

From Virtual to Real - Analysis of the Mercado dos Lavradores (Farmer's Market)

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ABSTRACT

The Mercado dos Lavradores (Funchal's farmer's market) is a historic building and one of Funchal's main tourist attractions, occupying a prominent location in the city's center. However, to the best of our knowledge, there has been no study carried out on the tourist satisfaction levels and experience at the Mercado dos Lavradores. This has led to an absence of strategic approaches for developing the market and regional progress. Accordingly, this study aims to understand the satisfaction of tourists visiting the Mercado dos Lavradores and whether these levels vary according to nationality and time of year. This study analyzed 3,228 visitors' reviews retrieved from TripAdvisor from tourists who visited Mercado dos Lavradores. The analysis employed text mining techniques: sentiment analysis and topic modeling. The findings illustrated how satisfaction levels are influenced by several factors and identified the most prominent topics of interest for visitors. Most visitors showed significant positive levels of satisfaction, with nationality emerging as an important influencing factor for each tourist. In addition, the levels of satisfaction across different seasons were similar, revealing that the time of year does not influence tourist satisfaction. This study enhances the understanding of tourist satisfaction levels and their perceptions at the Mercado dos Lavradores, and also puts forward theoretical contributions, particularly in terms of local and international tourism marketing.

Keywords: Farmers' market; Tourist satisfaction; Text mining; Sentiment analysis; TripAdvisor.

JEL Codes: M31, Z33

I. Introduction

TOURISM EMERGED as one of the most vital and productive sectors (Novera et al., 2022), which has a significant role in enhancing economic development, promoting balanced growth, fostering culture exchange, social inclusion and economic prosperity (Correia, 2022). In Portugal, specifically in Funchal, the capital of the Madeira Archipelago and one of the main drivers of the region, a total of 6,273,687 overnight stays in tourist establishments were recorded in 2022 (DREM, 2023).



Mercado dos Lavradores holds a central position in the Funchal municipality (Correia, 2022). It is a must-see for visitors to the Island, who immerse themselves here in an atmosphere dominated by excitement and joy (The Madeira Promotion Bureau, n.d.). As a space that preserves and upholds Madeiran culture and tradition, the Funchal City Council (Mercados Municipais Funchal, n.d.) manage it, with continuous emphasis on boosting and developing tourism in the Mercado dos Lavradores.

The term farmer's market is distinguished in literature with different concepts (Hall & Sharples, 2008; Hiebert et al., 2015), such as "farmers market," "street market," "food market", "public market", "municipal market" or "agricultural market", these terms are frequently used to describe this typology of space, aiming to explain this concept in the tourism context.

These markets host community events that bring consumers and producers together to engage, share, and enjoy local and regional products as well as value-added food products (Thompson, 2020), assuming the role of a multi-faceted tourism experience that integrates food, culture, education, shopping and the appreciation of rural landscapes (Tseng et al., 2023). These places are where you can find gastronomic alternatives that reflect the customs, daily life and characteristics of the territory, tending to become prominent tourist attractions (Rubio Huerta et al., 2022).

Building on the increasing recognition of the strong relationship between this market typology and tourism, existing literature has sought to explore how the attributes of food markets contribute to the tourist experience, with an analysis of the satisfaction level and the intention to revisit these markets, endeavoring to discern of disparities in the variables perceived between first-time visitors and repeat visitors (Dimitrovski & Crespi Vallbona, 2018). Understanding tourists' rationale during the visit and the relationship of these dimensions with satisfaction is influenced by factors like escape from routine, cultural experience, prestige, and involvement with the market (Dimitrovski & Crespi-Vallbona, 2017).

In local city council markets, local foods emerge as a pertinent factor in the management and commercialization of tourist experiences in a region, where "food markets" appear as a source of gastronomic tourism experiences (Fusté-Forné et al., 2021).

Research involving the concept of the farmer's market and tourism has been going on for some time, due to the growth of these markets in the context of tourism and leisure. Its impact on city economies causes markets to emerge as a new type of tourism and as a recreational product (Naicker & Rogerson, 2017).

The CMF, as the administrative authority of the farmer's' market, has a rudimentary notion of the market's target audience and has a well-defined understanding of strategies planned to run the space and make the events that take place there more dynamic. These strategies involve outlining the good management of space resources, including good planning of infrastructure and its usage, and providing a basic estimate of the number of individuals who visit the Tourist Office within the market.

As a result of mounting academic interest in regional markets and tourism, a total of nine pieces of research has emerged and widely enriched the literature by exploring farmer's markets from diverse perspectives, such as the distinctions between visitors and

residents (Dodds & Holmes, 2017; Thompson, 2020), visitor motivation and behavior (Garner & Ayala, 2018; Joenpolvi et al., 2024; Silkes, 2012), exploration of regional products (Fusté-Forné et al., 2021; Gürsoy, 2020), and analysis of market operators (Bartis & Oberholzer, 2022; Onyango et al., 2016). A synthesis of the previous studies is listed in Figure 1.

These studies employed statistical techniques, relying principally on primary data, limiting their sample sizes to a maximum of 993 respondents (e.g., Joenpolvi et al., 2024), qualitative analysis (e.g., Thompson, 2020), and analyzing secondary data qualitatively, based on bibliographic and documentary survey (Bartis & Oberholzer, 2022). There is an absence of a large-scale application of secondary data, which could provide a broader scope of analysis and yield novel insights. Moreover, no study that we know to date has focused on the distinct understanding of the influence of a visitor's nationality on tourist satisfaction, nor has it contributed to the literature on visitor's perceptions depending on the visit.

To bridge these gaps, this study analyses 3,228 visitors' reviews published on the Mercado dos Lavradores de Funchal's page on TripAdvisor, to assess the satisfaction levels and sentiments of tourists who visited these markets and examine whether nationality and time of year influence the level of tourist satisfaction. The paper employs an innovative methodology, which performs two robust text mining techniques: topic modeling and sentiment analysis. Additionally, this paper endeavors to identify the prominent topics raised by tourists who visit the market, and to test the hypotheses proposed in the literature. For this purpose, two tests were carried out, the ANOVA test (for time of year) and the Kruksal-Wallis' test (for nationality).

The study contributes to understanding tourists' satisfaction levels, improving strategies to ensure visitor's expectations are exceeded and designing a memorable experience by pinpointing areas for improvement.

II. Literature Review

A. Tourist satisfaction in food markets

Consumer satisfaction is an important topic in different economic sectors and is considered a crucial factor in the field of Tourism (Sánchez-Rebull et al., 2018). Meeting and exceeding tourists' expectations are fundamental to the success of destinations (Scaglione & Mendola, 2017).

Satisfaction is defined as the assessment of whether a product/service, provides a level of pleasure associated with its consumption (Oliver, 2014). Satisfaction derived from the expectation-disconfirmation theory, which posits that satisfaction arises from a process of comparison, with the formulation of judgments about products/services, between initial expectations, perceived performance and the consumer's perception of the experience (Oliver, 1980). In the tourism context, tourist satisfaction has been widely discussed among academics and practitioners, with different concepts emerging (Huete Alcocer & López Ruiz, 2020; Sánchez-Rebull et al., 2018).

Figure 1
Previous studies about farmers' markets.

Article	Silkes (2012)	Onyango et al. (2015)	Forné (2015)	Dodds and Holmes (2017)	Garner and Ayala (2019)	Thompson (2020)	Gursoy (2020)	Bartis and Oberholzer (2022)	Joempolvi et al. (2024)	Current paper
Aim	Explores the visitors' motivation to visit farmers' markets and identifies the culinary tourist's potential for economic sustainability	Uncovers the effective strategies that farmers market operators sustain and expand capacity utilization	Analyses the relations between local cheese production in the Canterbury region (New Zealand) and the tourism development	Investigates variations among visitors and residents in motivations for purchasing local and organic foods at farmers' markets	Assesses farmers market consumer behavior through a regional food and culinary tourism lens	Identifies and analyses the tensions that emerge when farmers' markets strive to serve their local communities with attract tourists	Explores economic, social, cultural relationships and everyday practices in the making and selling of Karakılıç bread	Presents a comprehensive analysis of farmers' markets in Africa	Examines the unintended effects of prosocial behaviors of visitors shopping at farmers' markets	Understands the level of tourists' satisfaction at Mercado dos Lavradores based on nationality and seasonal variations
Method	Factor analysis and multiple regression (primary data, 248 responses)	Factor, cluster and regression analyzes (primary data, 993 responses)	Literature review	Descriptive statistics (primary data, 322 responses)	Case study, descriptive statistical analysis (primary data, 270 responses)	Qualitative analysis (primary data, 14 responses)	Case study with qualitative analysis (primary data, 18 responses)	Content analysis (secondary data, 13 documents)	Descriptive statistics (primary data, 218 responses)	Text mining, topic modeling and sentiment analysis (secondary data, 3228 responses)
Contributions	Quality food and good shopping facilities are the most significant factors in improving visitor satisfaction	Identifies impactful factors of the farmers' market and consumers motivations for visiting markets. It explores the connection between consumers and sponsorship	Natural appeal and traditional community sense of place improving both hosts and guests with local food	Income is a predictor of patronage, and explains how visitor motivators differ from those of locals	Consumers will travel over than 40 miles to participate in a high-quality market, which may evolve into an essential factor of region's food identity	Desings a conceptual model illustrating how farmers markets can shift from community events to tourist attractions	Local spaces strengthen food heritage sharing and conservation with farmers markets stimulate sociability	Farmers' markets offer an opportunity to unite tourism, agriculture and local economic growth	Examines the behavioral outcomes of visiting farmers' markets, and whether licensing negatively affects group members	Nationality is a key factor influencing for each tourist. whereas the levels of satisfaction across different seasons were similar

Source: Own.

Tourist satisfaction refers to the pleasure and contentment experienced by a visitor as a result of their travel experience, characterized by the fulfilment of their desires, expectations, and needs (Chen & Tsai, 2007). Furthermore, it represents the conformity between tourist's expectations and the characteristics of the host destination (Truong et al., 2008), conceptualized as a multidimensional global judgment of the perceived quality of a place (Stedman, 2002), in an amalgam of tourist's expectations before travelling and those developed during the trip (Chen, 2010).

Three approaches in the literature are employed to measure tourist satisfaction, namely: meeting expectations (the relative performance through the fulfilment of expectations), benchmarking (analysis of satisfaction of various attributes compared to other competitors), and direct performance assessment (direct assessments based on a set of components and attributes, Zhou et al., 2014).

Satisfaction is a crucial component of visitor experience, therefore understanding the satisfaction levels will facilitate preparing a concrete and comprehensive evaluation of the management levels of tourist products/services.

Food markets are perceived by visitors as a genuine representation of local culture and offer a multidimensional experience where location, involvement in the market, food quality and food neophilia contribute positively to the experience of visiting the market, impacting visitor satisfaction and revisiting the destinations (Madeira et al., 2023).

Effective management of tourist attractions can increase tourist satisfaction, thereby improving the quality of the experience and the emergence of the desire to revisit/recommend the destination/attractions to others (Guerreiro & Rita, 2020; UNWTO, 2005). Accordingly, positive reviews and recommendations can significantly boost purchasing intentions and desires (Ye et al., 2009), conversely, negative reviews tend to negatively influence consumer perceptions (Ladhari & Michaud, 2015).

B. The influence of nationality on tourist satisfaction

A person's nationality of everyone is an important facet of human existence, capable of determining each person's preferences and tastes (Mekoth & Thomson, 2018). In the tourism context, tourist nationality of the tourist is a determining factor in tourist preference and choice (Huang & Crofts, 2019) and can also influence tourism service providers (Coves-Martínez et al., 2022).

In the literature, the concept of nationality is often equated with culture/ethnicity (Mekoth & Thomson, 2018). Nationality is strongly influenced by culture, considering that this is a collective and shared phenomenon, at least in part, with individuals who reside, or resided, in the same social context, and as a collective programming of the mind that distinguishes members of a group from others (Hofstede et al., 2010). It is measured through the diverse ways of thinking, feeling, and acting, which are learnt and shared by a plurality of people. It serves in a simultaneously objective and symbolic way to organize these people into a particular and distinct collectivity (Rodrigues, 2018), united by language, customs and traditions. It is the collection of spiritual, material, intellectual and emotional characteristics distinctive to society or a social group, which

encompasses not only art and literature but also lifestyles, ethical frameworks, traditions and beliefs (UNESCO, 2002).

Examining the relationship between nationality and its impact on tourist satisfaction demonstrates that it is a fundamental aspect in the tourism management context. Considering the significant connection between the tourist satisfaction dimensions and tourist nationality of tourists, managers must improve their service quality, to meet consumers' elevated expectations (Chand et al., 2016). Similarly, complexities exist within the interrelationships of the tourist's nationality, visitor satisfaction and the intention to recommend, where nationality has an impact on assessing the visitor's loyalty, while the willingness to recommend products/services to others also varies also according to the individual nationality (Vieira et al., 2021). Tourist nationality as it is a source of motivation and action for the tourist in diverse cultural environments influences the level of satisfaction with the tourist experience (Coves-Martínez et al., 2022).

Therefore, we put forward the following hypothesis:

H1: *Nationality is a predictor of tourist satisfaction at the Mercado dos Lavradores.*

C. The influence of various times of the year on tourist satisfaction

In isolation, tourism cannot exist (Chand et al., 2016). Monitoring satisfaction during the year is significant to ensure more efficient policies and more appropriate management for meeting tourists' expectations (Furtado et al., 2022).

Seasonality is the variation that occurs regularly in tourism supply and demand, which represents a temporal and spatial imbalance in the number of visitors within the year (Geng et al., 2021). It can be identified in terms of factors such as regular changes in the number of tourists and/their consumption, expenditure, transport flows, employment in the tourism sector, availability of accommodation and use of resources (Geng et al., 2021; Sæþórsdóttir et al., 2019). Seasonality can be measured in two dimensions: natural and institutional (Geng et al., 2021; Sæþórsdóttir et al., 2019).

Tourist activity plays a significant role in economic contributions, so upholding this standard throughout the 12 months of the year is essential (Barreira & Cesário, 2018). However, one of the aspects that contradicts this pattern, and is considered one of the major challenges in the tourism context is seasonality (Kastenholz & Lopes de Almeida, 2008). Tourist seasonality and its social, environmental and economic consequences are perceived as having negative effects on tourism and destinations (Geng et al., 2021). In the influx of tourists, seasonality generates periods of "peak" and "off-peak," or high season (late spring and summer) or low season (autumn and winter), which places pressure on infrastructure and presents challenges for tourism service providers (Barreira & Cesario, 2018). During the high season, due to the increased density of visitors at tourist destinations and attractions, tourist satisfaction may be negatively affected due to overcrowding (Butler, 1998). However, the issue of the seasonality of tourist activity at various times of the year could potentially be assessed favorably and not necessarily as a restriction of development, if a minimum level of tourist demand is warranted, as a way to sustain the operations of existing tourist companies in the

autumn/winter season seasonality (Kastenholz & Lopes de Almeida, 2008). This lower number of tourists, in the low season, allows residents to be more receptive towards foreign tourists, being able to dedicate more time and attention to their needs, thus increasing the level of satisfaction of fall/winter tourists (Vargas-Sánchez et al., 2014).

From the perspective of tourists, it is possible to postulate that the typical visitor to a destination, who arrives during the low season prioritizes the conditions that exist during that period of the year, which could potentially represent one of the main factors of attraction to the destination seasonality (Kastenholz & Lopes de Almeida, 2008). Under certain circumstances, tourist satisfaction becomes more apparent during the high season, with higher levels of satisfaction amongst older tourists, tourists who exhibit loyalty to a destination also report higher levels of satisfaction compared to those who are less loyal (Frleta & Jurdana, 2018). Thus, we hypothesize that:

H2: *The time of year predicts tourist satisfaction at Mercado dos Lavradores.*

III. Methodology

To test the hypotheses formulated to understand the perceptions and level of satisfaction of tourists who visited Mercado dos Lavradores, text mining techniques were applied to online reviews published on Mercado's page on Tripadvisor. The analyzed results facilitated the formulation of structured knowledge about tourist satisfaction, enhancing strategies that aim to meet visitors' expectations.

A. *Sample and procedures*

A survey of reviews was executed on the online platform Tripadvisor, considering the population of tourists who visited the farmer's market. The sample contains tourists who visited the market and left a comment on the market's page on the TripAdvisor platform. Tripadvisor offers a wide range of services in the tourism field, most of which are traditionally associated with user-generated reviews and recommendations, and it is the most important eWOM platform within the tourism sector (Reyes-Menendez et al., 2019). Users can share their experiences, give ratings and write comments about all kinds of tourist destinations/attractions around the world. Following the approach of Galhoz et al. (2024) and Ribeiro et al. (2024), data collection was performed using the Octoparse v.8.6.6 software, a web data collection tool, which transforms pages into structured data (Carvalho et al., 2024). 4,264 reviews were gathered. The date of publication (year and month) and the user's nationality were extracted from each comment. Next, data were cleaned and logically structured, organizing the columns according to information on the reviewer's nationality, year and month of publication and comment.

Finally, each comment was translated into English using the Google Translation Application Programming Interface (API), Google Translation API is one of the most accurate and viable translation engines for translating articles published in other languages into English (Jackson et al., 2019). To analyze nationalities and time of year,

1,036 reviews were excluded, due to the absence of the user's nationality and/or the year and month of the visit. Thus, the study's final dataset comprises 3,228 comments from 65 different nationalities, published between 2015 and 2024. All information was uploaded into a CSV file

Table1 presents the top 10 nationalities in the sample and the distribution of reviews according to the time of year.

Table 1: Top 10 nationalities and distribution of comments by time of year.

Nationality	Number of Reviews
British	894
Franch	465
Portuguese	455
German	265
Spanish	187
Dutch	106
Brazilian	97
Italian	91
Polish	86
Belgium	84
Others	498
Time of year	
Spring	788
Summer	1001
Automn	718
Winter	721
Total	3,228

For the analysis of the times of the year, we consider that:

- The winter season runs from January to March.
- The spring season runs from April to June.
- The summer season runs from July to September.
- The autumn season runs from October to December.

Table 2 depicts the number of comments each year between 2015 and 2024.

Table 2: Reviews distributed by year.

Year	N. reviews
2015	297
2016	512
2017	775
2018	663
2019	557
2020	159
2021	88
2022	87
2023	88
2024	2
Total	3,228

B. Data analysis

Text mining techniques were applied, they allow relevant knowledge patterns to be detected, based on extracting information from a significant part of unstructured textual data (Rita et al., 2020), reflecting what is mentioned online by users (Chang et al., 2023). Text mining is a knowledge-intensive process whereby interaction with a set of documents uses analysis tools to identify and explore patterns of interest (Ramos et al., 2019). Through text mining techniques, it is possible to extract and interpret information related to the tourist context, from demographic profiles, preferences, complaints or dislikes and images of the destination (Song et al., 2019).

A mixed method was carried out to analyze the data, aiming to obtain greater precision and relevance of insights and a better understanding of the content (Correia et al., 2023). All experiments were performed in R software, which is a free access platform that allows the use of a broad set of packages for data analysis (Ramos et al., 2019). Sentiment analysis and topic modeling were applied. Sentiment analysis is a technique used to detect positive, negative or neutral feelings, stated throughout pieces of text, capable of determining the emotional attitude expressed and evaluating the general trend of feelings, in tourism management contexts (Rita et al., 2020). Including the “neutral” rating can be an added value as it can provide additional beneficial information, usually on indicators of feelings of doubt/concern (Puh & Babac, 2023). Topic Modeling is one of the main natural language processing methods (Shafqat & Byun, 2019), which aims to extract and categorize large sets of documents with thematic information (Tonkin, 2016). The Latent Dirichlet Allocation (LDA) was applied, as it was considered the most appropriate and prominent (Ramos et al., 2019). Both methods have emerged as the most adopted in marketing and management to classify consumer experiences and detect polarities in text data and are especially relevant for tourism and events (Moro et al., 2023; Ramos et al., 2019).

To perform the sentiment analysis, the “sentimentr” package was run and the “topicmodels” package was run for topic modeling, following the approach of Furtado et al. (2022) and Moro et al. (2023).

Before proceeding to analysis, the dataset went through several cleaning and normalization steps, converting the text to lowercase letters to ensure uniformity: removing extra numbers, punctuation and spaces, and excluding common English words (stopwords). These steps were performed using the “tm” package.

To perform the topic modeling analysis, a Document Term Matrix (DTM) was created to represent the frequency of terms in the dataset. DTM has been filtered to remove terms that appear in less than 0.1% (sparsity) of the analyzed text, reducing noise and focusing on the most relevant terms. Subsequently, LDA was applied to the DTM to identify the six most representative topics. Employing the beta (β) matrix of the LDA model, the probability of a word being associated with a topic was extracted. The most significant words for each topic were grouped based on their β probabilities, indicating thematic areas referenced by each of them (Tonkin, 2016).

For testing the proposed hypotheses in the literature review, the ANOVA test (for time of year) and the Kruksal-Wallis test (for nationality) were performed, utilizing the SPSS

v.29 software. Insights from reviews analysis become valuable knowledge resources for different tourism stakeholders (Puh & Babac, 2023).

IV. Results and Discussion

A. Sentiment analysis

Sample characterization of the sentiment analysis

To gain and develop structured knowledge through sentiment analysis which analyzes the degree of visitors' satisfaction when visiting the Mercado de Lavradores. Sentiment values ranged from -1.17, the least satisfied, to 1.82, the most satisfied. These results reveal diverse satisfaction levels, where more satisfied visitors employed more positive speech than less satisfied visitors. An analysis scale was utilized to interpret these levels of satisfaction (Rita et al., 2020). Variable satisfaction levels were defined by the logic of a 7-point Likert scale, ranging from solid positive to solid negative.

The results show that 79% of visitors to Mercado dos Lavradores revealed positive satisfaction, suggesting that most tourists were satisfied with their experience at the market. Conversely, 19% expressed degrees of dissatisfaction (Table 3). The "Fragile Positive" level of satisfaction represents 1,713 reviews, characterizing 53% of the sample.

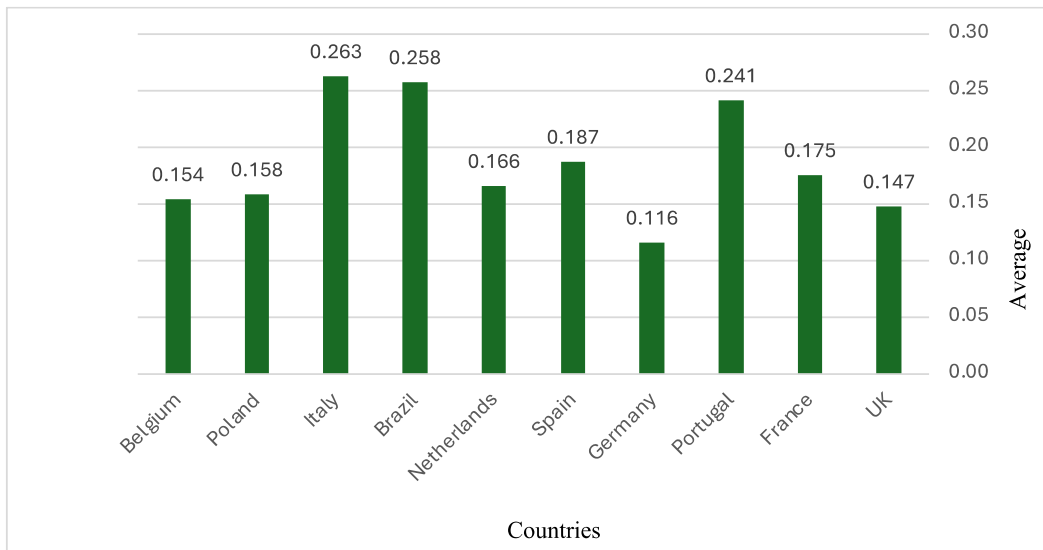
Table 3: Satisfaction.

Satisfaction levels	Reviews (Absolute numbers)	Reviews (Relative numbers)
≥ 0.60 - Solid Positive	103	3%
[0.30; 0.59] - Regular Positive	747	23%
[0.01; 0.29] - Fragile Positive	1713	53%
0 - Neutral	49	2%
[-0.29; -0.01] - Fragile Negative	553	17%
[-0.59; -0.30] - Regular Negative	55	2%
≤ -0.60 - Solid Negative	8	0.02%
Total	3,228	100%

Nationality analysis

The sample comprises visitors from a total of 65 countries, from diverse continents. Reviewers from The United Kingdom (England, Scotland, and Wales) posted the most reviews (Table 1). In the top 10 countries with the most reviews collected from the sample, the highest average sentiments were from Italy, with 0.263, subsequently Brazil and Portugal, with 0.258 and 0.241 respectively (Figure 2).

Figure 2
Average sentiments of the top10 nationalities with the most reviews

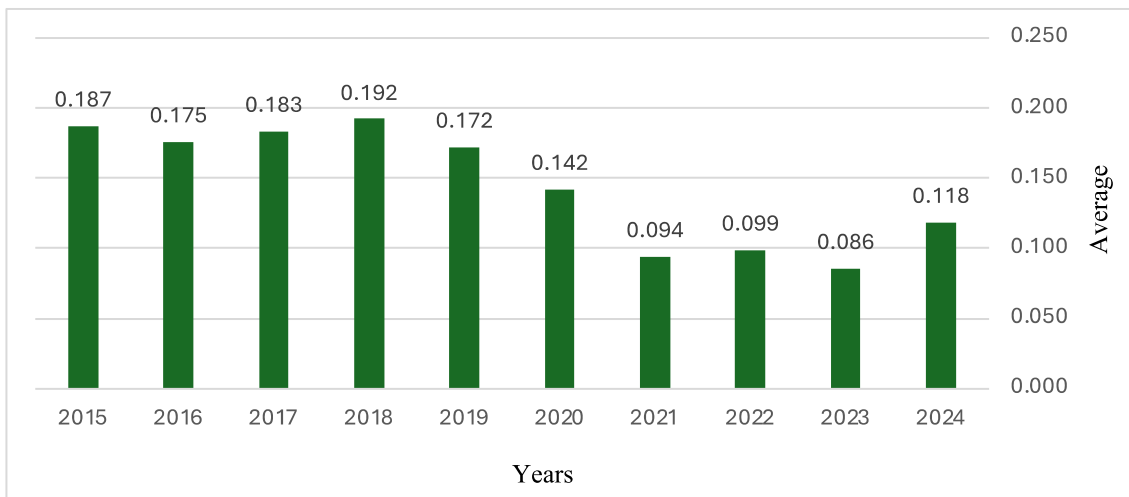


Countries with Western cultural influences are predominant in this sample (with the most reviews collected), with an average sentiment of 0.173, while those with Eastern culture (countries in the Middle East and Asia) have an average sentiment of 0.147.

Analysis by year and time of year

Over the years, the year with the highest sentiment was 2018, with 0.192 (Figure 3).

Figure 3
Average sentiments per year



The pre-pandemic period from 2015 to 2019 had the highest satisfaction levels, but post-2020, satisfaction levels declined, with no return to previous values. Several interconnected circumstances can elucidate this decrease in tourist satisfaction.

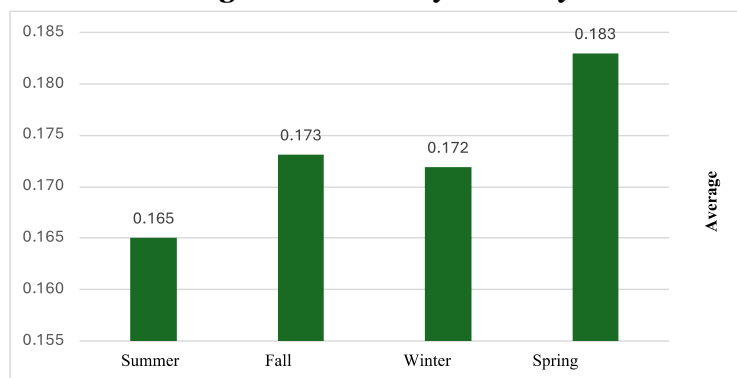
Firstly, COVID-19 significantly transformed the dynamics of Tourism. At Mercado dos Lavradores, the experience at the market may have been influenced by restrictions on visitation and circulation within the space, a reduction in the number of stands and operating stores, social distancing measures, and concerns related to sanitation and hygiene, which occurs when individuals increasingly value authentic and high-quality experiences, leading to elevated expectations. Under these circumstances, the market was unable to adapt to the circumstances and these expectations, resulting in lower visitor satisfaction. A comment from a visitor supports this: *“Mercado dos Lavradores is a market without sanitary control or social distancing, people are squashed and on top of each other. There is shouting everywhere, and it is dirty with rubbish (...); “I went to the market in the middle of the pandemic, so I had a very high expectation of finding many stalls full of fruit, and I found half a dozen.”*

Still, another factor that may have influenced the situation was a German TV report in 2021, which criticized the adulteration of fruit samples offered at the market, where they were artificially sweetened, to convince buyers to pay exorbitant and inflated amounts (Vidal, 2021). This report, which lasted just over 17 minutes, produced by a private German channel, aimed to denounce fraudulent tourist destinations. It had around 83 thousand views in 24 hours, as of today, the video published on YouTube has 1.2 million views (Freitas, 2021).

Thus, the artificiality and inflation of prices of products in the market would have resulted in a significant wave of indignation amongst tourists, and consequent dissatisfaction, as some comments point out: *“The people who sell the fruit are a bunch of thieves and fraudsters! Everyone knows that the fruit they give you to try has sugar on it. If you ask them to cut open a passion fruit in front of you and taste it, they get confused and ask you for an absurd amount for it. (...); “This market is a real sham! Fooling tourists with sugary fruits. Not to mention the exorbitant prices, I paid 69 euros for half a dozen pieces of fruit. (...); “A little disappointing, a few flowers, and some exotic fruits. Exaggerated prices. (...) My expectations were probably too high.”*

Regarding the analysis according to the time of year, summer, autumn, winter and spring, spring was the time of year that presented the highest average of sentiments, with 0.183 (Figure 4).

Figure 4
Average sentiments by time of year



This result can be attributed to several factors. Firstly, the Mercado dos Lavradores is a space symbolically famous for its trade in flowers, fruits and vegetables. It is in spring that many of these products reach the peak of their season (Neves, 2011), so tourists can find a wider variety of fresh, local fruits, vegetables, flowers and products during this period. The flower festival may also influence this increase in satisfaction, as it is one of the largest tourist events in the region, which takes place precisely in the spring (Visit Madeira, n.d.).

The event's festive atmosphere of the event highlights the region's floral abundance and beauty, and ends up extending to the market, considering that tourists can find a vast selection of flowers there, which intensifies the connection to the festive ambient, improving their sensory experience.

This expectation from the flower festival can heighten tourists' perception of the Mercado dos Lavradores, resulting heightened expectations, which after visiting the market are exceeded. This is in line with the congruence theory of Meir (1989), suggesting that when there is consistency among individuals' beliefs, values, attitudes, and behaviors, they experience greater satisfaction. Furthermore, in this context when the tourist experience aligns with the individual's expectations and values, there is a greater probability of satisfaction. This comment proves this: "(...) *We visited in May during the flower festival and were able to buy flowers and try fruit at numerous stalls in the city center. (...)*"; "*The market was not very full at our time of year, and the charming young ladies dressed for the start of the flower festival looked pretty.*".

While summer had the lowest average sentiment at 0.165, this result is attributed to the high season during this period, when there are more tourists, and consequently, a greater number of visitors inside the market, leading to the experience being less pleasant and more stressful (Sæþórsdóttir et al., 2019), as this comment affirms, "(...) *Moreover, it becomes quite unbearably crowded once big bus groups arrive.*"; "(...) *The only downside is that it is crowded and sometimes difficult to get through.*".

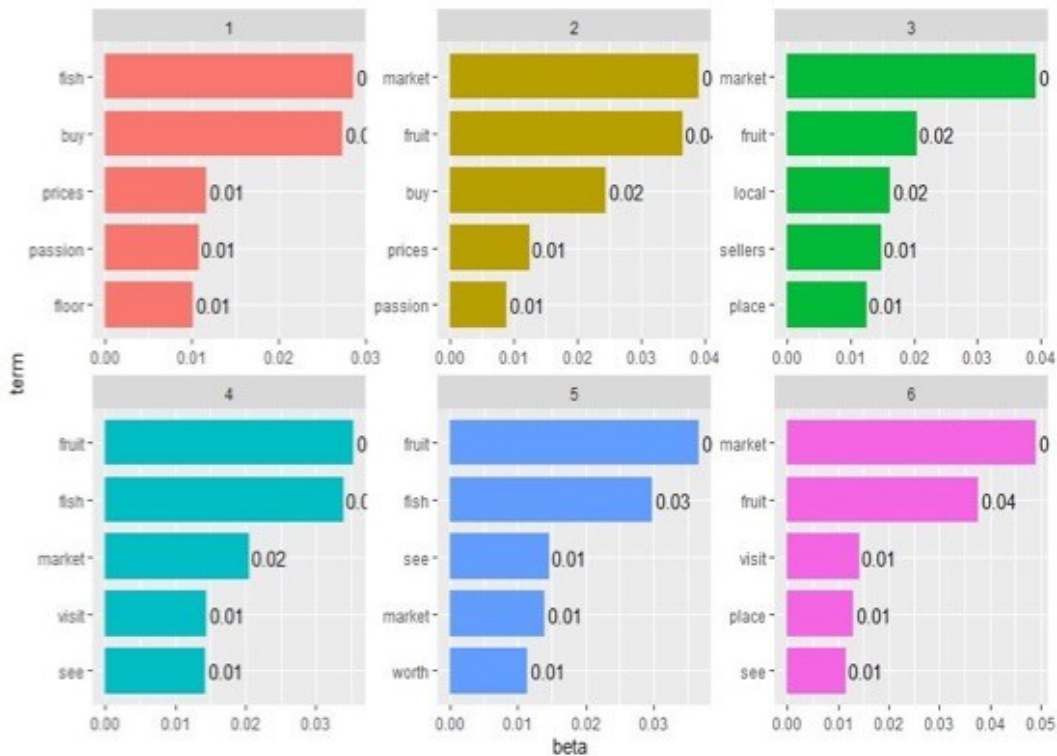
Another aspect is the climate at this time of year in the region. Summer temperatures tend to be quite high, often exceeding 30°C (Neves, 2011), heat could be considered a factor influencing tourists, potentially leading to fatigue, dehydration, and general discomfort, as well as posing challenges related to sanitation and hygiene. These factors could ultimately affect the products displayed (deterioration), affecting the perception of their quality – this review confirms this, "(...) *but please do not be tempted to try any of the sliced pieces of fruit on offer, firstly it's probably unhygienic, sitting outside in the warm heat for hours (...)*".

Another issue to highlight concerns prices, which are increasing. This is an aspect that is highly criticized by tourists: "*They trick us with fruit that is extremely expensive and tasteless! (...)*". All these factors make the experience unpleasant. However, the most notable difference is observed between summer and spring, while summer, autumn, and winter exhibit similar sentiment values, indicating a consistent level of satisfaction among tourists with the market over these periods.

Topic modeling

The topic modeling technique was performed and pinpointed the six most prominent topics, allowing a more central and organized analysis of the data (Figure 5).

Figure 5
Prominent topics



Topic 1, the terms “fish” and “buy”, are the most notable, the link to “fresh fish market”, which is amongst the market’s greatest attractions, followed by the keyword “price”, revealing that the prices of products in this part of the market are an aspect discussed by visitors. This review serves as an example: “I recommend the fish market, great prices” and “There is a wonderful fresh fish market in the rear where they offer various kinds of locally caught fish. Well worth a visit”.

These agricultural markets serve as venues that enhance local knowledge and foster local identity among tourists, thus the prices are often discussed. In this context, the average prices are higher due to the availability of fresh and locally sourced products, leading to objections from some tourists. However, there may be a greater willingness to pay premium prices for products (Tsai et al., 2019).

Topic 2, the dynamics of the fruit market are grounded on terms like “market”, “fruit” and “buy”, which pertained to (the countless stores, stalls and stands). The terms “buy,” and “prices” may be associated with fruit purchasing decisions and their prices. A comment reflects this topic: “A market with several stalls full of fruits, colors and entertainment... a place you must visit when you are in Madeira but be aware that the prices asked by sellers can be very inflated. There are grocery stores opposite the same

market with the same fruits charging much less”; “Definitely worth a look, but don't buy anything! In terms of prices, it is a tourist trap”. The term “passion” may be related to “passion fruit” which is one of the most sold fruits in the market and typical of the region. A remark illustrates this: “Pay attention to passion fruit sellers and the exorbitant prices they charge”; “Of the 18 varieties of passion fruit on the island, at this time of the year only eight were available, the winter ones. Banana, pineapple, melon, orange, lemon, mango, papaya and tomato: passion fruit flavors for all tastes.” This topic supports the apostolic themes identified in the literature, the availability of diverse types of fruit is amongst the primary considerations for tourists, which enriches the tourist experience (Thompson & Prideaux, 2019), highlighting that these markets are considered vital sources of gastronomic tourist experiences (Fusté-Forné et al., 2021).

Topic 3, the term “market” stands out, followed by other terms - “fruit,” “local,” and “sellers,” this topic is associated with the market's authenticity, as it sells local products, cited by tourists as: “Lively, colorful, unique! The most beautiful market I've ever visited, not to be missed! The only downside is that it's becoming a bit too touristy, I hope it doesn't lose its authenticity”; “Mercado dos Lavradores is a tourist attraction with real interest! We discovered local specialties there, it's full of flavors and colors, we meet wonderful people... In short, a real pleasure for all tourists passing through Funchal. Be careful though, the price of fruit is very high!”; and “A place full of flavors and charming, a market of local products and flower sellers in costumes typical of the region”. This outcome is in line with the previous literature, stating that tourists value authentic experiences, so purchasing local products will contribute to a positive self and social image (Joenpolvi et al., 2024; Thompson, 2020).

The literature also urges sellers to be effectively prepared to serve tourists and engage them in the market, thus increasing satisfaction (Bartis & Oberholzer, 2022; Dimitrovski & Crespi-Vallbona, 2017).

Topics 4, 5 and 6 highlight the significance of exploring the market, due to the products available for sale, namely “fruits” and fish”, offering an enhanced value area – “worth”. This is consistent with what was noted by tourists: “It's worth visiting the market just to see the building! Inside is a bustling throng of people trying to sell you things (mainly fruit but also souvenirs and fish)”; “Very interesting market full of colors, smells and flavors. You feel like buying everything: fresh and varied vegetables and fruit like nowhere else. An incredible place full of history and stories... An important market to be preserved by all of us for the Portuguese people themselves and foreigners. It's worth visiting and going shopping!”.

These markets are characterized by their authenticity and their ability to immerse tourists in local culture, demonstrating an enhanced value area (Rubio Huerta et al., 2022; Thompson, 2020). Hence, the findings imply that tourists recognize the significance of the Mercado dos Lavradores, which has an impact on the tourist experience.

B. Testing and validating the hypotheses

To validate the results obtained, the normality and homogeneity assumptions were performed. Regarding H1, satisfaction was the dependent variable, and nationality was

the independent variable. Concerning normality validation, the test was conducted on the 10 nationalities with the highest number of reviews out of a total sample of 65 nationalities. In table 4, there is a combination of results, where in some cases, the assumption of normality is not achieved. Therefore, we selected the Kruskal-Wallis test, it is a nonparametric statistical test used to determine whether the medians of two or more independent groups are significantly different, and it is considered to be an alternative of ANOVA, when data are not normally distributed (Clark et al., 2023).

Table 4: Normality test, and nationality.

Country		Normality test					
		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Sentiment Score	Belgium	0.135	84	<0.001	0.827	84	0.000
	Brazil	0.082	97	0.111	0.964	97	0.009
	France	0.041	465	0.058	0.978	465	0.000
	Germany	0.076	265	<0.001	0.948	265	0.000
	Italy	0.054	91	0.200*	0.992	91	0.887
	Netherlands	0.087	106	0.048	0.986	106	0.310
	Poland	0.052	86	0.200*	0.994	86	0.971
	Portugal	0.064	455	<0.001	0.951	455	0.000
	Spain	0.049	187	0.200*	0.993	187	0.492
	UK	0.038	894	0.003	0.974	894	0.000

* This is the lower bound of the true significance. ^a. Lilliefors Significance Correction.

Regarding the homogeneity of variances, the results indicate that the assumption of homogeneity is not satisfied, $p < 0.05$ (Table 5).

Table 5: Test of homogeneity of variances, nationality.

		Homogeneity of variances test			
		Levene statistic	df1	df2	Sig.
Sentiment Score	Mean	1.757	43	3,163	0.002
	Median	1.507	43	3,163	0.018
	Median and with adjusted <i>df</i>	1.507	43	2,649.596	0.019
	Trimmed mean	1.721	43	3,163	0.003

The assumption of homogeneity of variances is not met (Table 5), the normality test was also not completely achieved. Therefore, we selected the Kruskal-Wallis Test.

Table 6 displays the top 10 nationalities in the sample (out of a total of 65 nationalities), $p < 0.01$, the H_0 was rejected, and the alternative hypothesis was accepted which posits that there is a relationship between nationality and satisfaction. The Kruskal-Wallis test revealed that satisfaction differed across countries, $\chi^2(9) = 90.219$, $p < .001$, so H_0 was rejected, and H_1 was accepted.

Table 7 presents the country-wise comparison to compare satisfaction across nationalities. The positive test static means country1 is more satisfied and the negative test static means country1 is less satisfied. For example, Germany-France: there is a statistically significant difference in the level of satisfaction ($p = 0.011$). The positive test statistic (222.38) suggests Germany has a more positive levels of satisfaction than

France. Germany-Spain: there is a statistically significant difference in satisfaction ($p = 0.005$). The negative test statistic (-292.88) indicates Spain has a more positive level of satisfaction than Germany. The satisfaction differences between Germany and Belgium, the UK, the Netherlands, and Poland are not statistically significant ($p > 0.05$).

Table 6: Kruskal-Wallis test.

Sentiment	Country	N	Mean Rank	H	df	p
<i>M</i> = 0.176 <i>SD</i> = 0.232	Belgium	84	1,223.90	9	0.000	90.219
	Brazil	97	1,656.54			
	France	465	1,368.87			
	Germany	265	1,146.49			
	Italy	91	1,666.91			
	Netherlands	106	1,321.52			
	Poland	86	1,322.61			
	Portugal	455	1,556.85			
	Spain	187	1,439.36			
UK	894	1,276.22				

M = Mean, *SD* = Standard Deviation, *H* = Kruskal-Wallis H, *df* = degree of freedom.

Table 7: Country-wise Comparison of Satisfaction.

Country1 – Country2	Test Statistic	Standard Error	p
Germany-Belgium	77.41	98.70	1.000
Germany-UK	-129.73	55.13	0.838
Germany-Netherlands	-175.04	90.59	1.000
Germany-Poland	-176.12	97.82	1.000
Germany-France	222.38	60.67	0.011
Germany-Spain	-292.88	75.28	0.005
Germany-Portugal	-410.36	60.91	0.000
Germany-Brazil	510.05	93.54	0.000
Germany-Italy	-520.43	95.77	0.000
Belgium-UK	-52.32	89.95	1.000
Belgium-Netherlands	-97.62	115.14	1.000
Belgium-Poland	-98.71	120.92	1.000
Belgium-France	-144.97	93.45	1.000
Belgium-Spain	-215.46	103.53	1.000
Belgium-Portugal	-332.95	93.61	0.017
Belgium-Brazil	-432.64	117.48	0.010
Belgium-Italy	-443.01	119.26	0.009
UK-Netherlands	45.31	80.97	1.000
UK-Poland	46.39	88.99	1.000
UK-France	92.65	45.07	1.000
UK-Spain	163.15	63.38	0.452
UK-Portugal	280.63	45.39	0.000
UK-Brazil	380.32	84.26	0.000
UK-Italy	390.69	86.73	0.000
Netherlands-Poland	-1.09	114.39	1.000
Netherlands-France	47.35	84.84	1.000
Netherlands-Spain	-117.84	95.83	1.000
Netherlands-Portugal	-235.32	85.01	0.254
Netherlands-Brazil	335.02	110.75	0.112
Netherlands-Italy	345.39	112.64	0.098
Poland-France	46.26	92.52	1.000

Poland-Spain	-116.75	102.70	1.000
Poland-Portugal	-234.23	92.68	0.517
Poland-Brazil	333.93	116.75	0.190
Poland-Italy	344.30	118.54	0.166
France-Spain	-70.49	68.25	1.000
France-Portugal	-187.97	51.98	0.013
France-Brazil	287.67	87.98	0.048
France-Italy	-298.04	90.35	0.044
Spain-Portugal	117.48	68.47	1.000
Spain-Brazil	217.18	98.63	1.000
Spain-Italy	227.55	100.75	1.000
Portugal-Brazil	99.70	88.15	1.000
Portugal-Italy	110.07	90.52	1.000
Brazil-Italy	-10.37	115.03	1.000

p = significance based on Bonferroni correction

The results confirm H1, stating that tourists' nationality predicts visitor satisfaction at Mercado dos Lavradores. This is consistent with previous studies, affirming that nationality has a significant effect on the level of visitor satisfaction (Furtado et al., 2022; Martín et al., 2020). Thus, nationality is an influential source of satisfaction when it comes to tourist experiences (Coves-Martínez et al., 2022), demonstrating that tourists are more likely to recommend their experience to others (Vieira et al., 2021).

Regarding H2, satisfaction was the dependent variable, and the time of year was the independent variable. For the normality test (Table 8), the findings show that normality is not met in the diverse groups, therefore the data are not normally distributed. With the large sample size, ANOVA can be considered an appropriate analysis method (Rita et al., 2020).

Table 8: Normality test, time of year.

Season year		Normality test					
		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	<i>df</i>	Sig.	Statistic	<i>df</i>	Sig.
Sentiment Score	1	0.040	1001	<0.001	0.975	1001	<0.001
	2	0.046	788	<0.001	0.964	788	<0.001
	3	0.070	718	<0.001	0.959	718	<0.001
	4	0.050	721	<0.001	0.971	721	<0.001

a. Lilliefors Significance Correction

The assumption of homogeneity is met, and the p-value is greater than 0.05 (Table 9).

Table 9: Test of homogeneity of variances, time of year.

		Homogeneity of variances test			
		Levene statistic	<i>df1</i>	<i>df2</i>	Sig.
Sentiment Score	Mean	1.249	3	3,224	0.290
	Median	1.220	3	3,224	0.301
	Median and with adjusted <i>df</i>	1.220	3	3207.765	0.301
	Trimmed mean	1.236	3	3,224	0.295

Considering the findings, ANOVA is regarded as a suitable analytical technique. There are no statistically significant differences between the group means, $p > 0.05$. Therefore, the null hypothesis was confirmed, H2 was rejected, and the time of year does not predict tourist satisfaction at Mercado dos Lavradores (Table 10).

Table 10: ANOVA - time of year.

	Summer (n=1001)	Autumn (n=788)	Winter (n=718)	Spring (n=721)		
Variables	M (SD)	M (SD)	M (SD)	M (SD)	Z	p
Sentiment	0.165 (0.2307)	0.173 (0.2389)	0.171 (0.2309)	0.183 (0.2188)	0,901	0,440

Several studies indicate that tourist activity is highly susceptible to seasonal variations and satisfaction will therefore fluctuate throughout the year (Barreira & Cesario, 2018; Frleta & Jurdana, 2018; Perles-Ribes et al., 2021).

This satisfaction always varies from tourist to tourist (Frleta & Jurdana, 2018; Geng et al., 2021). However, the highest levels of satisfaction tend to be the highest in summer and spring (high season) in city contexts (Frleta & Jurdana, 2018). Studies showed that attractions in natural environments tend to present higher levels of satisfaction in the winter season (Perles-Ribes et al., 2021; Sæþórsdóttir et al., 2019). Several contemporary factors have lessened this seasonal reliance, leading to more uniform tourist satisfaction throughout the year. These results are attributed to several factors inherent not only to the Mercado dos Lavradores, as an emblematic tourist attraction in the heart of Funchal, but to the region itself.

Firstly, the Mercado dos Lavradores is renowned for its diverse offerings of fruits, vegetables, flowers, and fish supply, providing a wide range of products that are available all year (Gomes, 2019). Although, inevitably, there are seasonal variations in some products, especially fruits and vegetables, the Mercado dos Lavradores offers a unique diversity of products on offer, ensuring that there will always be something interesting for tourists no matter what time of year it is (Sousa, 2023). Secondly, besides the products offered, the building itself, the Mercado dos Lavradores has become an attraction, not solely due to its traditional architecture, but also given the energetic atmosphere (Gomes, 2019). Tourists do not only visit the shops but also want to experience firsthand the unique atmosphere and explore the Madeiran culture, linking this to special events that often take place in the market (Mercados Municipais Funchal, n.d.). Hence, this enhances the visitor's experience, and therefore it attracts tourists throughout the year.

Finally, another justification is linked to Madeira Island itself which is known for its mild climate and moderate temperatures throughout the year (Neves, 2011). Even in the winter months (the so-called low season), weather conditions are pleasant and inviting.

Therefore, all these factors together influence tourist satisfaction at Mercado dos Lavradores, regardless of the time of year.

V. Conclusions

Madeira Island and Funchal are renowned tourist destinations and play a fundamental role in the region's economics (Martins & Cró, 2021), examining tourist perceptions and their levels of satisfaction at Mercado dos Lavradores, will provide significant insights for stakeholders, destination managers and tourist attractions (Saayman et al., 2018).

Accordingly, this paper analyzes the tourists' experience at Mercado dos Lavradores, focusing on tourist perceptions and levels of satisfaction, aiming to bring valuable and strategic insights to facilitate the management of the local municipal market.

Sentiment Analysis results indicated that 79% of visitors to the Mercado dos Lavradores showed positive levels of satisfaction, with most tourists pleased with their experience at this attraction. During the year, the spring season is dominant. However, the sentiment indices are close, which implies that the Mercado dos Lavradores offers attractions that appeal to visitors regardless of the season. Additionally, tourists' satisfaction with the Mercado dos Lavradores remains constant throughout the year. Moreover, the effect of tourists' nationality was examined, primarily concentrating on Western tourists, particularly those from the United Kingdom. This is taking into consideration that it is the key export market in the region and Funchal (DREM, 2023), following Italy, was the region that showed the greatest satisfaction levels.

Theoretical implications

This study makes several contributions to the literature on international tourism. It expands our understanding of how everyday spaces, such as local markets, contribute to tourist experiences and destination image, moving beyond the traditional focus on designated heritage sites. The research adds to the body of knowledge on experiential tourism by examining how sensory experiences in a market setting influence visitor satisfaction. The finding that satisfaction remains consistent across seasons challenges existing theories about seasonality in tourism, suggesting a need for more nuanced models of temporal factors in tourist experiences. The insights of the study into the role of nationality in shaping satisfaction levels contribute to cross-cultural tourism theory, highlighting the importance of cultural background in perceiving and assessing tourism experiences. Additionally, this research provides a framework for examining the interplay between built environments, social interactions, and tourist satisfaction in non-traditional cultural spaces. This approach offers a new lens through which to study the dynamics of international tourism in everyday settings, potentially leading to more comprehensive models of tourist behavior and satisfaction in diverse cultural contexts.

Practical implications

The study on the Mercado dos Lavradores offers valuable practical insights for tourism management, particularly for the Funchal City Council (CMF) and similar entities. It highlights the potential of local markets as key attractions in international tourism. The CMF should consider developing targeted marketing strategies that showcase the market's unique atmosphere and local products, appealing to the diverse preferences of international visitors. The consistent satisfaction levels across seasons suggest an

opportunity for the CMF to promote year-round tourism, potentially through seasonal events or themed experiences at the market. Additionally, the influence of nationality on satisfaction levels indicates a need for culturally sensitive approaches in service delivery and communication at the market. The CMF could consider providing multilingual information, diverse payment options, and culturally appropriate interactions to enhance the experience for international tourists. Furthermore, the findings of the study can guide infrastructure improvements and space management at the market to better accommodate tourist flows while maintaining its authentic character. From a practical perspective, the findings of the study provide valuable insights for the international tourism industry. Understanding both the positive and negative effects of the presence of international visitors highlights the need to invest in strategies that improve the overall customer experience. Implementing training programs for staff and creating memorable interactions aligned with theatrical principles can strengthen ties with these consumers. Furthermore, recognizing the importance of the experience in encouraging return intentions provides practical guidelines for the market. Efforts to increase the perception of value in the international tourism experience, such as improving services, personalization, and cultural relevance, can directly impact international customers' revisit intentions. Thus, the insights gained can guide marketing and service development strategies, helping professionals design customer-centric experiences that not only attract, but also maintain customer loyalty over time. Finally, by considering these practical implications, tour operators can better align their offerings with customer expectations, resulting in enduring success.

Limitations and future research

Some limitations must be considered. Firstly, reviews were collected from Tripadvisor, limited to what has been published by visitors, with information that might be missing or not relevant. Future studies should collect data from other sources (e.g., Yelp, or questionnaires). Another issue is the translating process from different languages into English (after collecting data). Some reviews may have different interpretations than those in the original language. Future studies could employ translators to accurately reflect the reviews provided by non-English-speaking visitors. Also, the sentiment analysis technique is unable to discern the meanings of certain acronyms, nor the sarcasm/irony present in the reviews. Moreover, there is a 9-year variation in the data (2015 to 2024). During this period, some variations influenced the data collected, for example, the COVID-19 pandemic, which negatively affected the tourism sector. Finally, in 2024, the data is available only up to February, thus the 2024 data only encompass reviews from just two months.

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