifically, the study suggests that:

- The economy of Portugal was highly susceptible to the COVID-19 pandemic, particularly the tourism and accommodation sectors.
- Tourism activity at the municipal level was significantly impacted by the pandemic.
- Employees of accommodation establishments in Portugal felt many risks, as a direct result of the COVID-19 pandemic.

On a moment that tourism is recovering from the pandemic many doubts subsist about the actual impacts of this crisis and what can be learnt from this dramatic event. Is the pandemic crisis a potential catalyst for change, for improving the sustainability of the sector? Or, in another perspective, the comforting tourism figures of 2022 and 2023 show that the sector is coming back to business as usual?

Only with individual and collective learning the pandemic will be an opportunity to improve critical aspects that made industry more susceptible to external shocks with the recurrent crises.

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Appendix A: Consent Form

INFORMED CONSENT RELEASE

Investigator:

"**My name is (**Oluwafemi Lateef Ogunsola*)*, **and I am a** *(Post graduate student, faculty of Economic, tourism economics and regional development.)* **at** *(university of Algarve)*. **I am inviting you to participate in a research study. Involvement in the study is voluntary, so you may choose to participate or not. I am now going to explain the study to you. Please feel free to ask any questions that you may have about the research; I will be happy to explain anything in greater detail.**

"**I am interested in learning more about** *(The COVID-19 Pandemic and tourism types of municipalities and a case study of accommodation establishment in Portugal)*. **You will be asked to** *(state what the participant will be asked to do.)* **This will take approximately *30* min./hrs. of your time. All information will be kept** *(either confidential, in the case where subjects' identities need to be retained or can be associated with their responses, or anonymous and confidential, in the case where data collection does not allow responses to be connected with a particular subject)*. **If anonymous, this means that your name will not appear anywhere and no one except me will know about your specific answers. If confidential, I will assign a number to your responses, and only I will have the key to indicate which number belongs to which participant. In any articles I write or any presentations that I make, I will use a made-up name for you, and I will not reveal details or I will change details about where you work, where you live, any personal information about you, and so forth.**

"The benefit of this research is that you will be helping us to understand *(The covid 19 Pandemic and tourism types of municipalities and a case study of accommodation establishment in Portugal)*. **This information should help us to** *(benefit of the research, better understanding, etc.)*. **The risks to you for participating in this study are** *(state the risks to subjects)*. **These risks will be minimized by** *(state the procedures you will use to minimize the risks)*. **If you do not wish to continue, you have the right to withdraw from the study, without penalty, at any time."**

Appendix B: Questionnaire Form

Questionário

Título da dissertação: Impacto da pandemia COVID-19 na indústria do turismo em Portugal.

Objetivo: O objetivo central desta investigação é contribuir para a compreensão do impacto da pandemia de COVID-19 na indústria do turismo em Portugal. Em particular, o estudo irá prestar atenção aos diferentes tipos de atividade turística, recorrendo ao estudo de caso de estabelecimentos de alojamento em todo o país.

* Required

Demografia

1. Idade *

Mark only one oval.

- ◯ 18-24
- ◯ 25-30
- ◯ 31-40
- ◯ 41-acima

2. Gênero *

Mark only one oval.

- ◯ Macho
- ◯ Fêmea
- ◯ Prefiro não dizer

3. Estado civil *

Mark only one oval.

- Solteiro
- Casado
- Prefiro não dizer

4. Nível de educação *

Mark only one oval.

- Ensino Médio
- Politécnico
- Bacharelado
- Mestres

Acrônimos:
DT: Discordo Totalmente
D: Discordo
I: Incerto
C: Concordo
CF: Concordo Fortemente

Itens

5. Variável *

Mark only one oval per row.

	DT	D	I	C	CF
O medo de se infectar com o vírus COVID-19 pode afetar seu desempenho no trabalho?					
Seu desempenho no trabalho caiu porque você está com medo de perder o emprego, como resultado do COVID-19?					
Você teme ter uma experiência ruim ou triste, como resultado do COVID-19?					
Como a pandemia do COVID-19 aumentou seu estresse psicológico no trabalho?					
Acha que a pandemia de COVID-19 pode impactar negativamente a saúde mental dos colaboradores do setor do alojamento?					
Tem medo de redução salarial da					

sua entidade patronal, em consequência do impacto negativo da pandemia no setor do alojamento?					
Você teme que sua reputação e pedigree no trabalho possam ser afetados por questões relacionadas ao vírus COVID-19?					
Você teme ter que trabalhar por horas extras, como resultado do COVID-19?					
Como a pandemia do COVID-19 aumentou seu desconforto no trabalho, por conta dos protocolos e regras de segurança exigidos?					
Impacto da pandemia COVID-19 na indústria do turismo em Portugal					

Appendix C: Exploratory Factor Analysis

The alternate method adopted to achieve is the Exploratory Factor Analysis. The Pl Component Factor Analysis was adopted to identify the risks that employees of the accommodation sector in Portugal face. Primary data were obtained with the questions in Appendix B, and a total of 53 people responded to the survey (Appendix C). Due to the size of the sample, which was less than 300, the number of iterations for convergence was set at 100. The number of factors were extracted with the eigenvalue set as 1. Therefore, the study retrieved factors whose eigenvalues are greater than 1. The method of rotation was set to Direct Oblimin, a method of oblique (nonorthogonal) rotation, with delta as 0. This option was selected, because the study assumes that the questions have some sort of correlation with one another. Coefficients of each factor were sorted by size, and coefficients below 0.3 were suppressed to retrieve a tidy result.

Table AC.1: Total Variance Explained 1

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	1.968	19.681	19.681	1.968	19.681	19.681	1.891
2	1.525	15.247	34.928	1.525	15.247	34.928	1.575
3	1.345	13.449	48.377	1.345	13.449	48.377	1.286
4	1.164	11.637	60.014	1.164	11.637	60.014	1.220
5	1.055	10.547	70.561	1.055	10.547	70.561	1.144
6	.833	8.326	78.887				
7	.722	7.219	86.107				
8	.527	5.266	91.372				
9	.459	4.592	95.965				
10	.404	4.035	100.000				

The results presented in Table AC.1 indicates that there are five components or factors. The firsts component has an eigenvalue of 1.968, the second component has an eigenvalue of 1.525, the third, 1.345, the fourth, 1.164, and the fifth component has an eigenvalue of 1.055. The first factor explains 19.681% of the observed variances in the data, the second, 15.247% of the observed variances in the data, the third: 13.449%, the fourth: 11.637%, and the fifth: 10.547%. Cumulatively, the recognised factors explained 70.561% of the observed variances in the data. The scree plot is presented below in Figure AC.1 below.

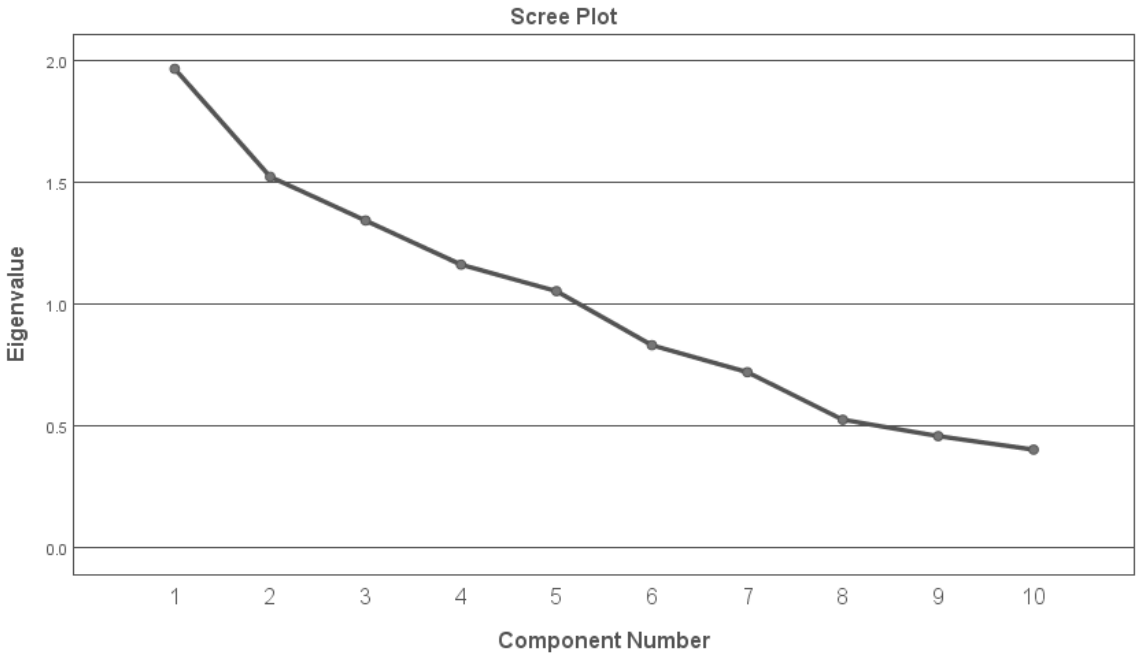


Figure AC.1: Scree Plot of the components.

The Pattern Matrix of the loading of each question on each factor or component is presented in the Table below. Loadings with the magnitude of loading coefficient of less than 0.3 are muted.

Table AC.2: Pattern Matrix 2

	Component				
	1	2	3	4	5
Question 4	.800				
Question 1	-.773				
Question 6	.624			.515	
Question 2		.818			
Question 7	.375	-.698			
Question 3		.486			.311
Question 5			.797		
Question 10		-.350	-.651		
Question 9				.943	
Question 8					.936

Questions 6, 7, 3, and 10 were ignored as they loaded on more than one factors or components. Subsequently, these questions were removed and the analysis was conducted again (Table AC.2).

Table AC.3: Total Variance Explained 2 (retest)

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	1.561	26.017	26.017	1.561	26.017	26.017	1.559
2	1.087	18.112	44.129	1.087	18.112	44.129	1.062
3	1.021	17.024	61.153	1.021	17.024	61.153	1.054
4	.991	16.517	77.670				
5	.857	14.279	91.949				
6	.483	8.051	100.000				

Table AC.4: Pattern Matrix 2 (retest)

	Component		
	1	2	3
Question 4	-.832		
Question 1	.818		
Question 9		-.644	
Question 5	.368	.580	
Question 8			.823
Question 2		-.506	.573

With the retest, three factors or components were observed (Table AC.3). Component 1 accounts for 26.017% of the observed variances in the data, 18.112% of the observed variances in the data, and 17.024% of the observed variances in the data. Questions 5 and 2 were disqualified, because they loaded on more than one factor (Table AC.4). Questions 4 and 1 loads or correlates highly on the first component only, Question 9 loads on the second component only, and Question 8 loads on the third component only. This implies that Question 4, 1, 9, and 8 will likely explain the risk faced by employees of the accommodation sector of Portugal, of all the questions or items in the questionnaire. Responses from this question will be used to suggest possible mitigations to the risks associated to the pandemic.

Appendix D: Municipality Behaviour During the Pandemic

The Two-Step cluster analysis was performed on each municipality in Portugal, with the continuous variable as the total Overnight stays in tourist accommodation establishments, and the categorical variable as the month of the data record. The data contains the monthly values for the continuous variable, from January 2013 to February 2022. Furthermore, five (5) clusters were specifically set to accommodate and capture "Very Low", "Low", "Medium", "High", and "Very High" tourism activities.

In this way, the study clusters the months in the last years by tourism activities in each municipality. In brief, this provides the evidence that the pandemic months, specially those associated with the lockdown were among the ones with more limited tourism activity in each municipality.

Albufeira Municipality

The Albufeira municipality is in the southern part of the Algarve region of Portugal, and a major holiday destination, because of its busy nightlife strip and sandy beaches. The city is surrounded by candy-coloured accommodations, with a waterfront promenade.

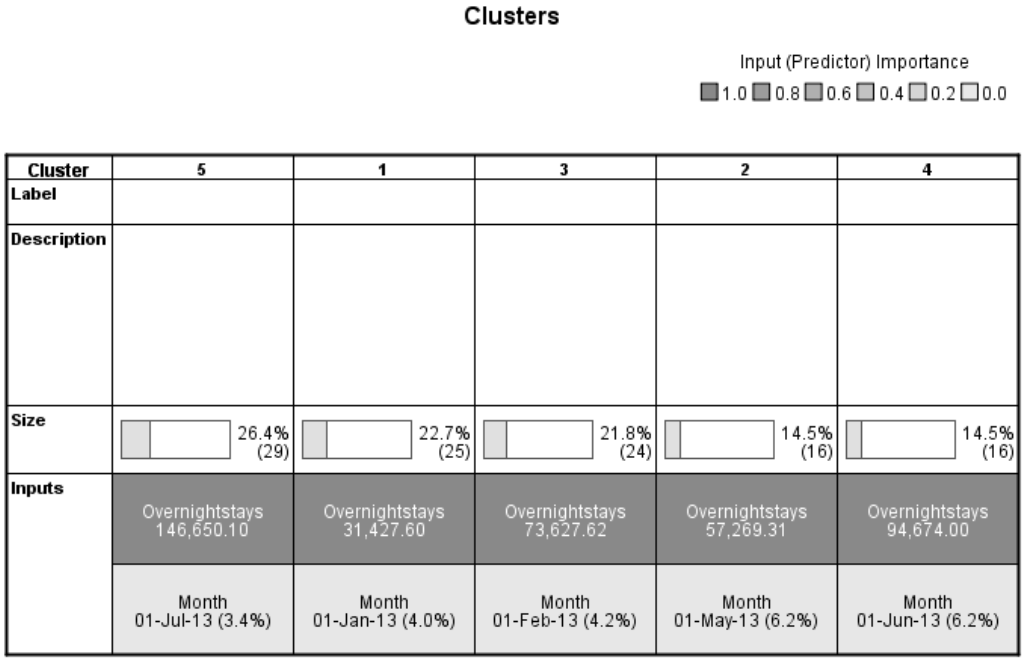


Figure AD.1: The cluster size and group from the Albufeira Municipality

Table AD.1: Clusters for the Albufeira Municipality

Cluster Name	Members (Months)
Cluster 1 (Very Low Tourism Activity)	01-Jan-13, 01-Feb-13, 01-Nov-13, 01-Dec-13, 01-Jan-14, 01-Feb-14, 01-Nov-14, 01-Dec-14, 01-Feb-15, 01-Nov-15, 01-Dec-15, 01-Jan-16, 01-Feb-16, 01-Nov-16, 01-Dec-16, 01-Jan-17, 01-Feb-17, 01-Nov-17, 01-Dec-17, 01-Jan-18, 01-Feb-18, 01-Nov-18, 01-Dec-18, **01-Jan-19, 01-Feb-19, 01-Nov-19, 01-Dec-19, 01-Jan-20, 01-Mar-20, 01-Oct-20**, 01-Nov-21, 01-Feb-22
Cluster 2 (Low Tourism Activity)	01-Mar-13, 01-Mar-14, 01-Jan-15, **01-Feb-20, 01-Apr-20, 01-May-20, 01-Jun-20, 01-Jul-20, 01-Nov-20, 01-Dec-20**, 01-Jan-21, 01-Feb-21, 01-Mar-21, 01-Apr-21, 01-May-21, 01-Dec-21, 01-Jan-22
Cluster 3 (Medium Tourism Activity)	01-Apr-13, 01-May-13, 01-Jul-13, 01-Oct-13, 01-Apr-14, 01-May-14, 01-Oct-14, 01-Mar-15, 01-Apr-15, 01-May-15, 01-Oct-15, 01-Mar-16, 01-Apr-16, 01-Oct-16, 01-Mar-17, 01-Apr-17, 01-Jun-17, 01-Sep-17, 01-Mar-18, 01-Apr-18, 01-Jun-18, 01-Sep-18, **01-Mar-19, 01-Jun-19, 01-Sep-19, 01-Aug-20, 01-Sep-20**, 01-Jun-21, 01-Jul-21, 01-Aug-21, 01-Sep-21, 01-Oct-21
Cluster 4 (High Tourism Activity)	01-Jun-13, 01-Sep-13, 01-Jun-14, 01-Sep-14, 01-Jun-15, 01-Sep-15, 01-May-16, 01-Jun-16, 01-Sep-16, 01-May-17, 01-Oct-17, 01-May-18, 01-Oct-18, **01-Apr-19, 01-May-19, 01-Oct-19**
Cluster 5 (Very High Tourism Activity)	01-Aug-13, 01-Jul-14, 01-Aug-14, 01-Jul-15, 01-Aug-15, 01-Jul-16, 01-Aug-16, 01-Jul-17, 01-Aug-17, 01-Jul-18, 01-Aug-18, **01-Jul-19, 01-Aug-19**

In the Albufeira municipality, generally, the tourism activity in January and February of the years in review had very low tourism activity (Table AD.1; Figure AD.1). Medium tourism activity were observed in August and September 2020, unlike the August of

other years observed; which are clustered as Very High Tourism Activity. It is worth noting, the tourism activity of July 2020 was low, unlike the July of the years before 2020, which saw very high tourism activity. However, there was a rebound of tourism activity in July 2021, as it was clustered in the Medium Tourism Activity cluster.

Braga Municipality

The Braga municipality is a municipality in the northeast of Porto, which is the far north of Portugal, and well known for its religious events and heritage. The city is the home to the Gothic-style Kings' Chapel and a sacred art museum.

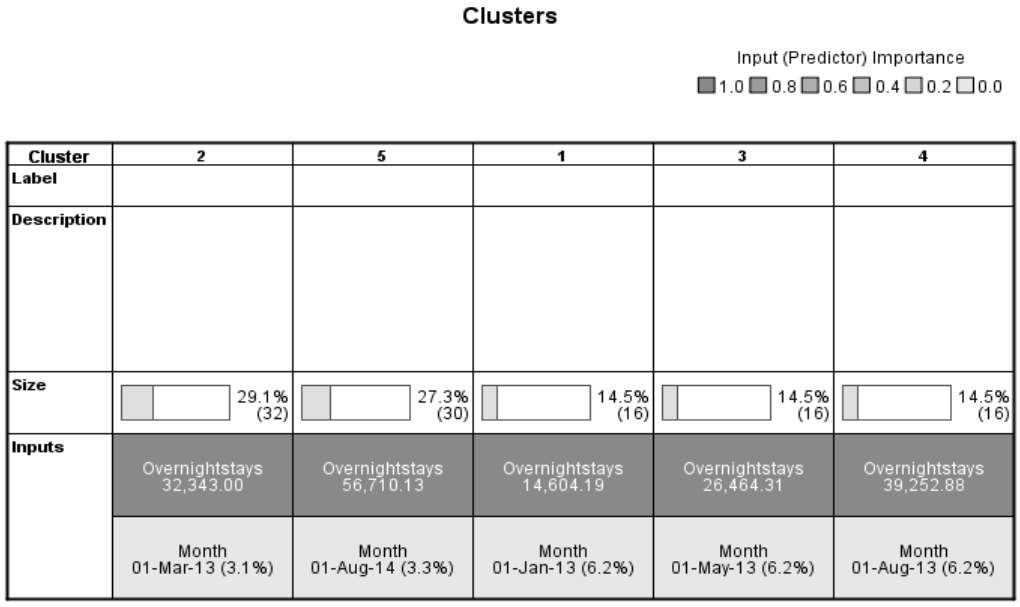


Figure AD.2: The cluster size and group from the Braga Municipality

Table AD.2: Clusters for the Braga Municipality

Cluster Name	Members (Months)
Cluster 1 (Very Low Tourism Activity)	01-Jan-13, 01-Feb-13, 01-Nov-13, 01-Jan-14, 01-Feb-14, 01-Apr-15, **01-Mar-20, 01-Apr-20, 01-May-20, 01-Jun-20, 01-Nov-20, 01-Dec-20**, 01-Jan-21, 01-Feb-21, 01-Mar-21, 01-Apr-21
Cluster 3 (Low Tourism Activity)	01-May-13, 01-Jun-13, 01-Jul-13, 01-Oct-13, 01-Dec-14, 01-Mar-15, 01-Nov-15, 01-Dec-15, 01-Jan-16, 01-Nov-16, 01-Dec-16, 01-Jan-17, 01-Feb-17, **01-Jul-20, 01-Oct-20**, 01-May-21
Cluster 2 (Medium Tourism Activity)	01-Mar-13, 01-Apr-13, 01-Sep-13, 01-Dec-13, 01-Mar-14, 01-Apr-14, 01-May-14, 01-Jun-14, 01-Oct-14, 01-Nov-14, 01-Jan-15, 01-Feb-15, 01-Feb-16, 01-Apr-16, 01-May-16, 01-Jun-16, 01-Oct-16, 01-Mar-17, 01-Oct-17, 01-Nov-17, 01-Jan-18, 01-Feb-18, 01-Apr-18, 01-Nov-18, **01-Feb-19, 01-Mar-19, 01-Dec-19, 01-Jan-20, 01-Sep-20**, 01-Jun-21, 01-Dec-21, 01-Jan-22
Cluster 4 (High Tourism Activity)	01-Aug-13, 01-Jul-14, 01-Sep-14, 01-May-15, 01-Jun-15, 01-Jul-15, 01-Oct-15, 01-Mar-16, 01-Dec-17, 01-Mar-18, 01-Dec-18, **01-Jan-19, 01-Feb-20**, 01-Jul-21, 01-Nov-21, 01-Feb-22
Cluster 5 (Very High Tourism Activity)	01-Aug-14, 01-Aug-15, 01-Sep-15, 01-Jul-16, 01-Aug-16, 01-Sep-16, 01-Apr-17, 01-May-17, 01-Jun-17, 01-Jul-17, 01-Aug-17, 01-Sep-17, 01-May-18, 01-Jun-18, 01-Jul-18, 01-Aug-18, 01-Sep-18, 01-Oct-18, **01-Apr-19, 01-May-19, 01-Jun-19, 01-Jul-19, 01-Aug-19, 01-Sep-19, 01-Oct-19, 01-Nov-19, 01-Aug-20**, 01-Aug-21, 01-Sep-21, 01-Oct-21

In 2020, there were low tourism in July and October; medium tourism in January and September; high tourism in February; and very high tourism in August (Table AD.2;

Figure AD.2). Despite the pandemic, tourism activity still peaked in August 2020, a pattern observed for all Augusts of other years reviewed.

Cascais Municipality

The Cascais municipality is a municipality in the Lisbon region of Portugal, and an important tourist destination.

Clusters

Input (Predictor) Importance

1.0 0.8 0.6 0.4 0.2 0.0

Cluster	5	1	2	3	4
Label					
Description					
Size	29.1% (32)	28.2% (31)	14.5% (16)	14.5% (16)	13.6% (15)
Inputs	Overnightstays 147,913.84	Overnightstays 37,788.87	Overnightstays 69,664.12	Overnightstays 95,926.50	Overnightstays 187,001.93
	Month 01-Jun-13 (3.1%)	Month 01-Jan-13 (3.2%)	Month 01-Mar-14 (6.2%)	Month 01-Mar-13 (6.2%)	Month 01-May-13 (6.7%)

Figure AD.3: The cluster size and group from the Cascais Municipality

Table AD.3: Clusters for the Cascais Municipality

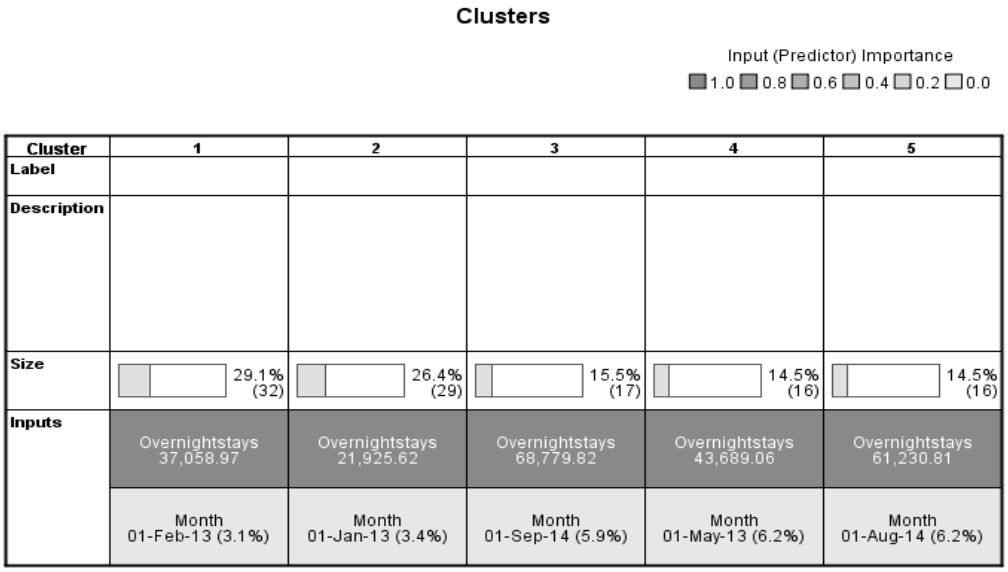
Cluster Name	Members (Months)
Cluster 1 (Very Low Tourism Activity)	01-Jan-13, 01-Feb-13, 01-Nov-13, 01-Dec-13, 01-Jan-14, 01-Feb-14, 01-Nov-14, 01-Dec-14, 01-Jan-15, 01-Feb-15, 01-Dec-15, 01-Jan-16, 01-Feb-16, 01-Jan-17, 01-Jan-18, **01-Mar-20, 01-Apr-20, 01-May-20, 01-Jun-20, 01-Jul-20, 01-Sep-20, 01-Oct-20, 01-Nov-20, 01-Dec-20**, 01-Jan-21, 01-Feb-21, 01-Mar-21, 01-Apr-21, 01-May-21, 01-Dec-21, 01-Jan-22
Cluster 2 (Low Tourism Activity)	01-Mar-14, 01-Nov-15, 01-Dec-16, 01-Feb-17, 01-Dec-17, 01-Feb-18, 01-Dec-18, **01-Jan-19, 01-Feb-19, 01-Dec-19, 01-Jan-20, 01-Feb-20**, 01-Jun-21, 01-Jul-21, 01-Nov-21, 01-Feb-22
Cluster 3 (Medium Tourism Activity)	01-Mar-13, 01-Apr-13, 01-Apr-14, 01-Mar-15, 01-Apr-15, 01-Mar-16, 01-Apr-16, 01-Nov-16, 01-Mar-17, 01-Nov-17, 01-Nov-18, **01-Mar-19, 01-Nov-19, 01-Aug-20**, 01-Sep-21, 01-Oct-21
Cluster 5 (High Tourism Activity)	01-Jun-13, 01-Jul-13, 01-Sep-13, 01-May-14, 01-Jun-14, 01-Sep-14, 01-Oct-14, 01-May-15, 01-Jun-15, 01-Sep-15, 01-Oct-15, 01-May-16, 01-Jun-16, 01-Sep-16, 01-Oct-16, 01-Apr-17, 01-May-17, 01-Jun-17, 01-Sep-17, 01-Oct-17, 01-Mar-18, 01-Apr-18, 01-May-18, 01-Jun-18, 01-Sep-18, 01-Oct-18, **01-Apr-19, 01-May-19, 01-Jun-19, 01-Sep-19, 01-Oct-19**, 01-Aug-21
Cluster 4 (Very High Tourism Activity)	01-May-13, 01-Aug-13, 01-Oct-13, 01-Jul-14, 01-Aug-14, 01-Jul-15, 01-Aug-15, 01-Jul-16, 01-Aug-16, 01-Jul-17, 01-Aug-17, 01-Jul-18, 01-Aug-18, **01-Jul-19, 01-Aug-19**

The tourism activity in August 2020 was medium unlike those of other Augusts that are mostly classified in the Very High Tourism Activity cluster (Table AD.3; Figure AD.3). Tourism activity rebounded in 2021, as it saw high tourism activity from medium in

2020. It is worth noting that months before the pandemic are clustered in the High Tourism Activity cluster, and as the pandemic emerged in late 2019, most of the months are clustered in the Very Low Tourism Activity cluster.

Coimbra Municipality

The Coimbra municipality is in the Centro region of Portugal. It happens to be the largest city in the Centro region.



Cluster	1	2	3	4	5
Label					
Description					
Size	29.1% (32)	26.4% (29)	15.5% (17)	14.5% (16)	14.5% (16)
Inputs	Overnightstays 37,058.97	Overnightstays 21,925.62	Overnightstays 68,779.82	Overnightstays 43,689.06	Overnightstays 61,230.81
	Month 01-Feb-13 (3.1%)	Month 01-Jan-13 (3.4%)	Month 01-Sep-14 (5.9%)	Month 01-May-13 (6.2%)	Month 01-Aug-14 (6.2%)

Figure AD.4: The cluster size and group from the Coimbra Municipality

Table AD.4: Clusters for the Coimbra Municipality

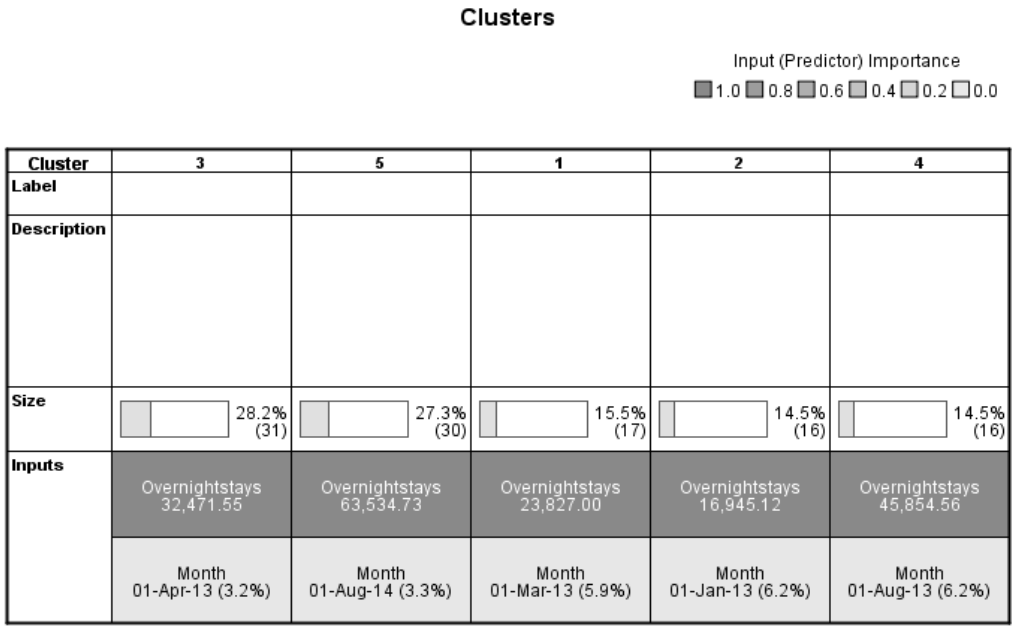
Cluster Name	Members (Months)
Cluster 2 (Very Low Tourism Activity)	01-Jan-13, 01-Mar-13, 01-Apr-13, 01-Jan-14, 01-Feb-14, 01-Mar-14, 01-Nov-14, 01-Dec-14, 01-Feb-15, 01-Nov-15, 01-Dec-15, 01-Jan-16, 01-Feb-16, 01-Jan-17, 01-Feb-17, **01-Mar-20, 01-Apr-20, 01-May-20, 01-Jun-20, 01-Sep-20, 01-Nov-20, 01-Dec-20**, 01-Jan-21, 01-Feb-21, 01-Mar-21, 01-Apr-21, 01-Jun-21, 01-Dec-21, 01-Feb-22
Cluster 1 (Low Tourism Activity)	01-Feb-13, 01-Jun-13, 01-Jul-13, 01-Nov-13, 01-Dec-13, 01-Jul-14, 01-Oct-14, 01-Jan-15, 01-Mar-15, 01-Jun-15, 01-Oct-15, 01-Mar-16, 01-Nov-16, 01-Dec-16, 01-Nov-17, 01-Dec-17, 01-Jan-18, 01-Feb-18, 01-Dec-18, **01-Jan-19, 01-Mar-19, 01-Nov-19, 01-Feb-20, 01-Jul-20, 01-Aug-20, 01-Oct-20**, 01-May-21, 01-Jul-21, 01-Aug-21, 01-Oct-21, 01-Nov-21, 01-Jan-22
Cluster 4 (Medium Tourism Activity)	01-May-13, 01-Aug-13, 01-Sep-13, 01-Oct-13, 01-Apr-14, 01-May-14, 01-Jun-14, 01-Apr-15, 01-Apr-16, 01-Mar-17, 01-Mar-18, 01-Nov-18, **01-Feb-19, 01-Dec-19, 01-Jan-20**, 01-Sep-21
Cluster 5 (High Tourism Activity)	01-Aug-14, 01-May-15, 01-Sep-15, 01-May-16, 01-Jul-16, 01-Sep-16, 01-Oct-16, 01-Apr-17, 01-May-17, 01-Jun-17, 01-Jul-17, 01-Oct-17, 01-Jun-18, 01-Oct-18, **01-Apr-19, 01-Jun-19**
Cluster 3 (Very High Tourism Activity)	01-Sep-14, 01-Jul-15, 01-Aug-15, 01-Jun-16, 01-Aug-16, 01-Aug-17, 01-Sep-17, 01-Apr-18, 01-May-18, 01-Jul-18, 01-Aug-18, 01-Sep-18, **01-May-19, 01-Jul-19, 01-Aug-19, 01-Sep-19, 01-Oct-19**

The Coimbra municipality, seven of the months in 2020 are clustered in the Very Low Tourism Activity, while four are clustered in the Low Tourism Activity dropped to low and very low (Table AD.4; Figure AD.4). The month of August for most years are

clustered in the Very High Tourism Activity cluster, the Augusts of 2020 and 2021 are clustered in the Low Tourism Activity cluster. This implies tourism activity had not rebounded from the negative impact of the pandemic.

Évora Municipality

The Évora municipality is the capital of the Alentejo Municipality, in the south-central of Portugal. The city hosts historic centres like the ancient Roman Temple of Évora.



Cluster	3	5	1	2	4
Label					
Description					
Size	28.2% (31)	27.3% (30)	15.5% (17)	14.5% (16)	14.5% (16)
Inputs	Overnightstays 32,471.55	Overnightstays 63,534.73	Overnightstays 23,827.00	Overnightstays 16,945.12	Overnightstays 45,854.56
	Month 01-Apr-13 (3.2%)	Month 01-Aug-14 (3.3%)	Month 01-Mar-13 (5.9%)	Month 01-Jan-13 (6.2%)	Month 01-Aug-13 (6.2%)

Figure AD.5: The cluster size and group from the Évora Municipality

Table AD.5: Clusters for the Évora Municipality

Cluster Name	Members (Months)
Cluster 2 (Very Low Tourism Activity)	01-Jan-13, 01-Feb-13, 01-Nov-13, 01-Dec-13, 01-Jan-14, 01-Feb-14, 01-Nov-14, 01-Dec-14, 01-Jan-15, 01-Feb-15, 01-Jan-16, **01-Mar-20, 01-Jun-20, 01-Nov-20, 01-Dec-20,** 01-Apr-21
Cluster 1 (Low Tourism Activity)	01-Mar-13, 01-May-13, 01-Mar-14, 01-Apr-14, 01-Jun-14, 01-Jul-14, 01-Apr-15, 01-Jan-17, **01-Dec-19, 01-Jan-20, 01-Apr-20, 01-May-20**, 01-Jan-21, 01-Feb-21, 01-Mar-21, 01-Nov-21, 01-Jan-22
Cluster 3 (Medium Tourism Activity)	01-Apr-13, 01-Jun-13, 01-Jul-13, 01-Sep-13, 01-Oct-13, 01-May-14, 01-Oct-14, 01-Mar-15, 01-Nov-15, 01-Dec-15, 01-Feb-16, 01-Mar-16, 01-Apr-16, 01-Nov-16, 01-Dec-16, 01-Feb-17, 01-Mar-17, 01-Nov-17, 01-Dec-17, 01-Jan-18, 01-Feb-18, 01-Nov-18, 01-Dec-18, **01-Jan-19, 01-Feb-19, 01-Jul-20, 01-Sep-20, 01-Oct-20**, 01-May-21, 01-Dec-21, 01-Feb-22
Cluster 4 (High Tourism Activity)	01-Aug-13, 01-Sep-14, 01-May-15, 01-Jun-15, 01-Jul-15, 01-Oct-15, 01-May-16, 01-Jun-16, 01-Jul-16, 01-Oct-16, 01-Mar-18, **01-Mar-19, 01-Nov-19, 01-Feb-20**, 01-Jun-21, 01-Jul-21
Cluster 5 (Very High Tourism Activity)	01-Aug-14, 01-Aug-15, 01-Sep-15, 01-Aug-16, 01-Sep-16, 01-Apr-17, 01-May-17, 01-Jun-17, 01-Jul-17, 01-Aug-17, 01-Sep-17, 01-Oct-17, 01-Apr-18, 01-May-18, 01-Jun-18, 01-Jul-18, 01-Aug-18, 01-Sep-18, 01-Oct-18, **01-Apr-19, 01-May-19, 01-Jun-19, 01-Jul-19, 01-Aug-19, 01-Sep-19, 01-Oct-19, 01-Aug-20**, 01-Aug-21, 01-Sep-21, 01-Oct-21

Évora municipality, prior to the pandemic, most months in 2019 had very high tourism activity, and some had high tourism activity (Table AD.5; Figure AD.5). March,

bounded in the municipality in July, September, and October 2020. Tourism activity in August of all years reviewed were either high or very high.

Faro Municipality

The Faro municipality is the capital of the Algarve region, in southern Portugal. The city has its neoclassical Arco da Vila on the site of a gate, which was part of the old Moorish wall. The museum in the city displays medieval and prehistoric artefacts, and religious art.

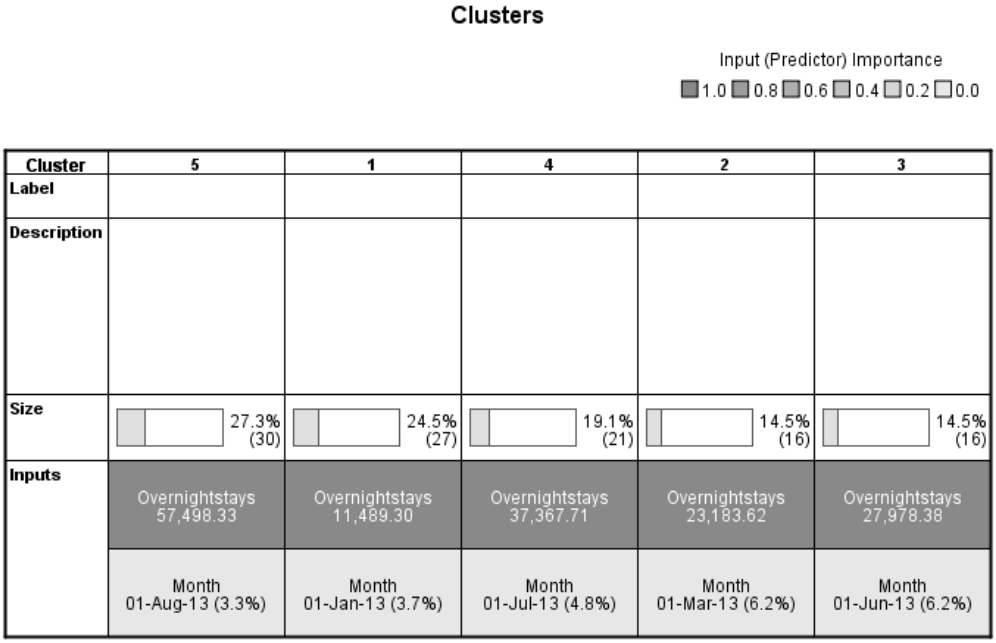


Figure AD.6: The cluster size and group from the Faro Municipality

Table AD.6: Clusters for the Faro Municipality

Cluster Name	Members (Months)
Cluster 1 (Very Low Tourism Activity)	01-Jan-13, 01-Feb-13, 01-Nov-13, 01-Dec-13, 01-Jan-14, 01-Feb-14, 01-Mar-14, 01-Nov-14, 01-Dec-14, 01-Jan-15, 01-Feb-15, 01-Nov-15, 01-Dec-15, 01-Jan-16, 01-Feb-16, **01-Mar-20, 01-Apr-20, 01-May-20, 01-Jun-20, 01-Nov-20, 01-Dec-20**, 01-Jan-21, 01-Feb-21, 01-Mar-21, 01-Apr-21, 01-May-21, 01-Jan-22
Cluster 2 (Low Tourism Activity)	01-Mar-13, 01-Apr-13, 01-May-13, 01-Apr-14, 01-Oct-14, 01-Mar-15, 01-Dec-16, 01-Jan-17, 01-Dec-17, 01-Jan-18, 01-Dec-18, **01-Jan-20, 01-Jul-20, 01-Oct-20**, 01-Dec-21, 01-Feb-22
Cluster 3 (Medium Tourism Activity)	01-Jun-13, 01-Oct-13, 01-May-14, 01-Jun-14, 01-Apr-15, 01-May-15, 01-Oct-15, 01-Mar-16, 01-Nov-16, 01-Feb-17, 01-Nov-17, 01-Feb-18, **01-Jan-19, 01-Feb-19, 01-Dec-19, 01-Feb-20**
Cluster 4 (High Tourism Activity)	01-Jul-13, 01-Sep-13, 01-Jul-14, 01-Sep-14, 01-Jun-15, 01-Sep-15, 01-Apr-16, 01-May-16, 01-Jun-16, 01-Oct-16, 01-Mar-17, 01-Apr-17, 01-Mar-18, 01-Nov-18, **01-Mar-19, 01-Nov-19, 01-Aug-20, 01-Sep-20**, 01-Jun-21, 01-Jul-21, 01-Nov-21
Cluster 5 (Very High Tourism Activity)	01-Aug-13, 01-Aug-14, 01-Jul-15, 01-Aug-15, 01-Jul-16, 01-Aug-16, 01-Sep-16, 01-May-17, 01-Jun-17, 01-Jul-17, 01-Aug-17, 01-Sep-17, 01-Oct-17, 01-Apr-18, 01-May-18, 01-Jun-18, 01-Jul-18, 01-Aug-18, 01-Sep-18, 01-Oct-18, **01-Apr-19, 01-May-19, 01-Jun-19, 01-Jul-19, 01-Aug-19, 01-Sep-19, 01-Oct-19**, 01-Aug-21, 01-Sep-21, 01-Oct-21

Faro municipality, (Table 4.6). Tourism activity attempted to recover in August and September 2020 as these months are clustered in the High Tourism (Table AD.6; Figure AD.6). However, tourism activity dropped in October 2020 to low, and very low in

November and December of the year. Most Augusts of the observed very high tourism activity.

Funchal Municipality

The Funchal municipality is the capital of the Madeira region of Portugal. The city houses the Contemporary Art Museum, with a collection of art works.

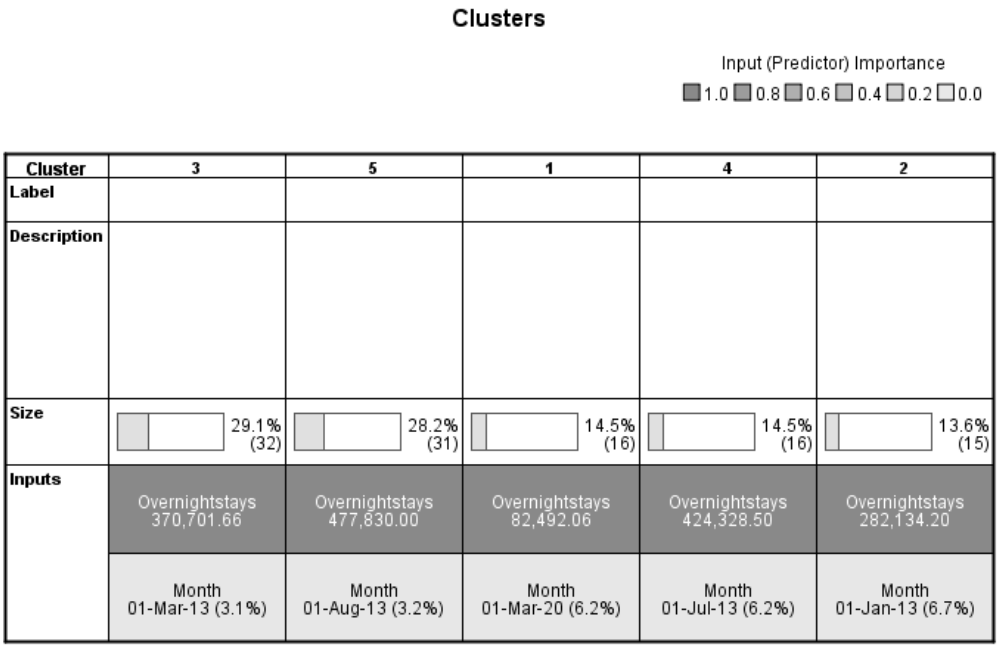


Figure AD.7: The cluster size and group from the Funchal Municipality

Table AD.7: Clusters for the Funchal Municipality

Cluster Name	Members (Months)
Cluster 1 (Very Low Tourism Activity)	**01-Mar-20, 01-Apr-20, 01-May-20, 01-Jun-20, 01-Jul-20, 01-Aug-20, 01-Sep-20, 01-Oct-20, 01-Nov-20, 01-Dec-20**, 01-Jan-21, 01-Feb-21, 01-Mar-21, 01-Apr-21, 01-May-21, 01-Jun-21
Cluster 2 (Low Tourism Activity)	01-Jan-13, 01-Feb-13, 01-Nov-13, 01-Dec-13, 01-Jan-14, 01-Feb-14, 01-Nov-14, 01-Dec-14, 01-Jan-15, 01-Dec-15, 01-Dec-16, 01-Dec-17, 01-Dec-21, 01-Jan-22, 01-Feb-22
Cluster 3 (Medium Tourism Activity)	01-Mar-13, 01-Apr-13, 01-May-13, 01-Jun-13, 01-Sep-13, 01-Oct-13, 01-Mar-14, 01-Apr-14, 01-Jun-14, 01-Oct-14, 01-Feb-15, 01-May-15, 01-Jun-15, 01-Nov-15, 01-Jan-16, 01-Feb-16, 01-Nov-16, 01-Jan-17, 01-Feb-17, 01-Nov-17, 01-Jan-18, 01-Feb-18, 01-Nov-18, 01-Dec-18, **01-Jan-19, 01-Feb-19, 01-Nov-19, 01-Dec-19, 01-Jan-20, 01-Feb-20**, 01-Jul-21, 01-Nov-21
Cluster 4 (High Tourism Activity)	01-Jul-13, 01-May-14, 01-Jul-14, 01-Sep-14, 01-Mar-15, 01-Apr-15, 01-Sep-15, 01-Oct-15, 01-Mar-16, 01-Apr-16, 01-Mar-17, 01-Mar-18, 01-Apr-18, **01-Mar-19, 01-Apr-19, 01-Oct-19**
Cluster 5 (Very High Tourism Activity)	01-Aug-13, 01-Aug-14, 01-Jul-15, 01-Aug-15, 01-May-16, 01-Jun-16, 01-Jul-16, 01-Aug-16, 01-Sep-16, 01-Oct-16, 01-Apr-17, 01-May-17, 01-Jun-17, 01-Jul-17, 01-Aug-17, 01-Sep-17, 01-Oct-17, 01-May-18, 01-Jun-18, 01-Jul-18, 01-Aug-18, 01-Sep-18, 01-Oct-18, **01-May-19, 01-Jun-19, 01-Jul-19, 01-Aug-19, 01-Sep-19**, 01-Aug-21, 01-Sep-21, 01-Oct-21

In the Funchal municipality, January and February 2020 had medium tourism activity (Table AD.7; Figure AD.7). In fact, very low tourism was observed for the first six months of 2021, and recovered to medium tourism activity in July 2021. Tourism

activity peaked back in August, September, and October 2021. Worth stating that most Augusts of the years reviewed are clustered in the Very High Tourism Activity cluster.

Grândola Municipality

The Grândola municipality is in the Setúbal district of the Alentejo Municipality of Portugal.

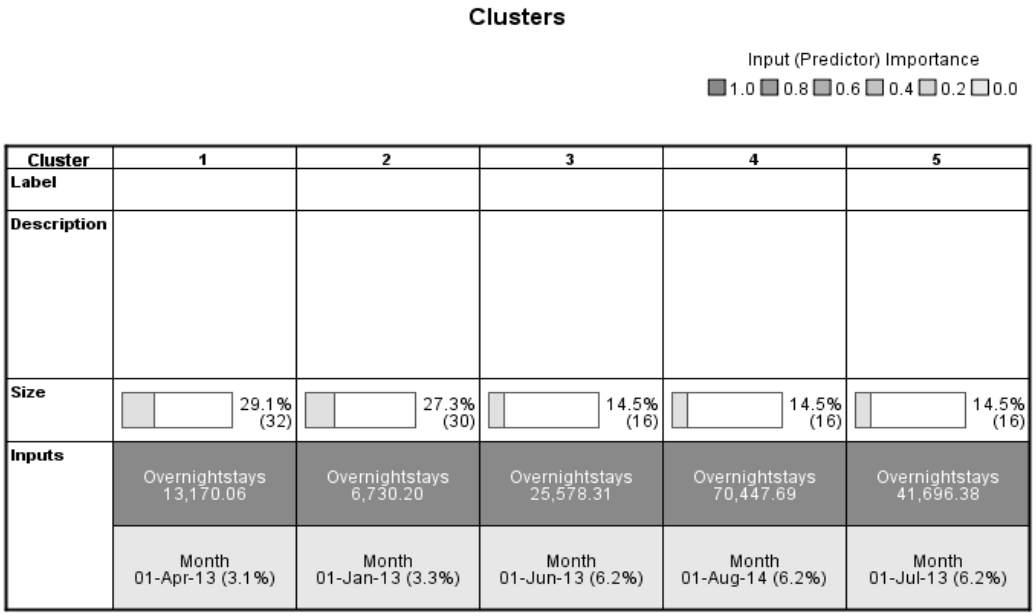


Figure AD.8: The cluster size and group from the Grândola Municipality

Table AD.8: Clusters for the Grândola Municipality

Cluster Name	Members (Months)
Cluster 2 (Very Low Tourism Activity)	01-Jan-13, 01-Feb-13, 01-Mar-13, 01-Oct-13, 01-Nov-13, 01-Jan-14, 01-Mar-14, 01-Nov-14, 01-Dec-14, 01-Jan-15, 01-Feb-15, 01-Nov-15, 01-Jan-16, 01-Feb-16, 01-Nov-16, 01-Dec-16, 01-Jan-17, 01-Mar-17, 01-Nov-17, 01-Dec-17, 01-Jan-18, 01-Feb-18, **01-Mar-20, 01-May-20, 01-Nov-20, 01-Dec-20**, 01-Jan-21, 01-Feb-21, 01-Dec-21, 01-Jan-22
Cluster 1 (Low Tourism Activity)	01-Apr-13, 01-May-13, 01-Dec-13, 01-Feb-14, 01-May-14, 01-Oct-14, 01-Mar-15, 01-May-15, 01-Oct-15, 01-Dec-15, 01-Mar-16, 01-Apr-16, 01-May-16, 01-Oct-16, 01-Feb-17, 01-May-17, 01-Mar-18, 01-Apr-18, 01-Nov-18, 01-Dec-18, **01-Jan-19, 01-Feb-19, 01-Mar-19, 01-Nov-19, 01-Dec-19, 01-Jan-20, 01-Feb-20, 01-Apr-20**, 01-Mar-21, 01-Apr-21, 01-Nov-21, 01-Feb-22
Cluster 3 (Medium Tourism Activity)	01-Jun-13, 01-Sep-13, 01-Apr-14, 01-Jun-14, 01-Sep-14, 01-Apr-15, 01-Jun-15, 01-Apr-17, 01-Oct-17, 01-May-18, 01-Oct-18, **01-Apr-19, 01-Oct-19, 01-Jun-20, 01-Oct-20**, 01-May-21
Cluster 5 (High Tourism Activity)	01-Jul-13, 01-Aug-13, 01-Jul-14, 01-Jul-15, 01-Sep-15, 01-Jun-16, 01-Sep-16, 01-Jun-17, 01-Sep-17, 01-Jun-18, 01-Sep-18, **01-May-19, 01-Jun-19, 01-Sep-20**, 01-Jun-21, 01-Oct-21
Cluster 4 (Very High Tourism Activity)	01-Aug-14, 01-Aug-15, 01-Jul-16, 01-Aug-16, 01-Jul-17, 01-Aug-17, 01-Jul-18, 01-Aug-18, **01-Jul-19, 01-Aug-19, 01-Sep-19, 01-Jul-20, 01-Aug-20**, 01-Jul-21, 01-Aug-21, 01-Sep-21

In the Grândola municipality, five of the months in 2020 were clustered in the Very Low Tourism Activity cluster; and January, February, and first four months of 2021

(Table AD.8; Figure AD.8). Further, the month of August, for all the years reviewed, are clustered either in the High Tourism Activity or Very High Tourism Activity.

Lagoa Municipality

The Lagoa municipality is in the Faro district of the Algarve region of Portugal. The city is an important travel destination for tourist, because of its coasts.

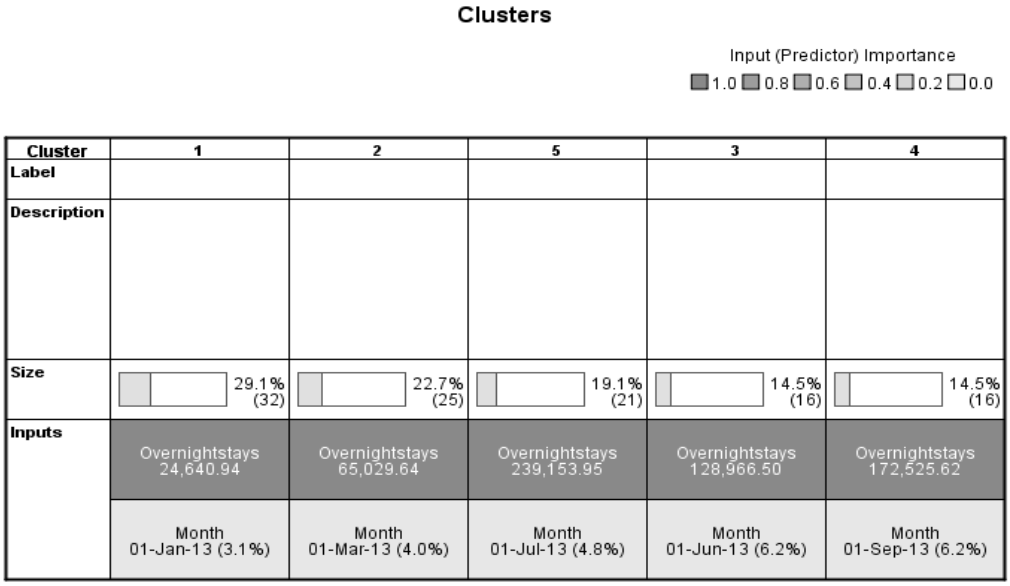


Figure AD.9: The cluster size and group from the Lagoa Municipality

Table AD.9: Clusters for the Lagoa Municipality

Cluster Name	Members (Months)
Cluster 1 (Very Low Tourism Activity)	01-Jan-13, 01-Feb-13, 01-Nov-13, 01-Dec-13, 01-Jan-14, 01-Feb-14, 01-Nov-14, 01-Dec-14, 01-Jan-15, 01-Feb-15, 01-Dec-15, 01-Jan-16, 01-Dec-16, 01-Jan-17, 01-Dec-17, 01-Jan-18, 01-Dec-18, **01-Jan-19, 01-Jan-20, 01-Mar-20, 01-Apr-20, 01-May-20, 01-Jun-20, 01-Nov-20, 01-Dec-20**, 01-Jan-21, 01-Feb-21, 01-Mar-21, 01-Apr-21, 01-May-21, 01-Dec-21, 01-Jan-22
Cluster 2 (Low Tourism Activity)	01-Mar-13, 01-Apr-13, 01-May-13, 01-Mar-14, 01-Apr-14, 01-Mar-15, 01-Nov-15, 01-Feb-16, 01-Mar-16, 01-Nov-16, 01-Feb-17, 01-Mar-17, 01-Nov-17, 01-Feb-18, 01-Mar-18, 01-Nov-18, **01-Feb-19, 01-Mar-19, 01-Nov-19, 01-Dec-19, 01-Feb-20, 01-Jul-20, 01-Oct-20**, 01-Nov-21, 01-Feb-22
Cluster 3 (Medium Tourism Activity)	01-Jun-13, 01-Oct-13, 01-May-14, 01-Oct-14, 01-Apr-15, 01-May-15, 01-Oct-15, 01-Apr-16, 01-Apr-17, 01-Apr-18, **01-Apr-19, 01-May-19, 01-Sep-20**, 01-Jun-21, 01-Jul-21, 01-Oct-21
Cluster 4 (High Tourism Activity)	01-Sep-13, 01-Jun-14, 01-Jun-15, 01-Sep-15, 01-May-16, 01-Jun-16, 01-Oct-16, 01-May-17, 01-Jun-17, 01-Oct-17, 01-May-18, 01-Oct-18, **01-Jun-19, 01-Oct-19, 01-Aug-20**, 01-Sep-21
Cluster 5 (Very High Tourism Activity)	01-Jul-13, 01-Aug-13, 01-Jul-14, 01-Aug-14, 01-Sep-14, 01-Jul-15, 01-Aug-15, 01-Jul-16, 01-Aug-16, 01-Sep-16, 01-Jul-17, 01-Aug-17, 01-Sep-17, 01-Jun-18, 01-Jul-18, 01-Aug-18, 01-Sep-18, **01-Jul-19, 01-Aug-19, 01-Sep-19**, 01-Aug-21

In Lagoa Municipality, tourism activities rebounded in August 2020, and gradually waned for the remainder of the year from medium tourism activity in September 2020, to low tourism activity in October, November, and December 2020 (Table AD.9; Figure

AD.9). The very low tourism activity continued till May 2021. Additionally, all Augusts, but August 2020, of the years reviewed had very high tourism activity.

Lagos Municipality

The Lagos municipality is in the Algarve region, southern Portugal, and known for its Atlantic beaches.

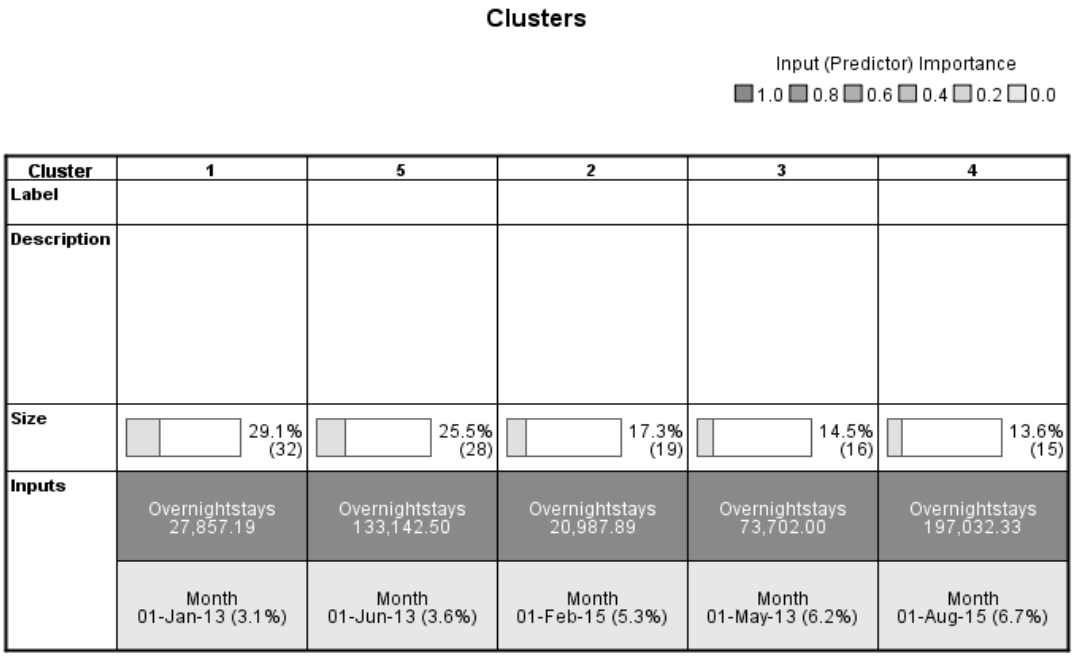


Figure AD.10: The cluster size and group from the Lagos Municipality

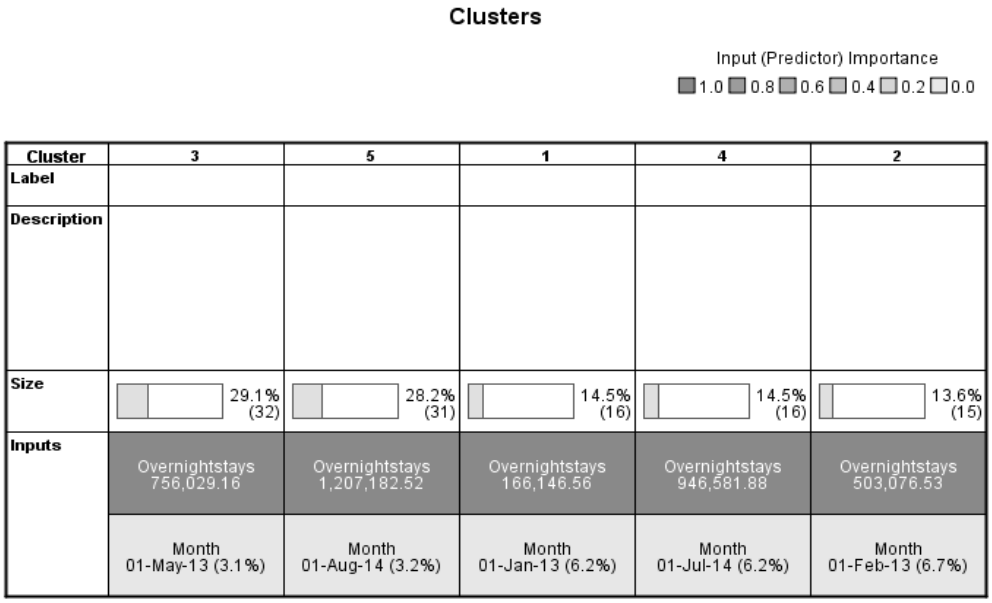
Table AD.10: Clusters for the Lagos Municipality

Cluster Name	Members (Months)
Cluster 2 (Very Low Tourism Activity)	01-Feb-15, 01-Nov-15, 01-Feb-16, 01-Dec-16, 01-Jan-17, 01-Feb-17, 01-Dec-17, 01-Jan-18, 01-Feb-18, 01-Dec-18, **01-Jan-19, 01-Jan-20, 01-Mar-20, 01-Apr-20, 01-May-20**, 01-Feb-21, 01-Mar-21, 01-Dec-21, 01-Jan-22
Cluster 1 (Low Tourism Activity)	01-Jan-13, 01-Feb-13, 01-Mar-13, 01-Apr-13, 01-Nov-13, 01-Dec-13, 01-Jan-14, 01-Feb-14, 01-Mar-14, 01-Nov-14, 01-Dec-14, 01-Jan-15, 01-Mar-15, 01-Dec-15, 01-Jan-16, 01-Mar-16, 01-Nov-16, 01-Mar-17, 01-Nov-17, 01-Mar-18, 01-Nov-18, **01-Feb-19, 01-Nov-19, 01-Dec-19, 01-Feb-20, 01-Jun-20, 01-Nov-20, 01-Dec-20**, 01-Jan-21, 01-Apr-21, 01-May-21, 01-Feb-22
Cluster 3 (Medium Tourism Activity)	01-May-13, 01-Oct-13, 01-Apr-14, 01-May-14, 01-Oct-14, 01-Apr-15, 01-May-15, 01-Oct-15, 01-Apr-16, 01-Apr-17, 01-Apr-18, **01-Mar-19, 01-Jul-20, 01-Oct-20**, 01-Jun-21, 01-Nov-21
Cluster 5 (High Tourism Activity)	01-Jun-13, 01-Jul-13, 01-Aug-13, 01-Sep-13, 01-Jun-14, 01-Jul-14, 01-Aug-14, 01-Sep-14, 01-Jun-15, 01-Jul-15, 01-Sep-15, 01-May-16, 01-Jun-16, 01-Sep-16, 01-Oct-16, 01-May-17, 01-Oct-17, 01-May-18, 01-Jun-18, 01-Oct-18, **01-Apr-19, 01-May-19, 01-Oct-19, 01-Aug-20, 01-Sep-20**, 01-Jul-21, 01-Sep-21, 01-Oct-21
Cluster 4 (Very High Tourism Activity)	01-Aug-15, 01-Jul-16, 01-Aug-16, 01-Jun-17, 01-Jul-17, 01-Aug-17, 01-Sep-17, 01-Jul-18, 01-Aug-18, 01-Sep-18, **01-Jun-19, 01-Jul-19, 01-Aug-19, 01-Sep-19**, 01-Aug-21

In the Lagos Municipality, July and October 2020 had medium tourism activities, and August and September 2020 had high tourism activities (Table AD.10; Figure AD.10). Furthermore, very low and low tourism are observed in January, February, March, April, and May 2021; with tourism activity rebounding in June of the same year. The Augusts of the reviewed years are either clustered in High or Very High Tourism Activity clusters.

Lisboa Municipality

The Lisboa municipality is in the Lisboa region of Portugal, and monuments like the imposing São Jorge Castle, National Azulejo Museum and Ponte 25 de Abril suspension bridge.



Cluster	3	5	1	4	2
Label					
Description					
Size	29.1% (32)	28.2% (31)	14.5% (16)	14.5% (16)	13.6% (15)
Inputs	Overnightstays 756,029.16	Overnightstays 1,207,182.52	Overnightstays 166,146.56	Overnightstays 946,581.88	Overnightstays 503,076.53
	Month 01-May-13 (3.1%)	Month 01-Aug-14 (3.2%)	Month 01-Jan-13 (6.2%)	Month 01-Jul-14 (6.2%)	Month 01-Feb-13 (6.7%)

Figure AD.11: The cluster size and group from the Lisboa Municipality

Table AD.11: Clusters for the Lisboa Municipality

Cluster Name	Members (Months)
Cluster 1 (Very Low Tourism Activity)	01-Jan-13, **01-Apr-20, 01-May-20, 01-Jun-20, 01-Jul-20, 01-Aug-20, 01-Sep-20, 01-Oct-20, 01-Nov-20, 01-Dec-20**, 01-Jan-21, 01-Feb-21, 01-Mar-21, 01-Apr-21, 01-May-21, 01-Jun-21
Cluster 2 (Low Tourism Activity)	01-Feb-13, 01-Mar-13, 01-Apr-13, 01-Dec-13, 01-Jan-14, 01-Feb-14, 01-Dec-14, 01-Jan-15, 01-Feb-15, 01-Dec-15, 01-Feb-16, **01-Mar-20**, 01-Jul-21, 01-Dec-21, 01-Jan-22
Cluster 3 (Medium Tourism Activity)	01-May-13, 01-Jun-13, 01-Jul-13, 01-Aug-13, 01-Sep-13, 01-Oct-13, 01-Nov-13, 01-Mar-14, 01-Apr-14, 01-May-14, 01-Jun-14, 01-Nov-14, 01-Mar-15, 01-Nov-15, 01-Jan-16, 01-Mar-16, 01-Nov-16, 01-Dec-16, 01-Jan-17, 01-Feb-17, 01-Dec-17, 01-Jan-18, 01-Feb-18, 01-Dec-18, **01-Jan-19, 01-Feb-19, 01-Jan-20, 01-Feb-20**, 01-Aug-21, 01-Sep-21, 01-Nov-21, 01-Feb-22
Cluster 4 (High Tourism Activity)	01-Jul-14, 01-Sep-14, 01-Oct-14, 01-Apr-15, 01-May-15, 01-Jun-15, 01-Jul-15, 01-Sep-15, 01-Oct-15, 01-Apr-16, 01-Jun-16, 01-Mar-17, 01-Nov-17, 01-Nov-18, **01-Dec-19**, 01-Oct-21
Cluster 5 (Very High Tourism Activity)	01-Aug-14, 01-Aug-15, 01-May-16, 01-Jul-16, 01-Aug-16, 01-Sep-16, 01-Oct-16, 01-Apr-17, 01-May-17, 01-Jun-17, 01-Jul-17, 01-Aug-17, 01-Sep-17, 01-Oct-17, 01-Mar-18, 01-Apr-18, 01-May-18, 01-Jun-18, 01-Jul-18, 01-Aug-18, 01-Sep-18, 01-Oct-18, 01-Mar-19, **01-Apr-19, 01-May-19, 01-Jun-19, 01-Jul-19, 01-Aug-19, 01-Sep-19, 01-Oct-19, 01-Nov-19**

In the Lisboa municipality, tourism activity in January and February 2020 was medium (Table AD.11; Figure AD.11). Most Augusts of the years reviewed, aside August 2020,

are clustered in the Very High Tourism Activity cluster, as they experienced very high tourism activity relative to other months.

Loulé Municipality

The Loulé municipality is in Faro district of the Algarve region of Portugal.

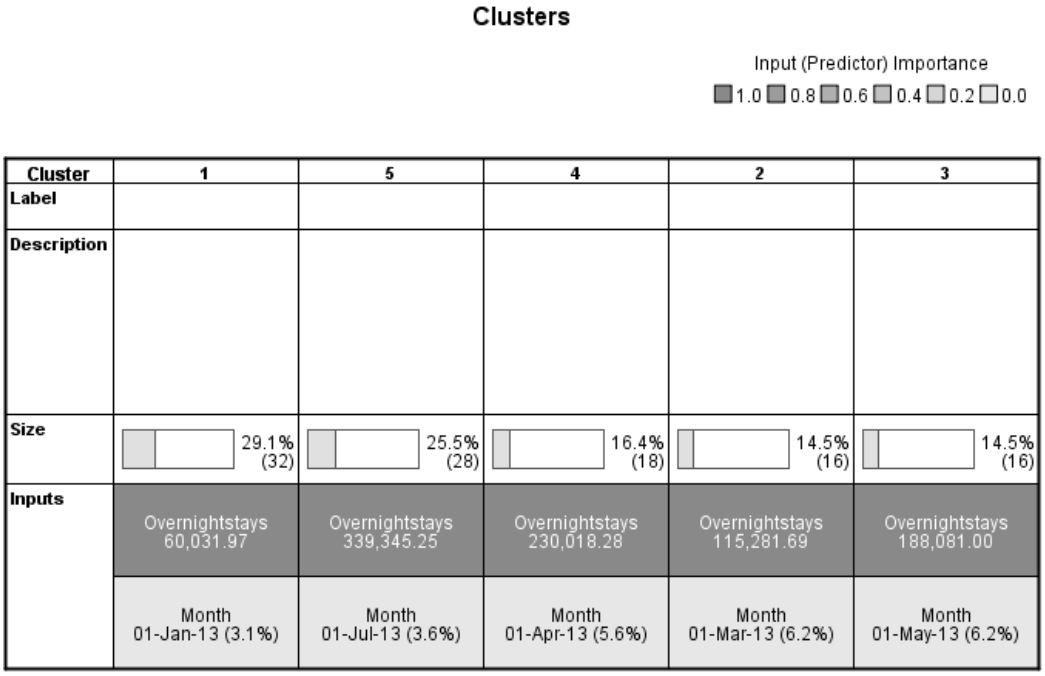


Figure AD.12: The cluster size and group from the Loulé Municipality

Table AD.12: Clusters for the Loulé Municipality

Cluster Name	Members (Months)
Cluster 1 (Very Low Tourism Activity)	01-Jan-13, 01-Feb-13, 01-Nov-13, 01-Dec-13, 01-Jan-14, 01-Feb-14, 01-Nov-14, 01-Dec-14, 01-Jan-15, 01-Feb-15, 01-Nov-15, 01-Dec-15, 01-Jan-16, 01-Dec-16, 01-Jan-17, 01-Dec-17, 01-Jan-18, 01-Dec-18, **01-Mar-20, 01-Apr-20, 01-May-20, 01-Jun-20, 01-Oct-20, 01-Nov-20, 01-Dec-20**, 01-Jan-21, 01-Feb-21, 01-Mar-21, 01-Apr-21, 01-May-21, 01-Dec-21, 01-Jan-22
Cluster 2 (Low Tourism Activity)	01-Mar-13, 01-Mar-14, 01-Mar-15, 01-Feb-16, 01-Nov-16, 01-Feb-17, 01-Nov-17, 01-Feb-18, 01-Nov-18, **01-Jan-19, 01-Feb-19, 01-Nov-19, 01-Dec-19, 01-Jan-20**, 01-Nov-21, 01-Feb-22
Cluster 3 (Medium Tourism Activity)	01-May-13, 01-Oct-13, 01-Apr-14, 01-May-14, 01-Oct-14, 01-Apr-15, 01-May-15, 01-Oct-15, 01-Apr-16, 01-Mar-18, 01-Apr-18, **01-Mar-19, 01-Feb-20, 01-Jul-20, 01-Sep-20**, 01-Jul-21
Cluster 4 (High Tourism Activity)	01-Apr-13, 01-Jun-13, 01-Sep-13, 01-Jun-14, 01-Sep-14, 01-Mar-16, 01-May-16, 01-Oct-16, 01-Mar-17, 01-Apr-17, 01-May-17, 01-Oct-17, **01-Apr-19, 01-May-19, 01-Oct-19**, 01-Jun-21, 01-Sep-21, 01-Oct-21
Cluster 5 (Very High Tourism Activity)	01-Jul-13, 01-Aug-13, 01-Jul-14, 01-Aug-14, 01-Jun-15, 01-Jul-15, 01-Aug-15, 01-Sep-15, 01-Jun-16, 01-Jul-16, 01-Aug-16, 01-Sep-16, 01-Jun-17, 01-Jul-17, 01-Aug-17, 01-Sep-17, 01-May-18, 01-Jun-18, 01-Jul-18, 01-Aug-18, 01-Sep-18, 01-Oct-18, **01-Jun-19, 01-Jul-19, 01-Aug-19, 01-Sep-19, 01-Aug-20**, 01-Aug-21

In the Loulé municipality, six of the months in 2020 had very low tourism activity (Table AD.12; Figure AD.12). Further, the first five months in 2021 are equally clustered in the Very Low Tourism Activity cluster, as tourism activity reduced to the minimum. However, tourism activity picked up in June 2021 to October 2021. Low and

very low tourism activity is observed in November and December 2021 respectively. All Augusts of the years observed had very high tourism activity.

Matosinhos Municipality

The Matosinhos municipality is in the Porto region, northern Portugal, and bordered by the city of Porto.

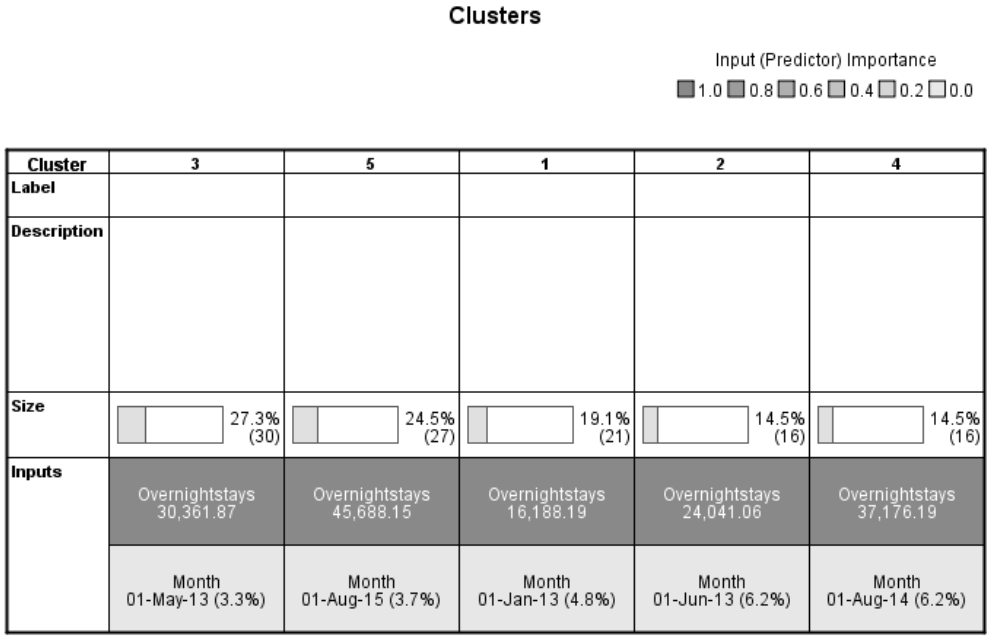


Figure AD.13: The cluster size and group from the Matosinhos Municipality

Table AD.13: Clusters for the Matosinhos Municipality

Cluster Name	Members (Months)
Cluster 1 (Very Low Tourism Activity)	01-Jan-13, 01-Feb-13, 01-Mar-13, 01-Apr-13, 01-Nov-13, 01-Dec-13, 01-Jan-14, 01-Feb-14, 01-Jan-15, 01-Feb-15, **01-Mar-20, 01-Apr-20, 01-May-20, 01-Jun-20, 01-Nov-20, 01-Dec-20**, 01-Jan-21, 01-Feb-21, 01-Mar-21, 01-Apr-21, 01-Jan-22
Cluster 2 (Low Tourism Activity)	01-Jun-13, 01-Oct-13, 01-Mar-14, 01-Apr-14, 01-Nov-14, 01-Dec-14, 01-Mar-15, 01-Nov-15, 01-Dec-15, 01-Jan-16, 01-Feb-16, 01-Jan-17, **01-Jul-20, 01-Oct-20**, 01-May-21, 01-Jun-21
Cluster 3 (Medium Tourism Activity)	01-May-13, 01-Jul-13, 01-Aug-13, 01-Sep-13, 01-May-14, 01-Jun-14, 01-Jul-14, 01-Sep-14, 01-Oct-14, 01-Apr-15, 01-Jun-15, 01-Oct-15, 01-Mar-16, 01-Nov-16, 01-Dec-16, 01-Feb-17, 01-Mar-17, 01-Nov-17, 01-Dec-17, 01-Jan-18, 01-Feb-18, **01-Jan-19, 01-Feb-19, 01-Dec-19, 01-Aug-20, 01-Sep-20**, 01-Jul-21, 01-Nov-21, 01-Dec-21, 01-Feb-22
Cluster 4 (High Tourism Activity)	01-Aug-14, 01-May-15, 01-Jul-15, 01-Sep-15, 01-Apr-16, 01-Sep-16, 01-Jun-17, 01-Oct-17, 01-Mar-18, 01-Nov-18, 01-Dec-18, **01-Mar-19, 01-Nov-19, 01-Jan-20, 01-Feb-20**, 01-Oct-21
Cluster 5 (Very High Tourism Activity)	01-Aug-15, 01-May-16, 01-Jun-16, 01-Jul-16, 01-Aug-16, 01-Oct-16, 01-Apr-17, 01-May-17, 01-Jul-17, 01-Aug-17, 01-Sep-17, 01-Apr-18, 01-May-18, 01-Jun-18, 01-Jul-18, 01-Aug-18, 01-Sep-18, 01-Oct-18, **01-Apr-19, 01-May-19, 01-Jun-19, 01-Jul-19, 01-Aug-19, 01-Sep-19, 01-Oct-19**, 01-Aug-21, 01-Sep-21

In the Matosinhos municipality, six of the months in 2020 are clustered in the Very Low Tourism Activity, and the first four months of 2021 equally had very low tourism activity (Table AD.13; Figure AD.13). Furthermore, July and October 2020 experienced

low tourism activity, after rebound in August and September 2020. Tourism activities in August and September 2020 were medium. It is worth stating, aside for August 2020, all Augusts are either clustered in High or Very High Tourism Activity.

Ourém Municipality

The Ourém municipality is in the district of Santarém in Portugal.

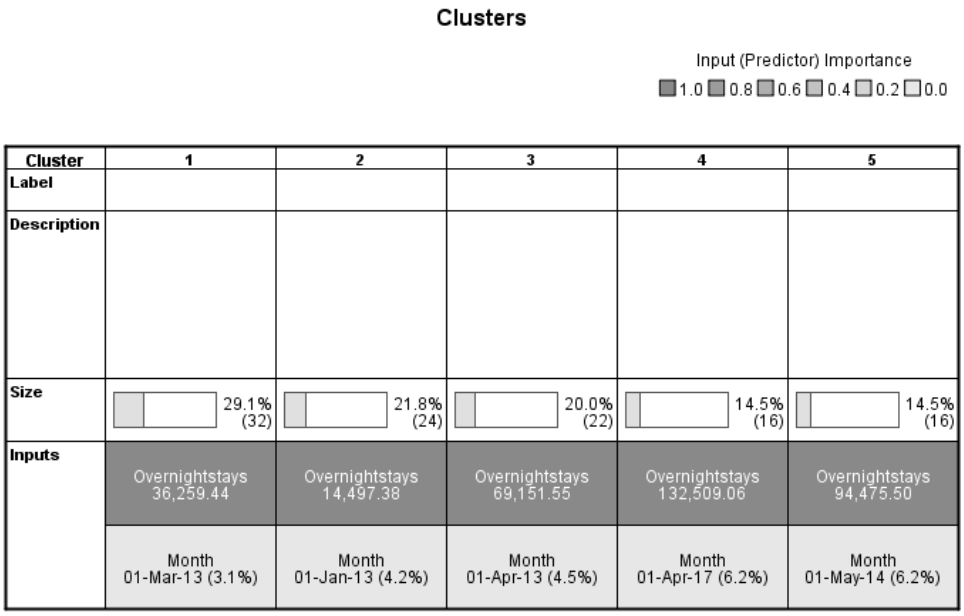


Figure AD.14: The cluster size and group from the Ourém Municipality

Table AD.14: Clusters for the Ourém Municipality

Cluster Name	Members (Months)
Cluster 2 (Very Low Tourism Activity)	01-Jan-13, 01-Feb-13, 01-Dec-13, 01-Dec-14, 01-Jan-15, 01-Feb-15, 01-Dec-15, 01-Jan-16, 01-Feb-16, 01-Dec-16, 01-Jan-17, **01-Mar-20, 01-Apr-20, 01-May-20, 01-Jun-20, 01-Oct-20, 01-Nov-20, 01-Dec-20**, 01-Jan-21, 01-Feb-21, 01-Mar-21, 01-Apr-21, 01-Dec-21, 01-Feb-22
Cluster 1 (Low Tourism Activity)	01-Mar-13, 01-Jun-13, 01-Nov-13, 01-Jan-14, 01-Feb-14, 01-Mar-14, 01-Jun-14, 01-Nov-14, 01-Mar-15, 01-Nov-15, 01-Mar-16, 01-Nov-16, 01-Feb-17, 01-Mar-17, 01-Dec-17, 01-Jan-18, 01-Feb-18, 01-Nov-18, 01-Dec-18, **01-Jan-19, 01-Feb-19, 01-Dec-19, 01-Jan-20, 01-Feb-20, 01-Jul-20, 01-Aug-20, 01-Sep-20**, 01-May-21, 01-Jun-21, 01-Jul-21, 01-Nov-21, 01-Jan-22
Cluster 3 (Medium Tourism Activity)	01-Apr-13, 01-May-13, 01-Jul-13, 01-Aug-13, 01-Sep-13, 01-Oct-13, 01-Apr-14, 01-Jul-14, 01-Aug-14, 01-Apr-15, 01-Jun-15, 01-Jul-15, 01-Apr-16, 01-Jun-16, 01-Jul-16, 01-Nov-17, 01-Mar-18, **01-Mar-19, 01-Nov-19**, 01-Aug-21, 01-Sep-21, 01-Oct-21
Cluster 5 (High Tourism Activity)	01-May-14, 01-Sep-14, 01-Oct-14, 01-May-15, 01-Aug-15, 01-Sep-15, 01-Oct-15, 01-May-16, 01-Aug-16, 01-Sep-16, 01-Oct-16, 01-Apr-18, 01-Jun-18, 01-Jul-18, **01-Apr-19, 01-Jul-19**
Cluster 4 (Very High Tourism Activity)	01-Apr-17, 01-May-17, 01-Jun-17, 01-Jul-17, 01-Aug-17, 01-Sep-17, 01-Oct-17, 01-May-18, 01-Aug-18, 01-Sep-18, 01-Oct-18, **01-May-19, 01-Jun-19, 01-Aug-19, 01-Sep-19, 01-Oct-19**

In the Ourém municipality, seven of the months in 2020 had very low tourism activity, and the first four months in 2021 were clustered as Very Low Tourism Activity (Table AD.14; Figure AD.14). Tourism activity slight recovered to low in May to July 2021,

and peaked in August, September, and October 2021; but regressed in November and December 2021.

Ponta Delgada Municipality

The Ponta Delgada municipality is in the Azores region of Portugal, and houses monuments like the 3-arched city gates, Carlos Machado Museum and Gothic-style Church of St. Sebastian.

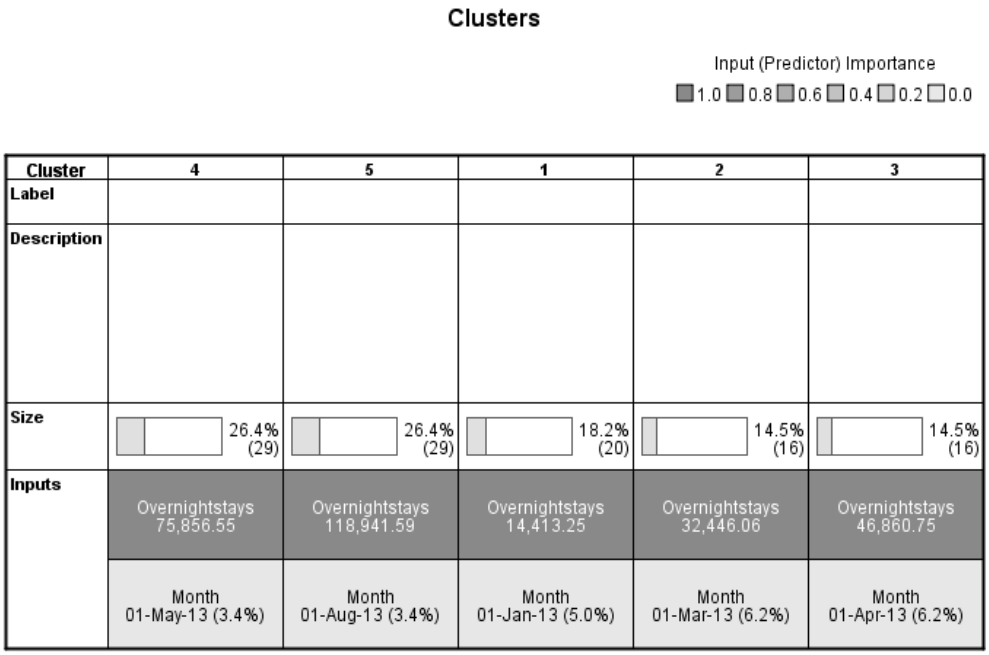


Figure AD.15: The cluster size and group from the Ponta Delgada Municipality

Table AD.15: Clusters for the Ponta Delgada Municipality

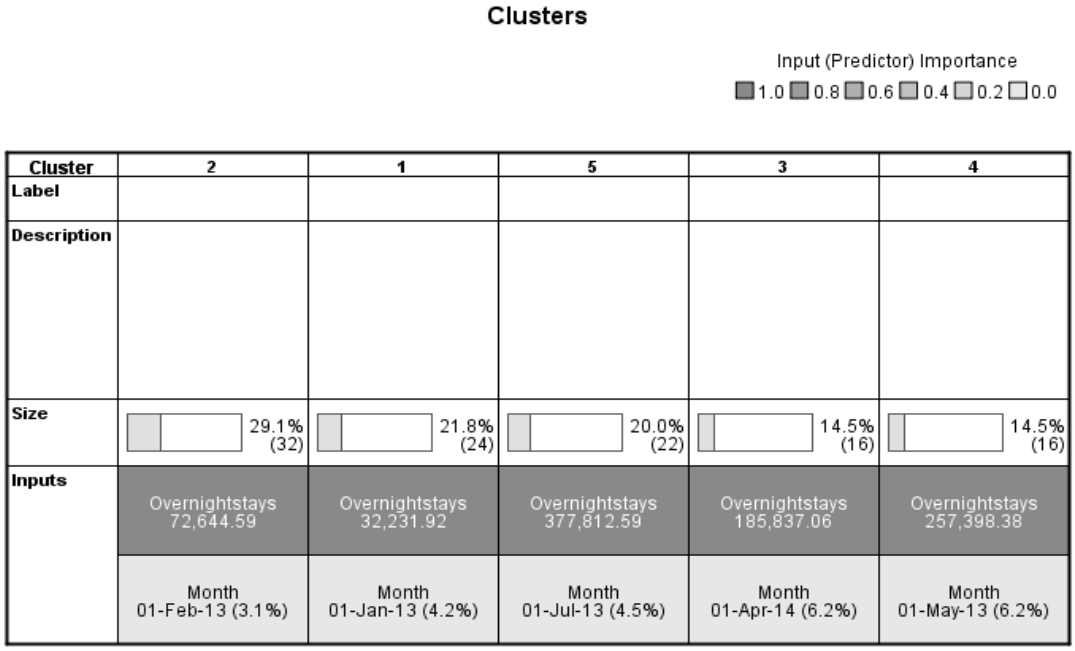
Cluster Name	Members (Months)
Cluster 1 (Very Low Tourism Activity)	01-Jan-13, 01-Feb-13, 01-Nov-13, 01-Dec-13, 01-Jan-14, 01-Feb-14, 01-Dec-14, 01-Jan-15, 01-Feb-15, **01-Apr-20, 01-May-20, 01-Jun-20, 01-Jul-20, 01-Nov-20, 01-Dec-20**, 01-Jan-21, 01-Feb-21, 01-Mar-21, 01-Apr-21, 01-Jan-22
Cluster 2 (Low Tourism Activity)	01-Mar-13, 01-Mar-14, 01-Nov-14, 01-Mar-15, 01-Dec-15, 01-Jan-16, 01-Feb-16, 01-Dec-16, 01-Jan-17, 01-Jan-18, **01-Mar-20, 01-Sep-20, 01-Oct-20**, 01-May-21, 01-Dec-21, 01-Feb-22
Cluster 3 (Medium Tourism Activity)	01-Apr-13, 01-Apr-14, 01-May-14, 01-Nov-15, 01-Nov-16, 01-Feb-17, 01-Nov-17, 01-Dec-17, 01-Feb-18, 01-Dec-18, **01-Jan-19, 01-Feb-19, 01-Dec-19, 01-Jan-20, 01-Aug-20**, 01-Nov-21
Cluster 4 (High Tourism Activity)	01-May-13, 01-Jun-13, 01-Jul-13, 01-Sep-13, 01-Oct-13, 01-Jun-14, 01-Jul-14, 01-Sep-14, 01-Oct-14, 01-Apr-15, 01-May-15, 01-Jun-15, 01-Sep-15, 01-Oct-15, 01-Mar-16, 01-Apr-16, 01-May-16, 01-Oct-16, 01-Mar-17, 01-Apr-17, 01-Oct-17, 01-Mar-18, 01-Nov-18, **01-Mar-19, 01-Nov-19, 01-Feb-20**, 01-Jun-21, 01-Jul-21, 01-Oct-21
Cluster 5 (Very High Tourism Activity)	01-Aug-13, 01-Aug-14, 01-Jul-15, 01-Aug-15, 01-Jun-16, 01-Jul-16, 01-Aug-16, 01-Sep-16, 01-May-17, 01-Jun-17, 01-Jul-17, 01-Aug-17, 01-Sep-17, 01-Apr-18, 01-May-18, 01-Jun-18, 01-Jul-18, 01-Aug-18, 01-Sep-18, 01-Oct-18, **01-Apr-19, 01-May-19, 01-Jun-19, 01-Jul-19, 01-Aug-19, 01-Sep-19, 01-Oct-19**, 01-Aug-21, 01-Sep-21

The first four months of 2021 had very low tourism activity, and recovered in May 2021 to low (Table AD.15; Figure AD.15). High tourism activities were observed in June,

July, and October 2021; and tourism activity peaked in August 2021, with very high tourism activity. However, tourism activity reduced to medium in November 2021, and low in December 2021. All Augusts of the years reviewed had very high tourism activity.

Portimão Municipality

The Portimão municipality is in the Algarve region of southern Portugal, and recognised for its old quarters, busy marinas and the proximity to many beaches. The city has monuments like the Museu de Portimão and the Gothic-style Nossa Senhora da Conceição church.



Cluster	2	1	5	3	4
Label					
Description					
Size	29.1% (32)	21.8% (24)	20.0% (22)	14.5% (16)	14.5% (16)
Inputs	Overnightstays 72,644.59	Overnightstays 32,231.92	Overnightstays 377,812.59	Overnightstays 185,837.06	Overnightstays 257,398.38
	Month 01-Feb-13 (3.1%)	Month 01-Jan-13 (4.2%)	Month 01-Jul-13 (4.5%)	Month 01-Apr-14 (6.2%)	Month 01-May-13 (6.2%)

Figure AD.16: The cluster size and group from the Portimão Municipality

Table AD.16: Clusters for the Portimão Municipality

Cluster Name	Members (Months)
Cluster 1 (Very Low Tourism Activity)	01-Jan-13, 01-Nov-13, 01-Dec-13, 01-Jan-14, 01-Dec-14, 01-Jan-15, 01-Feb-15, 01-Nov-15, 01-Dec-15, 01-Jan-16, 01-Jan-17, 01-Jan-18, **01-Mar-20, 01-May-20, 01-Jun-20, 01-Nov-20, 01-Dec-20**, 01-Jan-21, 01-Feb-21, 01-Mar-21, 01-Apr-21, 01-May-21, 01-Dec-21, 01-Jan-22
Cluster 2 (Low Tourism Activity)	01-Feb-13, 01-Mar-13, 01-Apr-13, 01-Oct-13, 01-Feb-14, 01-Mar-14, 01-Nov-14, 01-Mar-15, 01-Apr-15, 01-Feb-16, 01-Mar-16, 01-Nov-16, 01-Dec-16, 01-Feb-17, 01-Mar-17, 01-Nov-17, 01-Dec-17, 01-Feb-18, 01-Mar-18, 01-Nov-18, 01-Dec-18, **01-Jan-19, 01-Feb-19, 01-Mar-19, 01-Nov-19, 01-Dec-19, 01-Jan-20, 01-Feb-20, 01-Apr-20, 01-Oct-20**, 01-Nov-21, 01-Feb-22
Cluster 3 (Medium Tourism Activity)	01-Apr-14, 01-May-14, 01-May-15, 01-Oct-15, 01-Apr-16, 01-May-16, 01-Oct-16, 01-Apr-17, 01-Apr-18, **01-Apr-19, 01-Oct-19, 01-Jul-20, 01-Sep-20**, 01-Jun-21, 01-Jul-21, 01-Oct-21
Cluster 4 (High Tourism Activity)	01-May-13, 01-Jun-13, 01-Sep-13, 01-Jun-14, 01-Sep-14, 01-Oct-14, 01-Jun-15, 01-Sep-15, 01-Jun-16, 01-May-17, 01-Oct-17, 01-May-18, 01-Oct-18, **01-May-19, 01-Aug-20**, 01-Sep-21
Cluster 5 (Very High Tourism Activity)	01-Jul-13, 01-Aug-13, 01-Jul-14, 01-Aug-14, 01-Jul-15, 01-Aug-15, 01-Jul-16, 01-Aug-16, 01-Sep-16, 01-Jun-17, 01-Jul-17, 01-Aug-17, 01-Sep-17, 01-Jun-18, 01-Jul-18, 01-Aug-18, 01-Sep-18, **01-Jun-19, 01-Jul-19, 01-Aug-19, 01-Sep-19**, 01-Aug-21

In July and September 2020 tourism activities were medium, and peaked in August 2020, with high tourism activity (Table AD.16; Figure AD.16). Similarly, the first five

months of 2021 are clustered in the Very Low Tourism Activity. Aside August 2020, all Augusts of the observed years were clustered in the Very High Tourism Activity.

Porto Municipality

The Porto municipality is a city in the northwest of Portugal, and known for its impressive bridges and port wine production. The city houses monuments like the São Francisco Church and the palatial 19th-century Palácio de Bolsa.

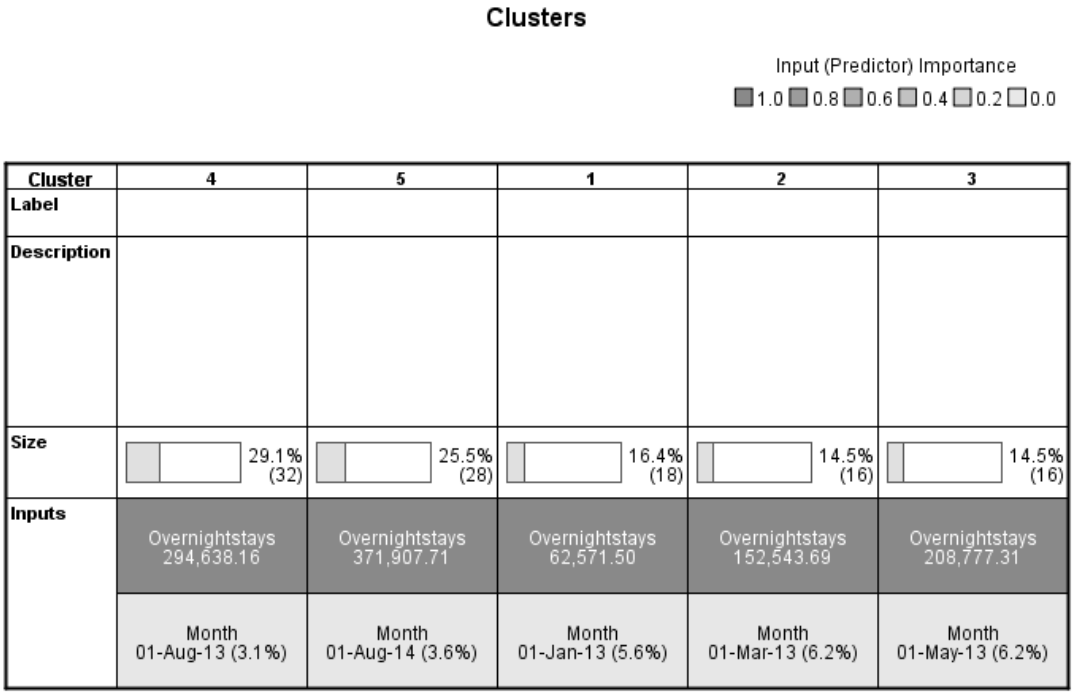


Figure AD.17: The cluster size and group from the Porto Municipality

Table AD.17: Clusters for the Porto Municipality

Cluster Name	Members (Months)
Cluster 1 (Very Low Tourism Activity)	01-Jan-13, 01-Feb-13, 01-Dec-13, 01-Jan-14, 01-Feb-14, **01-Mar-20, 01-Apr-20, 01-May-20, 01-Jun-20, 01-Jul-20, 01-Oct-20, 01-Nov-20, 01-Dec-20**, 01-Jan-21, 01-Feb-21, 01-Mar-21, 01-Apr-21, 01-May-21
Cluster 2 (Low Tourism Activity)	01-Mar-13, 01-Apr-13, 01-Nov-13, 01-Mar-14, 01-Nov-14, 01-Dec-14, 01-Jan-15, 01-Feb-15, 01-Dec-15, 01-Jan-16, 01-Feb-16, **01-Aug-20, 01-Sep-20**, 01-Jun-21, 01-Jul-21, 01-Jan-22
Cluster 3 (Medium Tourism Activity)	01-May-13, 01-Jun-13, 01-Jul-13, 01-Oct-13, 01-Apr-14, 01-Mar-15, 01-Nov-15, 01-Nov-16, 01-Dec-16, 01-Jan-17, 01-Feb-17, 01-Jan-18, 01-Feb-18, **01-Jan-19**, 01-Dec-21, 01-Feb-22
Cluster 4 (High Tourism Activity)	01-Aug-13, 01-Sep-13, 01-May-14, 01-Jun-14, 01-Jul-14, 01-Sep-14, 01-Oct-14, 01-Apr-15, 01-May-15, 01-Jun-15, 01-Oct-15, 01-Mar-16, 01-Apr-16, 01-Aug-16, 01-Mar-17, 01-Jul-17, 01-Sep-17, 01-Oct-17, 01-Nov-17, 01-Dec-17, 01-May-18, 01-Jun-18, 01-Oct-18, 01-Nov-18, 01-Dec-18, **01-Feb-19, 01-Apr-19, 01-Dec-19, 01-Jan-20, 01-Feb-20**, 01-Sep-21, 01-Nov-21
Cluster 5 (Very High Tourism Activity)	01-Aug-14, 01-Jul-15, 01-Aug-15, 01-Sep-15, 01-May-16, 01-Jun-16, 01-Jul-16, 01-Sep-16, 01-Oct-16, 01-Apr-17, 01-May-17, 01-Jun-17, 01-Aug-17, 01-Mar-18, 01-Apr-18, 01-Jul-18, 01-Aug-18, 01-Sep-18, **01-Mar-19, 01-May-19, 01-Jun-19, 01-Jul-19, 01-Aug-19, 01-Sep-19, 01-Oct-19, 01-Nov-19**, 01-Aug-21, 01-Oct-21

In the Tourism activities in December 2019, January 2020, and February 2020 were high (Table AD.17; Figure AD.17). Tourism activity picked up in June 2021, and peaked in Au021, but started to decline in September and November 2021. Except

August 2020, all other Augusts of the months observed were clustered in the Very High or High Tourism Activity cluster.

Porto Santo Municipality

Porto Santo municipality is in the autonomous Madeira region of Portugal.

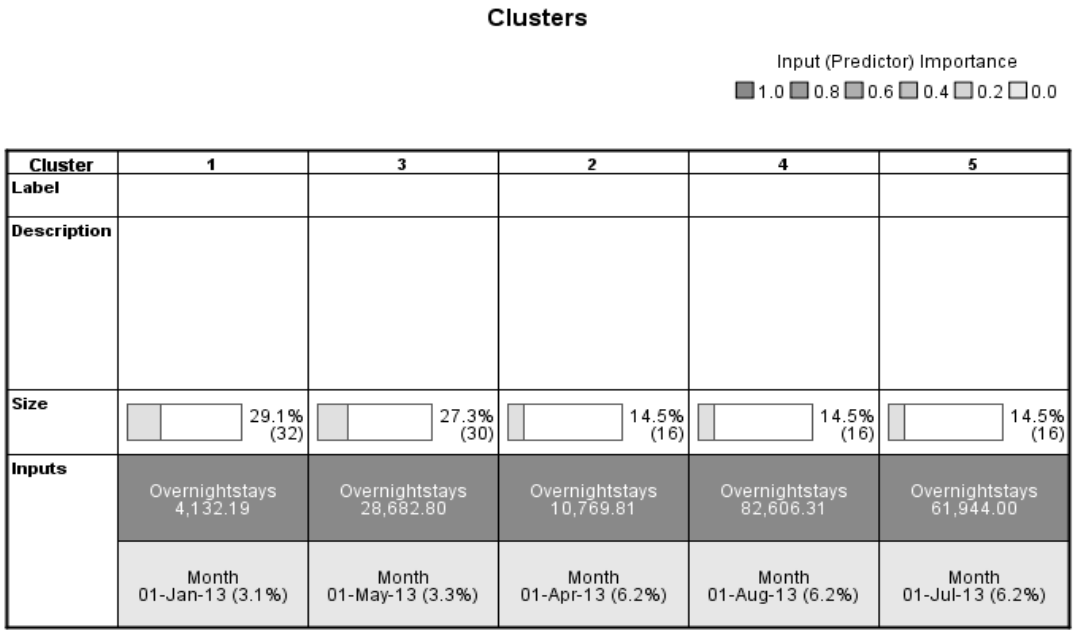


Figure AD.18: The cluster size and group from the Porto Santo Municipality

Table AD.18: Clusters for the Porto Santo Municipality

Cluster Name	Members (Months)
Cluster 1 (Very Low Tourism Activity)	01-Jan-13, 01-Feb-13, 01-Mar-13, 01-Nov-13, 01-Dec-13, 01-Jan-14, 01-Feb-14, 01-Mar-14, 01-Nov-14, 01-Dec-14, 01-Jan-15, 01-Feb-15, 01-Apr-15, 01-Dec-15, 01-Jan-16, 01-Dec-16, 01-Jan-17, 01-Dec-18, **01-Jan-19, 01-Jan-20, 01-Mar-20, 01-Apr-20, 01-May-20, 01-Jun-20, 01-Nov-20, 01-Dec-20**, 01-Jan-21, 01-Feb-21, 01-Mar-21, 01-Apr-21, 01-Dec-21, 01-Jan-22
Cluster 2 (Low Tourism Activity)	01-Apr-13, 01-Apr-14, 01-Mar-15, 01-Nov-15, 01-Feb-16, 01-Feb-17, 01-Dec-17, 01-Jan-18, 01-Feb-18, **01-Feb-19, 01-Dec-19, 01-Feb-20, 01-Jul-20**, 01-May-21, 01-Nov-21, 01-Feb-22
Cluster 3 (Medium Tourism Activity)	01-May-13, 01-Jun-13, 01-Oct-13, 01-May-14, 01-Oct-14, 01-May-15, 01-Oct-15, 01-Mar-16, 01-Apr-16, 01-May-16, 01-Oct-16, 01-Nov-16, 01-Mar-17, 01-Apr-17, 01-May-17, 01-Nov-17, 01-Mar-18, 01-Apr-18, 01-May-18, 01-Oct-18, 01-Nov-18, **01-Mar-19, 01-Apr-19, 01-May-19, 01-Oct-19, 01-Nov-19, 01-Aug-20, 01-Sep-20, 01-Oct-20**, 01-Oct-21
Cluster 5 (High Tourism Activity)	01-Jul-13, 01-Sep-13, 01-Jun-14, 01-Jul-14, 01-Sep-14, 01-Jun-15, 01-Sep-15, 01-Jun-16, 01-Sep-16, 01-Oct-17, 01-Jun-18, 01-Sep-18, **01-Jun-19, 01-Sep-19**, 01-Jun-21, 01-Sep-21
Cluster 4 (Very High Tourism Activity)	01-Aug-13, 01-Aug-14, 01-Jul-15, 01-Aug-15, 01-Jul-16, 01-Aug-16, 01-Jun-17, 01-Jul-17, 01-Aug-17, 01-Sep-17, 01-Jul-18, 01-Aug-18, **01-Jul-19, 01-Aug-19**, 01-Jul-21, 01-Aug-21

In the Porto Santo municipality, tourism activity began recovery in May 2021, and peaked in July and August 2021; but started to decline in September 2021 from high tourism activity to very low in December 2021 (Table AD.18; Figure AD.18). Aside

August 2020 with medium tourism activity, all Augusts of the years reviewed had very high tourism activity.

Santa Cruz Municipality

The Santa Cruz municipality is in the Centro region of Portugal, and It is the second most populous municipality, after the Funchal municipality.

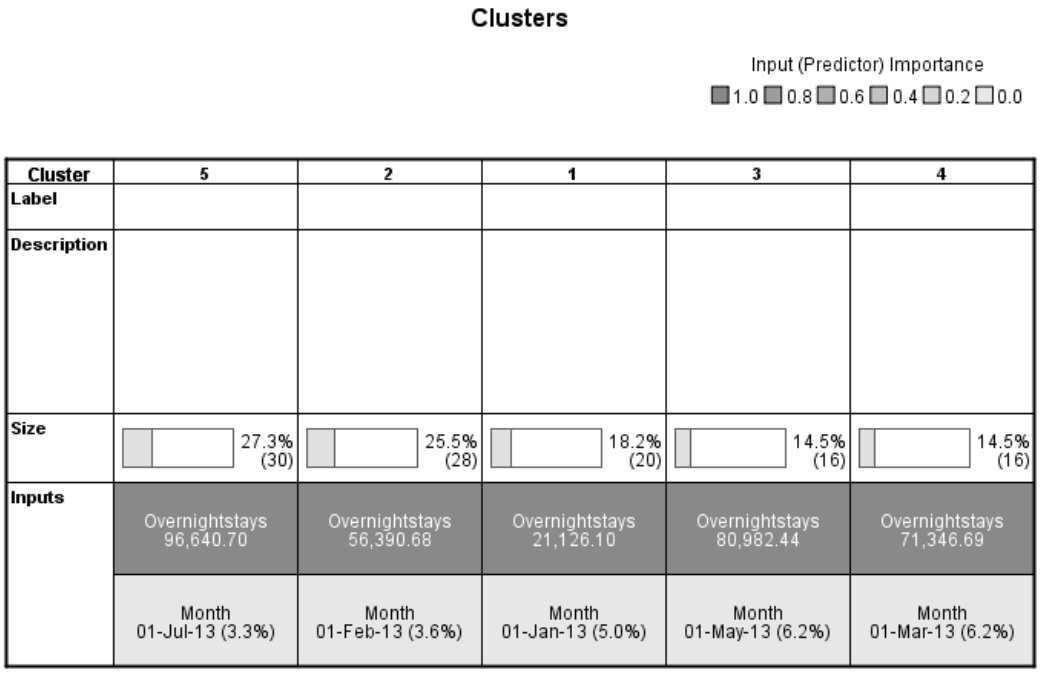


Figure AD.19: The cluster size and group from the Santa Cruz Municipality

Table AD.19: Clusters for the Santa Cruz Municipality

Cluster Name	Members (Months)
Cluster 1 (Very Low Tourism Activity)	01-Jan-13, **01-Mar-20, 01-Apr-20, 01-May-20, 01-Jun-20, 01-Jul-20, 01-Aug-20, 01-Sep-20, 01-Oct-20, 01-Nov-20, 01-Dec-20**, 01-Jan-21, 01-Feb-21, 01-Mar-21, 01-Apr-21, 01-May-21, 01-Jun-21, 01-Dec-21, 01-Jan-22, 01-Feb-22
Cluster 2 (Low Tourism Activity)	01-Feb-13, 01-Nov-13, 01-Dec-13, 01-Jan-14, 01-Feb-14, 01-Nov-14, 01-Dec-14, 01-Jan-15, 01-Feb-15, 01-Nov-15, 01-Dec-15, 01-Jan-16, 01-Feb-16, 01-Dec-16, 01-Jan-17, 01-Feb-17, 01-Dec-17, 01-Jan-18, 01-Feb-18, 01-Dec-18, **01-Jan-19, 01-Feb-19, 01-Nov-19, 01-Dec-19, 01-Jan-20, 01-Feb-20**, 01-Jul-21, 01-Nov-21
Cluster 4 (Medium Tourism Activity)	01-Mar-13, 01-Apr-13, 01-Oct-13, 01-Mar-14, 01-Oct-14, 01-Mar-15, 01-Oct-15, 01-Mar-16, 01-Nov-16, 01-Nov-17, 01-Mar-18, 01-Nov-18, **01-Mar-19, 01-Apr-19, 01-Oct-19**, 01-Oct-21
Cluster 3 (High Tourism Activity)	01-May-13, 01-Jun-13, 01-Sep-13, 01-Apr-14, 01-May-14, 01-Jun-14, 01-Sep-14, 01-Apr-15, 01-Jun-15, 01-Mar-17, 01-Apr-18, 01-Oct-18, **01-May-19, 01-Jun-19, 01-Sep-19**, 01-Sep-21
Cluster 5 (Very High Tourism Activity)	01-Jul-13, 01-Aug-13, 01-Jul-14, 01-Aug-14, 01-May-15, 01-Jul-15, 01-Aug-15, 01-Sep-15, 01-Apr-16, 01-May-16, 01-Jun-16, 01-Jul-16, 01-Aug-16, 01-Sep-16, 01-Oct-16, 01-Apr-17, 01-May-17, 01-Jun-17, 01-Jul-17, 01-Aug-17, 01-Sep-17, 01-Oct-17, 01-May-18, 01-Jun-18, 01-Jul-18, 01-Aug-18, 01-Sep-18, **01-Jul-19, 01-Aug-19**, 01-Aug-21

In the Table AD.19 and Figure AD.19, tourism activity began to recover in July 2021 with low tourism activity to very high tourism in August 2021; and decline in September to high tourism activity. In December 2021, tourism activity had declined to

very low. Aside August 2020 with very low tourism, all other Augusts were clustered in the Very High Tourism Activity cluster.

Sintra Municipality

The Sintra municipality is in the Greater Lisbon region of Portugal, and known as a resort town.

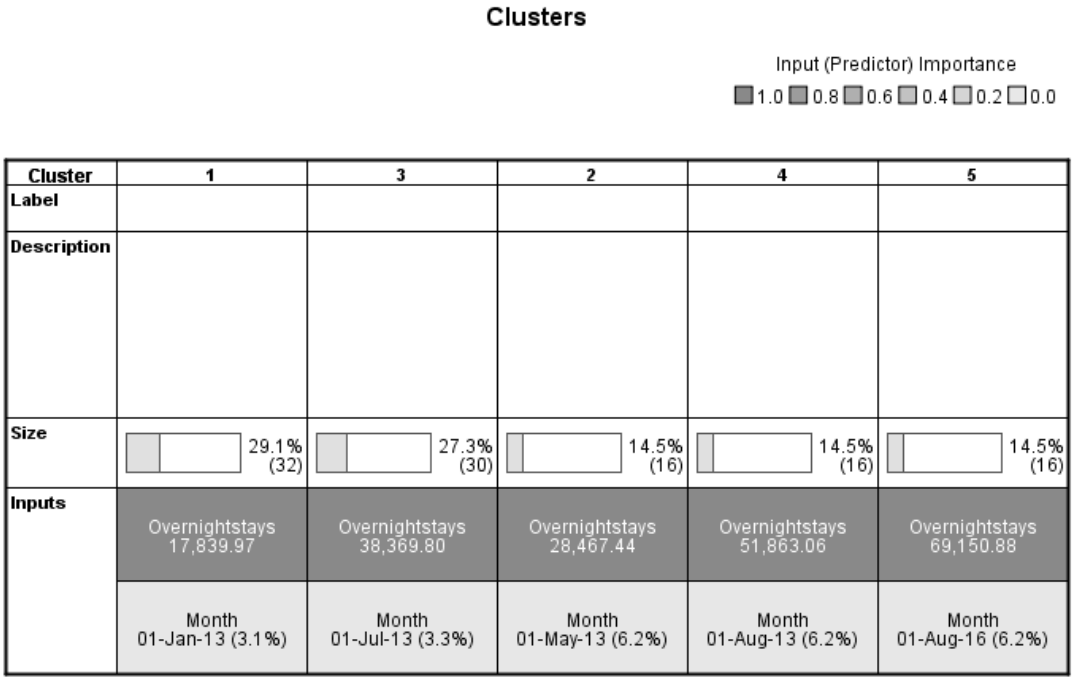


Figure AD.20: The cluster size and group from the Sintra Municipality

Table AD.20: Clusters for the Sintra Municipality

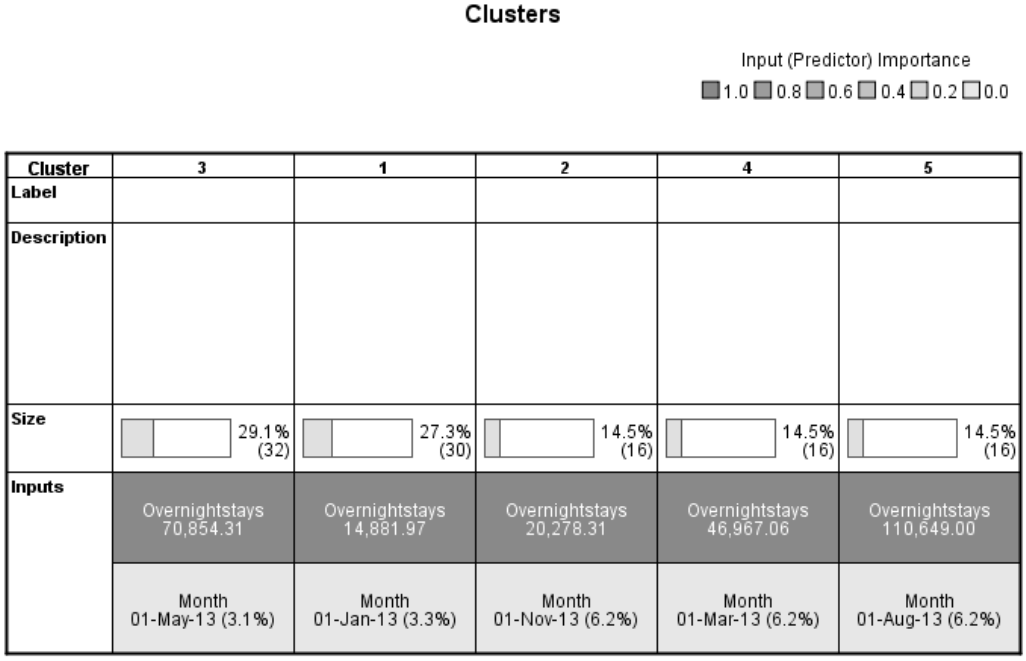
Cluster Name	Members (Months)
Cluster 1 (Very Low Tourism Activity)	01-Jan-13, 01-Feb-13, 01-Mar-13, 01-Apr-13, 01-Jun-13, 01-Nov-13, 01-Dec-13, 01-Jan-14, 01-Feb-14, 01-Nov-14, 01-Dec-14, 01-Jan-15, 01-Feb-15, 01-Dec-15, 01-Jan-16, 01-Feb-16, 01-Nov-16, 01-Dec-16, 01-Feb-17, 01-Jan-18, **01-Mar-20, 01-Apr-20, 01-May-20, 01-Jun-20, 01-Jul-20, 01-Oct-20, 01-Nov-20, 01-Dec-20**, 01-Jan-21, 01-Feb-21, 01-Mar-21, 01-Apr-21
Cluster 2 (Low Tourism Activity)	01-May-13, 01-Oct-13, 01-Mar-14, 01-Apr-14, 01-Oct-14, 01-Mar-15, 01-Apr-15, 01-Nov-15, 01-Apr-16, 01-Jan-17, 01-Mar-17, 01-Feb-18, **01-Jan-19, 01-Sep-20**, 01-May-21, 01-Jan-22
Cluster 3 (Medium Tourism Activity)	01-Jul-13, 01-Sep-13, 01-May-14, 01-Jun-14, 01-Jul-14, 01-Sep-14, 01-May-15, 01-Jun-15, 01-Jul-15, 01-Oct-15, 01-Mar-16, 01-May-16, 01-Jun-16, 01-Oct-16, 01-Nov-17, 01-Dec-17, 01-Mar-18, 01-Nov-18, 01-Dec-18, **01-Feb-19, 01-Nov-19, 01-Dec-19, 01-Jan-20, 01-Feb-20, 01-Aug-20**, 01-Jun-21, 01-Jul-21, 01-Nov-21, 01-Dec-21, 01-Feb-22
Cluster 4 (High Tourism Activity)	01-Aug-13, 01-Aug-14, 01-Aug-15, 01-Sep-15, 01-Jul-16, 01-Sep-16, 01-Apr-17, 01-May-17, 01-Jun-17, 01-Sep-17, 01-Oct-17, 01-Apr-18, **01-Mar-19, 01-Oct-19**, 01-Sep-21, 01-Oct-21
Cluster 5 (Very High Tourism Activity)	01-Aug-16, 01-Jul-17, 01-Aug-17, 01-May-18, 01-Jun-18, 01-Jul-18, 01-Aug-18, 01-Sep-18, 01-Oct-18, **01-Apr-19, 01-May-19, 01-Jun-19, 01-Jul-19, 01-Aug-19, 01-Sep-19**, 01-Aug-21

In the Sintra municipality, eight of the months in 2020, and the first four months of 2021 had very low tourism activity. Tourism started to recover in May to low tourism, and in September and October 2021 with high tourism; and by November and

December 2021, medium tourism activity emerged (Table AD.20; Figure AD.20). Tourism activity in most Augusts of the years reviewed were either clustered in High or Very High Tourism Activity clusters, excluding tourism activity in August 2020, which is clustered in Medium Tourism Activity cluster.

Tavira Municipality

The Tavira municipality is in the Algarve region of Portugal and known for its monuments like the Santa María do Castelo Church and long, sandy beach.



Cluster	3	1	2	4	5
Label					
Description					
Size	29.1% (32)	27.3% (30)	14.5% (16)	14.5% (16)	14.5% (16)
Inputs	Overnightstays 70,854.31	Overnightstays 14,881.97	Overnightstays 20,278.31	Overnightstays 46,967.06	Overnightstays 110,649.00
	Month 01-May-13 (3.1%)	Month 01-Jan-13 (3.3%)	Month 01-Nov-13 (6.2%)	Month 01-Mar-13 (6.2%)	Month 01-Aug-13 (6.2%)

Figure AD.21: The cluster size and group from the Tavira Municipality

Table AD.21: Clusters for the Tavira Municipality

Cluster Name	Members (Months)
Cluster 1 (Very Low Tourism Activity)	01-Jan-13, 01-Feb-13, 01-Dec-13, 01-Jan-14, 01-Nov-14, 01-Nov-15, 01-Dec-15, 01-Jan-16, 01-Feb-16, 01-Nov-16, 01-Nov-17, 01-Dec-18, **01-Dec-19, 01-Jan-20, 01-Feb-20, 01-Mar-20, 01-Apr-20, 01-May-20, 01-Jun-20, 01-Nov-20, 01-Dec-20**, 01-Jan-21, 01-Feb-21, 01-Mar-21, 01-Apr-21, 01-May-21, 01-Nov-21, 01-Dec-21, 01-Jan-22, 01-Feb-22
Cluster 2 (Low Tourism Activity)	01-Nov-13, 01-Feb-14, 01-Dec-14, 01-Jan-15, 01-Feb-15, 01-Dec-16, 01-Jan-17, 01-Feb-17, 01-Dec-17, 01-Jan-18, 01-Feb-18, 01-Nov-18, **01-Jan-19, 01-Feb-19, 01-Nov-19, 01-Oct-20**
Cluster 4 (Medium Tourism Activity)	01-Mar-13, 01-Apr-13, 01-Oct-13, 01-Mar-14, 01-Mar-15, 01-Apr-15, 01-May-15, 01-Oct-15, 01-Mar-16, 01-May-16, 01-Mar-17, 01-Apr-18, **01-Mar-19, 01-Apr-19**, 01-Jun-21, 01-Oct-21
Cluster 3 (High Tourism Activity)	01-May-13, 01-Jun-13, 01-Jul-13, 01-Sep-13, 01-Apr-14, 01-May-14, 01-Jun-14, 01-Sep-14, 01-Oct-14, 01-Jun-15, 01-Sep-15, 01-Apr-16, 01-Jun-16, 01-Sep-16, 01-Oct-16, 01-Apr-17, 01-May-17, 01-Jun-17, 01-Sep-17, 01-Oct-17, 01-Mar-18, 01-May-18, 01-Jun-18, 01-Oct-18, **01-May-19, 01-Jun-19, 01-Oct-19, 01-Jul-20, 01-Aug-20, 01-Sep-20**, 01-Jul-21, 01-Sep-21
Cluster 5 (Very High Tourism Activity)	01-Aug-13, 01-Jul-14, 01-Aug-14, 01-Jul-15, 01-Aug-15, 01-Jul-16, 01-Aug-16, 01-Jul-17, 01-Aug-17, 01-Jul-18, 01-Aug-18, 01-Sep-18, **01-Jul-19, 01-Aug-19, 01-Sep-19**, 01-Aug-21

In the Tavira municipality, nine of the months in 2020 and the first five months in 2021 are clustered in the Very Low Tourism Activity, including November and December

2021 (Table AD.21; Figure AD.21). All Augusts, but the August 2020 are classified in the Very High Tourism Activity cluster.

Vila Nova de Gaia Municipality

The Vila Nova de Gaia municipality is in the Norte region of Portugal, and known for its sandy beaches like Praia da Madalena. Additionally, it is a hub of the port wine industry in Portugal.

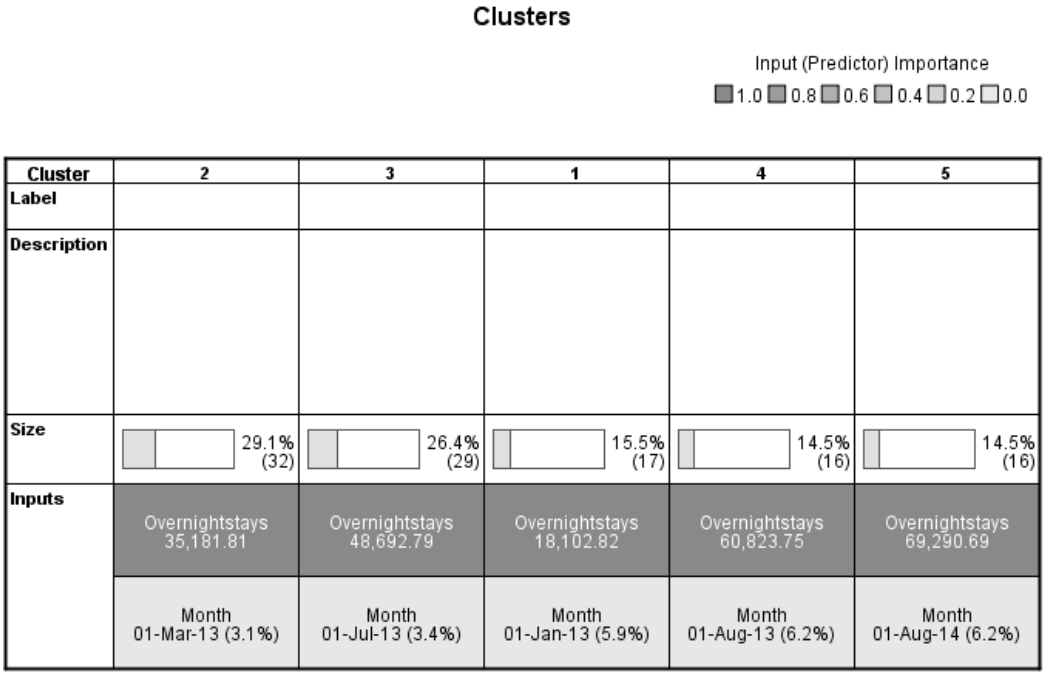


Figure AD.22: The cluster size and group from the Vila Nova de Gaia Municipality

Table AD.22: Clusters for the Vila Nova de Gaia Municipality

Cluster Name	Members (Months)
Cluster 1 (Very Low Tourism Activity)	01-Jan-13, 01-Feb-13, 01-Jan-14, 01-Feb-14, 01-Jan-15, **01-Mar-20, 01-Apr-20, 01-May-20, 01-Jun-20, 01-Jul-20, 01-Oct-20, 01-Nov-20, 01-Dec-20**, 01-Jan-21, 01-Feb-21, 01-Mar-21, 01-Apr-21
Cluster 2 (Low Tourism Activity)	01-Mar-13, 01-Apr-13, 01-May-13, 01-Jun-13, 01-Oct-13, 01-Nov-13, 01-Dec-13, 01-Mar-14, 01-Apr-14, 01-Nov-14, 01-Dec-14, 01-Feb-15, 01-Mar-15, 01-Nov-15, 01-Dec-15, 01-Jan-16, 01-Feb-16, 01-Mar-16, 01-Nov-16, 01-Dec-16, 01-Jan-17, 01-Feb-17, 01-Jan-18, 01-Feb-18, **01-Jan-19, 01-Feb-19, 01-Sep-20**, 01-May-21, 01-Jun-21, 01-Jul-21, 01-Jan-22, 01-Feb-22
Cluster 3 (Medium Tourism Activity)	01-Jul-13, 01-Sep-13, 01-May-14, 01-Jun-14, 01-Jul-14, 01-Sep-14, 01-Oct-14, 01-Apr-15, 01-Jun-15, 01-Oct-15, 01-Apr-16, 01-Jul-16, 01-Sep-16, 01-Oct-16, 01-Mar-17, 01-Nov-17, 01-Dec-17, 01-Mar-18, 01-Nov-18, 01-Dec-18, **01-Mar-19, 01-Nov-19, 01-Dec-19, 01-Jan-20, 01-Feb-20, 01-Aug-20**, 01-Sep-21, 01-Nov-21, 01-Dec-21
Cluster 4 (High Tourism Activity)	01-Aug-13, 01-May-15, 01-Jul-15, 01-Sep-15, 01-May-16, 01-Jun-16, 01-Apr-17, 01-May-17, 01-Jun-17, 01-Jul-17, 01-Sep-17, 01-Apr-18, 01-Jul-18, **01-Apr-19, 01-Jun-19**, 01-Oct-21
Cluster 5 (Very High Tourism Activity)	01-Aug-14, 01-Aug-15, 01-Aug-16, 01-Aug-17, 01-Oct-17, 01-May-18, 01-Jun-18, 01-Aug-18, 01-Sep-18, 01-Oct-18, **01-May-19, 01-Jul-19, 01-Aug-19, 01-Sep-19, 01-Oct-19**, 01-Aug-21

In the Vila Nova de Gaia Municipality, eight months in 2020 had very low tourism activity, and recovery began in May 2021 with low tourism activity and peaked in August 2021, but declined in December 2021 to medium tourism (Table AD.22; Figure

AD.22). Tourism activity in September, November, and December 2021 are classified in the Medium Tourism Activity cluster. Aside August 2020, which was clustered in Medium Tourism Activity cluster, all Augusts are clustered in either High or Very High Tourism Activity clusters.

Vila Real de Santo António Municipality

The Vila Real de Santo António municipality is in the Algarve region of Portugal.

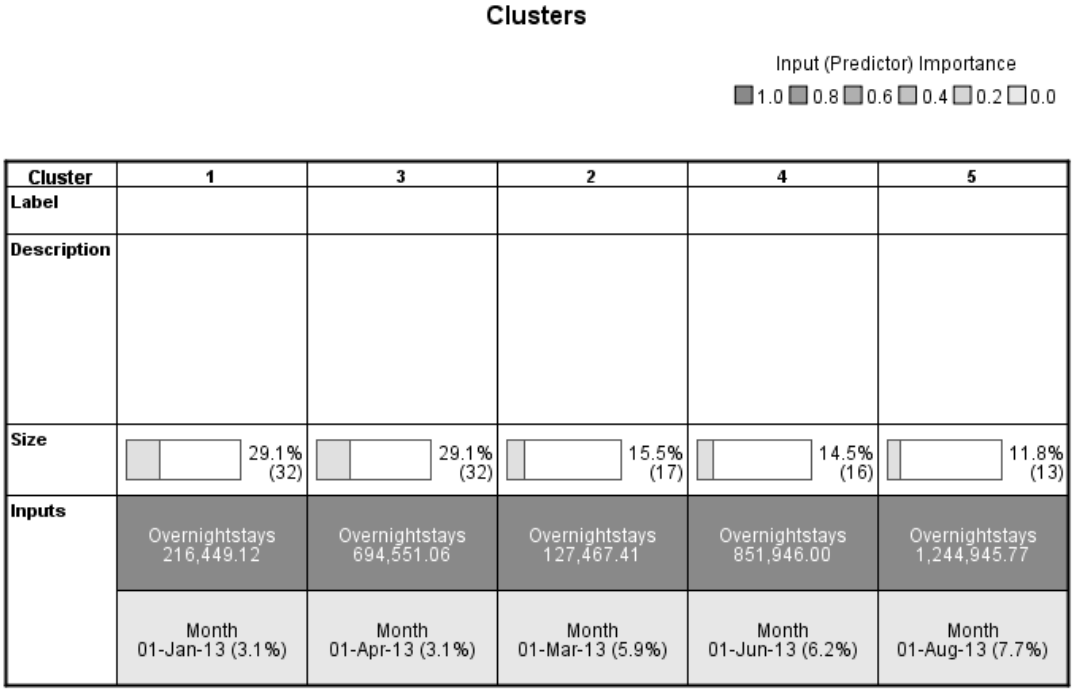


Figure AD.23: The cluster size and group from the Vila Real de Santo António Municipality

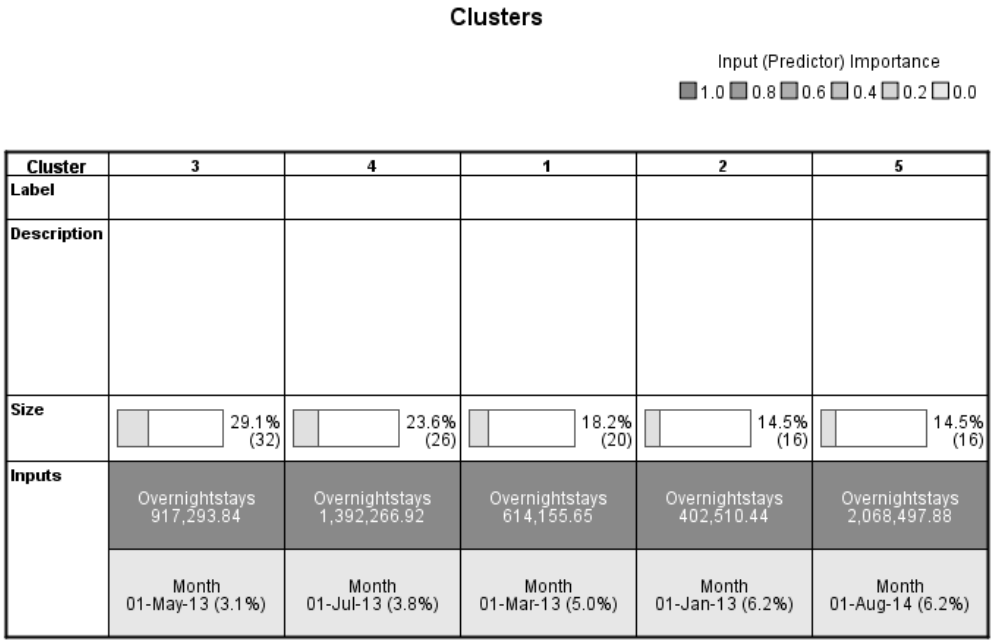
Table AD.23: Clusters for the Vila Real de Santo Municipality

Cluster Name	Members (Months)
Cluster 2 (Very Low Tourism Activity)	01-May-13, 01-Jan-14, 01-Feb-14, 01-Feb-15, 01-Nov-15, 01-Jan-16, 01-Nov-16, 01-Jan-17, 01-Nov-17, 01-Dec-17, 01-Jan-18, 01-Nov-18, **01-Jan-19, 01-Nov-19, 01-Jan-20,** 01-Feb-22
Cluster 1 (Low Tourism Activity)	01-Jan-13, 01-Nov-13, 01-Dec-13, 01-Nov-14, 01-Dec-14, 01-Jan-15, 01-Dec-15, 01-Dec-16, 01-Dec-18, **01-Dec-19, 01-Mar-20, 01-Apr-20, 01-May-20, 01-Jun-20, 01-Oct-20, 01-Nov-20, 01-Dec-20,** 01-Jan-21, 01-Feb-21, 01-Mar-21, 01-Apr-21, 01-May-21, 01-Nov-21, 01-Dec-21, 01-Jan-22
Cluster 3 (Medium Tourism Activity)	01-Feb-13, 01-Mar-13, 01-Apr-13, 01-Oct-13, 01-Mar-14, 01-May-14, 01-Oct-14, 01-Mar-15, 01-Apr-15, 01-May-15, 01-Oct-15, 01-Feb-16, 01-Mar-16, 01-Apr-16, 01-Feb-17, 01-Mar-17, 01-Feb-18, 01-Mar-18, **01-Feb-19, 01-Mar-19, 01-Feb-20, 01-Jul-20**, 01-Jun-21, 01-Oct-21
Cluster 4 (High Tourism Activity)	01-Jun-13, 01-Apr-14, 01-Jun-14, 01-May-16, 01-Oct-16, 01-Apr-17, 01-May-17, 01-Oct-17, 01-Apr-18, 01-May-18, 01-Oct-18, **01-Apr-19, 01-May-19, 01-Oct-19, 01-Sep-20**, 01-Sep-21
Cluster 5 (Very High Tourism Activity)	01-Jul-13, 01-Aug-13, 01-Sep-13, 01-Jul-14, 01-Aug-14, 01-Sep-14, 01-Jun-15, 01-Jul-15, 01-Aug-15, 01-Sep-15, 01-Jun-16, 01-Jul-16, 01-Aug-16, 01-Sep-16, 01-Jun-17, 01-Jul-17, 01-Aug-17, 01-Sep-17, 01-Jun-18, 01-Jul-18, 01-Aug-18, 01-Sep-18, **01-Jun-19, 01-Jul-19, 01-Aug-19, 01-Sep-19, 01-Aug-20**, 01-Jul-21, 01-Aug-21

In the Vila Real de Santo António municipality, seven of the months in 2020, and the first five months of 2021 are classified in the Low Tourism activity, and picked up in June 2020, with very high tourism activity (Table AD.23; Figure AD.23).

Other Municipalities

Data for the remaining 285 municipalities of the 308 municipalities in Portugal were captured as others "Outros". In all other municipalities in Portugal, five of the months in 2020, and first four months in 2021 are clustered in the Very Low Tourism Activity (Table AD.24; Figure AD.24). Tourism activity recovered in June 2020 with low tourism activity, and peaked in August 2020; but started to decline in 2021. September, November, and December 2021 are classified in the Medium Tourism Activity cluster. All Augusts of the years reviewed were clustered in either High or Very High Tourism clusters.



Cluster	3	4	1	2	5
Label					
Description					
Size	29.1% (32)	23.6% (26)	18.2% (20)	14.5% (16)	14.5% (16)
Inputs	Overnightstays 917,293.84	Overnightstays 1,392,266.92	Overnightstays 614,155.65	Overnightstays 402,510.44	Overnightstays 2,068,497.88
	Month 01-May-13 (3.1%)	Month 01-Jul-13 (3.8%)	Month 01-Mar-13 (5.0%)	Month 01-Jan-13 (6.2%)	Month 01-Aug-14 (6.2%)

Figure AD.24: The cluster size and group from the Other "Outros" Municipalities

Table AD.24: Clusters for the Other “Outros” Municipalities

Cluster Name	Members (Months)
Cluster 2 (Very Low Tourism Activity)	01-Jan-13, 01-Feb-13, 01-Jun-13, 01-Jan-14, 01-Feb-14, 01-Jan-15, 01-Mar-15, **01-Mar-20, 01-Apr-20, 01-May-20, 01-Nov-20, 01-Dec-20**, 01-Jan-21, 01-Feb-21, 01-Mar-21, 01-Apr-21
Cluster 1 (Low Tourism Activity)	01-Mar-13, 01-Apr-13, 01-Nov-13, 01-Dec-13, 01-Mar-14, 01-Nov-14, 01-Dec-14, 01-Feb-15, 01-Nov-15, 01-Dec-15, 01-Jan-16, 01-Feb-16, 01-Nov-16, 01-Dec-16, 01-Jan-17, 01-Feb-17, 01-Jan-18, **01-Jan-19, 01-Jun-20**, 01-Jan-22
Cluster 3 (Medium Tourism Activity)	01-May-13, 01-Sep-13, 01-Oct-13, 01-Apr-14, 01-May-14, 01-Jun-14, 01-Oct-14, 01-Apr-15, 01-May-15, 01-Jun-15, 01-Oct-15, 01-Mar-16, 01-Apr-16, 01-Mar-17, 01-Nov-17, 01-Dec-17, 01-Feb-18, 01-Mar-18, 01-Nov-18, 01-Dec-18, **01-Feb-19, 01-Mar-19, 01-Nov-19, 01-Dec-19, 01-Jan-20, 01-Feb-20, 01-Jul-20, 01-Oct-20**, 01-May-21, 01-Nov-21, 01-Dec-21, 01-Feb-22
Cluster 4 (High Tourism Activity)	01-Jul-13, 01-Aug-13, 01-Jul-14, 01-Sep-14, 01-Jul-15, 01-Sep-15, 01-May-16, 01-Jun-16, 01-Sep-16, 01-Oct-16, 01-Apr-17, 01-May-17, 01-Jun-17, 01-Oct-17, 01-Apr-18, 01-May-18, 01-Jun-18, 01-Oct-18, **01-Apr-19, 01-May-19, 01-Oct-19, 01-Sep-20**, 01-Jun-21, 01-Jul-21, 01-Sep-21, 01-Oct-21
Cluster 5 (Very High Tourism Activity)	01-Aug-14, 01-Aug-15, 01-Jul-16, 01-Aug-16, 01-Jul-17, 01-Aug-17, 01-Sep-17, 01-Jul-18, 01-Aug-18, 01-Sep-18, **01-Jun-19, 01-Jul-19, 01-Aug-19, 01-Sep-19, 01-Aug-20**, 01-Aug-21