



## Programa de Doctorado Interuniversitario en Turismo

Facultad de Turismo  
Universidad de Málaga

### **Tesis doctoral**

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## **Análisis de los efectos de la personalidad y la experiencia de marca en la intención de visitar un destino turístico**

*Analysis of the Effects of Brand Personality and  
Brand Experience on the Intention to Visit a Tourist  
Destination*

Tesis por compendio de publicaciones

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Málaga, 26 de noviembre de 2024



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EDITA: Publicaciones y Divulgación Científica. Universidad de Málaga



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Realizada bajo la dirección de SEBASTIÁN MOLINILLO JIMÉNEZ y RAFAEL ANAYA SÁNCHEZ y la tutorización de ANTONIO GUEVARA PLAZA

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## **Agradecimientos**

A mi familia, especialmente a mis padres, por apoyarme incondicionalmente, siempre, en todas mis excéntricas aventuras.

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## Listado de abreviaturas

|        |                                                                                                                                   |
|--------|-----------------------------------------------------------------------------------------------------------------------------------|
| AI:    | <i>Artificial Intelligence</i> (Inteligencia Artificial)                                                                          |
| AOI:   | <i>Area of Interest</i> (Área de Interés)                                                                                         |
| BE:    | <i>Brand Experience</i> (Experiencia de Marca)                                                                                    |
| BP:    | <i>Brand Personality</i> (Personalidad de Marca)                                                                                  |
| DBE:   | <i>Destination Brand Experience</i> (Experiencia de Marca del Destino)                                                            |
| ET:    | <i>Eye Tracking</i> (Seguimiento Ocular)                                                                                          |
| GSR:   | <i>Galvanic Skin Response</i> (Respuesta Galvánica de la Piel)                                                                    |
| LDA:   | <i>Latent Dirichlet Allocation</i> (Asignación Latente de Dirichlet)                                                              |
| NLP:   | <i>Natural Language Processing</i> (Procesamiento de Lenguaje Natural)                                                            |
| PLS:   | <i>Partial Least Squares</i> (Mínimos Cuadrados Parciales)                                                                        |
| SAT:   | <i>Sentiment Analysis Tools</i> (Herramientas de Análisis de Sentimientos)                                                        |
| SEM:   | <i>Structural Equation Modeling</i> (Modelado de Ecuaciones Estructurales)                                                        |
| SVM:   | <i>Support Vector Machines</i> (Máquinas de Soporte Vectorial)                                                                    |
| UGC:   | <i>User-Generated Content</i> (Contenido Generado por el Usuario)                                                                 |
| VADER: | <i>Valence Aware Dictionary for sEntiment Reasoning</i> (Diccionario Sensible a la Valencia para el Razonamiento de Sentimientos) |

# ABSTRACT

## 1. Introduction

This doctoral thesis is presented in the format of a compendium of three academic publications, each of which addresses a key aspect in the study of brand personality or brand experience within the context of tourism. Focusing on how these constructs influence the attraction to tourist destinations, the research is structured to offer a comprehensive and advanced perspective on tourism marketing. The first publication, corresponding to Chapter 2, establishes a solid theoretical and methodological foundation through a bibliometric analysis of the existing literature on brand personality. This analysis enables the identification of relevant scientific contributions and the detection of emerging trends in research, proposing a future agenda that integrates new technologies, such as virtual reality and artificial intelligence, into the study of brand personality in tourism.

The second publication, developed in Chapter 3, focuses on the measurement and analysis of brand experience in tourist destinations using advanced technologies such as data mining, natural language processing, sentiment analysis, topic modelling, and machine learning. This innovative methodological approach enhances objectivity and rigour in understanding brand experience, as well as identifying significant differences influenced by factors such as gender and culture. These findings are fundamental for personalising the tourism offering and developing more effective marketing strategies.

Finally, the third publication, presented in Chapter 4, explores the use of neuromarketing techniques, such as eye tracking and galvanic skin response, to investigate brand personality in the field of neurotourism. This study examines how gender differences influence visual attention and emotional response to brand values represented in logos of tourist destination brands and in images generated by artificial intelligence. The thesis as a whole offers a specialised theoretical and practical framework that drives academic advancement and also provides direct applications in the management and promotion of tourist destinations in a competitive global market.

## 2. Justification

This doctoral thesis makes an innovative and highly relevant contribution to the field of tourism marketing by effectively integrating theoretical constructs with advanced methodologies to investigate how brand personality and brand experience influence the attraction to tourist destinations. The novelty of this research is reflected in its multidimensional approach, which combines an exhaustive analysis of the existing literature, the use of advanced data analysis techniques, and the application of psychophysiological methods within the tourism context. This approach facilitates a deeper understanding of these constructs, ensures more rigorous and objective results, and allows adaptation to the current demands of the global tourism market.

The first study (Chapter 2), grounded in a rigorous bibliometric analysis using advanced analytical techniques, represents to date the most detailed and up-to-date research on brand personality. This analysis identifies both emerging trends and gaps in the literature, establishing a solid theoretical framework that will serve as a guide for future research in this field.

The second study, through the implementation of advanced technologies such as natural language processing and machine learning, introduces an innovative methodology to measure and analyse brand experience in tourist destinations, providing fundamental insights for the personalisation of the tourism offering.

Finally, the third study (Chapter 4) proposes a pioneering approach by integrating neuromarketing techniques, such as eye tracking and galvanic skin response, to analyse the emotional and visual reactions of consumers to brand stimuli in the tourism domain. This integration of multiple methodological approaches allows, on the one hand, the revitalisation of methodologies used to address the constructs of brand personality and brand experience in a more realistic, rigorous, comprehensive, and contemporary manner; and, on the other hand, expands their practical application, offering new perspectives for the development of more effective and personalised marketing strategies in the management of tourist destinations.

## 3. Objectives

The main objective of this doctoral thesis is to explore and analyse how the constructs of brand personality and brand experience shape the attraction towards tourist destinations.

This objective is addressed through three complementary studies that delve into the underlying theory and methodology, proposing and applying a clear methodological renewal to analyse these constructs.

Under the umbrella of the main objective, the thesis focuses on three specific objectives. The first seeks to establish a solid theoretical and methodological foundation for studying brand personality in the tourism domain. To this end, an exhaustive literature review is conducted through a bibliometric analysis supported by data mining and text mining techniques. The aims of this analysis are to gain a better understanding of the scientific contributions in the area, identify predominant themes and current trends, and propose a future research agenda.

The second objective is to formalise an innovative approach to measure and analyse brand experience in tourist destinations using advanced technologies such as data mining, natural language processing, sentiment analysis, topic modelling, and machine learning. This approach enhances objectivity and rigour in understanding brand experience, identifying significant differences influenced by gender and culture, which allows for more effective personalisation of tourism offerings and marketing strategies.

The third objective is to study consumers' responses to stimuli related to brand personality in the context of neurotourism, using psychophysiological techniques such as eye tracking and galvanic skin response. This approach enables the identification of visual attention patterns and emotional responses, highlighting the importance of integrating brand personality into the creation and marketing of tourism logos. This expands the field of tourism marketing by offering a deeper understanding of brand perception and tourists' decision-making processes.

#### 4. Theoretical Framework

The analysis of brand personality in tourist destinations is emerging as a fundamental field of study for understanding how tourists perceive and are attracted to a destination. Brand personality, initially conceptualised by Aaker and Fournier in the mid-1990s and later refined by Aaker in 1997, has become a key instrument for differentiation and value creation for brands. This tool not only facilitates the identification of a brand with human characteristics through five dimensions—sincerity, competence, excitement,

sophistication, and ruggedness—but also establishes a solid theoretical basis for its measurement (Aaker, 1997; Aaker and Fournier, 1995).

Ekinci and Hosany (2006) were pioneers in applying this construct to tourism, demonstrating how the brand personality of a destination can significantly influence tourists' choice of that destination. This approach allows one to go beyond tangible attractions, such as museums and monuments, to also encompass the connotations and emotions that the destination's personality evokes in visitors. This perception influences travel decisions and, moreover, contributes to the creation of a cohesive and distinctive brand experience for the tourist.

Similarly, the relevance of brand personality extends to various actors within the tourism sector, including service companies such as restaurants (e.g., Chua *et al.*, 2019; Lee *et al.*, 2009), hotels (e.g., Lee and Back, 2010; Li *et al.*, 2020), and airlines (e.g., Cervera-Taulet *et al.*, 2013; Kotsi and Valek, 2018), where it has been demonstrated that a well-defined and coherent brand personality enhances customer attraction and retention. Therefore, understanding and effectively managing the brand personality of a tourist destination, in addition to enriching the identity and positioning of the destination, boosts the intention to visit, thus delineating an essential area of study to maximise attractiveness and competitiveness in the global tourism arena.

The construct of destination brand experience is based on the brand experience theory proposed by Brakus *et al.* (2009), which conceptualises brand experience in four fundamental dimensions: sensory, affective, intellectual, and behavioural. According to this theory, tourists interact with a destination in a multidimensional manner, and these interactions shape their overall perception of the destination's brand by influencing their perceptions, behaviours, and emotions towards the brand.

Destination brand experience refers to the cumulative perception and emotional response that a tourist forms through direct or indirect interaction with the brand identity of a destination. These interactions encompass all touchpoints, including cultural attributes, natural landscapes, amenities, customer service, marketing communications, and personal experiences. This comprehensive approach turns destination brand experience into a valuable tool for evaluating and enhancing travellers' experiences with destination brands, which has a significant impact on destination selection, tourist satisfaction, and loyalty,

profoundly influencing the success of tourism marketing strategies (Boo *et al.*, 2009; Barnes *et al.*, 2014; Kumar and Kaushik, 2018).

The theoretical development of destination brand experience has evolved over time. In 2008, a seminal study introduced a destination brand model, underscoring the importance of destination-specific elements in brand equity (Boo *et al.*, 2008). Subsequently, the role of narrative in shaping destination brand experiences was accentuated. A netnographic analysis of travel blogs about South American cities demonstrated how stories and personal accounts shared online can mould the perception of the destination's brand (Colt, 2011). In 2014, the relevance of sensory experiences within the framework of destination brand experience and their influence on revisit intentions and word-of-mouth recommendations was emphasised (Barnes *et al.*, 2014).

Studies on brand experience have predominantly employed traditional methodological approaches, often relying on surveys conducted with Western participants, which has attracted criticism due to their limited scope (Boo *et al.*, 2009; Barnes *et al.*, 2014; Martins *et al.*, 2021). For instance, Boo *et al.* (2009) assessed the destination brand experiences of Las Vegas and Atlantic City using online surveys restricted to members of a specific database, primarily comprising Western individuals. Similarly, Barnes *et al.* (2014) analysed the destination brand experience of the Swedish city of Lund through surveys of Swedish, Danish, and German visitors. Martins *et al.* (2021) examined the destination brand experience of a Portuguese national park with respondents from the same nation. These studies highlight broader concerns regarding potential bias and the limited applicability of research involving mainly Western participants, suggesting the need for a more diverse and global approach in destination brand experience research.

Recent literature on destination brand experience shows significant theoretical expansion, although not as much in the methodological domain. Studies such as that of Yu *et al.* (2022) have highlighted the importance of destination brand experience in brand authenticity and its influence on consumer loyalty. Similarly, Lin *et al.* (2023) explored the application of a brand experience model to assess competitive differentiation and brand positioning in tourism, emphasising the affective and sensory dimensions of brand experience. This multidimensional approach was further expanded in the study by Ngwira *et al.* (2023), who suggested the inclusion of relational and spiritual dimensions in the destination brand experience model, especially relevant in the post-pandemic tourism context.

## 5. Methodologies

In the first study (Chapter 2), a solid theoretical foundation for the study of brand personality is established, with particular emphasis on the tourism context, through an extensive bibliometric analysis supported by data mining and text mining techniques. This analysis examines over a thousand articles to recapitulate the historical trajectory and fundamental dimensions of brand personality.

This methodology, known as bibliometrics, aims to evaluate the impact of academic works, discern publication patterns across various academic disciplines, and trace the evolution of scientific knowledge over time. It employs various metrics; for example, citation analysis examines how frequently a document is cited by others, serving as an indicator of its academic impact or importance within a scientific community.

Bibliometric analysis was chosen because techniques like data mining, text mining, and clustering have a great capacity to handle extensive databases, facilitating the identification of trends and patterns not immediately apparent. This is essential for a comprehensive understanding of the current state, evolution, and less explored areas within a specific field of study. It also highlights changes and trends within the field, allowing predictions of future directions by analysing rising and declining topics. Finally, it identifies significant knowledge gaps, guiding future research.

Subsequently, in Study 2 (Chapter 3), the thesis formalises an innovative approach to measure and analyse brand experience in tourist destinations using advanced technologies such as data mining, natural language processing, sentiment analysis, topic modelling, and machine learning. These techniques offer improvements in the objectivity and rigour of understanding brand experience.

Natural language processing (NLP), a subdivision of artificial intelligence, plays a crucial role in enhancing human-computer interaction by enabling computers to effectively understand and generate human language. In the tourism sector, NLP presents itself as an indispensable tool for analysing global travel trends and preferences (Arefeva and Egger, 2022). The analysis of linguistic data from various sources, such as traveller reviews and social media posts, allows the identification of preference patterns towards certain destinations or experiences, offering valuable insights for tourism professionals to customise their services (Hirschberg and Manning, 2015). The computational evaluation

of emotions and opinions, known as sentiment analysis, constitutes a specialised field within natural language processing.

This approach is dedicated to discerning and categorising emotions expressed in texts to determine the polarity of users' opinions towards specific objects, topics, or entities. It is based on advanced techniques of natural language processing, machine learning, and text analysis to discover and compile subjective opinions from vast data sets (Agarwal *et al.*, 2011; Liu, 2012).

In an effort to innovate in the application of sentiment analysis to tourism in this second study, SentiArt—a technique originally designed for the field of neurocognitive poetics (Jacobs, 2019)—has been employed to examine tourists' reviews. SentiArt, which operates using vector space models and does not require human classification data, calculates the semantic relationships between words and their positive or negative valences. This process results in the generation of numerical variables that quantify various emotional states such as happiness, anger, or disgust, providing a powerful tool for analysing travellers' reviews and thus offering a deeper perspective on their experiences and perceptions.

Machine learning, considered a subdiscipline of artificial intelligence, specialises in designing algorithms capable of learning and evolving from data and prior experiences (Bangare *et al.*, 2022). Its application in tourism has enabled the analysis of extensive datasets to gain insights, optimising service personalisation and strategic decision-making.

Finally, in Study 3 (Chapter 4), the intersection between neurotourism and brand personality is explored using psychophysiological techniques such as eye tracking and galvanic skin response, analysing consumers' reactions to tourist destination brand logos and visuals generated by artificial intelligence.

Eye tracking has established itself as an efficient technique both in the usability of products and services and in tourism research. This technique, based on the pioneering studies of Just and Carpenter (1980), uses infrared lights to analyse the direction and fixation of gaze on computer screens, revealing areas of interest and attention patterns during various tasks (Duchowski, 2002). Thus, eye tracking provides a unique window into individuals' cognitive processes and underlying motivations, allowing observation of how potential tourists view and process visual information, which is crucial for

optimising marketing strategies and enhancing user experience on digital tourism platforms (Scott *et al.*, 2020). Bibliometric studies on eye tracking in the field of tourism show annual growth in research, highlighting the increasing relevance of this methodology for understanding behaviours such as user satisfaction and the usability of tourism websites (Atabay and Güzeller, 2021).

This methodology is not limited to observing visual behaviour but is also complemented by other biometric tools such as galvanic skin response, which measures variations in the skin's electrical conductance caused by the activity of sweat glands, for a more comprehensive study of users' emotional and cognitive responses to stimuli (Ngan and Yu, 2019). This synergy between both techniques is opening new avenues in tourism research, allowing for an understanding of not only where and how attention is directed but also the emotions and motivations underlying these visual responses.

## 6. Results

In the first study (Chapter 2), it is observed that scientific production on brand personality from 1987 to 2022 has shown a consistent increase in annual publications. However, the impact of these publications, measured by citation count, correlates more with the relevance and originality of the contributions than with the total volume of articles. Among the most cited works are Aaker's seminal 1997 study introducing the dimensions of brand personality and Fournier's 1998 work. The research conducted during the early years laid the foundations for the study of brand personality and had a significant impact on the literature. Notable contributions include those of Aaker *et al.* (2001), who utilised the brand personality scale to demonstrate the cross-cultural importance of brand consumption; Aaker *et al.* (2004) examined the impact of brand personality on consumer–brand relationships; Pappu *et al.* (2005) introduced a consumer-based brand equity scale; Kressmann *et al.* (2006) analysed the effects of self-image congruence on brand loyalty; and Hosany *et al.* (2006) and Ekinci and Hosany (2006) explored brand personality in tourist destinations, a novel application at that time.

Research on brand personality has evolved towards the validation and adaptation of the original scale in different contexts, as well as towards the proposal of new conceptualisations and scales. Despite its foundational character, this scale has been subject to criticism due to concerns about its reliability and validity in different sectors

and cultures. These criticisms have generated a debate on the need to develop specific scales for each context or the possibility of employing a universal scale. The cultural adaptation of brand personality scales presents a considerable challenge, given that the dimensions of brand personality can vary significantly between cultures, influenced by each culture's vocabulary and values.

The methodologies used in studies on brand personality have been mostly quantitative, based on surveys. Aaker (1997) collected data through a five-point Likert scale survey in a representative sample of the United States. Aaker *et al.* (2001) and Aaker *et al.* (2004) employed personal and online surveys to examine cultural variations and consumer–brand relationships. Kressmann *et al.* (2006) evaluated self-image congruence through telephone surveys. Hosany *et al.* (2006) utilised personal surveys to analyse the relationship between destination image and destination personality. Malär *et al.* (2011) explored self-congruence and consumer attachment to brands through online surveys.

The analysis of the intellectual structure of research on brand personality produced four distinct groups: one set of works providing the theoretical basis for research on the subject, such as measurement scales and dimensions of brand personality; another group linking a wide range of topics related to communication and purchase intention, among others; a third group addressing methodologies and constructs of brand relationships (e.g., trust, attachment, identification); and a fourth group strongly focused on applying brand personality to tourist destinations.

Research topics on brand personality have evolved unevenly. Between 1997 and 2006, there was a notable increase in academic impact, with innovative research establishing the theoretical and conceptual framework of brand personality. During this time, branding and the personality of tourist destinations emerged as key areas. From 2007 to 2016, the literature on brand personality grew exponentially, diversifying into areas such as brand communication, brand image and identity, and brand management. Between 2017 and 2022, research consolidated, although with less academic influence, focusing on topics such as generic branding, consumer behaviours, brand loyalty, brand experience, and the influence of social networks, in addition to exploring niches like political brand personality and consumer engagement.

In the second study (Chapter 3), focused on investigating the dimensions of destination brand experience, the generative Latent Dirichlet Allocation (LDA) model was applied

for topic modelling of various cultural, experiential, and transport elements in the city of Turin. Through this approach, several main thematic areas were identified for each element, with associated keywords that highlighted the key aspects of the respective topics. For example, themes related to the Egyptian Museum included valuable experiences such as “interesting”, “complete”, “beautiful”, “Egyptian”, “value”, and “treasures”, as well as uncomfortable feelings like “shame”, “shameless”, “colonist”, “scandal”, and “stolen”.

Subsequently, advanced sentiment analysis tools were utilised, implementing the model and lexical database of the Valence Aware Dictionary for sEntiment Reasoning (VADER) (Borg and Boldt, 2020), along with SentiART, a multivariable SAT tool, to evaluate lexical and interlexical characteristics (Jacobs, 2019) in the analysed elements. The results showed an increase in positive sentiment, peaking in 2020, while negative sentiment remained stable. This suggests that visitors' experiences have been predominantly positive regarding this tourist attraction. Furthermore, the analysis of emotional components revealed continuous growth in “happiness”, which peaked in 2021, in contrast to a decrease in emotions such as “anger”, “fear”, and “disgust”. This increase in positivity and happiness could enhance the destination brand experience in Turin, promoting repeat visits and generating positive reviews. Additionally, stability was observed in “sadness” and variations in “surprise” over time, possibly reflecting the spiritual and historical resonance of the Shroud of Turin, evoking complex emotional reactions in visitors.

Finally, hypothesis testing using Student's t-test to investigate variations in the dimensions of destination brand experience according to the main categories of “culture”, “experience”, and “transport” also provided interesting data. In cross-cultural comparisons, notable differences were detected in the affective dimension of the Shroud of Turin among Western groups. These differences in the affective dimension could be explained by cultural variations in value systems and beliefs (Hofstede, 1980), as well as by religious differences and religious education that influence the perception of this relic (Tsai, 2007). Additionally, differences were detected in the intellectual dimension during visits to the Egyptian Museum between Western and Eastern groups.

In the third study (Chapter 4), the exploration of emotional responses and visual attention to destination brand logos, which embody dimensions of brand personality, revealed

significant differences in the way genders visually process logos associated with the dimensions of “Sophistication” and “Sincerity”.

In terms of visual attention, a tendency was observed among women to direct their attention more quickly towards logos that evoke “Sophistication”, for example, that of Stockholm. Moreover, women fixated on these stimuli more rapidly and tended to inspect the logos more thoroughly and for longer periods, which was reflected in a higher number of fixations.

On the other hand, men showed a more homogeneous visual reaction towards the Glasgow logo, associated with “Sincerity”, suggesting a more consistent but less intense pattern of attention. The heat map supported this observation, showing a notable difference in the intensity of attention between the Stockholm (“Sophistication”) and Glasgow (“Sincerity”) logos. While the Stockholm logo captured attention more diffusely, possibly due to the cognitive complexity required by its more elaborate design, the Glasgow logo concentrated attention at its centre, suggesting more direct and effective communication. Additionally, a distinct physiological response was observed between the Stockholm and Glasgow logos. The Stockholm logo elicited a more intense emotional response, measured through galvanic skin response, which could be attributed to the perception of exclusivity, elegance, and prestige associated with the “Sophistication” dimension.

Regarding the “Ruggedness” dimension, represented by the Lyon logo, a higher intensity of fixations was observed on the image of the lion, a symbol laden with visual and cultural significance. This symbol of strength and power appears to provoke an optimal level of arousal, attracting and retaining the viewer's attention. Men, in particular, showed a much higher average number of fixations compared to women, suggesting a greater male identification with the attributes of “Ruggedness”, reinforced by the symbolism of the lion, traditionally aligned with masculinity

Finally, when analysing the images generated by artificial intelligence that represented each dimension of brand personality, it was found that men exhibited greater physiological activation, with a higher average range of galvanic skin response. The “Excitement” dimension stood out for eliciting a greater response compared to other dimensions. Similarly, the “Sincerity” dimension showed a distinct pattern of reaction and attention, evidenced by the number of fixations and the average duration of the first

fixation. The “Ruggedness” dimension also revealed differences in attention between men and women, with men demonstrating greater attention towards these stimuli. These findings underscore the importance of considering gender differences in logo design and branding strategies to effectively communicate the desired dimensions of brand personality.

## 7. Conclusions

Regarding the first study (Chapter 2), which conducts an exhaustive literature review through a bibliometric analysis using data mining and text mining techniques, the analysis of the four thematic clusters and strategic theme diagrams, along with the new trends presented at the International Marketing Trends Conference, has enabled us to propose a future research agenda for brand personality. This agenda will include key topics such as the crucial role that technology will play in the development of studies on brand personality, encompassing consumer interactions with virtual and augmented reality, big data, artificial intelligence, 5G technologies, and the metaverse. Researchers will have the opportunity to explore how these technologies impact brand personality in omnichannel contexts, as demonstrated by the study of Choi *et al.* (2022), which investigated the interactive effects between brand personality and the type of service robot.

During the recent pandemic, the use of the internet and social networks experienced a significant increase. This growth anticipates a greater exploration of how brand personality is communicated and perceived on social media across various industries. Despite having been addressed over the past 36 years, these topics still present unexplored potential and are emerging as new lines of research in brand personality. In the coming years, differential growth is anticipated in various industries, facing new challenges. For example, in the tourism industry, paralysed by the invasion of Ukraine, the focus will be on how brand personality can help revitalise tourism activity, investigating its application in immersive experiences and the interaction between the physical or digital dimensions of destinations.

With reference to the second study (Chapter 3), the influence of cultural and gender factors on visitors' perception and experience at different cultural sites in Turin is highlighted. For example, the Western tradition of valuing historical heritage and familiarity with Egyptian art can intensify interest and intellectual experience at the

Egyptian Museum. Moreover, cognitive differences between Eastern and Western cultures, such as the analytical approach in Westerners and the holistic approach in Easterners (Nisbett *et al.*, 2001; Nisbett and Masuda, 2003), affect the perception of the museum. In terms of gender, women tend to experience more intense and varied emotions at the Mole Antonelliana monument, which could be attributed to cultural, social, or biological influences on emotional expression (Fisher and Dubé, 2005; Brody and Hall, 2000). Additionally, differences in gender socialisation influence emotional expectations related to different components of the destination brand experience (Kimmel, 2000). Regarding the dimensions of brand experience in Turin, the Shroud of Turin and the Royal Palace stand out for their high emotional connection, aligning with previous studies that emphasise the importance of emotional experiences in shaping consumer attitudes and behaviours (Bagozzi *et al.*, 1999). In the behavioural dimension, the Bicerin, a traditional beverage, has a significant impact, while Porta Nuova Station shows a lesser effect on tourist behaviour, being viewed more as a transit point (Lyons and Chatterjee, 2008).

The Shroud of Turin also excels in the intellectual dimension, reflecting its historical and religious relevance, thereby increasing visitors' interest (Keller, 1993; Petty and Cacioppo, 1986). In the sensory dimension, Gianduja offers a richer experience compared to the Egyptian Museum, given that sensory stimulation in a museum tends to be less intense compared to places involving a greater variety of stimuli such as tastes, smells, and sounds (Hultén *et al.*, 2009; Krishna, 2012; Lindstrom, 2005; Spence *et al.*, 2014).

Finally, the machine learning classifier employed to analyse how the textual characteristics of the dimensions of brand experience can differentiate between categories showed variations in its accuracy. The model performed well in classifying the Egyptian Museum, the Mole Antonelliana, and the Royal Palace, although it exhibited confusion between some classes, especially between the airport and the Egyptian Museum.

In the first study of the thesis (Chapter 2) on brand personality, it was revealed that this construct has been predominantly dominated by quantitative methodologies based on surveys. Therefore, following this line, it became evident that a methodological renewal could foster new approaches and findings. For this reason, in the third study (Chapter 4) that concludes the thesis by a compendium of publications, it is proposed to revitalise studies on the construct using neuromarketing techniques, specifically eye tracking and galvanic skin response.

Research employing psychophysiological techniques on tourist destination brands and visuals generated with artificial intelligence, which represent different dimensions of brand personality, has revealed significant differences between genders and/or dimensions. These findings suggest that certain dimensions of brand personality can influence the ability to capture and retain attention, as well as generate differentiated emotional responses. From a neuroscientific perspective, the variations observed in the number of fixations between men and women may reflect intrinsic differences in the neurological processes involved in visual and symbolic perception. In this sense, a predisposition of the female gender has been identified to direct attention more immediately towards destination brand logos that evoke the dimension of “Sophistication”. Conversely, the male gender shows a tendency to focus their attention more immediately on logos that evoke the dimension of “Ruggedness”.

Moreover, men exhibit a higher galvanic skin response to the same stimuli, specifically to the images generated with artificial intelligence that represent each of the dimensions of brand personality. These results have important implications for the design of brand logos and for the development of branding strategies that aim to effectively communicate the desired dimensions of brand personality. Adapting design and visual communication to these gender differences can contribute to greater effectiveness in conveying the values and attributes associated with the brand.

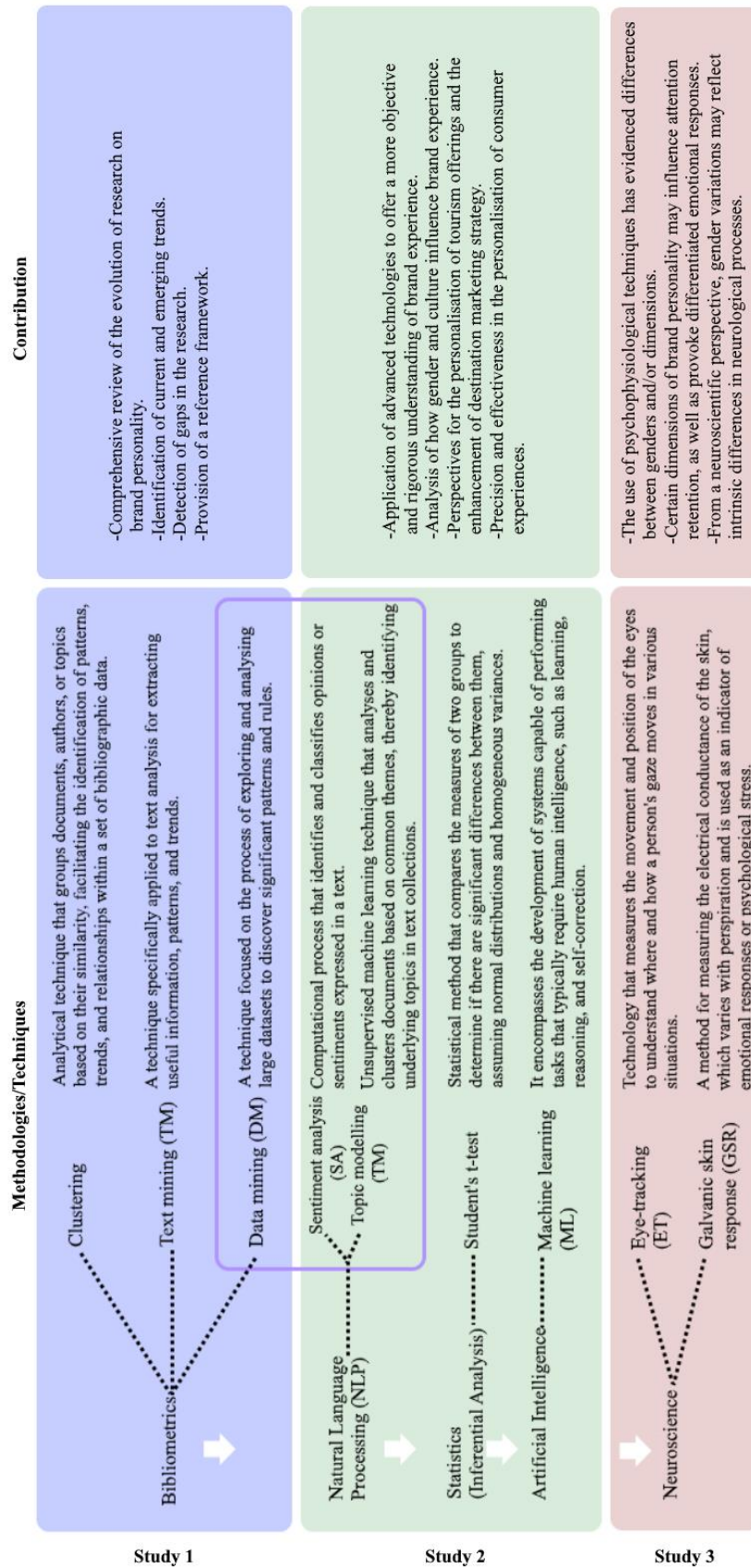
The convergence of these three studies underscores the importance of understanding brand personality and brand experience as strategic pillars in the promotion and management of tourist destinations. Each study, with its methodology, specific techniques (see Figure 1), and particular focus, contributes to a comprehensive understanding of how brand personality and brand experience influence the intention to visit a destination, providing both methodological advances and practical applications for the tourism sector. This thematic integration highlights the importance of adapting and personalising tourism marketing strategies to effectively connect with the motivations, perceptions, and emotions of tourists in an increasingly competitive global market.

#### Keywords

Brand Personality, Brand Experience, Bibliometric Analysis, Data Mining, Text Mining, Machine Learning, Natural Language Processing, Sentiment Analysis, Topic Modelling,

Neuromarketing, Eye Tracking, Galvanic Skin Response, Tourism Industry, Tourist Destinations, Tourism Marketing

Figure 1: Scheme of Studies, Techniques, and Contribution



# CAPÍTULO 1

## Introducción

## 1. Contextualización de la investigación

La presente tesis doctoral se sumerge en la esencia de cómo los constructos de personalidad de marca (*brand personality*) y experiencia de marca (*brand experience*) configuran la atracción turística de los destinos. Esta tesis doctoral se presenta en formato de compendio de tres publicaciones académicas, cada una de las cuales aborda un aspecto clave en el estudio de la personalidad de marca o la experiencia de marca en el contexto del turismo. La primera publicación, titulada *Brand personality: current insights and future research directions*, se desarrolla en el capítulo 2, y establece las bases teóricas y metodológicas del análisis de la personalidad de marca. La segunda publicación, que corresponde al capítulo 3 y lleva por título *Understanding Destination Brand Experience through Data Mining and Machine Learning*, explora la experiencia de marca en destinos turísticos mediante la aplicación de técnicas avanzadas de análisis de datos. Finalmente, la tercera publicación, titulada *Neurotourism Insights: Eye Tracking and Galvanic Analysis of Tourism Destination Brand Logos and AI Visuals*, se presenta en el capítulo 4, y ofrece una perspectiva innovadora sobre el neuroturismo utilizando técnicas de neuromarketing. Este compendio secuencialmente estructurado proporciona una visión integral y enriquecida sobre cómo la personalidad y la experiencia de marca configuran la atracción turística en destinos, ofreciendo tanto un marco teórico sólido como aplicaciones prácticas para la gestión de marcas turísticas.

## 2. Análisis y detección de vacíos de investigación

Sin embargo, a pesar de la relevancia reciente y creciente de estos temas, como el neuroturismo, ejemplificado en los estudios de Li *et al.* (2023) o Cardoso *et al.* (2024), existe un vacío significativo en la literatura académica que esta investigación busca llenar. En particular, no se ha explorado suficientemente la integración de tecnologías avanzadas y metodologías innovadoras para el análisis de estos constructos, así como la forma en que factores como género y cultura influyen en la percepción y experiencia de marca en el ámbito turístico.

El primer vacío de investigación identificado se refiere a la evolución teórica y metodológica de la personalidad de marca en el turismo. A pesar del extenso cuerpo de literatura existente, se identifican varios vacíos que aún no han sido explorados en

profundidad. Por ejemplo, la insuficiente atención a la diversidad cultural en los estudios de personalidad de marca. La mayoría de los estudios se ha centrado en contextos occidentales, particularmente en Estados Unidos (por ejemplo, Aaker, 1997; Siguaw *et al.*, 1999; Freling y Forbes, 2005; Geuens *et al.*, 2009), lo que limita la comprensión de cómo la personalidad de marca se manifiesta y se percibe en otras culturas. Este enfoque predominantemente occidental sugiere la necesidad de realizar investigaciones más amplias y diversas que incluyan contextos culturales asiáticos, africanos y latinoamericanos, para aumentar la validez del constructo y ofrecer una visión más global de su funcionamiento.

Aunque la personalidad de marca ha sido ampliamente estudiada en otros contextos, su aplicación específica en el turismo y su adaptación a las dinámicas cambiantes de esta industria no han sido suficientemente exploradas. La primera publicación de esta tesis utiliza una revisión bibliométrica extensa, apoyada en técnicas de *data mining* (minería de datos) y *text mining* (minería de texto), para sentar las bases teóricas de esta investigación. Este enfoque no solo recapitula la trayectoria histórica y las dimensiones fundamentales de la personalidad de marca, sino que también identifica tendencias emergentes como la aplicación de la personalidad de marca en la realidad virtual y la inteligencia artificial (por ejemplo, Vernuccio *et al.*, 2021). Esta revisión revela la necesidad de adaptar la teoría de la personalidad de marca a las nuevas tecnologías y medios digitales, un área que ha recibido poca atención en la literatura existente.

El segundo vacío de investigación se encuentra en la medición y análisis de la experiencia de marca en destinos turísticos utilizando tecnologías avanzadas. La segunda publicación de la tesis aborda esta brecha mediante el desarrollo de un enfoque innovador que emplea *data mining* (minería de datos), *natural language processing* (NLP) (procesamiento de lenguajes naturales, PLN), *sentiment analysis* (análisis de sentimientos), *topic modeling* (modelado de temas) y *machine learning* (aprendizaje automático). A pesar de la creciente importancia de la experiencia de marca (Motta-Filho, 2021), los estudios que combinan estas técnicas avanzadas para analizar las opiniones de los visitantes y proporcionar un análisis profundo sobre cómo los turistas experimentan y se relacionan con los destinos son escasos.

Además, este estudio profundiza en cómo las diferencias de género y cultura influyen en la experiencia de marca, ofreciendo una comprensión más rica y matizada de estos

factores, que es crucial para la personalización de la oferta turística y la estrategia de marketing.

Finalmente, el tercer vacío significativo se encuentra en la aplicación de metodologías emergentes y tecnológicas en el estudio de la personalidad de marca. Aunque ha habido intentos recientes de integrar técnicas como el *sentiment analysis* y el *machine learning* (por ejemplo, Lelis, 2021), todavía existe una falta de estudios que empleen métodos de neuromarketing, como el eye tracking (seguimiento ocular) y la galvanic *skin response* (respuesta galvánica de la piel), en la evaluación de la percepción de la personalidad de marca. Estas técnicas pueden proporcionar datos más precisos y objetivos sobre las respuestas emocionales y visuales de los consumidores, superando las limitaciones de los métodos de autorreporte tradicionales (Scott *et al.*, 2020; Schwarz, 1999). La aplicación de estas tecnologías en el estudio de marcas de logos turísticos y otros elementos visuales de marca podría revelar conocimientos críticos o útiles sobre cómo se capturan y retienen la atención y las emociones de los consumidores, ofreciendo una base sólida para el desarrollo de estrategias de marketing más personalizadas y efectivas.

Por ello, la presente tesis doctoral llena un importante vacío crítico en la literatura académica al integrar nuevas tecnologías y metodologías avanzadas para el estudio de la personalidad de marca y la experiencia de marca en el turismo. Al hacerlo, ofrece un marco teórico y práctico especializado que puede orientar la investigación futura y apoyar las prácticas de marketing en la industria turística, proporcionando herramientas y conocimientos que faciliten a los destinos adaptarse a las dinámicas cambiantes del mercado y responder de manera más efectiva a las expectativas de los turistas. Esta tesis doctoral tiene como objetivo principal explorar y analizar cómo los constructos de personalidad de marca y experiencia de marca configuran la atracción turística de los destinos. Este objetivo se aborda a través de tres estudios que no solo profundizan en la teoría y la metodología subyacente, sino que, a su vez, aplican innovadoras técnicas neurocientíficas para entender mejor la toma de decisiones de los turistas.

### **3. Preguntas de investigación**

A pesar de que la personalidad de marca ha sido objeto de numerosos estudios en otros ámbitos, su aplicación particular en el sector turístico y su ajuste a las dinámicas en

constante evolución de esta industria no habían sido investigados en profundidad. Este vacío de investigación se relacionó directamente con las preguntas y objetivos del primer estudio de la siguiente manera:

En primer lugar, se planteó la pregunta: “¿Cuál es el rendimiento (productividad e impacto) de los autores y revistas relevantes en la investigación sobre personalidad de marca?”. Para abordar la limitada atención a la diversidad cultural y la concentración en contextos occidentales, esta pregunta evaluó el rendimiento y el impacto de las contribuciones científicas en el campo de la personalidad de marca. Al analizar la productividad e impacto de los autores y revistas, el estudio identificó si las investigaciones estaban diversificadas culturalmente o si estaban predominantemente centradas en estudios occidentales. Esto proporcionó una base para entender la necesidad de ampliar la investigación hacia contextos culturales no occidentales, tal como se había identificado en el vacío de investigación.

En segundo lugar, se formuló la pregunta: “¿Cuáles son las interacciones intelectuales y las conexiones estructurales entre autores y temas en la investigación sobre personalidad de marca?”. Esta pregunta buscó desentrañar las interacciones intelectuales y las conexiones estructurales en la investigación sobre personalidad de marca, lo que fue esencial para identificar si las teorías y metodologías predominantes estaban adaptadas o eran aplicables a diferentes contextos culturales.

Finalmente, se exploró la pregunta: “¿Qué investigaciones han fundamentado el constructo de personalidad de marca?”. Al investigar las contribuciones clave que habían fundamentado el concepto de personalidad de marca, esta pregunta permitió identificar si estas investigaciones habían considerado su aplicación en diferentes sectores, incluido el turismo. Esto fue fundamental para adaptar la teoría de la personalidad de marca a nuevos contextos culturales y tecnológicos, como la realidad virtual y la inteligencia artificial. Este enfoque permitió abordar de manera integral los vacíos identificados en la literatura, proporcionando una base sólida para futuras investigaciones en el campo de la personalidad de marca en el turismo.

El segundo vacío identificado en esta investigación se relacionó con la necesidad de avanzar en la medición y análisis de la experiencia de marca en destinos turísticos, especialmente mediante el uso de tecnologías avanzadas. Este vacío impulsó la

formulación de preguntas de investigación específicas que buscan abordar las limitaciones actuales y explorar nuevas oportunidades en este campo.

Primero, se planteó la pregunta: “¿Cómo pueden las técnicas de *sentiment analysis*, *topic modeling*, y *machine learning* mejorar la medición y análisis de la experiencia de marca de un destino en comparación con enfoques tradicionales?”. Esta pregunta fue diseñada para explorar el valor añadido que aportan las técnicas modernas de análisis de datos. Considerando que el vacío identificaba la escasez de estudios que combinan estas técnicas avanzadas, esta pregunta permitió evaluar cómo herramientas innovadoras como el *sentiment análisis* o el *machine learning* pueden superar las limitaciones de los enfoques tradicionales, proporcionando análisis más precisos y profundos sobre la experiencia de los turistas en un destino.

En segundo lugar, se formuló la pregunta: “¿Cómo influyen las dimensiones sensorial, afectiva, intelectual y conductual en la percepción y experiencia de marca de un destino turístico?”. Esta pregunta está directamente relacionada con la necesidad de comprender cómo las distintas dimensiones de la experiencia de marca afectan la percepción global de los visitantes. Al explorar estas dimensiones, el estudio pudo proporcionar una visión más detallada de cómo los turistas interactúan con un destino, lo que es crucial para desarrollar estrategias de marketing más efectivas y adaptadas a las expectativas de los consumidores.

Finalmente, la pregunta: “¿Qué diferencias existen en la experiencia de marca de un destino turístico cuando se consideran factores de género y cultura?” abordó la importancia de considerar variables demográficas y culturales en la evaluación de la experiencia de marca. Dado que el vacío identificó una falta de comprensión sobre cómo género y cultura influyen en la experiencia de marca, esta pregunta permitió investigar estas variaciones, ofreciendo una comprensión más rica y matizada que es esencial para personalizar las ofertas turísticas y mejorar la relevancia cultural de las estrategias de marketing.

El tercer vacío identificado en esta investigación se centró en la falta de estudios que integraran metodologías emergentes y tecnologías avanzadas en el análisis de la personalidad de marca, especialmente en el contexto del turismo. Este vacío motivó la formulación de preguntas de investigación que buscaban comprender mejor cómo las

dimensiones de la personalidad de marca influyen en las reacciones visuales y emocionales de los consumidores, utilizando herramientas avanzadas como el *eye tracking* y la *skin galvanic response*.

Primero, se planteó la pregunta: “¿Cómo influyen las diferentes dimensiones de la personalidad de marca (sinceridad, emoción, sofisticación, competencia y robustez) en la atención visual y la respuesta emocional de los consumidores hacia los logotipos de marcas de destinos turísticos?”

Esta pregunta abordó la necesidad de explorar cómo las distintas dimensiones de la personalidad de marca afectan la atención y las emociones de los consumidores, empleando técnicas de neurociencia para obtener datos más precisos y objetivos que los métodos tradicionales de autorreporte.

En segundo lugar, se formuló la pregunta: “¿Existen diferencias significativas en la percepción y reacción emocional hacia los logotipos de destinos turísticos basadas en el género de los consumidores?”. Esta pregunta permitió analizar si el género influye en cómo los consumidores perciben y reaccionan emocionalmente ante los logotipos, lo que es crucial para desarrollar estrategias de marketing más personalizadas.

Finalmente, se exploró la pregunta: “¿Qué patrones de atención visual y activación emocional se observan al exponer a los consumidores a imágenes generadas por inteligencia artificial que representan las dimensiones de la personalidad de marca de un destino turístico?”. Esta pregunta investigó cómo las imágenes generadas por inteligencia artificial, que reflejan distintas dimensiones de la personalidad de marca, afectan la atención y la activación emocional de los consumidores, lo que podría ofrecer nuevos conocimientos para el diseño de elementos visuales más efectivos en la promoción de destinos turísticos.

Tabla 1. Resumen de las preguntas de investigación por estudios

| Estudio                                     | Preguntas de investigación                                                                                                                                                                                                                                                                      |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Estudio 1: Personalidad de marca en turismo | <ol style="list-style-type: none"> <li>1. ¿Cuál es el rendimiento (productividad e impacto) de los autores y revistas en la investigación sobre personalidad de marca?</li> <li>2. ¿Cuáles son las interacciones intelectuales y las conexiones estructurales entre autores y temas?</li> </ol> |

|                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                        | 3. ¿Qué investigaciones han fundamentado el constructo de personalidad de marca?                                                                                                                                                                                                                                                                                                                                                                                             |
| Estudio 2: Experiencia de marca en destinos turísticos | 1. ¿Cómo pueden el <i>sentiment analysis</i> , el <i>topic modeling</i> y el <i>machine learning</i> mejorar la medición de la experiencia de marca en destinos turísticos frente a enfoques tradicionales?<br>2. ¿Cómo influyen las dimensiones sensorial, afectiva, intelectual y conductual en la percepción de la marca de un destino turístico?<br>3. ¿Qué diferencias existen en la experiencia de marca en función del género y la cultura?                           |
| Estudio 3: Neuroturismo y personalidad de marca        | 1. ¿Cómo influyen las dimensiones de la personalidad de marca en la atención visual y la respuesta emocional hacia los logotipos de marcas de destinos turísticos?<br>2. ¿Existen diferencias significativas en la reacción emocional hacia logotipos basadas en el género de los consumidores?<br>3. ¿Qué patrones de atención visual y activación emocional surgen al exponer a los consumidores a imágenes generadas por IA sobre la personalidad de marca de un destino? |

### 3. Justificación de la necesidad de la investigación

La globalización y la competitividad del mercado turístico exigen una diferenciación clara y efectiva de los destinos, lo cual se logra a través de una gestión estratégica de la personalidad y experiencia de marca. Estos constructos, además de permitir atraer y retener turistas, contribuyen a la creación de una imagen de destino cohesiva y distintiva.

La personalidad de marca se refiere a los atributos humanos asignados a una marca, permitiendo que los consumidores establezcan una conexión emocional con ella. En el contexto del turismo, una personalidad de marca bien definida puede influir significativamente en la elección de los turistas al crear una identidad única que destaque frente a otros destinos similares. Según Aaker (1997), los consumidores prefieren marcas cuyas personalidades reflejan sus propios valores y aspiraciones. Esta diferenciación es crucial para atraer a segmentos específicos de turistas que buscan experiencias alineadas con su propia personalidad y estilo de vida. Por ejemplo, un destino percibido como aventurero y emocionante atraerá a un tipo particular de turista, mientras que uno

percibido como relajante y tranquilo atraerá a otro. Por lo tanto, entender la personalidad de marca de un destino es esencial para desarrollar estrategias de marketing efectivas que capturen al público objetivo deseado y fortalezcan la imagen del destino (Hultman *et al.*, 2016).

Además, la personalidad de marca tiene un impacto directo en la percepción y comportamiento del turista. Los turistas atribuyen rasgos de personalidad a los destinos y buscan una conexión emocional con ellos (Ekinci y Hosany, 2006; Murphy *et al.*, 2007). Esta conexión puede influir en la intención de recomendación y en la fidelidad al destino, aspectos críticos para el marketing de destinos.

La fidelidad se traduce no únicamente en visitas repetidas, sino además en la promoción del destino a través del boca a boca (Chi, 2012), lo cual es especialmente relevante en la era digital actual donde las opiniones y recomendaciones se difunden rápidamente en las redes sociales.

Una de las principales razones para estudiar la experiencia de marca es la comprensión integral del turista. Analizar las experiencias de los turistas permite a los gestores de destinos identificar qué aspectos del servicio o del entorno generan mayor satisfacción o insatisfacción. Esto se traduce en una mejora continua de la oferta turística y en la capacidad de personalizar las experiencias para distintos segmentos de turistas. Según Brakus *et al.* (2009), las dimensiones de la experiencia de marca (sensorial, afectiva, intelectual y conductual) ofrecen un marco útil para analizar cómo los turistas perciben y reaccionan a diferentes aspectos de un destino.

Otra razón fundamental es la influencia en la satisfacción y lealtad del turista. La experiencia de marca positiva puede llevar a una mayor satisfacción y, consecuentemente, a una mayor lealtad (Başer *et al.*, 2015).

Los turistas satisfechos no solo tienen una mayor probabilidad de regresar, sino que además están más inclinados a recomendar el destino a otros (Kim y Stepchenkova, 2017). Esto es crucial en un mercado turístico donde la recomendación boca a boca y las reseñas en línea juegan un papel determinante en la toma de decisiones de otros viajeros.

#### 4. Objetivos

El primer objetivo específico de la tesis es establecer una base teórica y metodológica sólida para el estudio de la personalidad de marca en el contexto turístico (1). A través de una extensa revisión de la literatura, mediante un análisis bibliométrico apoyado en técnicas de *data mining* y *text mining*, se examinan más de mil artículos para recapitular la trayectoria histórica y las dimensiones fundamentales de la personalidad de marca. Esto tiene como propósito, primero, mejorar la comprensión de las contribuciones científicas realizadas por la investigación sobre la personalidad de marca; segundo, identificar los temas predominantes y las tendencias actuales de investigación relacionadas con la personalidad de marca; y tercero, proponer una agenda de investigación futura.

El segundo objetivo específico es formalizar un enfoque innovador para medir y analizar la experiencia de marca en destinos turísticos, utilizando tecnologías avanzadas como *data mining*, *natural language processing (NLP)*, *sentiment analysis*, *topic modelling* y *machine learning* (2). Este estudio no solo mejora la objetividad y el rigor en la comprensión de la experiencia de marca, sino que identifica, a su vez, diferencias significativas influenciadas por el género y la cultura, proporcionando perspectivas cruciales para la personalización de la oferta turística y la estrategia de marketing de destinos.. La integración de estas tecnologías avanzadas permite un análisis detallado de las opiniones de los visitantes, abriendo nuevas avenidas para mejorar la satisfacción turística y personalizar las experiencias de los consumidores de manera más precisa y efectiva.

El tercer objetivo específico es utilizar técnicas de neurociencia del consumidor, como el *eye tracking* y la *galvanic skin response*, para estudiar la respuesta de los consumidores a ciertos estímulos relacionados con la personalidad de marca en el contexto del Neuroturismo (3). Analizar la reacción de los consumidores ante las marcas de logotipos turísticos y visuales generados por inteligencia artificial, destacando cómo las diferencias de género afectan a la atención y la respuesta emocional hacia los valores de marca de destinos específicos. Con el propósito de que sea posible revelar patrones de atención visual y respuestas emocionales distintas, subrayando la importancia de integrar la personalidad de marca en la creación y el marketing de logotipos de marcas turísticas. Este objetivo no solo amplía el campo del marketing turístico al incorporar técnicas neurocientíficas, sino que también proporciona una comprensión más profunda de cómo

los elementos visuales influyen en la percepción de marca y en la toma de decisiones de los turistas.

Tabla 2. Resumen de los objetivos de la investigación

| Objetivo              | Descripción                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Objetivo Específico 1 | (1) Establecer una base teórica y metodológica sólida para estudiar la personalidad de marca en el ámbito turístico mediante un análisis bibliométrico con técnicas de <i>data mining</i> y <i>text mining</i> .                                                                                                                                                |
| Objetivo Específico 2 | (2) Formalizar un enfoque innovador para medir y analizar la experiencia de marca en destinos turísticos utilizando tecnologías avanzadas como <i>data mining</i> , <i>natural language processing</i> , <i>sentiment analysis</i> , <i>topic modelling</i> y <i>machine learning</i> .                                                                         |
| Objetivo Específico 3 | (3) Estudiar la respuesta de los consumidores a estímulos relacionados con la personalidad de marca en el contexto del neuroturismo, utilizando técnicas psicofisiológicas como <i>eye tracking</i> y <i>skin galvanic response</i> . Con el propósito de identificar patrones de atención visual y respuestas emocionales para mejorar el marketing turístico. |

## 5. Metodologías

Existe una clara necesidad de rejuvenecer las metodologías para abordar los constructos de personalidad de marca y experiencia de marca de manera más realista, moderna, completa y novedosa. Esta necesidad se fundamenta en la adaptación y evolución de las técnicas de investigación frente a los constantes cambios en el comportamiento del consumidor y las dinámicas del mercado.

Hasta la fecha, la mayoría de las metodologías utilizadas han sido investigaciones basadas en encuestas con muestras de Estados Unidos (por ejemplo, Aaker, 1997; Siguaw *et al.*, 1999) y, en menor medida, de Europa (Hanna y Rowley, 2019) y Asia (Zheng y Chen, 2022).

Esta falta de diversidad metodológica limita las contribuciones realizadas en el estudio del constructo. En la última década, se han introducido en la disciplina del marketing otras metodologías, como la netnografía, el análisis de sentimientos y, más recientemente,

el *machine learning*. Estas nuevas metodologías pueden aumentar el conocimiento sobre cómo los consumidores perciben las diferentes características y dimensiones de la personalidad de marca, y cómo estas influyen en sus comportamientos. Por ejemplo, Pamuksuz *et al.* (2021) emplean un enfoque novedoso utilizando el *machine learning* para extraer estimaciones de personalidad de marca en redes sociales en tiempo real. Esto proporciona una herramienta adaptable y escalable para estudios de gestión, destacando la necesidad de técnicas automatizadas y avanzadas para evaluar la personalidad de marca en contextos digitales.

Por lo tanto, futuros trabajos pueden examinar la personalidad de marca utilizando métodos mixtos y en múltiples contextos culturales. Por ejemplo, empleando técnicas de recolección de datos inconscientes, como la *galvanic skin response*, lo que permitiría identificar cómo responden los consumidores a las diferentes dimensiones de la personalidad de marca.

En este sentido, se busca no solo mejorar el entendimiento de estos constructos desde una perspectiva académica, sino ofrecer además un marco más aplicable y relevante para los profesionales del marketing de destinos y la gestión de marcas. La adopción de enfoques innovadores en este estudio facilita una interpretación más profunda y enriquecida de la personalidad y la experiencia de marca. Este enfoque renovado subraya la importancia de mantenerse actualizado con las últimas tendencias y metodologías de investigación para captar la esencia de la marca de manera que resuene mejor en las audiencias turísticas contemporáneas.

La integración de nuevas tecnologías en el estudio de la personalidad y experiencia de marca ofrece nuevas oportunidades de investigación y mejora nuestra comprensión de estos constructos en el turismo. El uso de técnicas avanzadas como el análisis de sentimientos y el *machine learning* permite analizar grandes volúmenes de datos generados por los usuarios, como comentarios y reseñas en línea, de manera más precisa y objetiva. Estas técnicas facilitan la identificación de temas y sentimientos predominantes en las experiencias de los turistas, proporcionando conocimientos valiosos para los gestores de destinos. Un ejemplo de ello es la experiencia turística, identificada como un factor clave para el desarrollo del sector, en la que las relaciones sociales juegan un papel fundamental en la construcción de una imagen positiva del destino (Dagustani *et al.*, 2017). Además, la aplicación de técnicas de neuromarketing como el *eye tracking*

y la *galvanic skin response* puede proporcionar datos sobre las respuestas emocionales y visuales de los turistas a los elementos de la marca del destino, como logos y material promocional (Al-Nafjan *et al.*, 2023). Estas herramientas permiten una evaluación más objetiva de cómo los turistas procesan visual y emocionalmente los estímulos de la marca, ofreciendo información detallada para optimizar el diseño y la comunicación visual de la marca del destino.

El estudio de la personalidad y experiencia de tiene implicaciones teóricas y prácticas significativas. Teóricamente, la investigación sobre estos constructos contribuye a un mayor entendimiento de cómo los turistas perciben y se relacionan emocionalmente con los destinos. Esto incluye la exploración de temas emergentes como y la experiencia del turismo basada en la tecnología. La integración de técnicas avanzadas de análisis y neuromarketing en el estudio de estos constructos puede enriquecer el marco teórico existente y abrir nuevas líneas de investigación. Prácticamente, los hallazgos de estos estudios pueden ayudar a los gestores de destinos a diseñar estrategias de marketing más efectivas y personalizadas. Por ejemplo, entender cómo diferentes segmentos de turistas responden a ciertos rasgos de personalidad del destino puede guiar la creación de campañas de marketing que conecten más con el público objetivo. Además, la capacidad de medir y mejorar continuamente la experiencia de marca permite a los destinos mantenerse competitivos y relevantes en un mercado en constante cambio.

## **6. Contribución y originalidad**

El primer estudio de la tesis se basa en un análisis bibliométrico exhaustivo, complementado con técnicas de *data mining* y *text mining*, para explorar la evolución teórica y metodológica de la personalidad de marca. Este estudio aporta una visión integral y actualizada de la literatura sobre personalidad de marca, identificando tendencias actuales y emergentes. Su contribución radica en la identificación de áreas inexploradas y en la propuesta de una agenda de investigación futura que integra nuevas tecnologías como la realidad virtual y la inteligencia artificial en el contexto del turismo. Este enfoque no solo revisa la trayectoria histórica de la personalidad de marca, sino que también proporciona una base sólida para futuras investigaciones, destacando la necesidad de adaptar y expandir las escalas de medición de la personalidad de marca en

diferentes contextos culturales y tecnológicos (Azoulay y Kapferer, 2003; Geuens *et al.*, 2009; Austin *et al.*, 2003).

El segundo estudio de la tesis se centra en la formalización de un enfoque innovador para medir y analizar la experiencia de marca en destinos turísticos, utilizando tecnologías avanzadas como el *data mining*, *natural language processing (NLP)*, *sentiment analysis*, *topic modeling*, and *machine learning*. La originalidad de este estudio radica en la integración de estas tecnologías para ofrecer una comprensión más objetiva y rigurosa de la experiencia de marca, identificando diferencias significativas influenciadas por el género y la cultura. Este enfoque proporciona perspectivas cruciales para la personalización de la oferta turística y la estrategia de marketing de destinos (Qin Li *et al.*, 2019), abriendo nuevas vías para mejorar la satisfacción turística y personalizar las experiencias de los consumidores de manera más precisa y efectiva.

El tercer estudio representa un avance cualitativo al explorar la intersección entre el neuroturismo y la personalidad de marca mediante el uso de técnicas de neuromarketing como el *eye tracking* y la *skin galvanic response*. La contribución original de este estudio se manifiesta en la aplicación de estas técnicas para analizar las reacciones visuales y emocionales de los consumidores ante logotipos de destinos turísticos y visuales generados por inteligencia artificial. Este enfoque revela patrones distintos de atención visual y respuestas emocionales, subrayando la importancia crítica de integrar la personalidad de marca en la creación y marketing de logotipos de destinos turísticos. Además, destaca cómo las diferencias de género afectan la percepción y respuesta emocional (Stevens y Hamann, 2012) hacia los valores de marca de destinos específicos, proporcionando una comprensión más profunda de cómo los elementos visuales influyen en la percepción de marca y en la toma de decisiones de los turistas (Lourenção *et al.*, 2020).

Estas contribuciones subrayan la relevancia de cada estudio dentro del marco general de la tesis, proporcionando aplicaciones prácticas para la gestión del marketing turístico y la personalidad de marca en destinos turísticos.

## 7. Estructura

El capítulo 1 se presenta con una introducción detallada que contextualiza la investigación, identifica los vacíos existentes en la literatura, formula preguntas clave de investigación y justifica la relevancia del estudio. Este capítulo también expone los objetivos, las metodologías empleadas y la originalidad de la investigación. El cuerpo principal de la tesis se desarrolla en los capítulos siguientes, que corresponden a cada uno de los artículos que componen el compendio de la tesis.

El capítulo 2 se dedica a profundizar en el análisis bibliométrico de la literatura sobre personalidad de marca, estableciendo una base teórica sólida para los estudios posteriores. Actúa como un puente crucial entre la introducción general presentada en el capítulo 1 y los estudios desarrollados en los capítulos 3 y 4. El capítulo 3 analiza la experiencia de marca en destinos turísticos mediante el uso de tecnologías avanzadas como el *data mining* y el *machine learning*, proporcionando un enfoque innovador para la medición y análisis de la experiencia de los turistas. El capítulo 4 explora el uso de técnicas de neuromarketing, como el *eye tracking* y la *skin galvanic response*, para evaluar las reacciones visuales y emocionales de los consumidores ante logotipos de marcas de destinos turísticos y visuales generados por inteligencia artificial que representan las dimensiones de la personalidad de marca.

Finalmente, el capítulo 5 ofrece una síntesis de las conclusiones derivadas de los estudios, destacando la contribución de la tesis tanto al avance teórico como a las aplicaciones prácticas en la gestión y promoción de destinos turísticos. Este enfoque integrador permite que la tesis proporcione una comprensión holística de cómo la personalidad y la experiencia de marca pueden ser empleadas estratégicamente para influir en la decisión de los turistas al elegir un destino.

La tesis integra diversos métodos de investigación para crear un corpus cohesivo, que avanza de manera secuencial a lo largo de tres artículos claramente relacionados y enriquecedores. Cada trabajo es fundamental para la comprensión del siguiente y, además, refina y actualiza las investigaciones sobre los constructos de marketing mediante la integración de nuevas metodologías basadas en técnicas contemporáneas adaptándolos a los desafíos actuales del turismo y la percepción de marca. Estas nuevas técnicas permiten refinar, actualizar o redefinir estos constructos para que sean más relevantes en contextos

contemporáneos. La convergencia de estos tres estudios en una única tesis resalta la importancia crítica de comprender la personalidad y experiencia de marca, no simplemente como constructos de marketing aplicados a la industria turística, sino también como herramientas analíticas y pilares estratégicos en la promoción y gestión de destinos turísticos. Cada trabajo, con su metodología y enfoque particular, contribuye a un mejor entendimiento de cómo la personalidad de marca y la experiencia de marca influyen en la intención de visitar un destino, ofreciendo tanto un marco teórico robusto como líneas de investigación o aplicaciones prácticas para el sector turístico. Esta integración temática subraya la relevancia de adaptar y personalizar las estrategias de marketing turístico para conectar efectivamente con las motivaciones, percepciones y emociones de los turistas en un mercado global cada vez más competitivo.

# CAPÍTULO 2

## *Brand Personality: current insights and future research directions*

El contenido del siguiente capítulo ha sido publicado como artículo con la siguiente referencia:

Calderón-Fajardo, V., Molinillo, S., Anaya-Sánchez, R., & Ekinici, Y. (2023). Brand personality: Current insights and future research directions. *Journal of Business Research*, 166, 114062. DOI: <https://doi.org/10.1016/j.jbusres.2023.114062>

Factor de impacto JCR: 11,3, situado en el primer decil (D1) de la categoría “Business”, ocupando el puesto 10 de 306. Pertenece a la edición “Social Sciences Citation Index (SSCI)”.

# BRAND PERSONALITY: CURRENT INSIGHTS AND FUTURE RESEARCH DIRECTIONS

## ABSTRACT

The aim of this study is to improve the understanding of the scientific contributions made by brand personality (BP) research, to identify its predominant themes and to propose a relevant research agenda. An analysis was undertaken of the 1,051 brand personality-related articles published over the period 1987-2022 that are indexed in the Scopus scientific database. A bibliometric approach was adopted to systematically analyse the publications, and a performance analysis and science mapping were undertaken. The results showed that the motor themes of BP research related to its conceptualisation, dimensions and measurement, its impact on consumer-brand relationships and application in tourism destination-focused studies. Emerging BP-focused themes are its applications in virtual reality, artificial intelligence, service robots, storytelling and tourism segments, such as luxury. This study contributes by providing a better understanding of the state-of-the-art research on BP, and by identifying future research directions.

**Keywords:** Brand Personality; Literature review; Bibliometric analysis; Text Mining; Science mapping; Co-word analysis.

## 1. Introduction

The first reference to "brand personality" (BP) in a scientific article was made by Aitken *et al.* (1987). In the following decade, Aaker and Fournier (1995) suggested that BP is an instrument of differentiation that might increase brand value. The most prominent definition of BP, proposed two years later by Aaker (1997), suggests that BP is "the set of human characteristics associated with a brand" (p. 347). Aaker (1997) made a seminal contribution to the theoretical foundation of BP and developed a measurement scale comprised of five dimensions influenced by the "Big Five" human personality framework (Norman, 1963): sincerity, excitement, competence, sophistication and ruggedness.

Aaker's (1997) work has influenced extensive research on consumer-brand relationships, attitudes towards brands (Helgeson & Supphellen, 2004), brand associations (Freling & Forbes, 2005), consumer preferences (Swaminathan *et al.*, 2009), brand trust, affection felt towards brands (Sung & Kim, 2010), emotional attachment to brands (MacInnis & Folkes, 2017; Malär, *et al.*, 2011), brand identification (Kuenzel & Halliday, 2010), purchase intentions (Freling *et al.* 2011), perceived quality (Ha & Janda, 2014), word-of-mouth (Tho *et al.*, 2016) and brand loyalty (Molinillo *et al.*, 2017). However, some authors, for example, Madrigal and Boush (2008), have criticised Aaker's (1997) work because social responsibility is not included among the BP dimensions. Similarly, Anandkumar and George (2011) question the transferability of the BP dimensions across different cultures. Given the weaknesses of Aaker's BP framework, and the need to adjust the BP scale to different contexts, some authors have introduced alternative frameworks (d'Astous & Levesque, 2003; Geuens *et al.*, 2009). Meanwhile, BP research has been extended into various research areas, such as tourism destinations (e.g., Ekinici & Hosany, 2006; Usakli & Baloglu, 2011), hotels (Leung & Law, 2010; Magnini & Thelen, 2008), restaurants (Siguaw *et al.*, 1999; Lee *et al.*, 2009), sports organisations (e.g., Carlson *et al.*, 2009; Tsiotsou, 2012), retailing (Zentes *et al.*, 2008; Da Silva & Alwi, 2006), fast-moving consumer goods (Hodge, 2015), consumer durables (Anisimova, 2007; Clemenz *et al.*, 2012) and professional services (Smith, 2009; Guzmán & Sierra, 2009).

Thus, it can be concluded that BP research has undergone remarkable development, with important repercussions for the theory and practice of brand management since the 1990s. However, while the scientific output has been considerable, few works have analysed in depth the evolution of the BP literature. Therefore, the objective of the present study is

three-fold: first, to improve the understanding of the scientific contributions made by BP research; second, to identify related predominant themes/topics and current research trends; and third, to propose a research agenda.

In doing so, the present study adopts a bibliometric approach to examine the scientific production of the BP research undertaken between 1987 and 2022, following Donthu *et al.*'s (2021a) guidelines. Bibliometric analysis is a rigorous method that allows researchers to explore and analyse a large amount of data from scientific publications, and to identify both the specific nuances of a topic's evolution and its emerging themes (Donthu *et al.*, 2021b). The present study differs from previous works by conducting the most extensive examination, to date, of the BP-focused articles (1,051) published between 1997 and 2022 that are indexed on the Scopus database (Appendix A. Supplementary material). For example, Ghorbani *et al.* (2022) analysed a shorter period, 2005-2021, and looked only at journals included in the CABS Academic Journal Guide (107 articles), while Llanos-Herrera and Merigo (2019) conducted an analysis of the period January 1995-April 2018, drawing on the Web of Science database, which covered only 435 articles. By examining the period up to the end of 2022, the present work includes production carried out in the extraordinary context of Covid-19, and updates the research agenda based on problems identified during that period. This approach provides a broader, more comprehensive view of the scientific contributions made to BP research, which will allow researchers to better understand the existing academic literature and to better target their future work to help advance the knowledge on BP.

To this end, this study will address the following BP-related research questions (RQs):

- RQ1: What is the performance (productivity and impact) of the relevant authors and journals?
- RQ2: What are the intellectual interactions and structural connections of authors and themes?
- RQ3: What research has underpinned BP?

By answering these questions, the present study will allow researchers and marketing professionals to gain a better understanding of BP and to identify future research that can contribute to the construction of scientific knowledge.

## 2. Methodology

This study adopts a bibliometric analysis methodology. This methodology provides an objective and systematic investigation of research progress (Chellappandi & Vijayakumar, 2018) by identifying motor themes, emerging trends, patterns of collaboration, the impact of articles and journals, and reveals the intellectual structure of a specific topic in the literature (Donthu *et al.*, 2020; Donthu *et al.*, 2021a; Verma & Gustafsson, 2020).

### 2.1. Bibliometric analysis

A literature review is a valuable study methodology that consolidates existing knowledge in a specific field; this consolidation supports and facilitates the development of new knowledge in the field. It is a retrospective view of the body of knowledge in a field that describes progress in the field and suggests possible future research directions. Lim *et al.* (2022) suggested that literature reviews are valuable in five ways: 1) they explain the need for future research, give it theoretical support and propose future research directions; 2) they give credit to scholars for work they have done in the past, discourage plagiarism and duplication of research and provide rapid, comprehensive knowledge of the field of study; 3) they demonstrate the appropriate use of previous theories and results and assess emerging fields, or mature fields still widely researched; 4) they can highlight the urgent need for future research, both because of the importance of the phenomenon under study and because of the limitations of previous studies; 5) they support and facilitate the development of new knowledge by clarifying key concepts, providing an overview of the field of study, identifying important research gaps and by proposing suggestions that future researchers can adopt to advance the field of study.

Kraus *et al.* (2022) proposed a list of methods to use when analysing previous literature. Of the methods listed, the present study adopts bibliometric analysis, which uses quantitative indicators, statistical techniques and software to examine the biographical data of scientific production (Donthu *et al.*, 2021a). Bibliometric analysis was chosen, over other methods, because it allows researchers to process large amount of data to identify possible "hidden patterns", which provides a better understanding of the state of art in a research field, its evolution and gaps (Kraus *et al.*, 2022). Bibliometric studies tend to be more objective and more far-reaching than other types of review (Donthu *et*

*al.*, 2021a). For example, meta-analyses can also explore large amounts of data, but require studies to be homogeneous and unbiased, otherwise the validity of the results may be compromised (Donthu *et al.*, 2021a). In addition, while content analysis or systematic reviews are recommended when the scope of a study is limited, and/or when a dataset is sufficiently small and manageable that its content can be manually reviewed using quantitative and qualitative techniques, or using software that allows semi-automatic analysis (Kraus *et al.*, 2022), this is not the case in the present study.

Mukherjee *et al.* (2022) also argued that bibliometric research contributes to knowledge development, again in five ways: 1) it promotes the objective identification of knowledge groups; 2) it clarifies the state of a field of study by identifying key concepts and their relationships (nomological networks); 3) it maps social patterns that explain the social processes that support knowledge development; 4) it recognises evolutionary nuances that explain where the study field is headed (e.g., declining and emerging topics); 5) it identifies key knowledge gaps, which can guide future research.

Bibliometric analysis is largely based on descriptive indicators and network analyses. The two fundamental reference criteria for assessing research are productivity and number of citations received (Podsakoff *et al.*, 2008). Co-citation analysis is based on the belief that researchers cited in the same article are very likely to be discussing related or similar ideas (Boyack & Klavans, 2010). This analysis places weights on relationships based on their strength. A high value indicates the tendency of certain journals and authors to be co-cited in the same article. Using the clustering technique, analytical software can create a co-citation matrix that shows the groupings of directly related articles (Waltman & Van Eck, 2012). In this instance, the Leiden technique was applied, given that it is a very effective way of identifying connected groups and, when the method is followed repeatedly, it successfully disaggregates the relevant subsets of all groups/communities (Traag *et al.*, 2019).

Topic mapping analysis, which identifies hidden themes, is a very useful and recommended instrument for conducting bibliometrics and text mining (Yan *et al.*, 2012). The analysis is carried out using a methodology that transforms hidden, undetectable, covert and/or non-obvious topics, within large bodies of bibliographic materials, into graphs that depict clusters of topics and the relationships between the topics (Van Eck & Waltman, 2010). Finally, one of the most important techniques in bibliometrics is overlay

visualisation. This instantly identifies trends and accurately represents the chronological development of topics (Leydesdorff & Bornmann, 2012).

## 2.2. *Analytical tools used*

To undertake the bibliometric analysis three of the most popular software were employed: VOSviewer, Bibliometrix and SciMAT. VOSviewer was used to carry out the bibliometric mapping and text mining (Van Eck *et al.*, 2010) (Appendix B. Supplementary material). In a complementary way, the Bibliometrix software creates diagrams that reveal the degree of development (density) and the degree of relevance (centrality) of topics (Aria & Cuccurullo, 2017). In addition, SciMAT, a powerful software that performs science mapping analysis within longitudinal frameworks (Cobo *et al.*, 2012), was used to analyse the themes that developed over the three periods under study.

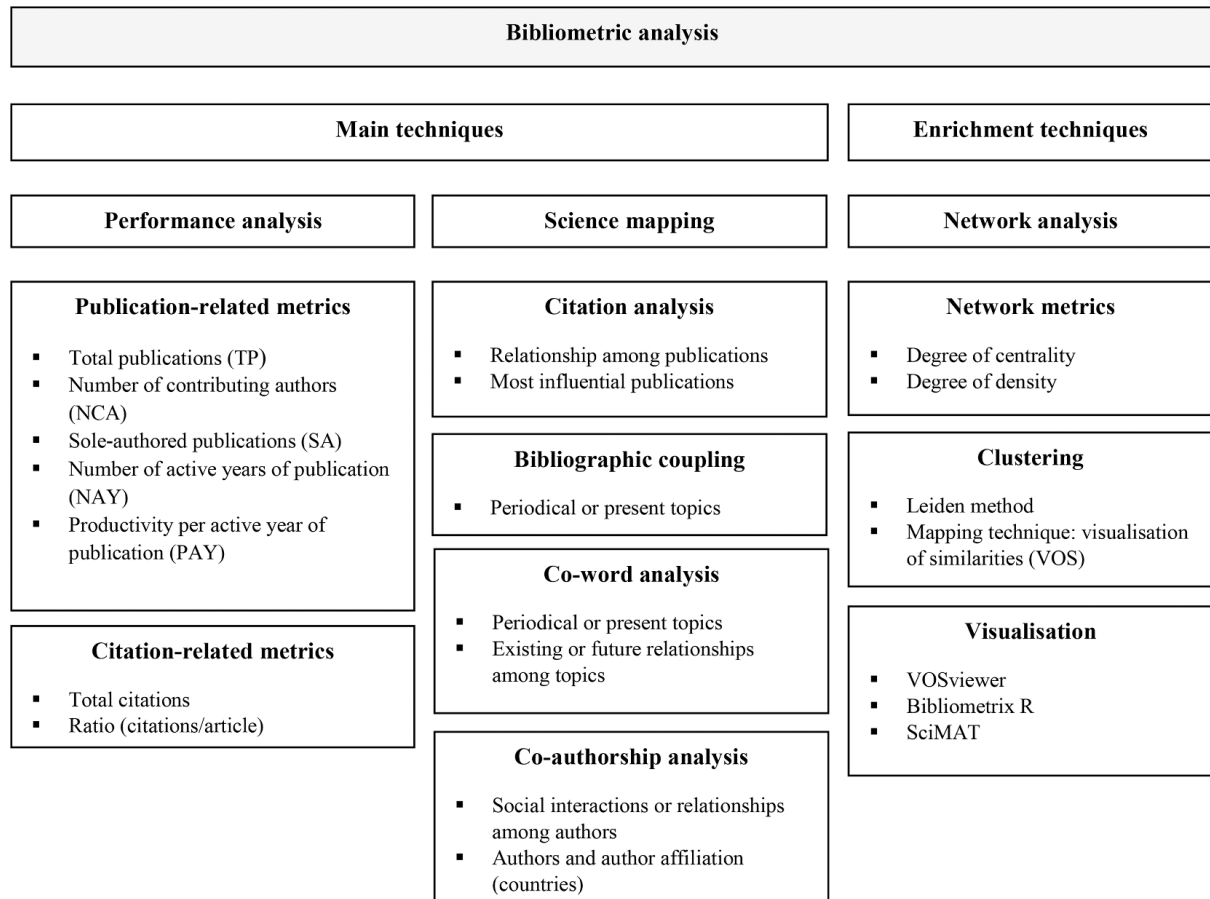
## 2.3. *Data collection*

The data used for the bibliometric analysis were collected from the Scopus database, one of the most comprehensive and reliable databases of scientific publications (Harzing & Alakangas, 2016). Journal articles were used as the unit of analysis for the selection of documents, on the basis that they been considered to be the most up-to-date sources of knowledge in the field of business and management and are the unit most frequently used in bibliometric studies (Donthu *et al.*, 2021a; Rojas-Lamorenna *et al.*, 2022). The search query "Brand Personality" entered into Scopus identified 1,051 works published up to December 31, 2022. Using information extracted from the identified articles a database was created with the following items: author(s), country of affiliation, title, abstract, keywords, journal, date of publication and citations. The data were cleaned and treated to amend incomplete records and to adapt the format before importing them into the software. Similarly, a thesaurus was developed to homogenise singular and plural words (e.g., consumer and consumers) and words with spelling differences depending on the use of British or American English (e.g., behaviour and behavior). In addition, a process of checking and standardising the names of journals and authors was carried out, as sometimes the journals themselves were described differently, for example, "Journal of Product & Brand Management" vs. "Journal of Product and Brand Management", and

authors were identified in different ways, for example, "Loureiro, S." vs. "Loureiro, SMC".

Figure 1 shows the performance analysis, science mapping and network analysis used in the study.

Figure 1. Outline of techniques used in the bibliometric analysis



### 3. Results

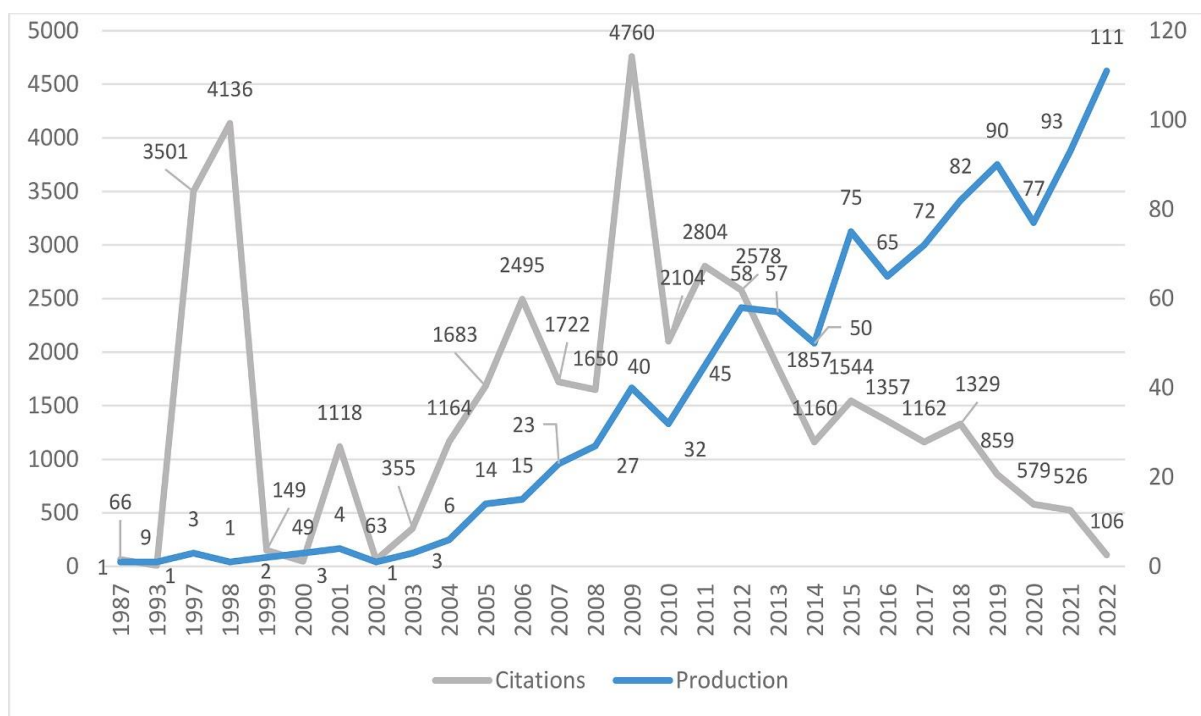
#### 3.1. Performance analysis

The first article which discussed BP appeared in the Scopus database in 1987 (i.e., Aitken *et al.*, 1987). The number of published articles was largely insignificant until 2002. Only 16 were published in fifteen years. Since 2002, a cumulative total of 1,035 articles have been published, 111 of them in 2022.

In relation to RQ1, Figure 2 shows the evolution of the scientific production on BP and citations received per year in the period 1987-2022. Although the evolution of annual

production was progressively positive throughout the whole period, the volume of citations received by the works was clearly higher in years in which important contributions to the literature were made. For example, in 1997 the seminal work of Aaker (1997) was published. This work, for the first time, proposed dimensions for BP, and attracted 3,365 citations, 96,1% of the total citations received by the three relevant articles published that year. Similarly, Fournier (1998) received 4,132 citations. The emergence of tourism-related BP, supported by Hosany *et al.* (2006) and Ekinci and Hosany (2006), received 475 and 438 citations, respectively. A total of 2,495 citations were shared among 15 articles published in 2006. Finally, Brakus *et al.* (2009), who examined BP's relationship with another important construct (brand experience), deserves special mention, given that it received 42.10% of the total citations (4,760) shared by the 40 articles published in 2009.

Figure 2. Evolution in the number of articles on BP, and citations



As to the most prolific and cited contributors, 2,670 authors from 75 different countries produced the 1,051 articles. Appendix A, supplementary material, shows the most prolific BP authors. The research impact measured by the number of citations received is not proportional to the number of articles published. That is, the most productive authors, for example, Sung (14) and Rojas-Méndez (9), are not among the most cited authors. The more cited authors who produced fewer articles are Fournier, Aaker, Schmitt,

Zarantonello and Brakus, among others. Therefore, it may be concluded that the number of citations received by an author depends on various factors, such as the journal impact ratio, the type of journal, the open access coverage, the originality of the contribution and the age of the publication.

BP articles have appeared in 399 journals specialised in different topics, such as marketing, branding, consumer behaviour and tourism. This is an indication of the breadth of interest in BP. However, publications have been concentrated on a small number of journals, such that the top 10 with the highest output ( $\geq 11$ ) published 21.12% of the total articles (Appendix A. Supplementary material). Each of the top 3 (*Journal of Brand Management*, *Journal of Business Research* and *Journal of Product and Brand Management*) published more than 30 papers, followed by *Psychology and Marketing* (28), and *European Journal of Marketing* (21). The journals with the highest number of citations are *Journal of Business Research* with 3,187 (40 articles published), *Journal of Product and Brand Management* with 2,048 (40 articles published) and *Psychology and Marketing*, with 1,504 citations (28 articles published).

We assessed the impact of articles on the literature through number of citations received (Table 1). The two most cited articles include seminal works in the construction of the theoretical framework of BP by Fournier (1998) and Aaker (1997). The former contributed to consumer-brand relationships, and the latter to the measurement of BP. Both works were used as key references for studies in the following two decades, during which BP research clearly took off. Works undertaken during those years laid the foundations of BP and made an important impact on the literature, as evidenced by the fact that 8 of the 10 most cited articles on BP were published in that period. Among these (in addition to the two key articles previously discussed), were notable contributions made by Aaker *et al.* (2001), who used the BP scale to show the cross-cultural significance of brand consumption. Aaker *et al.* (2004) examined the impact of BP on consumer-brand relationships. Pappu *et al.* (2005) introduced a consumer-based brand equity scale. Kressmann *et al.* (2006) analysed the effects of self-congruence on brand loyalty. Hosany *et al.* (2006) and Ekinici and Hosany (2006) examined BP in tourism destinations, a novel application at that time. In addition, two of the top 10 articles published between 2007 and 2016 integrated BP into two emerging constructs, brand experience (Brakus *et al.*, 2009) and brand attachment (Mälar *et al.*, 2011). It should be

noted that the ranking of the top 10 publications would change if the performance metric was changed to average number of citations received annually, rather than total number of citations received.

Table 1. Top 10 articles in terms of citations received included in the Scopus database (ordered by total citations)

| Pos. | Title                                                                                                      | Author(s)                                                            | Year | Journal                                      | Citations | Citations/<br>year |
|------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|------|----------------------------------------------|-----------|--------------------|
| 1    | Consumers and their brands: Developing relationship theory in consumer research                            | Fournier S.                                                          | 1998 | Journal of Consumer Research                 | 4,132     | 165.28             |
| 2    | Dimensions of Brand Personality                                                                            | Aaker J.L.                                                           | 1997 | Journal of Marketing Research                | 3,365     | 129.42             |
| 3    | Brand Experience: What Is It? How Is It Measured? Does It Affect Loyalty?                                  | Brakus J.J., Schmitt B.H., Zarantonello L.                           | 2009 | Journal of Marketing                         | 2,004     | 143.14             |
| 4    | When good brands do bad                                                                                    | Aaker J., Fournier S., Brasel S.A.                                   | 2004 | Journal of Consumer Research                 | 894       | 47.05              |
| 5    | Emotional brand attachment and Brand Personality: The relative importance of the actual and the ideal self | Malär L., Krohmer H., Hoyer W.D., Nyffenegger B.                     | 2011 | Journal of Marketing                         | 678       | 56.50              |
| 6    | Consumption symbols as carriers of culture: A study of Japanese and Spanish Brand Personality constructs   | Aaker J.L., Benet-Martínez V., Garolera J.                           | 2001 | Journal of Personality and Social Psychology | 582       | 26.45              |
| 7    | Direct and indirect effects of self-image congruence on brand loyalty                                      | Kressmann F., Sirgy M.J., Herrmann A., Huber F., Huber S., Lee D.-J. | 2006 | Journal of Business Research                 | 547       | 32.18              |

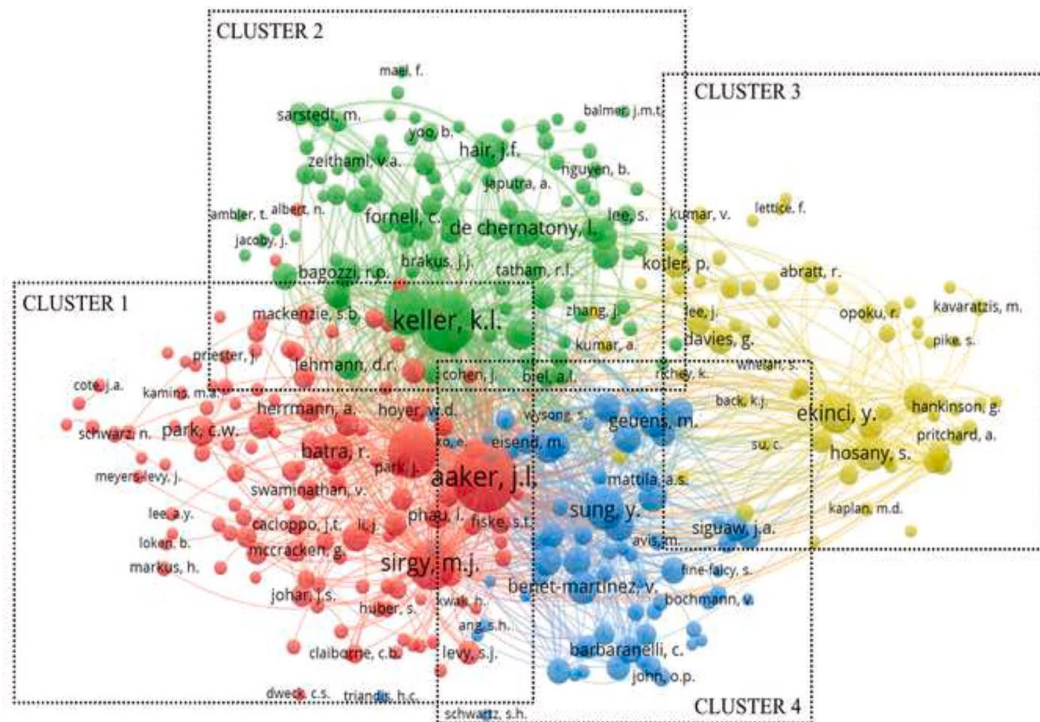
|    |                                                                                                      |                                            |      |                                       |     |       |
|----|------------------------------------------------------------------------------------------------------|--------------------------------------------|------|---------------------------------------|-----|-------|
| 8  | Consumer-based brand equity: improving the measurement – empirical evidence                          | Pappu R.,<br>Cooksey R.W.,<br>Quester P.G. | 2005 | Journal of Product & Brand Management | 495 | 27.50 |
| 9  | Destination image and destination personality: An application of branding theories to tourism places | Hosany S.,<br>Ekinci Y.,<br>Uysal M.       | 2006 | Journal of Business Research          | 475 | 27.94 |
| 10 | Destination personality: An application of Brand Personality to tourism destinations                 | Ekinci Y.,<br>Hosany S.                    | 2006 | Journal of Travel Research            | 438 | 25.76 |

### 3.2. Co-citation link analysis

Regarding RQ2, co-citation link analysis identifies relationships between authors (Figure 3). This analysis is based on the idea that two articles or authors are related when they appear in the reference list of a third article. Articles that are cited together will most likely address related ideas/topics. In the co-citation analysis of the BP database four clusters were identified. Cluster 1 (red) includes authors who provided the fundamental theoretical basis of BP. In this cluster are J. L. Aaker (1,654 co-citations), with her work on the conceptualisation of BP, Fournier (678 co-citations) for her contribution about consumer-brand relationships, and Sirgy (646 co-citations) for his contribution to the theory of self-congruence. Cluster 2 (green) includes authors who have made notable contributions to the development of the theoretical frameworks of brand management, brand performance and brand equity. Among them are Keller (982 co-citations), D. Aaker (663 co-citations) and Chernatony (308 co-citations). Cluster 3 (yellow) groups authors with a special interest in topics related to tourism and tourist destinations. Particularly noteworthy are pioneers in the adaptation of the BP construct to tourism destinations, Ekinci (387 co-citations), Hosany (281 co-citations) and Baloglu (251 co-citations). Cluster 4 (blue) includes authors who analysed psychological variables, for example, perceptions of personality traits, attitudes and emotions in the context of communications, advertising and virtual communities, such as Sung (417 co-citations) and Supphellen (208 co-citations), or that adapted pre-existing BP frameworks to other areas (e.g., culture),

such as Bénet Martínez (260 co-citations), Azoulay (228 co-citations) and Geuens (223 co-citations).

Figure 3. Co-citation analysis by author



### 3.3. Brand personality conceptualisation and measurement

Aaker (1997) led to the emergence of a fruitful line of research in which authors focused much of their efforts on the validation of the original BP measurement scale in different contexts, its adaptation and, indeed, on proposing new conceptualisations and measurement scales (Appendix A. Supplementary material). Nonetheless, it should be noted that Aaker's (1997) BP scale has received much criticism about its reliability and validity across different sectors and cross cultures (Azoulay & Kapferer 2003; Geuens *et al.*, 2009; Austin *et al.*, 2003). There is no consensus whether it is necessary to develop different measurement scales for some contexts, or whether it is possible to use the same scale for all contexts.

Regarding the cultural adaptation of the measurement scale, the vocabulary used in a language is the most important source for describing brand personality (Caprara *et al.*, 2001), and the dimensions of BP may contain important nuances based on culture. The psycho-lexical approach has allowed researchers to develop BP scales, but only from the

point of view of western cultures. Therefore, the interrelation and interdependence of brands in an international and globalised context requires that a cross-cultural multipurpose validation of BP scales be undertaken. Studies have suggested that some BP-related factors are culture specific, for example, "ruggedness" in the United States, and "passion" in Spain (Aaker *et al.*, 2001). A Korean study into BP, based on world-renowned brands, such as Nike and Adidas, identified two BP dimensions specific to that culture, "passive likeableness" and "ascendancy" (Sung & Tinkham 2005). Hofstede and McCrae (2004) argued that the weight of the Big Five personality factors can differ between cultures. In this sense, Cheung *et al.* (2008) argued that, although the structure of the five dimensions has been confirmed in different cultural environments, the features that make up each dimension can harbour specific culture-specific components. In addition, questioning even the number of dimensions, Hofstede (2007) argued that Aaker's (1997) five major dimensions should be expanded to include "dependence on others" in Asia-based studies. On the same lines, Schmitt *et al.* (2007) suggested that, while research using the same group of items has shown the validity of the five-dimensional structure of BP in many cultures, this does not mean they are the only dimensions of personality (Schmitt *et al.* 2007).

Beyond the application of BP in different sectors and/or cultural contexts, some relatively recent BP-focused studies have begun to examine the digital environment due to its increased importance as a channel of contact with consumers. The first such studies examined websites and online stores (e.g., Opoku *et al.*, 2006), and these were followed by research into social networks (e.g., Pentina *et al.*, 2013), digital products and services (e.g., Liu & Yan, 2022), and interactions with smart objects and artificial intelligence-powered devices (e.g., chatbots, voice assistants, robots) (e.g., Vernuccio *et al.*, 2021); in online contexts, studies also examined augmented reality and virtual reality. In this sense, one of the first works, Müller and Chandon (2003), concluded that consumers' perceptions of two dimensions of BP (youthfulness and modernity; sincerity and confidence) were enhanced after they were exposed to a brand's website. Pentina *et al.* (2013) showed that similarity in personality traits between Twitter users and the Twitter brand built trust in the platform. More recently, Paschen *et al.* (2017) found that the personality of an online brand community, rather than the personality of the brand itself, can be deduced from the communications that occur within the community. Hu *et al.*

(2019) developed a predictive model of BP (measured through the Aaker (1997) scale) based on information available on social media. In the context of digital services (i.e., knowledge services), Liu and Yan (2022) demonstrated that brand personality positively influences brand love. Regarding new touchpoints, Youn and Jin (2021) showed that the type of relationship consumers establish with chatbots (virtual assistantship versus virtual friendship) influences their perceptions of a brand's personality. Ghorbani *et al.* (2022), in their systematic literature review of consumers' perceptions of digital brands' personalities, highlighted the need to broaden the topic's theoretical foundations.

Arora and Stoner (2009) made the criticism that most BP-focused studies used only quantitative scales and fail to combine the results of qualitative and quantitative methodologies when identifying BP dimensions (e.g., some dimensions identified in quantitative analyses are not identified in qualitative analyses). Similarly, it has been observed that some respondents find it difficult to understand the fundamental bases of BP when they are asked to think of brands as if they were people (Avis, 2012). On the same lines, Capelli and Jolibert (2009) even questioned the validity of the metaphor which attributes personality traits to brands, which calls into question the entire conceptual development of BP.

On the other hand, in parallel with the development of the BP construct, in recent years studies have gone even further than the seminal ideas of Aaker and Fournier (1995) by suggesting brands not only possess personality characteristics, but can also be perceived as if they were actual human beings. Guido and Peluso (2015) developed a three-dimensional brand anthropomorphism scale (human body lineaments, human facial physiognomy and self-brand congruity) and demonstrated its predictive power in terms of BP and brand loyalty. Subsequently, Portal *et al.* (2018) developed a theoretical model to guide managers through the process of building more human brands from brand traits, brand attributes and brand authenticity, which provides brands with benefits (loyalty, reputation and customer relationships). Golossenko *et al.* (2020) developed and validated a 4-dimensional measurement scale for the construct brand anthropomorphism (appearance, moral virtue, cognitive experience and conscious emotionality), which has been shown to be a good predictor of other constructs, such as brand trust and brand commitment. On the same lines, Kim *et al.* (2020) showed that when an anthropomorphised brand interacts with consumers on social networks it is perceived as

trustworthy, it generates more "likes" (than non-anthropomorphised brands) and improves the attitude of consumers towards the brand.

### 3.4. Dominant methodologies

The methodology used in the articles was, in general, quite similar. Although the most cited article, Fournier (1998), collected qualitative data through interviewing three consumers, quantitative methodologies gathering data through surveys have been predominant in the BP literature. Aaker (1997) collected data using a survey including five-point Likert scales from a representative sample of the USA population. Aaker *et al.* (2001) examined how symbolic and expressive attributes associated with brands varied across three cultures (Spanish, Japanese, USA) using personally administered surveys. Similarly, Aaker *et al.* (2004) used online surveys to examine consumer-brand relationships. Using telephone surveys, Kressmann *et al.* (2006) evaluated the direct and indirect effects of personal image congruence on consumer behaviour. Hosany *et al.* (2006) used personally administered surveys to evaluate the relationship between destination image and destination personality in the UK. Malär *et al.* (2011) examined the implications of self-congruence and consumer attachment to brands through online surveys in Switzerland.

The huge growth in the number of active users on social networks has provided a new source of particularly rich information, which has led to the emergence of qualitative studies using techniques such as semantic analysis, textual and narrative analysis and storytelling. For example, Masiello *et al.* (2020) undertook a qualitative analysis, based on a free-listing psychological meaning approach, to understand the design and management of the BP of social-media based festivals, and how the concept is communicated to, and perceived by, users. Subsequently, they performed a content analysis of tweets and posts using NVivo11 software. Chakraborty and Bhat (2018) used netnography - another qualitative method - to assess the impact of online reviews on BP. Ramadan (2019) used an inductive thematic analysis to analyse followers' comments on Twitter. Finally, some researchers have developed specific tools for assessing BP in social networks, as was the case with Liu *et al.* (2016), who created a visual analysis, named SocialBrands, to help brand managers understand public perceptions of brands on social media.

### 3.5. Thematic analysis

Co-word analysis was used to develop a map of the most important topics in BP research and their relationships. This technique examines the content of publications on the basis that words that frequently appear together are thematically related. The words used in co-word analysis were drawn from the "author keywords" and the "keyword co-occurrences" of the "article titles" and "abstracts", following a recommended methodology frequently applied in the literature (e.g., Baker *et al.*, 2020; Burton *et al.*, 2020; Donthu *et al.*, 2020; Emich *et al.*, 2020; Liu *et al.*, 2019).

Using the text mining algorithms of the VOSviewer software, 17,017 BP-related terms were identified. The treatment set a minimum frequency of 10 times. Subsequently, the software chose, by default, 60% of the most relevant terms and represented them through different coloured clusters based on their co-occurrence, or coincidence, in the same article. The greater the co-occurrence, the greater is the identification with the cluster. The diameter of the circles represents the frequency at which words appear, the larger the circle, the greater the frequency.

#### 3.5.1. Key research topics clustering

The analysis of the intellectual structure of research into BP produced four very different clusters (Figure 4): a set of works that provided the theoretical basis for research into the subject, such as measurement scales and BP dimensions (blue cluster); another group in which research relates a wide range of topics related to communication and purchase intention, among others (red cluster); a third group which addressed methodologies and brand relationship constructs (e.g., trust, attachment, identification); and a fourth group strongly focused on the application of BP to tourist destinations (Appendix C, supplementary material).

This network visualization represents a large collection of research topics in marketing and business, interconnected by lines. The nodes are colored and sized to represent different clusters and their relative importance or frequency. The main clusters include:

- Green Cluster (Top Left):** Focuses on brand identity, structural equation modeling, brand experience, brand trust, attachment, commitment, involvement, and purchase intention.
- Blue Cluster (Top Right):** Focuses on tourism, destination, brand personality, sophistication, competence, excitement, and exploratory factor analysis.
- Red Cluster (Bottom Left):** Focuses on brand personality dimension, brand identity, communication, brand relationship, brand selection, brand extension, brand experience, brand name, and brand differentiation.
- Yellow Cluster (Top Center):** Focuses on self-congruity, body self-image, and intention.
- Other Clusters:** Includes nodes for social medium, review, content, scale, structure, factor analysis, and many others.

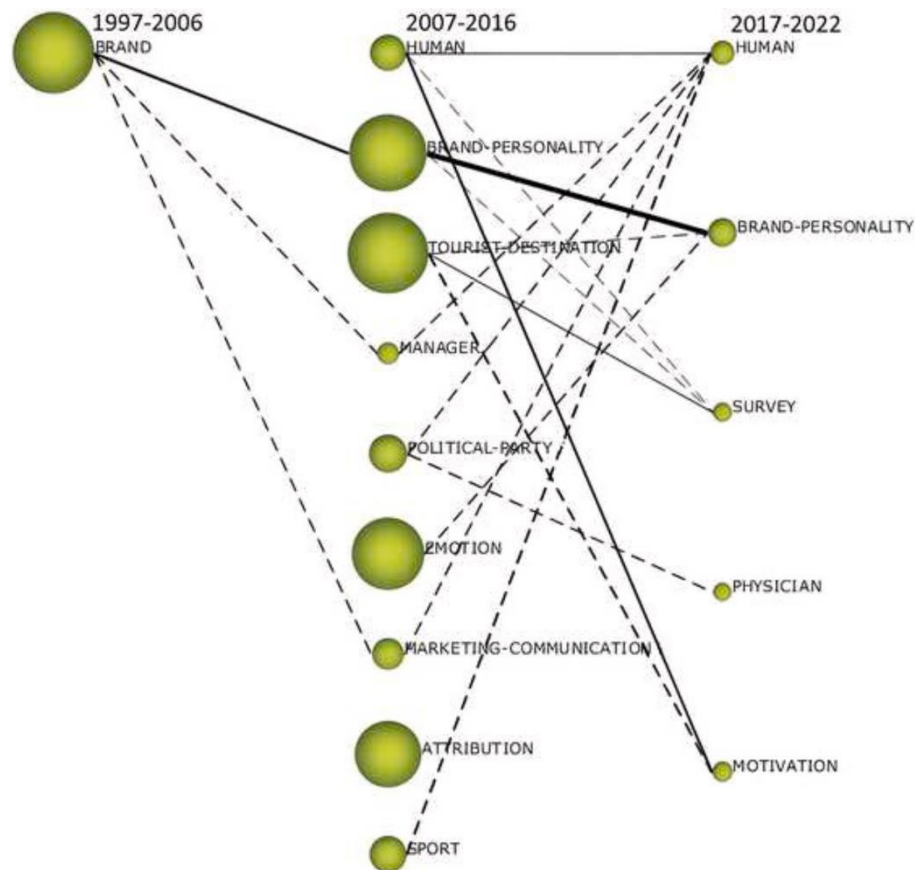
The network is highly interconnected, with many nodes having multiple connections, indicating a complex and multifaceted research landscape.

The BP research topics identified in the four clusters had an uneven evolution over time. For the purpose of this analysis the research timeframe (1987-2022) was divided into four periods, the first three decades and the final six years. However, as only two of the 1,051 articles in the database were published between 1987 and 1996, it does not make sense to graphically represent the period. The first work published was Aitken *et al.* (1987), which analysed children's perceptions of brand personality in tobacco advertising. Six years later, Stern (1993) defined the concept of the "persona" and its relationships with brand personality and brand image in the context of advertising. Therefore, the main research focus of BP in this period was perceived brand personality through advertising.

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analysis was undertaken, using SciMAT software (Figure 5), through the co-occurrence of keywords. Each node, or sphere, is a theme, or set of keywords, which appear adjacent to the word with most centrality. The size of the sphere is proportional to the number of items in the set. A solid line indicates that themes appear in two periods, or that a theme which appears in one period also appears in the thematic network of a keyword in the other period, because both are researched from a related perspective. A dashed line indicates that both sets of themes have topics in common. The thickness of the line (solid or dashed) is proportional to the degree of co-occurrence of the keywords in the sets and indicates the strength of the association between topics. As can be seen, most of the relationships are represented with dashed lines, which denotes that there is a lack of cohesion or continuity between the themes over the periods; but, at the same time, it also denotes that relationships between the themes existed. The evolution of the second period (the first represented) to the third period (second represented) is very simple because in the second only a "brand" theme was generated, which is joined by a continuous line to "brand personality" (because the brand theme is in BP's thematic network) and by a discontinuous line with "manager" and "marketing-communication", because they share topics. In addition, new, very important, themes appear, that is, works addressing "tourism-destination", "emotion" and "attribution", along with other, less important themes, such as "human" and "sport". In the fourth period (the third represented), less important themes, such as "survey" and "physician", appear. Some themes, such as "brand personality" and "human", continue from the third (second represented) to the fourth period (third represented), while others published in the third period are included in the thematic networks of other research topics in the fourth, such as "human" and "motivation"; it can be observed that over these two periods many relationships exist between dissimilar themes, but that have topics in common, such as "political-parties" and "physician", and "sport" and "human".

Figure 5. Longitudinal evolution map

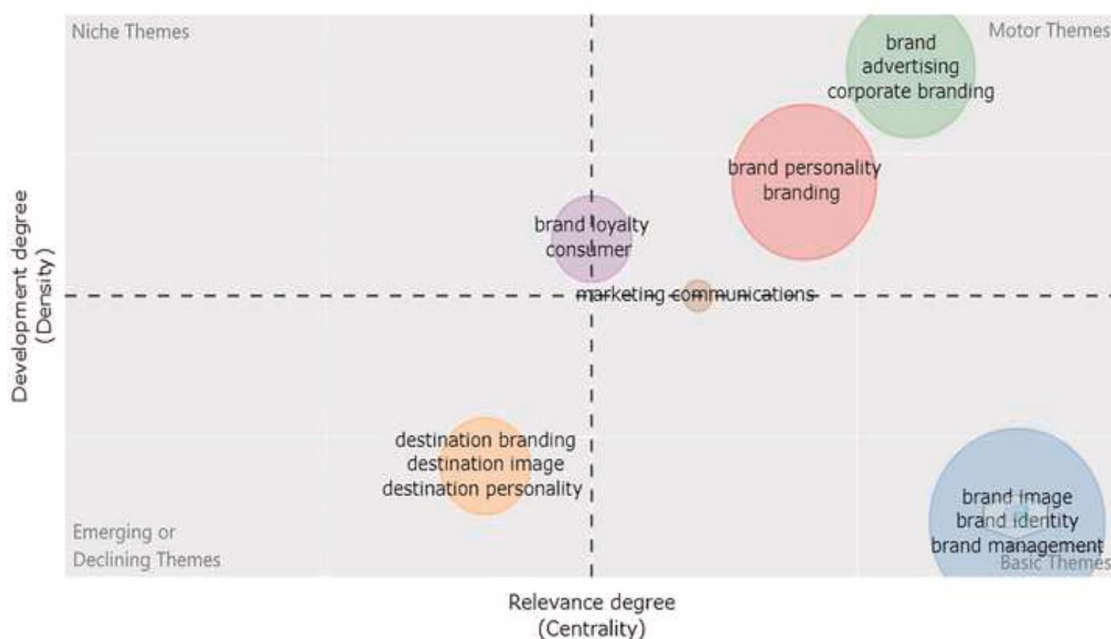


The relative prominence of each topic can be observed in the Bibliometrix-based strategic diagram. The diagram has two axes, degree of development (density) -vertical- and degree of relevance (centrality) -horizontal. Density "measures the internal strength of the keywords or thematic network, while centrality refers to the degree of interaction between different networks" (Rojas-Lamorenna *et al.*, 2022, p. 1070). The intersection of the two axes creates four categories of themes: niche themes, motor themes, emerging/declining themes and basic and transversal themes. The authors' "keywords" were taken as references in the development of the diagram as they are an exhaustive and concrete indicator of an article's content (Zhang *et al.*, 2016).

Figure 6 is the strategic diagram of the second period (1997-2006). This period accounts for 4.95% of BP publications (52/1,051) and, more importantly, 35.97% of total citations of all BP-focused output. Eight of the 10 most cited articles between 1987 and 2022 were published in this period. This reflects the impact that the pioneering and innovative work

undertaken during this stage has had on the development of BP's theoretical and conceptual framework. The Bibliometrix clustering process identified as motor themes of research into BP: the conceptualisation of the construct; the empirical validation of BP's theoretical framework (Fournier, 1998; Govers & Schoormans 2005; Siguaw *et al.*, 1999; Supphellen & Grønhaug, 2003); brand advertising; corporate branding; brand loyalty and marketing communications. Investigation of the relationships between BP, brand image and brand identity were fundamental for brand management. The end of the period saw three themes emerge that were clearly related to the application of BP to the management of tourism destinations, that is, destination branding, destination image and destination personality (Ekinci & Hosany, 2006; Hosany *et al.*, 2006).

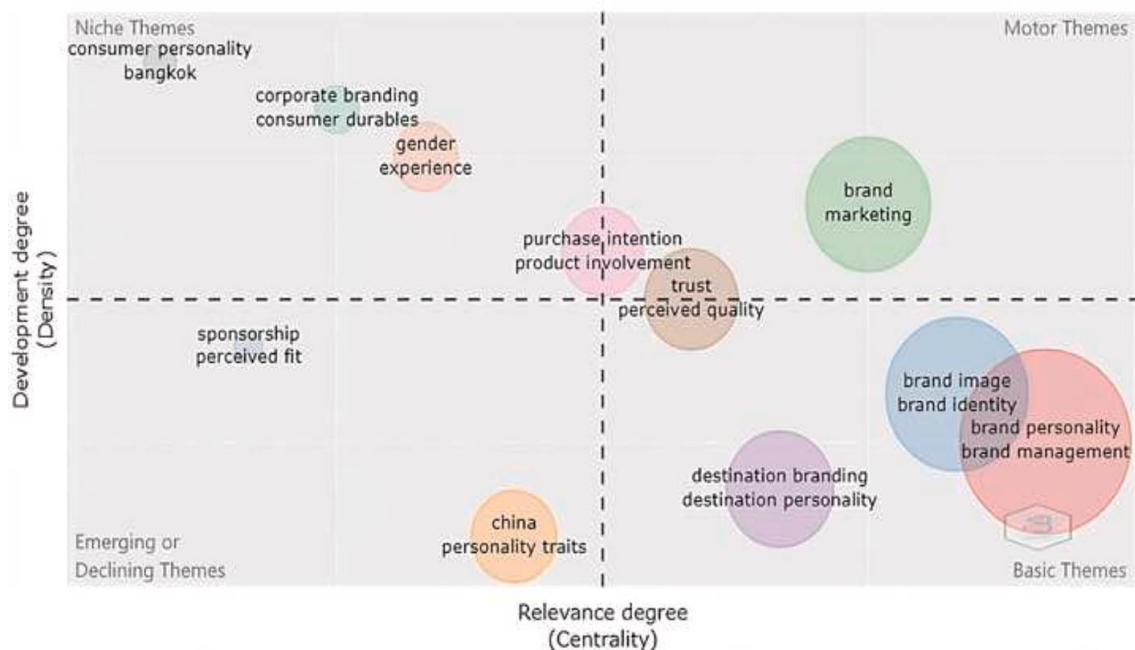
Figure 6. Strategic diagram for the period 1997-2006



Scientific publications about BP grew exponentially in the third period (2007-2016), indicating the development and consolidation of this scholarly topic. Half (44.91%) of the total BP production (472/1,051) was published during this period. The strategic diagram (Figure 7) depicts a wide range of topics, although no motor theme other than brand communication is clearly highlighted. Tourism-related themes (destination branding and destination personality) passed from being emerging themes at the end of

the previous decade to basic themes in this period (Murphy *et al.*, 2007; Usakli & Baloglu, 2011; Gómez Aguilar *et al.*, 2016). Other basic topics were brand image, brand identity and brand management, which developed a little more in this phase than in the previous period. Further topics that stand out in the centre of the diagram are purchase intentions, product involvement, trust and perceived quality. Finally, corporate branding lost importance in this period, while perceived sponsorship fit emerged.

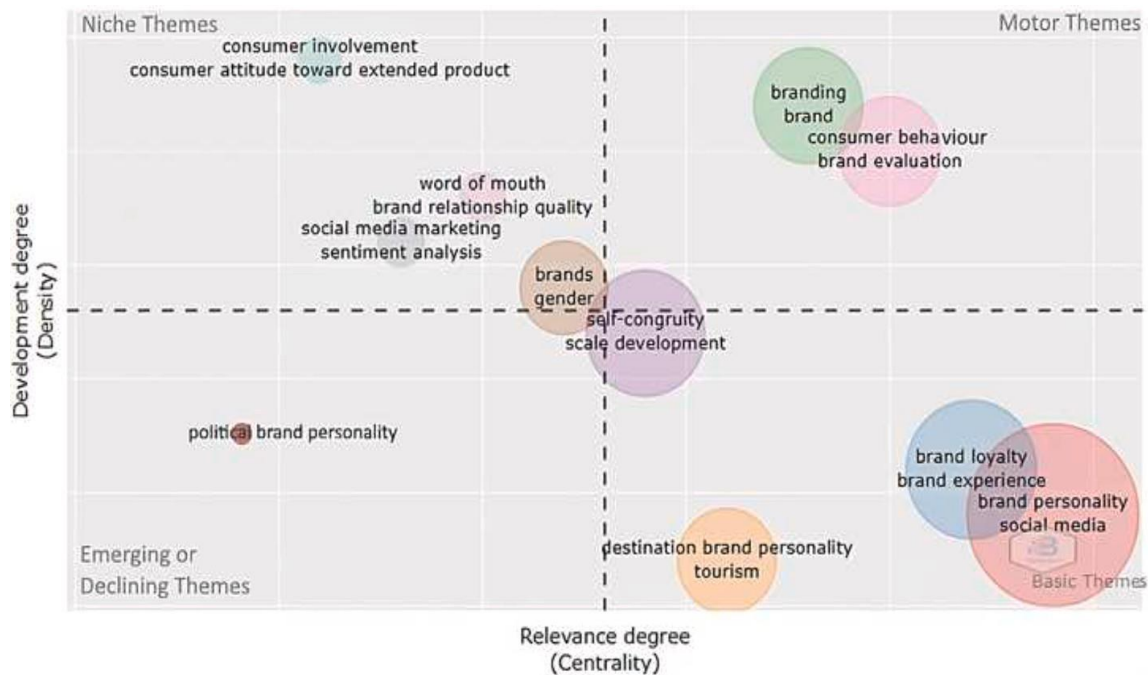
Figure 7. Strategic diagram for the period 2007-2016



The fourth and final period (2017-2022) represents the consolidation of the BP research stream. In just six years, 49.95% of the total articles (525/1,051) were published, although their impact has been quite small given that they account for only 11.15% of total citations. This could be interpreted as an expansion of production but, at the same time, as showing the weakness of the most recent research given the absence of works that became references in the evolution of the discipline. This interpretation should be treated with caution, since measuring impact in terms of number of citations can be misleading given that many publications appeared only in recent years. Over this period the motor themes were generic branding (as in the previous phase), consumer behaviours and brand evaluation (Hassey, 2019) (Figure 8). New basic BP-focused research themes emerged, such as brand loyalty (Mekhum & Sriupayo, 2020), brand experience (Japutra & Molinillo, 2019) and the social media context (Borges-Tiago, 2019; Peco-Torres *et al.*,

2020). Tourism-related issues (e.g., destination brand personality) continued to develop as basic themes. At the opposite extreme, as niche themes, concepts such as consumer involvement (Lee and Kim, 2018), brand relationships (Nobre & Simões, 2019), quality (Nikhashemi *et al.*, 2017) and word-of-mouth (Carpentier *et al.*, 2019) appeared, while an emerging theme was political brand personality (Gopal & Verma, 2018).

Figure 8. Strategic diagram for the period 2017-2022



Appendix D, supplementary material, provides additional information on production for each of the three main periods (from 1997 onwards). In addition, as a complement to the Bibliometrix-based longitudinal thematic analysis, Table 2 summarises the main performance indicators and the predominant topics in each period.

Table 2. Summary of the longitudinal analysis of BP production and predominant topics

| Period    | Prod. | % Prod. total | Citations | % Total citations | Predominant topics                                                                                                                     |
|-----------|-------|---------------|-----------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| 1987-1996 | 2     | 0.19%         | 75        | 0.18%             | Communications                                                                                                                         |
| 1997-2006 | 52    | 4.95%         | 14,709    | 35.97%            | Concept, Dimensions, Scale<br>Consumers and Brands<br>Cultural/Transcultural Differences<br>Tourist Destinations and Destination Image |

|           |       |        |        |        |                                                                                                                                                                                                                                       |
|-----------|-------|--------|--------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2007-2016 | 472   | 44.91% | 21,552 | 52.70% | Tourist Destinations<br>Consumers and Brands<br>Concept and Scales<br>Cultural/Transcultural Differences<br>Digital-online<br>Social Networks<br>Non-profit Organisations<br>Fashion and luxury brands<br>Political Parties<br>Sports |
| 2017-2022 | 525   | 49.95% | 4,561  | 11.15% | Purchase Intentions<br>Social Networks<br>Tourism + Online<br>Non-profit Organisations<br>Fashion and luxury brands<br>Machine Learning                                                                                               |
| Total     | 1,051 | 100%   | 40,897 | 100%   |                                                                                                                                                                                                                                       |

#### 4. Research Agenda

The analysis of the four thematic clusters and the strategic topic diagrams, together with the new trends proposed in the International Marketing Trends Conference (Garofano, *et al.*, 2022), lead us to put forward a future research agenda (Table 3) for BP in which the following important topics would feature.

##### 4.1. Technology

Technology will be a transversal axis that will affect the development of future BP-related studies. Topics related to the consumer's interactions with virtual and augmented reality, big data, artificial intelligence, 5G technologies, metaverse, etc., will be addressed (Plotkina *et al.*, 2021). Researchers can contribute by analysing BP (conceptualisation, measurement and results) in the consumer's interactions with these types of technology in omnichannel contexts. For example, Choi *et al.* (2022) examined the interactive effects of brand personality and service robot type.

#### *4.2. Social media*

Internet and social media use, and online communications, skyrocketed during the recent pandemic. It has been estimated that during the years 2020-2021, 7.3% more people employed the internet and 13% more subscribed to social networks (Social & Hootsuite, 2021). This increase makes it foreseeable that how BP is communicated and perceived in social media in different industries will be addressed. Although these have been dealt with occasionally over the last 36 years, they are not, as yet, fully developed, nor have they shown their full potential. Therefore, some topics await introduction as new lines of BP research.

#### *4.3. Ethical, environmental and social responsibility*

Since the financial crisis of 2008-2009, public interest entities have been very focused on corporate social responsibility strategies and on the three sustainable dimensions, the economic, the social and the environmental. Companies are increasingly aware of stakeholder pressure and criticisms of greenwashing (Velte, 2021). The growth of society's sensitivity to these issues will push companies towards adopting sustainability and energy efficient policies. In parallel, other crises, such as Covid-19 and the invasion of Ukraine, invite analyses of the most appropriate BP strategies to respond to the conjunct challenges they set.

#### *4.4. Growing industries*

In the coming years, some industries will grow more than others and face new challenges. For example, the global sports industry has grown to generate more than €450 billion per annum (Desbordes *et al.*, 2019), expanding segments being e-sports and the possibilities opened up by the metaverse and participation in virtual events. It is foreseeable that new studies will analyse the BP of different sports teams, players, sponsors and, even, major events (Perić *et al.*, 2017). The tourism industry will also continue to grow in prominence in the coming years. After the global paralysis caused by Covid-19 it is possible that tourism industry-related themes will re-arise, or become much more important. How can BP contribute to the recovery of tourism activity in destinations? In addition, technology and tourism are conjoined topics in the context of the immersive experiences of tourists

in augmented/virtual reality, omnichanneling, artificial intelligence, smart tourism, big data, etc. (Chang *et al.*, 2022). How BP can contribute to improving the tourist experience in the interaction of the physical, digital and social dimensions of destinations will be investigated.

#### 4.5. Methodology

The results of this study show that research into BP has been dominated by quantitative survey-based methodologies, using samples mainly from the USA. It is clear from the analysis that research methods that could have provided other approaches and findings have been very little used (e.g., neuroimaging techniques, such as electroencephalography and functional magnetic resonance imaging, galvanic skin responses and eye tracking, big data, projective techniques, ethnographic studies). In addition, it seems that the current understanding of BP is largely conditioned by western cultural perceptions, which suggests that more cross-cultural studies are needed. Finally, while various conceptualisations and measurement scales were identified in the literature, the vast majority used in current research are still based on the pioneering study of J. L. Aaker (1997) and the Big Five personality traits; it is expected that, in the future, researchers will challenge this theoretical framework with new research paradigms.

Table 3. Research agenda summary

| Key trends   | Extant gaps                                                       | Directions for the future                                                    | Rationales for those directions                                                                                                                                                                                    |
|--------------|-------------------------------------------------------------------|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Technology   | <i>How will technology influence future research into BP?</i>     | <i>Establish a methodology capable of measuring technological influence.</i> | <i>It will be important to develop technologies that brands can use in their interactions with consumers (e.g., virtual and augmented reality, big data, artificial intelligence, 5G technologies, metaverse).</i> |
| Social media | <i>How will BP be communicated and perceived on social media?</i> | <i>Analyse BP communications on social media.</i>                            | <i>The importance of social media has increasing substantially, especially since the Covid-19 pandemic.</i>                                                                                                        |

|                                                  |                                                                                                                                                                                                              |                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                        |
|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ethical, environmental and social responsibility | <i>How will corporate social responsibility and corporate sustainability affect BP?</i>                                                                                                                      | <i>Analyse the influence of public and private policies related to corporate social responsibility and sustainability on BP.</i>                                                                                                                        | <i>Societies are becoming more sensitive to, and demand greater, corporate social responsibility.</i>                                                                                                                  |
| Growing industries                               | <i>How is BP perceived in the context of new or emerging industry sectors, such as esports, cryptocurrencies, etc.?</i><br><i>How can BP contribute to the recovery of tourism activity in destinations?</i> | <i>Study new segments, contexts and scenarios.</i><br><i>Analyse the management of BP as an instrument for the recovery of tourism companies.</i>                                                                                                       | <i>To date, BP-focused studies have paid little attention to some emerging industries.</i><br><i>The global paralysis caused by Covid-19 has particularly affected the activity in this important economic sector.</i> |
| Methodologies                                    | <i>How can BP scales be adjusted to different contexts?</i><br><i>How can BP's dimensions be transferred to different cultures?</i><br><i>How can BP scales be used in other areas?</i>                      | <i>Examine new methodologies that answer and/or complement unresolved questions. For example, new findings/approaches may arise based on neuroscience techniques (e.g., electroencephalography, functional magnetic resonance imaging) or big data.</i> | <i>Utilise new methodologies because of the predominance of quantitative methodologies based exclusively on surveys carried out, above all, in the USA and Europe.</i>                                                 |

## 5. Conclusions

This work presents the most complete bibliometric analysis of the scientific production on BP carried out to date. The analysis of the 1,051 articles published between 1987 and 2022 featured in the Scopus database contributes to our understanding of the state-of-the-art of research into BP and helps to identify future research directions. This study makes, consequently, several theoretical and practical contributions to the marketing discipline in general, and to branding in particular. The findings show the evolution of the scientific production of BP, its intellectual structure, the most influential works about BP, the most popular BP topics, how BP has been conceptualised and measured, what methodologies have been used and what emerging topics may attract research in coming years.

First, as to the evolution of the research, it should be noted that the scientific production, which began in the late eighties, is still growing. Although there was significant growth in research into BP in the first decade (1997-2006), the real turning point was the period 2007-2016, when 472 articles were published (44.91% of the total). Further strong growth took place in the last six years analysed (2017-2022), during which 525 articles were published, an annual average of 87.5. The findings demonstrate that BP is a construct of great interest to the scientific community and that its theoretical corpus continues to grow. Second, more than two thousand six hundred authors from seventy-five countries engaged in BP research. About 30% of the production was undertaken by authors affiliated with US institutions, many of whom had a significant impact on the literature (e.g., Aaker, Brakus, Fournier, Schmitt). This finding highlights the need to focus on BP in other cultural contexts, such as Asia and Africa, to increase the validity of the construct and to better understand how it might operate in other environments. Third, as to dissemination channels, the articles were published in 399 journals, mainly specialised in business research, marketing, branding, consumer behaviour, retailing and tourism. Therefore, the topic is of interest to editors of a wide variety of journals, which highlights the transversal implications for brand management and the potential for further development. Fourth, the articles that made the greatest impact in terms of number of citations and had the highest influence on the subsequent development of research into BP appeared in the period 1997 - 2006.

The seminal articles published at the beginning of this period were followed by works that expanded BP's theoretical framework: these examined cross-cultural issues/effects,

the effects of BP on consumer-brand relationships, the relationship between BP and emerging constructs (e.g., consumer-based brand equity) and the application of BP in other sectors, such as tourism destinations. Fifth, as to motor themes, it was observed that the diverse topics are organised into four clusters. The first cluster focuses on BP's theoretical conceptualisation, BP dimensions and on BP scale development. The second theme cluster relates to BP marketing communications, social media and purchase intention. The third cluster focuses on BP's relationships with other brand-related constructs (e.g., attitude, trust, love and attachment) and methodological choices (e.g., structural equation modelling). The fourth theme cluster covers the tourism sector. These research topics evolved unevenly over time. The strategic diagrams show that after the theoretical framework of BP was established in the first and second periods, the third saw a greater focus on the concept in the field of tourism and diversification towards other sectors and applications. The most recent period has been characterised by a continuous increase in tourism-related studies, particularly examining destinations, and about specific types of tourism (e.g., cultural, health) and the Internet (e.g., social networks, human-technology interactions).

Sixth, with respect to the methodologies that have been used, the analysis showed that survey-based research methodologies using samples from the USA and, to a lesser extent, from Europe and Asia, were dominant. This lack of methodological diversity limits the contributions that have been made in the study of the construct. Within the last decade other methodologies (e.g., netnography, sentiment analysis, machine learning) have been introduced into the marketing discipline that can increase the knowledge of how consumers perceive the different characteristics and dimensions of brand personality, and how they influence their behaviours. Therefore, future works may examine BP using mixed methods (e.g., focus groups, experiment design) and across multiple cultural settings. For example, by employing unconscious data collection techniques (i.e., neuronal. electrodermal activity, projective techniques), which would allow us to identify how consumers respond to the different BP dimensions.

Finally, this study contributes to the literature by proposing a research agenda that identifies important issues that might be addressed in the future to support the theoretical and practical development of BP, both in terms of its application in various industries and technological contexts, and to the use of new research methodologies. In particular,

technology-based consumer-brand interactions (e.g., omnichannel, AI-powered devices such as chatbots, voice assistants and robots, virtual reality, augmented reality, the metaverse) offer a new study context in which BP can undoubtedly play an important role. In parallel, the application of the construct in emerging sectors (e.g., esports, virtual events, live-stream shopping, artificial intelligence and robot companions) opens new and interesting research avenues.

## 6. Limitations and future research

Despite the value of this research, we are aware that it may have some limitations. First, the database was created from publications indexed in Scopus. Although Scopus is one of the most important global bibliographic base, and offers a broad and multidisciplinary coverage of high-impact scientific journals (Mongeon & Paul-Hus, 2016; Muñoz-Leiva *et al.*, 2015), it may not include all BP-related publications. Future works might broaden the research base by including publications indexed in other bibliographic databases, such as Web of Science, not indexed in Scopus.

Second, the study methodology is, largely, a bibliometric analysis. The valuable indicators, clusters and thematic maps associated with this type of analysis have been enriched with a review of the relevant construct conceptualisations and measurement scales. However, due to the broad scope of the study, it was not possible to examine other issues. Future work might use other methods to explore the main BP-related themes in more depth. For example, a meta-analysis of the subject could make an objective, quantitative assessment of relationships commonly analysed in the literature and advance the understanding of its key concepts (see Kraus *et al.*, 2022); a conceptual review could aid in the development of new concepts, frameworks, models, taxonomies and theories, which may include propositions or hypotheses relevant to the field of study (see Lim *et al.*, 2022).

Finally, the narrow definition of the search query "brand personality" yielded a volume of data large enough to justify a bibliometric analysis and, at the same time, focused enough not to diverge from the scope of the present study. However, future work might use other, related terms, such as "personality factors" and "brand anthropomorphism".

## Appendix A. Supplementary material

Table 4. Previous bibliometric studies on BP

| Authors                             | Database                                                      | Period            | Size of coverage                                                                                          | Focus                                                                                                                                       | Method                                                            | Key findings                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------|---------------------------------------------------------------|-------------------|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Radler (2018)                       | Web of Science (WoS)                                          | 1995 - April 2016 | 220 articles                                                                                              | Reviewing the extant literature and identifying relevant research gaps.                                                                     | Bibliometric co-citation meta-analysis. HistCite software.        | Future brand personality research is likely to be even more heavily influenced by psychology.<br><br>Emerging topics: Application of brand personality to related areas (Tourism, non-profit organisations, services or organisations).                                                                                                     |
| Llanos-Herrera & Merigo (2019)      | Web of Science (WoS)                                          | 1995 - April 2018 | 425 articles<br>10 reviews                                                                                | To provide a global overview of the research conducted.                                                                                     | Bibliometric. VOSviewer software.                                 | BP seems to still to be at an early stage of development.<br><br>Emerging topics: Social media, advertising and tourism.                                                                                                                                                                                                                    |
| Khurana & Kumar (2019)              | Google Scholar                                                | 1997 - 2019       | The exact number is not indicated. Addresses only articles that develop or evaluate Aaker's (1997) scale. | To understand the different personality dimensions of BP that emerged in the post-Aaker (1997) literature.                                  | Literature review. No mention of software.                        | Strong evidence emerged for three of Aaker's BP dimensions (excitement, sincerity and competence) and weak evidence for others (extraversion, agreeableness and conscientiousness). Further studies need to be undertaken into the fundamental dimensions of BP.                                                                            |
| Lara-Rodríguez <i>et al.</i> (2019) | Scientific databases (i.e., ISI, Scopus, EBSCO and ProQuest). | 1950 - 2017       | 1038 documents (books, book sections, conference proceedings, articles, theses, etc.)                     | Identifying BP's knowledge structure and possible emerging research topics.                                                                 | Bibliometric analysis. Bibliometrix, VOSviewer, and TOS software. | There is no unified method for measuring or conceptualising BP.<br><br>Emerging topics: Brand management, customer behaviour, digital marketing, communication and perceived experiences in digital environments.                                                                                                                           |
| Ghorbani <i>et al.</i> (2022)       | WoS, Scopus, EBSCO.                                           | 2005 - 2021       | 107 articles                                                                                              | To provide the groundwork for future study into the realm of brand personality in a digital world.                                          | Systematic literature review based on the TCCM framework.         | Existing information from multiple digital contexts is summarised, and a conceptual model of digital BP is established.<br><br>Emerging topics: Research on new technologies and digital contexts.                                                                                                                                          |
| Roy & Banerjee (2022)               | Scopus                                                        | 2000 - 2020       | 493 articles                                                                                              | To explore the congruence between consumer personality and brand personality, and related concepts like brand animism and anthropomorphism. | Bibliometric analyses                                             | The level of congruence between consumer personality and brand personality remains unclear and needs further research. Research is also needed, in the context of BP, into the related concepts brand animism and anthropomorphism. BP applications have, to date, been strongly focused on a relatively limited group of brand categories. |

Table 5. Top 10 authors with the greatest production, and most cited authors

| Most productive authors |                                     |      |      |                   |  | Most cited authors |                                      |      |       |                   |
|-------------------------|-------------------------------------|------|------|-------------------|--|--------------------|--------------------------------------|------|-------|-------------------|
| Author                  | Current affiliation                 | Art. | Cit. | Ratio (cit./doc.) |  | Author             | Current affiliation                  | Art. | Cit.  | Ratio (cit./doc.) |
| 1 Sung, Y.              | University of Seoul                 | 14   | 808  | 57.71             |  | 1 Fournier S.      | Boston University                    | 3    | 5,255 | 1751.67           |
| 2 Rojas-Méndez J.I.     | Carleton University                 | 9    | 265  | 29.44             |  | 2 Aaker J.L.       | Stanford Graduate School of Business | 5    | 5,100 | 1700.0            |
| 3 Moutinho, L.          | University of Suffolk               | 7    | 384  | 54.86             |  | 3 Schmitt B.H.     | Columbia Business School             | 2    | 2,028 | 676.0             |
| 4 Demo, G.              | Universidade de Brasília            | 7    | 26   | 3.71              |  | 4 Zarantonello L.  | University of Roehampton             | 1    | 2,004 | 668.0             |
| 5 Supphellen, M.        | NHH Norwegian School of Economics   | 6    | 416  | 69.33             |  | 5 Brakus J.J.      | University of Leeds                  | 1    | 2,004 | 668.0             |
| 6 Davies, G.            | Alliance Manchester Business School | 6    | 298  | 49.67             |  | 6 Ekinci Y.        | University of Portsmouth             | 4    | 1,093 | 364.33            |
| 7 Grohmann, B.          | John Molson School of Business      | 6    | 443  | 73.83             |  | 7 Hosany S.        | Royal Holloway, University of London | 3    | 1,074 | 358.0             |
| 8 Lettice, F.           | Norwich Business School             | 6    | 130  | 21.67             |  | 8 Brasel S.A.      | Carroll School of Management         | 2    | 923   | 307.67            |
| 9 Tong, X.              | The University of Alabama           | 6    | 138  | 23.00             |  | 9 Hoyer W.D.       | McCombs School of Business           | 4    | 840   | 280.0             |
| 10 Su, J.               | University of North Carolina        | 6    | 181  | 30.17             |  | 10 Krohmer H.      | University of Bern                   | 4    | 840   | 280.0             |

Table 6. Top 10 journals in production terms of articles published about BP in the Scopus database

|    | Journal                                           | Articles | % total Articles | Citations | % total Citations |
|----|---------------------------------------------------|----------|------------------|-----------|-------------------|
| 1  | Journal of Brand Management                       | 41       | 3.90%            | 1,137     | 2.78%             |
| 2  | Journal of Business Research                      | 40       | 3.81%            | 3,187     | 7.79%             |
| 3  | Journal of Product and Brand Management           | 33       | 3.14%            | 1,014     | 2.48%             |
| 4  | Psychology and Marketing                          | 28       | 2.66%            | 1,504     | 3.68%             |
| 5  | European Journal of Marketing                     | 21       | 2.00%            | 1,169     | 2.86%             |
| 6  | Journal of Consumer Marketing                     | 13       | 1.24%            | 507       | 1.24%             |
| 7  | Journal of Consumer Behavior                      | 12       | 1.14%            | 187       | 0.46%             |
| 8  | Journal of Fashion Marketing and Management       | 12       | 1.14%            | 254       | 0.62%             |
| 9  | Asia Pacific Journal of Marketing and Logistics   | 11       | 1.05%            | 169       | 0.41%             |
| 10 | Frontiers in Psychology                           | 11       | 1.05%            | 5         | 0.01%             |
|    | Total of BP articles in top 10 journals           | 222      | 21.12%           |           |                   |
|    | Total articles published on BP                    | 1,051    | 100%             |           |                   |
|    | Total citations of BP articles in top 10 journals |          |                  | 9,133     | 22.33%            |
|    | Total citations in articles published about BP    |          |                  | 40,897.2  | 100%              |

Table 7. A non-exhaustive list of brand personality measurements

| Year | Authors                    | Research Field           | Method                                                                                         | Dimensions                                                                       | No. |
|------|----------------------------|--------------------------|------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-----|
| 1997 | Aaker                      | Commercial Brands        | 631 questionnaires<br>37 brands<br>42 items<br>5-point Likert-type scale                       | Sincerity, Excitement, Competence, Sophistication, Ruggedness                    | 5   |
| 1999 | Koebel & Ladwein           | Multiple                 | 50 questionnaires<br>85 brands<br>42 items<br>7-point Likert-type scale                        | Competence, Conscience, Domination, Expansiveness, Masculinity, Seduction        | 6   |
| 2001 | Caprara <i>et al.</i>      | Commercial Brands        | 1,586 questionnaires<br>40 items<br>12 brands<br>5-point Likert-type scale                     | Agreeableness, Emotional Stability, Extraversion, Openness                       | 4   |
| 2003 | D'Astous & Lévesque        | Store Personality        | 226 questionnaires                                                                             | Enthusiasm, Genuineness, Solidity, Sophistication, Unpleasant                    | 5   |
| 2003 | Supphellen & Grønhaug      | Commercial Brands        | 107 questionnaires +<br>93 questionnaires<br>42 items<br>2 brands<br>5-point Likert-type scale | Excitement, Sincerity, Sophistication, Successful, Ruggedness                    | 5   |
| 2004 | Rojas-Mendez <i>et al.</i> | Automobile Brands        | 388 questionnaires<br>42 items<br>5-point Likert-type scale                                    | Competence, Excitement, Sincerity, Sophistication, Ruggedness                    | 5   |
| 2004 | Olavarrieta <i>et al.</i>  | Multiple                 | 173 questionnaires<br>37 brands<br>7-point Likert-type scale                                   | Competence, Excitement, Sincerity, Sophistication, Ruggedness, Tradition         | 6   |
| 2004 | Saavedra <i>et al.</i>     | Malls                    | 168 questionnaires<br>42 items<br>Likert-type scale (undefined)                                | Excitement, Passion, Peace, Ruggedness, Sincerity                                | 5   |
| 2004 | Helgeson & Supphellen      | Retail Brands            | 24 questionnaires<br>5 brands                                                                  | Classic, Modern                                                                  | 2   |
| 2004 | Davies <i>et al.</i>       | Corporate brands         | 719 questionnaires                                                                             | Agreeableness, Chic, Competence, Enterprise, Informality, Machismo, Ruthlessness | 7   |
| 2005 | Venable <i>et al.</i>      | Non-Profit Organisations | 42 items<br>5-point Likert-type scale                                                          | Integrity, Nurturance, Sincerity, Sophistication, Ruggedness                     | 5   |
| 2005 | Park <i>et al.</i>         | e-Brand Personality      | 8,184 (web users) surveys<br>e-brands                                                          | Analytical, Bold, Friendly, Sophisticated                                        | 4   |
| 2005 | Sung & Tinkham             | Consumer Brands          | 367 questionnaires +<br>409 questionnaires                                                     | Ascendancy, Competence, Likeableness, Ruggedness,                                | 8   |

| Year | Authors               | Research Field           | Method                                                                                   | Dimensions                                                                                                                                                                                         | No. |
|------|-----------------------|--------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
|      |                       |                          | 4 brands<br>42 items<br>5-point Likert-type scale                                        | Sophistication, Tradition, Trendiness, Western                                                                                                                                                     |     |
| 2005 | Venable <i>et al.</i> | Non-Profit Organizations | 376 questionnaires<br>18 interviews<br>8 brands                                          | Integrity/Care, Sophistication/ Ruggedness.                                                                                                                                                        | 2   |
| 2006 | Ekinici & Hosany      | Tourism Destination      | 250 questionnaires<br>4 continents                                                       | Conviviality, Excitement, Sincerity                                                                                                                                                                | 3   |
| 2006 | Smith <i>et al.</i>   | Sports                   | 413 questionnaires<br>1 brand                                                            | Competence, Excitement, Innovation, Sincerity, Sophistication                                                                                                                                      | 5   |
| 2007 | Sung & Tinkham        | Multiple                 | 196 questionnaires +<br>215 questionnaires<br>20 brands<br>7-point Likert-type scale     | Androgen, Competence, Ruggedness, Sophistication, Sympathy, Traditionalism, Trendiness, White Collar Ascendance, East, Competence Ruggedness, Sophistication, Sympathy, Traditionalism, Trendiness | 8   |
| 2007 | Chan-Olmsted & Cha    | Television News          | 113 questionnaires<br>6 brands                                                           | Competence, Dynamism, Timeless, Timeliness, Traditional                                                                                                                                            | 5   |
| 2007 | Bosnjak <i>et al.</i> | Multiple                 | 216 questionnaires<br>13 brands                                                          | Competence, Conscientiousness, Emotion, Excitement, Drive, Sincerity, Superficiality                                                                                                               | 7   |
| 2007 | Milas & Mlačić        | Consumer Brands          | 267 questionnaires<br>10 brands<br>90 items<br>5-point Likert-type scale                 | Agreeableness, Conscientiousness, Emotional Stability, Extraversion                                                                                                                                | 4   |
| 2007 | Murphy <i>et al.</i>  | Tourism Destination      | 464 questionnaires<br>2 destinations<br>5-point Likert-type scale                        | Exciting, Honest, Outdoorsy, Sincere, Sophisticated, Tough, Upper Class                                                                                                                            | 7   |
| 2009 | Chu & Sung            | Commercial brands        | 698 questionnaires<br>90 items<br>7-point Likert-type scale                              | Competency, Sophistication, Excitement, Traditionalism, Happiness, Trendiness                                                                                                                      | 6   |
| 2009 | Kim                   | Tourism Destination      | 480 questionnaires<br>42 items<br>5-point Likert-type scale<br>7-point Likert-type scale | Competence, Excitement, Family-Oriented, Ruggedness, Sincerity, Sophistication, Uniqueness                                                                                                         | 7   |
| 2009 | Grohmann              | Gender/Multiple brands   | 2,800 participants<br>12 items<br>MBP/FBP scale                                          | Masculine Traits:                                                                                                                                                                                  | 6   |
|      |                       |                          |                                                                                          |                                                                                                                                                                                                    | 6   |



| Year | Authors                       | Research Field           | Method                                                                       | Dimensions                                                                                                                           | No. |
|------|-------------------------------|--------------------------|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-----|
|      |                               |                          |                                                                              | Adventurous, Aggressive, Brave, Daring, Dominant, Sturdy<br>Feminine Traits: Expressive, Fragile, Graceful, Sensitive, Sweet, Tender |     |
| 2009 | Smith                         | Politics                 | 183 questionnaires<br>42 items<br>5-point Likert-type scale                  | Honesty, Image, Leadership, Spirited, Toughness, Uniqueness                                                                          | 6   |
| 2009 | Geuens <i>et al.</i>          | Multiple                 | 12,789 questionnaires<br>193 brands<br>40 items<br>7-point Likert-type scale | Activity, Aggressiveness, Emotionality, Responsibility, Simplicity, Sincerity                                                        | 6   |
| 2010 | Heere                         | Sports                   | 323 questionnaires<br>5 brands (teams)<br>7-point Likert-type scale          | Accessible, Attractive, Cool, Dynamic, Exciting, Passionate, Warm                                                                    | 7   |
| 2010 | Ambroise & Valette - Florence | Multiple                 | 3,114 questionnaires<br>39 brands<br>6-point Likert-type scale               | Agreeableness, Conscientiousness, Disingenuousness, Introversion, Sophistication                                                     | 5   |
| 2011 | Freling <i>et al.</i>         | Brand Personality appeal | 171 questionnaires<br>2 brands<br>7-point Likert-type scale                  | Clarity, Favourability, Originality                                                                                                  | 3   |
| 2011 | Sung & Park                   | Cable Network            | 166 surveys<br>36 brands<br>28 traits<br>7-point Likert-type scale           | Intelligence, Warmness, Excitement, Controversy, Ruggedness                                                                          | 5   |
| 2011 | Herbst & Merz                 | Industrial Products      | 213 questionnaires<br>42 items<br>5-point Likert-type scale                  | Performance, Sensation, Credibility                                                                                                  | 3   |
| 2011 | Mishra                        | Mobile Brand             | 250 questionnaires<br>42 items                                               | Excitement, Modernity, Sincerity, Sophistication, Community, Strong, Masculinity                                                     | 7   |
| 2012 | Rojas-Méndez & Papadopoulos   | Brands from USA          | 223 questionnaires<br>27 traits<br>5-point Likert-type scale                 | Amiability, Resourcefulness, Neuroticism, Spirited                                                                                   | 4   |
| 2012 | Muniz & Marchetti             | Multiple                 | 1,302 questionnaires<br>28 items<br>7-point Likert-type scale                | Sincerity, Sophistication, Audacity, Sensibility, Happiness.                                                                         | 5   |
| 2012 | Romero <i>et al.</i>          | Multiple                 | 313 questionnaires +<br>320 questionnaires<br>6 brands                       | Sincerity, Success, Professionalism, Sophistication,                                                                                 | 8   |



| Year | Authors                         | Research Field      | Method                                                                                                                           | Dimensions                                                                                                                                              | No.    |
|------|---------------------------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
|      |                                 |                     | 42 items<br>5-point Likert-type scale                                                                                            | Ruggedness, Happiness, Vivacity, Domesticity                                                                                                            |        |
| 2012 | Huang <i>et al.</i>             | Multiple            | 152 questionnaires<br>40 items                                                                                                   | Extraversion, Agreeableness, Conscientiousness, Neuroticism, Openness                                                                                   | 5      |
| 2012 | Tsiotsou                        | Sports              | 301 questionnaires<br>42 items<br>7-point Likert-type scale                                                                      | Competitiveness, Prestige, Morality, Authenticity, Credibility                                                                                          | 5      |
| 2013 | Ávila <i>et al.</i>             | Multiple            | 360 questionnaires<br>20 brands<br>7-point Likert-type scale                                                                     | Sincerity, Enthusiasm, Competence, Sophistication, Ruggedness, Spontaneity                                                                              | 6      |
| 2013 | Valette - Florence & De Barnier | Print media         | 780 questionnaires<br>24 brands<br>121 items<br>6-point Likert-type scale                                                        | Respectability, Disingenuous, Conviviality, Assertiveness, Charm                                                                                        | 5      |
| 2013 | De Moya & Jain                  | Tourism Destination | 32,779 words for Brazil and 20,996 words for Mexico<br>42 items                                                                  | Through social media: Sincerity, Sophistication, Excitement<br>Ruggedness, Excitement, Competence, with Invalid Values for Sincerity and Sophistication | 3<br>5 |
| 2013 | Ventura <i>et al.</i>           | Electronic          | 855 questionnaires<br>22 items<br>6-point Likert-type scale                                                                      | Reliability, Pleasantness, Welcomeness                                                                                                                  | 3      |
| 2013 | Rojas-Méndez <i>et al.</i>      | Culture             | 428 questionnaires+<br>477 questionnaires<br>209 items<br>5-point Likert-type scale                                              | Creative, Friendly, Self-Centred                                                                                                                        | 3      |
| 2015 | Ham & Lee                       | Internet Media      | 224 questionnaires+<br>206 questionnaires<br>17 brands<br>30 items<br>7-point Likert-type scale<br>7-point semantic differential | Intelligent, Amusing, Convenient, Sociable, Confusing                                                                                                   | 5      |
| 2015 | Sung <i>et al.</i>              | Luxury Brands       | 123 questionnaires<br>30 brands<br>36 items<br>7-point Likert-type scale                                                         | Sincerity, Professionalism, Excitement, Sophistication, Materialism, Attractiveness                                                                     | 6      |
| 2016 | Tsaur, <i>et al.</i>            | Tourism Destination | 251 questionnaires+<br>272 questionnaires<br>32 items                                                                            | Friendly, Reliable, Glamorous                                                                                                                           | 3      |

| Year | Authors             | Research Field | Method                                                                   | Dimensions                                                                | No. |
|------|---------------------|----------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------|-----|
|      |                     |                | 5-point Likert-type scale                                                |                                                                           |     |
| 2017 | Ahmad & Thyagaraj   | Multiple       | 612 questionnaires<br>168 items<br>3 brands<br>5-point Likert-type scale | Sophistication, Excitement, Popularity, Competence, Trendiness, Integrity | 6   |
| 2017 | Pan <i>et al.</i>   | Tourism        | 331 questionnaires+<br>515 surveys<br>18 items                           | Competence, Sacredness, Vibrancy, Femininity, Excitement                  | 5   |
| 2018 | George & Anandkumar | Multiple       | 606 questionnaires<br>21 brands<br>26 items<br>5-point Likert-type scale | Happy, Youthful, Reliable, Adventurous, Competent, Accountable, Appeal    | 7   |

## Appendix B. Supplementary material

VOSviewer was developed in the University of Leiden in the Netherlands, uses algorithms to identify the keywords in publications and then applies a mapping technique, visualisation of similarities (VOS), to create bibliometric maps (named landscapes) (Van Eck *et al.*, 2010). The maps depict publication-related metrics such as authorship, bibliographic coupling and co-citations. VOSviewer's visualisation of similarities algorithm provides a low-dimensional viewpoint, in which the distance between pairs of items very accurately depicts their levels of similarity (Van Eck & Waltman, 2010). The maps are constructed in three steps. First, the similarity matrix is obtained from a co-occurrence matrix of items using the association strength, or proximity, index: “the similarity  $s_{ij}$  between two items  $i$  and  $j$  is calculated as:

$$s_{ij} = \frac{c_{ij}}{w_i w_j}$$

where  $c_{ij}$  denotes the number of co-occurrences of items  $i$  and  $j$  and where  $w_i$  and  $w_j$  denote either the total number of occurrences of items  $i$  and  $j$  or the total number of co-occurrences of these items” (Van Eck & Waltman, 2010, p. 531). Second, a two-dimensional map is constructed based on the similarity matrix. Very similar items will appear adjacent, while dissimilar items will be far distant from each other. The algorithm is based on the minimisation of the weighted sums of the squared Euclidean distances between all pairs of items. The greater the similarity is between two items, the greater will be the weight of their squared distance in the addition. “The objective function to minimize is given by

$$V(x_1, \dots, x_n) = \sum_{i < j} s_{ij} \|x_i - x_j\|^2$$

where the vector  $x_i = (x_{i1}, x_{i2})$  denotes the location of item  $i$  in a two-dimensional map and where  $\|\bullet\|$  denotes the Euclidean norm” (Van Eck & Waltman, 2010, p. 532). Third, to produce consistent results, three transformations (translation, rotation and reflection) were applied to the solution obtained for the objective function.

## Appendix C. Supplementary material

### Comment on Figure 4

The blue cluster is focused on various topics including BP measurement scales, and BP dimensions such as competence, excitement and sophistication. This cluster includes important studies such as Aaker's (1997) seminal work, some critics of her conceptual proposal (e.g., Caprara *et al.*, 2001), supporters of the BP framework (e.g., Huang *et al.*, 2012), and empirical examinations of BP application in different contexts (e.g., Siguaw *et al.*, 1999; Kim *et al.*, 2001; Supphellen & Grønhaug, 2003). The red cluster depicts relationships between BP and topics such as communications, differentiation and positioning of brands (e.g., Zouganeli *et al.*, 2012), social media advertising content (Lee, Hosanagar & Nair, 2018) and the consequences of BP (e.g., purchase intention) (e.g., Hu *et al.*, 2013; Lee & Kang, 2013; Wang & Yang, 2011). In the green cluster, methodological approaches and research methods (e.g., hypothesis, structural equation modelling) are related to consumer-brand relationships themes (e.g., attitude, trust, love, attachment). Finally, the yellow cluster depicts terms associated with tourism, such as destination branding, destination personality, tourist destinations and others, such as satisfaction and self-congruence (e.g., De Moya & Jain, 2013; Hosany *et al.*, 2006; Ekinci & Hosany 2006; Peco-Torres *et al.*, 2020).

## Appendix D. Supplementary material

### Comment on Strategic diagrams

#### Figure 6

The second period (1997-2006) saw the real take-off point of research into BP. At the beginning of this period the American psychologist-marketing scholar J. L. Aaker (1997) introduced a brand personality scale formed with five dimensions based on the "Big Five" human personality traits. From that point researchers used Aaker's (1997) framework as the reference for investigating BP, relationships between BP and theoretically related constructs (Helgeson & Supphellen, 2004), measurement of BP (Siguaw, 1999) and criticism of BP (Austin *et al.*, 2003; Azoulay & Kapferer, 2003). Similarly, during this decade other topics have emerged regularly. Among them are consumer-brand personality relationships (Fournier, 1998; Supphellen & Grønhaug, 2003; Govers & Schoormans, 2005), cross-cultural effects on BP (Murase & Bojanic, 2004; Chang & Chieng, 2006), and applications of BP to tourist destinations (Ekinci & Hosany, 2006; Hosany, *et al.*, 2006).

#### Figure 7

In the third period (2007-2016), among the research topics, tourism stands out, with works, for example, on tourism destinations (Murphy *et al.*, 2007; Usakli & Baloglu, 2011; Gómez Aguilar *et al.*, 2016), destination image (Klabi, 2012), hospitality (Leung & Law, 2010), tourist destination social networks (De Moya & Jain, 2013), tourist behaviours (Baloglu, *et al.*, 2014) and tourist loyalty (Hultman *et al.*, 2015). In parallel with research into this important topic, work also continued on other themes featured in the previous stage, such as the conceptualisation of BP (Voeth & Herbst, 2008; Smith, 2009; Freling *et al.*, 2011), the effect of BP on consumer-brand relationships (Anisimova, 2007; Burnett & Bruce, 2007; Madrigal & Boush, 2008; LeBel & Cooke, 2008) and the effects of cultural differences on BP (Cheng *et al.*, 2007). This period marked the beginning of a broad diversification of BP and its applications in different contexts such as non-profit organisations (Mort G.S., *et al.*, 2007; Shehu *et al.*, 2016), fashion brands (Mulyanegara & Tsarenko, 2009; Heine, 2010; Xia-zi & Jun, 2010; Willems *et al.*, 2011), political parties (Smith, 2009; Guzman & Sierra, 2009; Kulshrestha & Kapoor, 2011), sports brands (Čáslavová & Petráčková, 2011; Cho & Kang, 2012; Tong & Li, 2013; Tong

& Su, 2014) and social media (Pentina *et al.*, 2013; Xia, 2013; Killian & McManus, 2015).

### Figure 8

During the final period (2017-2022) research into BP in the context of tourism destinations continued to increase (Yang *et al.*, 2020; Moons *et al.*, 2020), as well as BP-focused research into specific types of tourism, such as health tourism (Mekhum & Sriupayo, 2020), heritage tourism (Farooq *et al.*, 2021; Pong *et al.*, 2021) and paranormal tourism (Houran *et al.*, 2020). In addition, reflecting the expansion of the internet and social networks, new research sub-themes, such as tourism and social networks (Peco-Torres *et al.*, 2020) and online tourism (Tiago *et al.*, 2021) appeared. Research in this period also continued into topics developed in the previous phase, such as fashion branding (Bishnoi & Singh S., 2021; Zainudin *et al.*, 2019), technological products (Mao *et al.*, 2020) and non-profit organisations (Chrissos *et al.*, 2021; Mirzaei *et al.*, 2021). Finally, advances in the digitalisation of brand-consumer relationships in social media environments drove research (He *et al.*, 2021; Farhat, *et al.*, 2021; Lee *et al.*, 2020; Pamuksuz *et al.*, 2021; Priporas *et al.*, 2020), as did consumers' interactions with emerging technologies such as machine learning (Shanmugam & Padmanaban, 2021; Pamuksuz *et al.*, 2021) and artificial intelligence (Yang & Hu, 2021).

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# CAPÍTULO 3

## *Understanding Destination Brand Experience through data mining and machine learning*

El contenido del siguiente capítulo ha sido publicado como artículo con la siguiente referencia:

Calderón-Fajardo, V., Anaya-Sánchez, R., & Molinillo, S. (2024). Understanding destination brand experience through data mining and machine learning. *Journal of Destination Marketing & Management*, 31, 100862.

DOI: <https://doi.org/10.1016/j.jdmm.2024.100862>

Factor de impacto JCR: 8,9, situado en el primer decil (D1) de la categoría “Hospitality, Leisure, Sport & Tourism”, ocupando el puesto 8 de 139. Pertenece a la edición “Social Sciences Citation Index (SSCI)”.

# UNDERSTANDING DESTINATION BRAND EXPERIENCE THROUGH DATA MINING AND MACHINE LEARNING

## **Abstract:**

This research formalises a new methodology to measure and analyse Destination Brand Experience, improving upon traditional approaches by offering greater objectivity and rigour. Adopting a case study approach, five distinct and complementary types of analysis have been conducted: comprehensive sentiment analysis and topic modelling, an analysis using multiple thesauri, statistical analyses for hypothesis testing, and machine learning for classification. The methodological innovation, through the construction of thesauri, has enabled the measurement of sensory, affective, intellectual, and behavioural dimensions in unique and emblematic attractions, experiences, and transportation within a tourist destination, based on visitor reviews. This new approach allows tourism professionals and destination managers to identify areas for improvement and develop strategies to enhance tourist satisfaction. The findings suggest that there are significant differences in the relationships between specific dimensions and that gender and culture moderate or impact these relationships.

**Keywords:** Destination Brand Experience; Data Mining; Machine Learning

## 1. Introduction

Literature has demonstrated that destination branding provides a competitive advantage (Boo *et al.*, 2009), and in this regard, understanding tourists' experience with a destination brand is crucial (Berrozpe, 2019; Rather *et al.*, 2021; Kumar & Kaushik, 2020), as it encompasses aspects such as sensory, affective, intellectual, and behavioural (Barnes *et al.*, 2014). The construct of Destination Brand Experience (DBE), first introduced by (Barnes *et al.*, 2014) and derived from the general Brand Experience (BE) construct of Brakus *et al.* (2009), is a comprehensive model that captures these four essential dimensions of destination brand experience. DBE refers to the cumulative perception and emotional response that a tourist forms through direct or indirect interaction with a destination's brand identity. This encompasses all touchpoints, including cultural attributes, natural scenery, amenities, customer service, marketing communication, and personal experiences. As such, it plays a significant role in destination selection, satisfaction, and loyalty, profoundly influencing the overall success of tourism marketing strategies (Boo *et al.*, 2009; Barnes *et al.*, 2014; Kumar & Kaushik, 2018)

Destinations are complex products, not only because they combine various tourism-related offerings, but also due to consumers' subjective interpretation of them (Buhalis, 2000). The multisensory, fantasy, and emotional aspects of consumer behaviour in relation to products are particularly significant in the tourism industry (Hirschman & Holbrook, 1982; Govers *et al.*, 2007). The application of the BE construct to tourist destinations presents a formal, rigorous, and systematic approach for assessing destination brand experiences. This comprehensive approach makes the DBE construct a valuable tool in the tourism industry for evaluating and enhancing travellers' experiences with destination brands (Barnes *et al.*, 2014).

The paper highlights the prevalence of SEM and PLS in prior studies, emphasizing their utility in identifying and validating relationships between variables within DBE (Boo *et al.*, 2009; Barnes *et al.*, 2014; Khan & Rahman, 2017; Kumar & Kaushik, 2018; Bhattachary & Dutta, 2016).

However, the paper also raises methodological questions regarding the adaptability of these traditional techniques to the current context of abundant digital data sources, such as social media and online reviews, which have significantly expanded the volume of available data on brand experiences in tourist destinations (Westland, 2014). It questions

the limitations of SEM and PLS in handling large data volumes and their capacity to detect non-linear patterns and complex interactions, hinting at the need for more agile and comprehensive methodologies.

The theoretical question addressed pertains to the evolving nature of DBE in the digital age and how traditional methodologies may not capture emerging trends or nuanced insights about shifting tourist preferences and perceptions (Barnes *et al.*, 2014). The paper proposes data mining and machine learning (ML) as innovative alternatives. Data Mining is seen as a means to uncover meaningful patterns and relationships in large data sets, potentially revealing previously unnoticed facets of DBE. machine learning, with its adaptability and ability to handle unstructured data like text and images, is suggested as a powerful tool for gaining deeper and more dynamic insights into DBE. In the tourism industry, the utilisation of machine learning is becoming increasingly prevalent as an indispensable tool for ascertaining the most pertinent search query details and significantly enhancing the accuracy of forecasts in the realms of tourism and hospitality (Li *et al.*, 2020). This growing trend is exemplified by studies such as those by Zhang *et al.* (2023) on destination perception and by Li *et al.* (2023) on tourist demand.

Due to the limitations of traditional approaches in measuring and analysing DBE, it has been necessary to propose an innovative, complementary, and coherent methodology through four types of complementary analyses: sentiment analysis, topic modelling, an analysis with multiple thesauri, multiple statistical analyses for hypothesis testing, and a classification using machine learning, to achieve greater objectivity and rigour in measuring DBE. Given the growing importance of tourism and visitor experience in the perception and success of a destination, it is essential to develop methods that enable tourism professionals and destination managers to better understand and optimise the tourist experience.

Conversely, DBE, as a measurement tool, aims to quantify a destination's brand experience. Employing text analysis techniques like sentiment analysis and topic modelling, along with the implementation of machine learning techniques, it becomes feasible to measure and analyse DBE. This measurement enables researchers and destination managers to acquire insights into how tourists perceive and value a destination concerning their sensory, affective, intellectual, and behavioural experiences. Such measurement then facilitates the enhancement of the destination's management and

marketing, empowering destination managers to devise more efficient strategies to boost the tourist experience and ultimately the perception of the destination's brand.

Following the introduction, this paper is structured as follows: Section 2 delves into the theoretical framework of the DBE dimensions used, as well as the concept of sentiment analysis. Section 3 details the methodology employed, covering research design, acquisition of selected data considering temporal, spatial, and category aspects, text preprocessing and cleaning, the use of a thesaurus, and sentiment analysis and topic modelling combined with statistical analysis techniques and data mining and machine learning. Section 4 presents the results, including sentiment analysis, comparison of the distributions of the studied dimensions through hypothesis testing, and as validation, the performance achieved by a machine learning classifier and the study of its metrics. Finally, this research concludes with Section 5, where conclusions, discussions, limitations, and future research directions surrounding the findings are offered.

## **2. Background**

### *2.1. Theoretical framework*

In the past few decades, the exploration of consumer experiences has consistently evolved. Brakus *et al.* (2009) formulated a robust framework to understand and analyse brand experiences across four dimensions: sensory, behavioural, intellectual, and affective. The forthcoming discussion will thoroughly explore these dimensions, referring to the contributions of several authors and studies cited in scholarly literature.

The destination brand experience (DBE) construct originates from the brand experience theory proposed by Brakus *et al.* (2009), which conceptualises it into four dimensions: sensory, affective, intellectual, and behavioural. This theory underscores that tourists engage with the destination in a multidimensional fashion and posits that these interactions shape their comprehensive perception of the destination's brand. Hence, DBE, in its capacity as a theoretical construct, offers a holistic framework to comprehend how tourists perceive and experience a destination, and how these experiences mould their perception of the destination's brand. DBE has emerged as a focal point in tourism research over the past decade and beyond.

In 2008, a seminal study introduced a destination brand model, underscoring the significance of destination-specific elements in brand equity. This was particularly evident when tested with visitors to renowned destinations such as Las Vegas and Atlantic City (Boo *et al.*, 2008). By 2011, the narrative's role in shaping destination brand experiences was accentuated, as evidenced by a netnographic analysis of travel blogs pertaining to South American cities (Colt, 2011). A shift towards a more holistic approach was observed in 2014, emphasizing the salience of sensory experiences within the DBE framework and its influence on revisit intentions and word-of-mouth referrals (Barnes *et al.*, 2014).

Researchers addressing DBE have primarily adhered to a traditional approach and methodology, depending on surveys for their analyses. Prominent examples of this approach emerge in studies by Barnes *et al.* 2014; Singh & Mehraj, 2018; Singh & Mehraj, 2019; Rather, 2021; Khan & Fatma 2021; Lin *et al.* 2023.

A distinct group of studies, encompassing those by Smith (2013) and Chen *et al.* (2014), has attempted to measure Brand Experience (BE) on social networks like Facebook. Yet, they only address some of the BE dimensions that Brakus *et al.* (2009) formulated or fail to differentiate them clearly. Jiménez-Barreto's study (2020) stands out, focusing on User-Generated Content (UGC) from platforms like Facebook and Twitter, which currently witness a clear decline in content.

It is important to note that while there are indeed studies that focus exclusively on addressing the destination brand experience perspectives of Western destinations with surveys from solely Western participants, such as the study by Barnes *et al.* (2014) which utilized surveys from Swedish, Danish, and German visitors to analyse the destination brand experience of the Swedish city of Lund, and the study by Boo *et al.* (2009) that assessed the destination brand experience of the cities of Las Vegas and Atlantic City in the United States with an online survey restricted to members of surveysampling.com, these studies may be criticized for their limited scope. It reflects a broader concern about the potential bias and limited applicability of studies that primarily involve Western participants, as highlighted by the study by Martins *et al.* (2021), which predominantly examines the destination brand experience of a Portuguese National Park with respondents from the same nation. This critique suggests the need for a more diverse and

comprehensive approach to destination brand experience research to ensure the reliability and relevance of measurement tools in a global context.

As research progressed, the intricate relationship between destination brand personality, tourism services, satisfaction, and word-of-mouth communication was explored in depth. This led to the proposition of a structural framework, validated through Structural Equation Modelling (Bhattachary & Dutta, 2016). In 2018, an encompassing perspective of tourism destinations was presented through the DBE lens, revealing its profound impact on tourist trust and loyalty, especially within the context of Indian tourist destinations (Kumar & Kaushik, 2018). The pivotal role of brand experience in nurturing enduring consumer relationships was further highlighted, with a particular emphasis on tourist satisfaction as a key determinant for global destination prominence (Singh & Mehraj 2018).

The recent literature on DBE unveils a theoretical expansion, albeit not methodological, in understanding how DBE influences varied aspects of consumer behaviour and brand perception in the tourism realm. The study by Yu *et al.* (2022) articulates a theoretical framework that underscores the importance of DBE on brand authenticity and the consequent consumer loyalty. This line of inquiry aligns with the findings presented by Lin *et al.* (2023), who explore the application of a brand experience model to evaluate competitive differentiation and brand positioning in tourism. Their emphasis on the affective and sensory dimensions of DBE resonates with the arguments set forth in our work, and establishes a clear connection with the research of Kim *et al.* (2022), which advocates for the incorporation of heritage resources to enhance brand appeal. This multidimensional approach to DBE is further expanded upon by the study of Ngwira *et al.* (2023), which suggests an extension of the DBE model to include relational and spiritual dimensions, especially relevant in the post-pandemic tourist context.

Brand experiences, as delineated by Brakus *et al.* (2009), encompass sensory, behavioural, intellectual, and affective dimensions that influence consumer perception, behaviour, and emotions towards a brand (see extended explanation in Appendix A).

## 2.2. *Sentiment analysis*

Often referred to as opinion mining, sentiment analysis is a computational technique that uncovers and categorizes emotional tones embedded in consumers' text snippets (Liu, 2012). Its main purpose is to break down the polarity of user feedback — in other words, to determine whether a user's stance towards a particular subject, topic, or entity is positive, negative, or neutral (Pang & Lee, 2008). Sentiment analysis employs a blend of Natural Language Processing (NLP) techniques and machine learning methodologies, extracting and identifying subjective information from a dataset (Agarwal *et al.*, 2011). There are two prominent approaches to sentiment analysis: lexicon-based and machine learning-based (Taboada *et al.*, 2011).

The lexicon-based method leverages predefined lists of words, known as thesauri, which come with assigned polarity values, such as sentiment lexicons. This method calculates the overall polarity of a text by summing up the polarity values of its constituent words, based on the assumption that a sentence or document's sentiment directly aligns with the polarity of the words it contains (Wilson *et al.*, 2005; Turney, 2002).

On the other hand, the machine learning-based method uses supervised or unsupervised algorithms to train models that can classify texts based on their polarity (Pang *et al.*, 2002). Supervised techniques need a labelled dataset with known polarities for training and validating the model. In contrast, unsupervised methods do not require polarity labels, relying instead on clustering or topic detection techniques (Ramage *et al.*, 2010). Despite their higher adaptability to specific contexts and domains, these methods can demand more computational resources and a high-quality training dataset (Liu, 2012).

## 3. Methodology

The widely adopted analytical methods of Partial Least Squares (PLS) and Structural Equation Modelling (SEM) have played a significant role in social science research, including studies on destination brand experience (DBE). However, recent findings, as indicated by Westland (2014), have revealed that PLS projections can exhibit biases and variability, particularly when based on limited sample sizes. To mitigate these issues, large sample sizes are recommended. Furthermore, PLS may suffer from inadequate hypothesis evaluation, resulting in an excessive number of false positive outcomes.

Both SEM and PLS are confirmatory techniques grounded in pre-existing theories and models, making them susceptible to biases if the underlying theoretical model is flawed or incomplete. This reliance on theory can limit their generalizability across diverse contexts or populations, as noted by Hair (2010).

In contrast, machine learning offers an exploratory approach, capable of handling varying dataset sizes without strict reliance on theoretical assumptions. Machine learning techniques can reduce biases and variability, providing a flexible and robust evaluation of data relationships. They optimize models based on data, seeking accurate data representation, and can generalize effectively to new datasets. Traditional methodological approaches in DBE research have highlighted limitations, such as limited common method bias and item bias in multi-sample tests, as seen in studies by Ngwira *et al.* (2023) and Boo *et al.* (2009). Kumar and Kaushik (2018) caution about limited samples and potential response biases in DBE research. Overall, machine learning techniques offer a promising alternative to address these challenges in DBE research.

In this article, we describe a methodology that enhances textual data analysis by leveraging machine learning. We extract features from texts and quantify them in the DBE dimensions using the thesauri constructed for this purpose. The technique goes beyond traditional analytical methods, such as simple sentiment analysis and word frequency or percentage counts. Instead of merely uncovering the extent to which a consumer likes something, the scale-oriented text analysis combines the richness of traditional textual and sentiment analysis with the theoretical structure and analytical rigour provided by conventional marketing scales. The technique we describe is novel and could potentially increase response rates and facilitate a more natural methodology for both practitioners and academics. We believe that the possible improvements in efficiency that our methodology offers justify its application.

### *3.1. Research design*

The present study utilises online user generated content (UGC) as a data source to evaluate the DBE of the Italian city of Turin as a tourist destination, using it as a case study, although it is perfectly generalisable and extrapolatable to other cities. Specifically, the study analyses reviews related to a set of resources (cultural, transport or experiences)

that will be detailed later and provide an excellent representation of the Italian city's DBE. The use of UGC as a data source for evaluating the DBE of tourist destinations has gained prominence in recent years (Buhalis & Law, 2008; Marine-Roig & Clavé, 2015). Similarly, the use of sentiment analysis as a tool for assessing destinations has been widely adopted in tourism research (Jabreel, 2017; Eunil *et al.*, 2020). To carry out the sentiment analysis, an open-source platform based on Python libraries for scientific computing is employed. This allows access to functionalities for data analysis and mining, sentiment analysis, topic modelling, and classification through machine learning. Subsequently, Table 1 presents an outline of the entire methodology employed.

Table 1. Outline of the employed methodology. Multi-analysis of the DBE

| SENTIMENT ANALYSIS                                                                                                                                                      | TOPIC MODELLING                                                                                                       | MULTIPLE THESAURI                                                                                                                                                     | STATISTICAL ANALYSES                                           | MACHINE LEARNING                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>VADER</b><br>Lexical database<br>“Valence Aware Dictionary for sEntiment Reasoning”<br><b>SentiART</b><br>(different computational SA tools)<br>(Borg & Boldt, 2020) | <b>Latent Dirichlet Allocation (LDA)</b><br>A technique that identifies underlying patterns<br>(Jelodar et al., 2019) | <b>Roget's Thesaurus</b><br><b>4 thesauri representing the 4 dimensions of the DBE</b><br>Groups semantically related words or “meaning clusters”.<br>(Jarmasz, 2012) | Hypothesis testing<br><b>Student's t-test</b><br>(Efron, 1969) | Machine Learning <b>algorithm</b><br><b>AdaBoost</b><br>Able to classify instances based on their dimension scores and other derived features<br>(Schapire, 2013) |

### 3.2. Data acquisition: selected data (temporal, spatial and category scope)

Firstly, the content of reviews (data) is collected from the Google Reviews platform for the years 2011 to March 2023. Google integrates Google Reviews into the Google My Business platform, allowing users to provide feedback, ratings, and opinions on various establishments, products, or services. These evaluations build a collective public rating that helps potential consumers make informed decisions based on others' experiences and

perspectives and enables researchers to analyse phenomena or trends across multiple disciplines. Google Reviews not only serve as a valuable resource for understanding the local business landscape, but also play a crucial role in fostering decision-making and the development of policies related to trade or destination marketing.

Using web scraping techniques, various datasets were compiled containing a set of reviews related to the tangible and intangible elements that form an excellent example of the DBE of the city of Turin. Specifically, and after reaching a consensus, those that represented the city with greater weight (reviews) and with indisputable recognition (uniqueness) were selected and categorised into three groups. The result is summarised in Table 2.

Table 2. Selected elements that build the Turin's DBE

| Category                              | Selection                                               | Reason                                                                                                                 | Total Registers | Total registers with reviews |
|---------------------------------------|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|-----------------|------------------------------|
| <b>Welcome/access infrastructure</b>  | Turin Airport - Caselle                                 | The most important air access.                                                                                         | 6,402           | 2,169                        |
|                                       | Porta Nuova Railway Station                             | The main railway station of Turin and the third busiest of Italy.                                                      | 6,412           | 2,183                        |
| <b>Emblematic tourist attractions</b> | Egyptian Museum of Turin                                | The second most important for its collection of Egyptian antiquities in the world, after the Egyptian Museum in Cairo. | 43,320          | 20,990                       |
|                                       | Mole Antonelliana - National Museum of Cinema           | The symbol of the city.                                                                                                | 41,803          | 17,423                       |
|                                       | Royal Palace                                            | The first and most important of the Residences of the Royal House of Savoy.                                            | 5,553           | 2,210                        |
| <b>Genuine and local experiences</b>  | Shroud of Turin in the Cathedral of St John the Baptist | It is believed by many to be the real burial cloth of Jesus Christ                                                     | 4,766           | 1,645                        |
|                                       | Tasting of Bicerin                                      | The traditional and native drink of Turin                                                                              | 2,289           | 1,419                        |

|                                            |                                                                |         |        |
|--------------------------------------------|----------------------------------------------------------------|---------|--------|
| (Historical coffee shop)                   |                                                                |         |        |
| Tasting Gianduja (Artisan chocolate maker) | A unique and universally known chocolate originary from Turin. | 1,835   | 852    |
| Total                                      |                                                                | 112,380 | 48,891 |

The dataset focuses on features related to guest comments across the different categories mentioned. The main variables taken into account were: the number of comments, the date, and the comments (already automatically translated into English upon download to allow for content universality). Additionally, depending on the dataset, two new variables were created: gender (using an Application Programming Interface -API- to predict the gender of a name) and the original language of the comment (using the function in Google Sheets that detects the language of a given text string).

- The "gender" variable in the database represents the estimated gender of the visitor who wrote the review, obtained through the genderize.io API (<https://genderize.io/>). The inclusion of this information allows researchers to explore possible relationships between the guests' gender and their experiences, preferences, or perceptions of tourist attractions. Moreover, it enables more accurate comparative studies on the differences in the various dimensions of the DBE.
- The "language" variable indicates the original language of the visitor's review. Knowing the distribution of languages in the reviews can provide relevant information about the diversity of the visitor population and assist in designing strategies to adapt communication and marketing efforts to different linguistic and cultural backgrounds.

### 3.3. Text Pre-processing and Cleaning

The study processed data using basic Natural Language Processing (NLP) techniques. The overall sentiment analysis process consists of a series of sequential steps. Firstly, a cleaning and normalisation process began with the extraction of data (text reviews) from the Google collaborative platform. To do this, all languages used were detected, and an

automatic translation of all content to the majority language, English, was carried out to achieve uniformity in the treatment of the reviews in order to make a fair comparison.

Secondly, we segmented the text into sentences and tokens. Tokenisation involves dividing the text into units, such as words and punctuation marks. Thirdly, the analysis carried out part-of-speech tagging (PoS tagging), which identifies the grammatical form (morphosyntactic category) of words based on the definition of each word in context. For example, in the sentence "the restaurant is great", "restaurant" is a noun, and "great" is an adjective.

Fourthly, the analysis performed lemmatisation, which converts each word to its root form and transforms the opinions to lowercase. Lemmatisation aims to reduce the word to its lemma, i.e., the root form, canonical form, or the most common form of words. For example, "runs", "running", and "ran" are all forms of the word "run".

Lastly, the study included a list of stop words, such as "the", "and", or "other", which distort the meaning of sentiment analysis, topic modelling, and the subsequent textual analysis.

### *3.4. Topic Modelling*

The study employed Latent Dirichlet Allocation (LDA) to perform Topic Modelling. LDA is a topic modelling technique that identifies underlying patterns of words and themes within a set of documents (Jelodar *et al.*, 2019). LDA is a generative probabilistic model that assumes each document is a mixture of various topics, and that each topic is composed of a collection of words with different probabilities. The algorithm utilises Dirichlet distributions to model both the distribution of topics in documents and the distribution of words in each topic. By applying LDA, we obtained a compact and coherent representation of the themes present in a corpus, facilitating the understanding and analysis of large volumes of text.

### *3.5. Sentiment analysis, data mining and machine learning*

The study employed a sentiment analysis tool, model, and lexical database called "Valence Aware Dictionary for sEntiment Reasoning" (VADER) (Borg & Boldt, 2020),

which is rule-based and perfectly optimised for analysing the sentiments of UGC. Through this tool, each word in the lexicon (in English or translated into English) is automatically classified as positive, neutral, or negative, and it not only displays the assigned scores but also the degree to which a sentiment is positive or negative (Hutto & Gilbert, 2014). VADER is essentially constructed from well-established sentiment lexicons that use lexical attributes typically employed to express sentiment in social media. The VADER lexicon contains over 7,500 words, including abbreviations, acronyms, initials, and icons. It also utilises sentiment modules from NLTK (Natural Language Toolkit) and is complemented by the Data Science Lab. Specifically, VADER calculates the sentiments of each comment and returns them with a score ranging from -1 for negative sentiment to 1 for positive sentiment. It is currently considered a valuable standard in social media lexicons (Bonta & Janardhan 2019). In addition to VADER, SentiART is also employed, a multivariable SAT (different computational SA tools) capable of calculating four lexical features (arousal, emotion potential, valence, and aesthetic potential) and two inter-lexical features (valence span and arousal span) with the aim of predicting various aspects associated with the sentiment distribution of a text (Jacobs, 2019).

The analysis converted textual data into numerical features to be treated with various statistical and machine learning methods, primarily boxplots, hypothesis tests, and classification algorithms. The conversion of sentiments (dimensions) to numerical scores allowed for visualising the distribution of sentiment scores among different categories or groups, and the Student's t-test was employed to determine whether there were significant differences between the sentiment scores of different groups. Finally, machine learning algorithms, such as AdaBoost, were applied to classify instances based on their dimension scores and other derived features.

### 3.6. *Thesaurus*

We designed a comprehensive and appropriate thesaurus of terms with multiple synonyms representing the four dimensions of Brakus *et al.*'s (2009) brand experience (BE) as a novel, differentiating, and relevant contribution. This process was carried out using the online version of the Encyclopaedia Britannica, considered one of the best in English (Hamilton, 2003), and the Oxford Thesaurus of English. The study consulted Roget's

Thesaurus to locate additional synonyms in order to further improve the thesaurus before incorporating it into the analysis software. It consists of six main categories, represented as a tree with over a thousand branches, each of which groups semantically related words or "meaning clusters". Although the words included in Roget's Thesaurus are not necessarily exact synonyms, they can be considered as nuances or variations of a meaning or as a range of related concepts. Roget's thesaurus has proven to be an excellent resource for measuring semantic similarity; lexical chains are easily built but more difficult to evaluate (Jarmasz, 2012). This process helped us develop a final list of words that were distributed relatively evenly across the four original dimensions of Brakus *et al.*'s (2009) BE.

Based on the different thesauri, the programme identifies relevant reviews and assigns them a weight in the dimension of the construct. For example, Table 3 shows some words collected in each dimension, and Table 4 provides an example of the reviews.

Table 3. Example of words included in the thesaurus representing each dimension

| Affective | Behavioural | Sensory   | Intellectual |
|-----------|-------------|-----------|--------------|
| Beautiful | Learn       | Absorbed  | Adventurous  |
| Unique    | Distrust    | Acidic    | Aesthetic    |
| Adorable  | Behaviour   | Acoustic  | Functional   |
| Ugly      | Conduct     | Delicious | Analytical   |

Table 4. Examples of reviews representing each dimension

| Dimension    | Item                    | Review                                                  |
|--------------|-------------------------|---------------------------------------------------------|
| Affective    | Mole Antonelliana       | Also <i>beautiful</i> seen from below, then from above! |
| Behavioural  | Egyptian Museum         | You can <i>learn</i> , that is not little.              |
| Sensory      | Gianduja                | It was <i>delicious</i> !                               |
| Intellectual | Turin Airport (Caselle) | Very <i>functional</i> !                                |

## 4. Results

### 4.1. Topic modelling

Through the application of Latent Dirichlet Allocation (LDA) for topic modelling of various cultural, experiential, and transport elements in the city of Turin, several main thematic areas have been identified for each element, with associated keywords highlighting the key aspects of the respective themes. For example, the Mole Antonelliana is characterised by themes including its iconic status (symbol, history, museum, representation, recognisable), positive experiences (panoramic, view, beautiful, top, cinema, interesting), and negative experiences (expensive, worthless, queue, overpriced). In contrast, the topics of the Egyptian Museum consist of valuable experiences (interesting, complete, experience, beautiful, Egyptian, worth, treasures) and uncomfortable feelings (shame, shameless, shameful, colonist, scandal, stolen). The versatility of the LDA method has allowed for the generation of meaningful insights by synthesising thousands of data points, facilitating a more comprehensive understanding of visitors' experiences and perceptions of the elements that shape the destination brand experience of the city of Turin.

Table 5. Topic Modelling following the LDA method

|                   | Items             | Topics                 | Topics Keywords                                                                 |
|-------------------|-------------------|------------------------|---------------------------------------------------------------------------------|
| <b>Cultural</b>   | Mole Antonelliana | Icon                   | <i>symbol, history, museum, representation, recognisable</i>                    |
|                   |                   | Positive experience    | <i>panoramic, view, beautiful, top, cinema, interesting</i>                     |
|                   |                   | Negative experience    | <i>expensive, worthless, queue, worthless, overpriced</i>                       |
|                   | Egyptian Museum   | Valuable               | <i>interesting, complete, experience, beautiful, Egyptian, value, treasures</i> |
|                   |                   | Uncomfortable feelings | <i>shame, shameless, shameful, colonist, scandal, stolen</i>                    |
|                   | Royal Palace      | Specific features      | <i>savoy, history, beautiful, palazzo, royal, gardens, armory</i>               |
| <b>Experience</b> | Shroud of Turin   | Specific features      | <i>holy, saint, ancient, chapel, shroud, cathedral, church</i>                  |

|                  |                           |                     |                                                                     |
|------------------|---------------------------|---------------------|---------------------------------------------------------------------|
| <b>Transport</b> | Bicerin                   | Specific features   | <i>chocolate, drink, coffee, cream, small, hot, milk</i>            |
|                  |                           | Icon                | <i>worth, historic, typical</i>                                     |
|                  | Gianduja                  | Specific features   | <i>chocolate, quality, cocoa, cream, shop, bitter</i>               |
|                  |                           | Positive experience | <i>tasting, experience, great, delicious, excellent</i>             |
|                  | Turin Airport (Caselle)   | Specific features   | <i>small, queue, staff, check, waiting, control, parking, clean</i> |
|                  | Train Station Porta Nuova | Specific features   | <i>beautiful, clean, nice, station, train, shops, tracks, city</i>  |

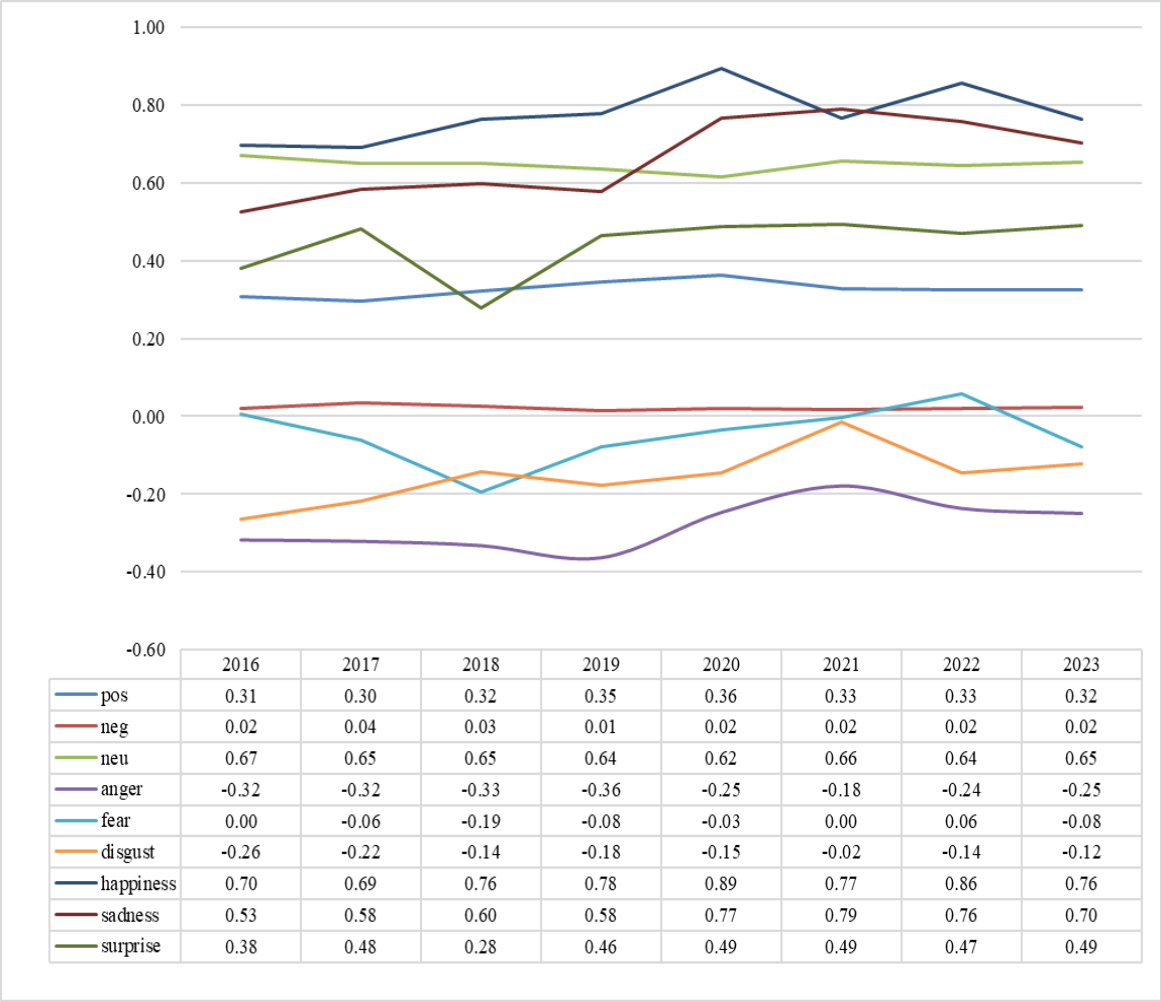
#### 4.2. Evolution of sentiments: Shroud of Turin

Upon employing the sentiment analysis tool, model, and lexical database of "Valence Aware Dictionary for sEntiment Reasoning" (VADER) (Borg & Boldt, 2020) and the SentiART, a multivariable SAT (different computational SA tools) for calculating lexical and inter-lexical features (Jacobs, 2019) on the various items studied, an example of the results for the evolution of sentiments on visiting the Shroud of Turin between 2016 and 2023 is presented in figure 1. It is essential to consider both the overall sentiment and the various emotional components in order to gain a comprehensive understanding of Turin's destination brand experience (DBE), particularly in regard to the Shroud of Turin as a unique tourist attraction.

In this case, the data demonstrate an overall increase in positive sentiment, with a peak in 2020, alongside relatively stable negative sentiment. This suggests that visitors have generally had a predominantly positive experience with the attraction in the destination. An analysis of the emotional components indicates that "happiness" has experienced a steady increase, reaching a maximum in 2021, while other emotions such as anger, fear, and disgust have shown a downward trend. The increase in positive sentiment and happiness could contribute to enhancing Turin's DBE, as positive emotions are likely to encourage repeat visits and generate positive word-of-mouth. In addition to the main sentiment components, it is worth noting the changes in other emotions such as sadness and surprise. Sadness has remained relatively stable and has gradually increased over the years, while surprise displays fluctuations without a clear trend. These emotions could be

associated with the spiritual and historical significance of the Shroud of Turin, which elicits complex emotions in visitors.

Figure 1. Evolution of sentiments on visiting the Shroud of Turin



#### 4.3. Statistical analysis through hypothesis testing of the distributions of the DBE

Table 6 displays the most significant comparisons made across the dimensions of DBE and the three main categories: Culture, Experience, and Transport. It can be observed that the Student's t-test values do not always indicate insignificance.

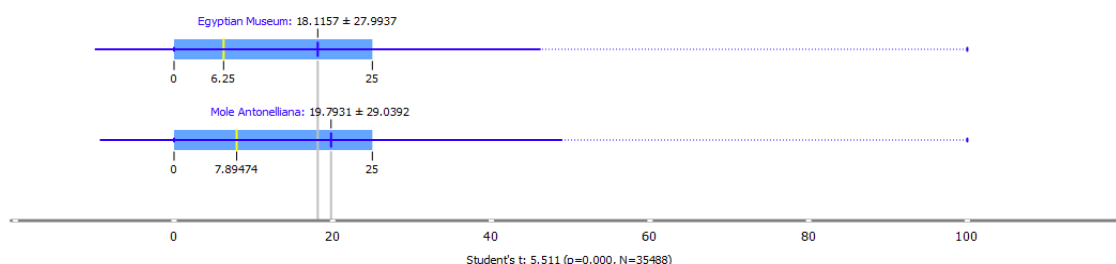
Table 6. Comparative analysis between the dimensions of the DBE and the items of the city of Turin

| BRAND EXPERIENCE DIMENSIONS |                                                     |                  |                   |                   |                   |
|-----------------------------|-----------------------------------------------------|------------------|-------------------|-------------------|-------------------|
|                             | ITEMS SELECTED                                      | AFFECTIVE        | BEHAVIOURAL       | INTELLECTUAL      | SENSORY           |
| C - C                       | Egyptian Museum – Mole Antonelliana                 | p=0.000, N=35488 | p=0.000, N=35488  | p=0.004, N=35488  | p=0.000, N=35488  |
| C - C                       | Egyptian Museum – Royal Palace                      | p=0.000, N=21734 | p=0.000, N=21734  | p=0.001, N=21734  | p=0.692, N=21734* |
| C - C                       | Mole Antonelliana – Royal Palace                    | p=0.000, N=18698 | p=0.066, N=18698* | p=0.056, N=18698* | p=0.000, N=18698  |
| C - T                       | Cultural – Experience                               | p=0.000, N=8340  | p=0.000, N=41949  | p=0.000, N=41949  | p=0.000, N=41949  |
| E - E                       | Shroud of Turin – Bicerin                           | p=0.000, N=3063  | p=0.000, N=3063   | p=0.000, N=3063   | p=0.000, N=3063   |
| E - E                       | Shroud of Turin – Gianduja                          | p=0.000, N=2571  | p=0.000, N=2571   | p=0.692, N=2344*  | p=0.000, N=2571   |
| E - E                       | Bicerin – Gianduja                                  | p=0.152, N=2344* | p=0.413, N=2344*  | p=0.692, N=2344*  | p=0.000, N=2344   |
| E - T                       | Experience – Transport                              | p=0.000, N=8340  | p=0.000, N=8340   | p=0.000, N=8340   | p=0.000, N=8340   |
| T - T                       | Turin Airport (Caselle) – Train Station Porta Nuova | p=0.000, N=4351  | p=0.000, N=4351   | p=0.000, N=4351   | p=0.425, N=4351*  |
| T - C                       | Transport – Cultural                                | p=0.000, N=42311 | p=0.000, N=42311  | p=0.000, N=42311  | p=0.000, N=42311  |

Among all the combinations shown, it is worth noting that the sentiments of the sensory dimension in the two main access points of Turin had a t-test result of 0.797, with a p-value of 0.425 and a sample size of N = 4351. As the p-value (0.425) is greater than the typical threshold for statistical significance of 0.05, it indicates that we cannot reject the null hypothesis and cannot claim that there are statistically significant differences in the sensory dimension between the airport and the train station in Turin.

However, as a contrasting example, when evaluating the differences in affective perceptions between the Egyptian Museum and the Mole Antonelliana, the t-test result was 5.511, with a p-value of 0.000 and a sample size of N = 35,488. Unlike the previous case, the p-value (0.000) is less than the typical threshold for statistical significance of 0.05, indicating that we can reject the null hypothesis and assert that there are statistically significant differences in the affective dimension between the Egyptian Museum and the Mole Antonelliana (see figure 2).

Figure 2. Comparison of the affective dimension between the Egyptian Museum and the Mole Antonelliana in Turin



However, the distributions of the sensory dimension for the Royal Palace and the Egyptian Museum show similar means. After applying the Student's t-test to compare these two distributions, a t-value of 0.396 and a p-value of 0.692 were obtained, with a sample size of  $N = 21,734$ . This suggests that we cannot reject the null hypothesis and assert that there are statistically significant differences between the means of both distributions. Therefore, it can be concluded that visitors' sensory perceptions concerning the Royal Palace and the Egyptian Museum are comparable and do not present relevant differences in terms of the sensory experience.

On the other hand, from Table 7 of disaggregated emotions, it can be inferred that several distributions among the various items are similar. For example, in the "happiness" sentiment of the experience group, it is concluded that the perceptions of "happiness" concerning the Shroud of Turin and the Gianduja are similar and do not present notable differences in terms of the emotion experienced by individuals in these contexts. In other words, visiting the Shroud of Turin does not involve a different "happiness" than tasting the traditional Bicerin drink.

Table 7. Comparative analysis between disaggregated emotions

| EMOTIONS DISAGGREGATED |                                        |                      |                      |                     |                      |                     |                     |
|------------------------|----------------------------------------|----------------------|----------------------|---------------------|----------------------|---------------------|---------------------|
|                        | ITEMS<br>SELECTED                      | ANGER                | SADNESS              | HAPPINESS           | SURPRISE             | DISGUST             | FEAR                |
| C - C                  | Egyptian Museum<br>– Mole Antonelliana | p=0.499,<br>N=35488* | p=0.000,<br>N=35488  | p=0.000,<br>N=35488 | p=0.000,<br>N=35488  | p=0.000,<br>N=35488 | p=0.000,<br>N=35488 |
| C - C                  | Egyptian Museum<br>– Royal Palace      | p=0.052,<br>N=21734* | p=0.703,<br>N=21734* | p=0.000,<br>N=21734 | p=0.538,<br>N=21734* | p=0.000,<br>N=21734 | p=0.000,<br>N=21734 |
| C - C                  | Mole Antonelliana                      | p=0.023,             | p=0.000,             | p=0.000,            | p=0.000,             | p=0.004,<br>N=18698 | p=0.000,            |

|       |                                                     |                     |                     |                     |                     |                      |                     |
|-------|-----------------------------------------------------|---------------------|---------------------|---------------------|---------------------|----------------------|---------------------|
|       | – Royal Palace                                      | N=18698             | N=18698             | N=18698             | N=18698             |                      | N=18698             |
| C - E | Cultural – Experience                               | p=0.000,<br>N=8340  | p=0.000,<br>N=8340  | p=0.000,<br>N=8340  | p=0.000,<br>N=8340  | p=0.000,<br>N=8340   | p=0.000,<br>N=8340  |
| E - E | Shroud of Turin – Bicerin                           | p=0.000,<br>N=3063  | p=0.000,<br>N=3063  | p=0.189,<br>N=3063* | p=0.000,<br>N=3063  | p=0.000,<br>N=3063   | p=0.000,<br>N=3063  |
| E - E | Shroud of Turin - Gianduja                          | p=0.000,<br>N=2571  | p=0.000,<br>N=2571  | p=0.214,<br>N=2571* | p=0.000,<br>N=2571  | p=0.000,<br>N=2571   | p=0.000,<br>N=2571  |
| E - E | Bicerin – Gianduja                                  | p=0.152,<br>N=2344  | p=0.000,<br>N=2344  | p=0.019,<br>N=2344  | p=0.000,<br>N=2344  | p=0.000,<br>N=2344   | p=0.401,<br>N=2344* |
| E - T | Experience – Transport                              | p=0.000,<br>N=8340  | p=0.000,<br>N=8340  | p=0.000,<br>N=8340  | p=0.000,<br>N=8340  | p=0.000,<br>N=8340   | p=0.000,<br>N=8340  |
| T - T | Turin Airport (Caselle) – Train Station Porta Nuova | p=0.000,<br>N=4351  | p=0.007,<br>N=4351  | p=0.001,<br>N=4351  | p=0.036,<br>N=4351  | p=0.000,<br>N=4351   | p=0.000,<br>N=4351  |
| T - T | Transport – Cultural                                | p=0.007,<br>N=42311 | p=0.007,<br>N=42311 | p=0.000,<br>N=42311 | p=0.000,<br>N=42311 | p=0.692,<br>N=42311* | p=0.004,<br>N=42311 |

Table 8 displays the comparisons between the items and opinions originating from Western and Eastern language/culture groups. For example, a statistically significant difference is observed in the affective dimension of the Shroud of Turin between Eastern ( $M = 10.9352$ ,  $SD = 13.8858$ ) and Western ( $M = 16.9009$ ,  $SD = 25.0957$ ) cultures;  $t(19260) = 4.659$ ,  $p < .001$ . The differences found in the affective dimension could be attributed to various factors, such as cultural differences or disparities in value and belief systems (Hofstede, 1980), which may play a significant role in the affective perception of the Shroud of Turin. Furthermore, religious differences and exposure to religious education could also influence the affective perception of this relic (Tsai, 2007).

Similarly, differences are displayed in the intellectual dimension of the Egyptian Museum between Eastern and Western language/culture groups. The long-standing tradition of visiting historical heritage and hosting significant heritage museums in Western culture could influence the expectations and perceptions of Western visitors, who might value the intellectual experience in museums like the Egyptian Museum more highly (Lowenthal, 1998).

Secondly, differences in exposure and familiarity with Egyptian history and art due to education and exposure in Western-origin culture could increase interest and intellectual

connection with the content of the Egyptian Museum (Falk & Dierking, 2000). Finally, the differences in cognitive and thinking styles between Eastern and Western cultures (Nisbett *et al.*, 2001), such as the analytical thinking centred on specific objects and categories in Westerners and the holistic thinking that considers context and relationships in Easterners (Nisbett & Masuda, 2003), could affect the way both cultures experience the Egyptian Museum and its content.

Table 8. Cultural differences: Western – Eastern

|                                          | GR. | ITEMS                     | AFFECTIVE         | BEHAVIOURAL       | INTELLECTUAL      | SENSORY           |
|------------------------------------------|-----|---------------------------|-------------------|-------------------|-------------------|-------------------|
| CUL.<br>DIFF.<br>Western<br>–<br>Eastern | C   | Mole Antonelliana         | p=0.000, N=16226* | p=0.278, N=16226  | p=0.000, N=16226* | p=0.000, N=16226* |
|                                          |     | Egyptian Museum           | p=0.000, N=19262* | p=0.000, N=19262* | p=0.000, N=19262* | p=0.196, N=19262  |
|                                          |     | Royal Palace              | p=0.849, N=2472   | p=0.000, N=2472*  | p=0.582, N=2472   | p=0.429, N=2472   |
|                                          | E   | Shroud of Turin           | p=0.033, N=1645*  | p=0.727, N=1645   | p=0.306, N=1645   | p=0.000, N=1645*  |
|                                          |     | Bicerin                   | p=0.501, N=1418   | p=0.630, N=1418   | p=0.902, N=926    | p=0.449, N=1418   |
|                                          |     | Gianduja                  | p=0.226, N=926    | p=0.896, N=926    | p=0.902, N=926    | p=0.111, N=926    |
|                                          | T   | Turin Airport (Caselle)   | p=0.000, N=2168*  | p=0.744, N=2168   | p=0.000, N=2168*  | p=0.308, N=2168   |
|                                          |     | Train Station Porta Nuova | p=0.000, N=2183*  | p=0.793, N=2183   | p=0.917, N=2183   | p=0.357, N=2183   |

Table 9 displays the comparison for the gender variable. All elements within the cultural group (Mole Antonelliana, Egyptian Museum, and Royal Palace) present significant differences between female and male genders in the affective variable. For instance, in the Mole Antonelliana, significant differences are observed in the mean scores and variability. The female gender tends to experience more intense or varied emotions compared to men, which could lead to a higher mean score and variability in the affective dimension (Fisher & Dubé, 2005). These differences could be due to cultural, social, or biological factors that influence how men and women experience and express their

emotions (Brody & Hall, 2000). Furthermore, differences in gender socialisation may affect expectations and emotional experiences concerning the Mole Antonelliana and other aspects of the destination brand experience (Kimmel, 2000).

Table 9. Comparative analysis between genders

|   | ITEM                        | GENDER | AFFECTIVE         | BEHAVIOURAL      | INTELLECTUAL      | SENSORY          |
|---|-----------------------------|--------|-------------------|------------------|-------------------|------------------|
| C | Mole Antonelliana           | M – F  | p=0.000, N=15671* | p=0.964, N=15671 | p=0.063, N=15671  | p=0.527, N=15671 |
| C | Egyptian Museum             | M – F  | p=0.000, N=18633* | p=0.428, N=18633 | p=0.000, N=18633* | p=0.505, N=18633 |
| C | Royal Palace                | M – F  | p=0.025, N=2372*  | p=0.691, N=2372  | p=0.024, N=2372*  | p=0.693, N=2372  |
| E | Shroud of Turin             | M – F  | p=0.008, N=1556*  | p=0.791, N=1556  | p=0.622, N=1556   | p=0.308, N=1556  |
| E | Gianduja                    | M – F  | p=0.682, N=903    | p=0.999, N=903   | p=0.847, N=903    | p=0.075, N=903   |
| E | Bicerin                     | M – F  | p=0.120, N=1354   | p=0.707, N=1354  | p=0.931, N=1354   | p=0.605, N=1354  |
| T | Turin Airport (Caselle)     | M – F  | p=0.169, N=2088   | p=0.532, N=2088  | p=0.674, N=2088   | p=0.487, N=2088  |
| T | Train Station (Porta Nuova) | M – F  | p=0.693, N=2109   | p=0.209, N=2109  | p=0.276, N=2109   | p=0.155, N=2109  |

Figure 3 presents the percentage distribution of the DBE dimensions (affective, behavioural, intellectual, and sensory) among all resources that make up the city of Turin's DBE. In the case of the affective dimension, the Shroud of Turin (34.35%) and the Royal Palace (33.75%) exhibit the highest percentages, suggesting an intense emotional connection at these historical and cultural sites. This is consistent with the research of Bagozzi *et al.* (1999), which argues that emotional experiences have a significant impact on the formation of consumer attitudes and behaviours.

Regarding the behavioural dimension, Bicerin (23.25%) displays the highest percentage, suggesting that tourists may be more inclined to share and discuss their experience with this typical Turin product. In contrast, the Train Station Porta Nuova (15.80%) might not generate significant behaviour among tourists, as train stations are often seen as transit points rather than destinations in themselves (Lyons & Chatterjee, 2008).

The intellectual dimension is found in the Shroud of Turin (32.53%). This is consistent with the literature on information processing (Keller, 1993; Petty & Cacioppo, 1986), which suggests that advertising and brand communications can influence consumer

beliefs and expectations. The Shroud of Turin is an object laden with history and religious significance, which may increase intellectual interest in visiting it.

Lastly, in relation to the sensory dimension, we note that sensory stimuli can evoke emotions and memories (Hultén *et al.*, 2009) and are essential for creating memorable experiences (Krishna, 2012; Lindstrom, 2005). In this regard, Figure 4 shows a comparison between the Egyptian Museum and Gianduja specifically. It is observed that Gianduja (40.45%) exhibits the highest percentage in the sensory dimension, suggesting a high sensory experience when tasting this typical Italian chocolate. On the other hand, the Egyptian Museum (14.83%) may offer a more limited sensory experience. This may be related to the fact that the sensory experience in a museum tends to be low, compared to places involving more varied stimuli, such as flavours, smells, and sounds (Spence *et al.*, 2014).

Figure 3. Percentage distribution of the DBE dimensions among the analysed items

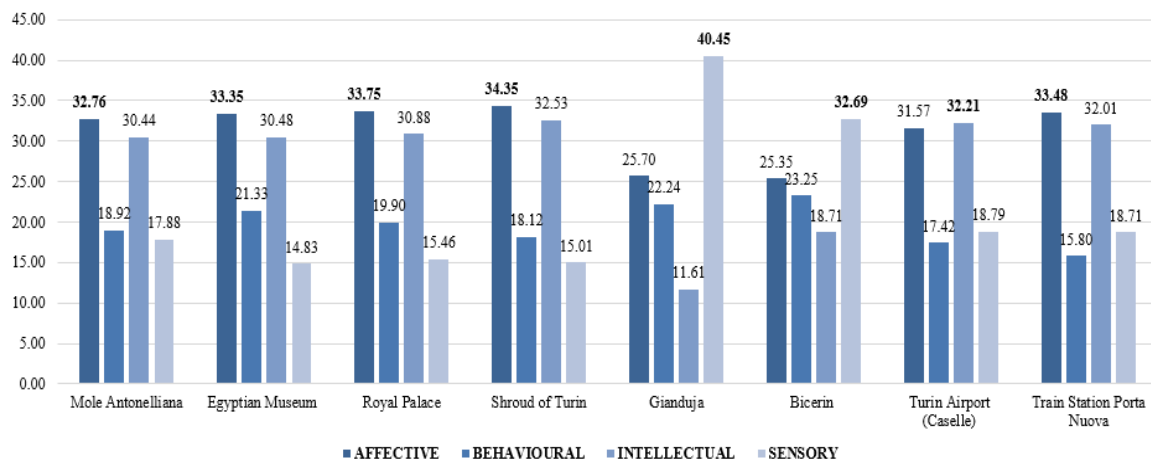
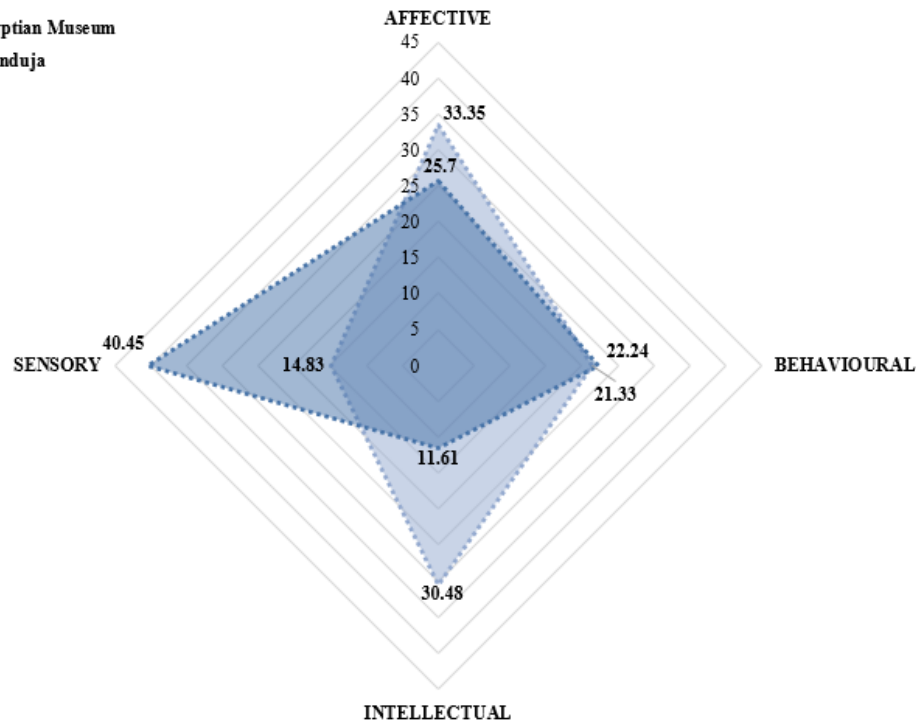


Figure 4. Percentage distribution of the DBE dimensions between the Egyptian Museum and Gianduja



#### 4.4. Classification by machine learning techniques

By using a classifier, the aim is to determine the extent to which the use of features (DBE dimensions) derived from the text allows distinguishing between classes using a machine learning algorithm. The higher the performance achieved in distinguishing one class, the better the selected features will define that class, meaning it will be more distinct from other classes. Likewise, the classes have been balanced to avoid bias. Following a classic classification process, we have trained and validated an Ada Boost algorithm through an iterative cross-validation process to distinguish a class. Machine learning classification employs cross-validation as a technique to evaluate a model's performance, dividing the dataset into multiple subsets. In our approach, we divide the data into five equally sized folds. Four of these folds serve as training data, while we reserve the remaining fold for testing. We repeat this process five times, with each fold taking its turn as the test set once. After completing the five trials, we average the model's performance to give a more reliable and accurate estimate of how well it will generalise to unseen data. To maximise performance, we have also carried out parameter optimisation (hypertuning).

The model's ability to reduce classification errors, including both false positives and false negatives, adds to the validity and robustness of the conclusions we draw from the data. The following findings indicate that the AdaBoost classification approach is an effective tool for addressing similar classification problems in future research.

Looking at the confusion matrix (see Table 10), we see that the performance varies among different classes. The matrix shows numerous accurate classifications but also reveals some confusion within specific classes. For the airport, the model correctly predicts 56.5% of cases, although it confuses it with the Egyptian Museum (21.2%) and the Mole Antonelliana (14.0%). On the other hand, in the case of Bicerin, the model achieves correct classification 75.2% of the time, with the Egyptian Museum being the class with which it is most confused (12.8%). The model demonstrates good performance in predicting the Egyptian Museum with an accuracy of 85.0%, Mole Antonelliana with 82.1%, Royal Palace with 73.7% accuracy, and Shroud of Turin with 71.8%. Regarding transportation, the model classifies Train Station Porta Nuova with 59.6% of cases, but exhibits confusion with Turin Airport (Caselle).

Table 10. Confusion Matrix

|      | Predicted                 |               |               |                 |               |                   |               |                 |                           |
|------|---------------------------|---------------|---------------|-----------------|---------------|-------------------|---------------|-----------------|---------------------------|
|      |                           | Airport       | Bicerin       | Egyptian Museum | Gianduja      | Mole Antonelliana | Royal Palace  | Shroud of Turin | Train Station Porta Nuova |
| Act. | Airport                   | <b>56.50%</b> | 0.80%         | 21.20%          | 1.00%         | 14.00%            | 1.90%         | 2.00%           | 2.70%                     |
|      | Bicerin                   | 5.30%         | <b>75.20%</b> | 12.80%          | 0.40%         | 5.30%             | 0.40%         | 0.00%           | 0.40%                     |
|      | Egyptian Museum           | 4.00%         | 0.20%         | <b>85.00%</b>   | 0.10%         | 8.80%             | 0.90%         | 0.70%           | 0.30%                     |
|      | Gianduja                  | 8.90%         | 0.00%         | 5.20%           | <b>72.60%</b> | 10.40%            | 1.50%         | 0.00%           | 1.50%                     |
|      | Mole Antonelliana         | 4.40%         | 0.20%         | 11.00%          | 0.70%         | <b>82.10%</b>     | 0.50%         | 0.70%           | 0.50%                     |
|      | Royal Palace              | 4.10%         | 0.30%         | 14.00%          | 0.00%         | 6.60%             | <b>73.70%</b> | 0.80%           | 0.40%                     |
|      | Shroud of Turin           | 3.50%         | 0.00%         | 10.00%          | 0.00%         | 13.50%            | 0.80%         | <b>71.80%</b>   | 0.40%                     |
|      | Train Station Porta Nuova | 12.30%        | 0.90%         | 11.10%          | 0.30%         | 10.80%            | 0.60%         | 4.20%           | <b>59.60%</b>             |

Various metrics are applied to measure the relevance of features in the classification process (see Table 11). The affective dimension has the highest information gain (Info. Gain) and the highest gain ratio, suggesting that this feature provides the most information about the target variable and would be the best predictor among the four dimensions analysed. Additionally, it also presents the highest  $\chi^2$  value, indicating a greater dependency on the target variable. The sensory dimension, on the other hand, has the highest values in ANOVA and ReliefF. The ANOVA test implies that there is a statistically significant difference between the group means based on the sensory dimension, while ReliefF suggests that this feature could be useful in differentiating between classes.

However, the behavioural dimension and the intellectual dimension appear to be less relevant in the classification of attractions according to the presented metrics, as their values are generally lower compared to the previous dimensions.

Table 11. Feature Importance

| Dimension    | Info. gain | Gain ratio | Gini  | ANOVA  | $\chi^2$ | ReliefF | FCBF       |
|--------------|------------|------------|-------|--------|----------|---------|------------|
| Behavioural  | 0.043      | 0.029      | 0.010 | 33.619 | 507.933  | 0.010   | 0.00000234 |
| Affective    | 0.089      | 0.052      | 0.019 | 54.714 | 992.753  | 0.017   | 0.0468     |
| Intellectual | 0.029      | 0.023      | 0.006 | 18.867 | 393.024  | 0.012   | 0.00000164 |
| Sensory      | 0.076      | 0.038      | 0.018 | 74.161 | 574.920  | 0.018   | 0.00000368 |

The strong performance of the AdaBoost model in classifying classes, through features extracted from the dimensions of thesauri based on user reviews, indicates that our methodology has successfully extracted relevant features that characterise and synthesise people's opinions and feelings.

## 5. Conclusions and discussion

### 5.1. Theoretical Implications

**Multidimensional Methodology and Advanced Analytical Techniques:** This study marks a seminal contribution to academic discourse on DBE, introducing a profound, contextualized understanding through an advanced, multidimensional methodology. Leveraging a vast array of real-world data generated by visitors, it transcends conventional techniques by integrating five types of analysis: sentiment analysis, topic modelling, multi-thesaurus analysis, statistical analyses through hypothesis testing, and machine learning-based classification. The flexible Latent Dirichlet Allocation approach and tools like VADER and SentiART enhance the understanding of DBE, offering robust means for analysing visitor reviews and identifying key thematic areas. This multifaceted approach provides a holistic view of DBE, setting a new benchmark for future research.

**Novel Measurement Tools:** The development of a unique set of thesauri to measure a city's DBE through User Generated Content represents a novel method for quantifying the original dimensions of the brand experience by Brakus *et al.* (2009) within visitor comments. This new way of measuring the DBE of cities proposes a clear representation and weight of sensory, behavioural, intellectual, and affective dimensions, offering versatile tools for future research and methodology.

Our research marks a transformative shift in DBE studies, both theoretically and methodologically. We introduce a model that recognises intricate DBE differences, offering actionable insights for destination marketers. Methodologically, our work pioneers a multifaceted approach, combining advanced textual analysis with machine learning. This methodology provides a holistic view of DBE, integrating sentiment analysis and key theme identification.

### 5.2. Managerial Implications

**Destination Management Strategy:** Findings reveal significant differences in the affective dimension between emblematic elements of the city, such as the Egyptian Museum and the Mole Antonelliana, suggesting the need for destination managers to rethink strategies to shape a renewed DBE. This involves understanding and enhancing the sensory experiences at key access points, acknowledging that the sensory experience at both

access points is similar, which may influence the overall image tourists have of Turin. Managers should analyse this data in detail and seek specific areas for improvement, such as cleanliness, aesthetics, signage, and lighting.

**Application of Machine Learning:** The implementation of a machine learning model to classify reviews demonstrates how technology can assist in monitoring DBE dimensions and automating the classification of new opinions. The model's use of cross-validation ensures its robustness, enhancing the monitoring of DBE dimensions and offering destination managers a tool to design experiences that resonate with diverse tourist demographics.

**Insights for Tourism Professionals:** The model's commendable performance, especially in predicting landmarks, provides invaluable insights for tourism professionals. These insights can guide improvements in areas influencing visitors' sensory perceptions and help in designing tailored destination management strategies based on nuanced DBE differences discerned by the model.

### *5.3. Social Implications*

**Cultural Understanding and Gender Differences in Perception:** The study underscores how cultural and language differences impact the perception of destinations, highlighting the need for inclusive and sensitive marketing strategies. It reveals that women tend to experience more intense emotions than men, which might influence the affective dimension of perception. These findings have social implications for understanding gender-specific preferences and designing emotionally engaging experiences for all visitors.

**Impact of Global Events:** The observed increase in positive sentiment towards the Turin Shroud during the pandemic year 2020 suggests that global events can significantly influence destination perception. This has broader social implications for how destinations might respond and adapt to changing circumstances and visitor needs.

This transformative research on DBE in the city of Turin offers a comprehensive, multidimensional approach that integrates advanced textual analysis with machine learning, providing theoretical, managerial, and social insights. The study's methodological innovations and practical applications set a new precedent for

understanding and enhancing the brand experience, guiding future research and destination management strategies. It recognizes intricate DBE differences and provides actionable insights for destination marketers, paving the way for tailored experiences that resonate with diverse tourist demographics and respond to the evolving global landscape.

## **6. Limitations and future lines of work**

Machine learning and data mining have revolutionised numerous fields, including tourism. However, they present certain limitations, more due to the nature of the data than its processing, which must be taken into account, especially in research endeavours seeking methodological innovation, such as the study at hand. Machine learning algorithms largely depend on the quality and quantity of the data with which they are trained. If the data are incomplete, the model's performance can be compromised (Reddy *et al.*, 2020). Within the context of this study, it was imperative to have analysed the dataset to ensure that all visitor opinions were accounted for and to extract certain records that contained solely emojis and not words.

There might potentially be limitations in some of the following aspects, albeit without clear evidence. Firstly, the study employed only one classifier for sentiment analysis for the sake of simplicity. While this classifier may have its merits, there exists a plethora of other techniques in the realm of machine learning and natural language processing that could potentially offer different insights or improved accuracy. Techniques such as Support Vector Machines (SVM), Random Forests, and Neural Networks have been widely recognized in the literature for their efficacy in sentiment analysis tasks. By relying on a single classifier, the study assumes a similar performance with other classification methods.

Secondly, the selection of sentiment features is another area of potential limitation. Different feature extraction methods can lead to varied results. The choice of one over the other can lead to slightly different results and potentially somewhat different rankings depending on the consistency of the data used; however, in any case, the overall final result will generally be similar.

Regrettably, we are constrained by the nature of the available data. Additionally, the use of a dataset from a specific time period can introduce temporal biases. Sentiments and

their expressions evolve over time, influenced by cultural, social, and technological changes. By focusing on a specific time frame, the study might not capture the temporal evolution of sentiments, which could be crucial for understanding long-term trends and shifts in public opinion.

Looking ahead, future research directions present exciting opportunities. One promising avenue is the incorporation of additional variables into the dataset. Variables such as age, type of trip (business vs. leisure), purpose of travel (tourism, work, migration), or income level can introduce new dimensions to the analysis. For instance, understanding how sentiments vary across different age groups or income levels can provide deeper insights into the socio-economic factors influencing public opinion. Such granularity can be invaluable for policymakers, businesses, and other stakeholders aiming to tailor their strategies or interventions based on specific demographic or economic segments.

## Appendix A

The sensory dimension of brand experiences, as defined by Brakus *et al.* (2009), centres around the consumers' perception and processing of information via their senses. This dimension plays a pivotal role in crafting unforgettable and meaningful experiences, as sensory stimuli hold the potential to provoke emotions and recall memories (Hultén *et al.*, 2009a, 2009b, pp. 1–23). Existing research underscores that the strategic integration of sensory stimuli in marketing efforts can enrich brand perception and fortify emotional bonds with consumers (Krishna, 2012; Li, Lin, & Xiao, 2022; Lindstrom, 2005). For example, background music, scents, and lighting in a retail setting can shape customers' mood and purchasing patterns (Spence *et al.*, 2014).

The behavioural dimension concentrates on the impact of brand experiences on consumer behaviour, as delineated by Brakus *et al.* (2009). This dimension bears a strong connection to Fishbein & Ajzen's (1975) theory of reasoned action, which posits that an individual's attitudes and beliefs dictate their behaviour. Consequent studies have discovered that positive brand experiences can amplify consumer loyalty and commitment (Chaudhuri & Holbrook, 2001; Oliver, 1999; Tran *et al.*, 2023), as well as propel positive word-of-mouth (Larsen, 2018; Zeithaml *et al.*, 1996). Moreover, Schmitt's (1999) insights on experiential marketing underscore the crucial role of actions and interaction in fashioning unique brand experiences.

In terms of the intellectual dimension, this involves cognition and thinking in brand experiences, according to Brakus *et al.* (2009). This dimension embraces aspects like mental stimulation and learning, reflected in how consumers process information and address problems (Pieters, 2010). Scholarly work on information processing proposes that advertising and brand communications can shape consumers' beliefs and product or service expectations (Keller, 1993; Petty & Cacioppo, 1986). Furthermore, neuromarketing research has shed light on the influence of brand experiences on cognitive processing and brain activity (Plassmann *et al.*, 2012; Woodham *et al.*, 2017).

Brakus *et al.* (2009) define the affective dimension as the emotions and feelings that consumers undergo during brand interactions. The theory of emotion in marketing implies that emotional experiences significantly shape the development of consumer attitudes and behaviours (Bagozzi *et al.*, 1999; Volo, 2021). Studies rooted in consumer psychology

have highlighted various emotions like joy, surprise, sadness, and anger, which brand experiences can trigger (Lazarus, 1991; Richins, 1997).

## **Funding**

This study was supported by the European Regional Development Fund Operational Programme of Andalusia 2014–2020, through the Andalusian Research, Development and Innovation Plan (Plan Andaluz de Investigación, Desarrollo e Innovación). PAIDI 2020 (Grant: P20\_00457), and by the Spanish Ministry of Education, Culture and Sport (Ministerio de Educacion, Cultura y Deporte del Gobierno de España) (Grant: FPU20/00235).

## **CRediT authorship contribution statement**

Víctor Calderon-Fajardo: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing. Rafael Anaya-Sánchez: Investigation, Writing – review & editing. Sebastian Molinillo: Funding acquisition, Project administration, Resources, Supervision, Writing – review & editing.

## **Declaration of competing interest**

The authors have no relevant financial or non-financial interests to disclose.

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# CAPÍTULO 4

## *Neurotourism Insights: Eye Tracking and Galvanic Analysis of Tourism Destination Brand Logos and AI Visuals*

El contenido del siguiente capítulo ha sido publicado como artículo con la siguiente referencia:

Calderón-Fajardo, V., Anaya-Sánchez, R., Rejón-Guardia, F., & Molinillo, S. (2024). Neurotourism Insights: Eye Tracking and Galvanic Analysis of Tourism Destination Brand Logos and AI Visuals. *Tourism & Management Studies*, 20(3), 53-78.

DOI: <https://doi.org/10.18089/tms.20240305>

Factor de impacto JCR: 2,6, situado en el Q2 de la categoría “Hospitality, Leisure, Sport & Tourism”, ocupando el puesto 52 de 139. Pertenece a la edición “Emerging Sources Citation Index (ESCI)”.

# NEUROTOURISM INSIGHTS: EYE TRACKING AND GALVANIC ANALYSIS OF TOURISM DESTINATION BRAND LOGOS AND AI VISUALS

## Abstract

This pioneering study explores the intersection between Neurotourism, defined as the integration of neurosciences in tourism, and the perception of tourism brand personality (BP) through the advanced use of psychophysiology techniques, specifically Eye tracking (ET) and Galvanic Skin Response (GSR). It analyses how tourism destination brand logos/combination marks and images generated by artificial intelligence (AI) influence consumer attention and emotional response. Focusing on the five dimensions of BP proposed by Aaker (1997) - sincerity, excitement, sophistication, competence, and ruggedness - this study highlights significant differences in how men and women process and react to brand values associated with specific cities. Employing a rigorous methodological approach and the application of non-parametric statistical analyses, the findings reveal distinct patterns of visual attention and emotional responses across genders, emphasising the importance of considering BP in the marketing and design of tourism destination brand logos/combination marks. This work not only advances theoretical understanding of tourist consumer behaviour but also offers relevant practical implications for tourism marketing and destination management.

**Keywords:** Neurotourism, Neuromarketing, Eye tracking, Galvanic Skin Response, Brand Personality

## 1. Introduction

Tourism constitutes a fundamental pillar in the global economic dynamics, driving the growth of various sectors (Telfer & Sharpley, 2015). This extensive range of influences underscores the importance of tourism as a driver of economic development and a fertile ground for research and innovation in understanding consumer behaviour.

Within the realm of tourism and hospitality, previous studies have demonstrated how affective states play a crucial role in influencing tourists' motivations, actions, decisions, and satisfaction levels (Goossens, 2000; Tsai, 2007). However, the measurement of these emotions, traditionally conducted through subjective tools such as surveys and questionnaires, often proves insufficient to capture the complexity of tourist experiences (Ziegel *et al.*, 1998). In this context, neurotourism emerges as a pioneering application or integration of neurosciences within the tourism sector aimed at refining marketing strategies directed towards tourists (Panyik & Gonçalves, 2017; Alsharif *et al.*, 2023). Neuroscience presents itself as a revolutionary interdisciplinary tool and approach that seeks to transform our understanding of tourists' decisions and preferences, offering an objective basis for designing and implementing more enriching and satisfying tourist experiences (Agarwal & Dutta, 2015).

Psychophysiological techniques, such as eye tracking (hereafter ET) and Galvanic Skin Response (hereafter GSR), are emerging as valuable methods for analysing how tourists visually process images of destinations, offering significant advantages in understanding the psychological and emotional processes underlying reservation decisions (Boz & Koç, 2022; Kim & Kim, 2024; Xie, Zhang & Ma, 2023) or even in analysing the type of navigation used with Travel 2.0 tools (Muñoz-Leiva *et al.*, 2016).

These techniques, by recording eye movements and changes in pupil contraction or dilation (Casado-Aranda *et al.*, 2023), reveal the unconscious behaviour of individuals in response to different visual stimuli (Ahn *et al.*, 2018; Scott, Le *et al.*, 2020), typically in a controlled environment (Duchowski, 2002; Bielikova *et al.*, 2018). Researchers sometimes combine ET techniques with other neuroscientific methods, such as EEG (Electroencephalogram). For example, the Babaç & Yüncü (2022) study evaluates the user experience on specific websites. The tourism sector, characterised by the intangibility of its products, greatly benefits from analysing travellers' visual attention through images (Rakić & Chambers, 2010; Li *et al.*, 2016). These not only shape the

perception of the destination (Espelt & Benito, 2005) but also impact purchase decisions (Underwood & Klein, 2002) or booking tourist services (Lustigová *et al.*, 2021). The destination image, defined as an attitudinal construct that includes knowledge, emotions, and overall impressions (Baloglu & McCleary, 1999; Tasci & Gartner, 2007), is more influenced by visual elements than by actual features, conveying ideas and values as well (Mackay & Fesenmaier, 2000).

Eye tracking has been applied in marketing research, particularly over the last decade, due to the interest in studying the visual attention of consumers and users (Muñoz-Leiva, 2023). ET applied to tourism enables marketing professionals to optimise resources, advertising strategies, and content (Wedel & Pieters, 2008), ensuring that a destination's most attractive and differentiating aspects are effectively highlighted (Savin *et al.*, 2022). Moreover, the detailed analysis of viewing patterns helps predict consumer behaviour, allowing for the development of more personalised and effective campaigns to enhance the tourist experience and promote destination choice (Le *et al.*, 2020).

GSR, a psychophysiological technique, serves to detect emotional activation through changes in skin, sweat and electricity, reflecting emotional arousal (McCleary, 1950). This methodology allows for the measurement of activation, impact, and emotional valence, revealing whether reactions to a stimulus are positive or negative. Guerrero-Rodríguez *et al.* (2020) investigated how a promotional video affects perception and the intention to visit a tourist destination, concluding that, although the video had a significant impact, the mode of viewing did not alter the results, and psychophysiological measures did not always coincide with self-reports. Similarly, Li *et al.*, 2016 used GSR to analyse emotional responses to tourist advertisements, finding coherence between the reported affective experience and the collected emotional data, demonstrating the effectiveness of these techniques in capturing instant emotional responses. Scott *et al.* (2016) compared two versions of a tourism advertisement, finding that block advertisements are more effective at capturing attention than those with text. Deng Lin & Chen (2021) explored how first impressions and visual appeal of photographs influence the intention to visit a destination, concluding that natural and professional images improve perception and choice intention. These studies underline the importance of ET in understanding visual attention and decision-making in tourism.

### *1.1. Innovation: Neurotourism and Brand Personality*

Despite the growing importance of neurotourism, few studies have ventured to address tourism destination brand logos through ET and GSR techniques. The sole notable study to date is that of Lourenção *et al.* (2020), which examines how logos influence tourists' visual attention and their perception of advertisement effectiveness. However, some recent works have indeed addressed the integration of neuroscience in tourism, for example by analysing tourist behaviours (Ma *et al.*, 2014), managing tourism marketing (Giudici *et al.*, 2017), and studies examining the directions and usage of neurotourism (Cardoso *et al.*, 2024; Li *et al.*, 2023). Nonetheless, no study has addressed the brand personality (BP) of tourism destination brand logos and directly linked it to neurotourism techniques, nor on images generated by artificial intelligence representing the BP dimensions of the destination.

BP is the theoretical construct underpinning our research with the employed neuroscientific methods (ET and GSR). Its use is justified from the perspective of evidence in the academic literature that defends the notion that a destination's BP exerts a notable influence both on the image tourists perceive of it (Ekinici & Hosany, 2006; Papadimitriou *et al.*, 2015) as well as on their behaviour (Baloglu *et al.*, 2014; Hultman *et al.*, 2015).

The BP construct, introduced in the 1990s by Aaker and Fournier, has been established as a distinctive mechanism that enriches a brand's value (Aaker & Fournier, 1995). According to Aaker (1997), BP encapsulates a set of human attributes associated with a brand, organised into five key dimensions: sincerity, excitement, sophistication, competence, and ruggedness. Research on BP has shown a historical preference for quantitative methodologies, particularly surveys, alongside traditional techniques such as SEM and PLS, which have predominated in this field for years. However, this approach presents limitations, including biases (Westland, 2014). In this context, neuroscience stands out as a promising field, offering techniques capable of revealing consumers' direct and unconscious reactions to brands. This allows for a deeper understanding of how tourists form brand associations in their minds, as suggested by Kotsi *et al.* (2018). ET methods, in particular, provide objective measures of participants' attention and interest, aiding in measuring both conscious and unconscious attention, thus avoiding biases and validity issues in data collection, as argued by Scott *et al.* (2020), and overcoming the

limitations of self-report instruments that depend on individual reflection and memory, susceptible to exogenous influences, according to Schwarz (1999).

The study presented constitutes a significant contribution to research in the field of BP and tourist consumer behaviour, standing out for pioneering the integration of neurotourism techniques, specifically ET and GSR, in analysing tourism destination brand logos and AI-generated images of renowned European cities.

The main objective of this research is to identify and establish attention patterns in the areas of interest (AOIs) and GSRs related to the different dimensions of BP. Through the use of ET, we aim to delve deeper into understanding how tourist consumers perceive and react emotionally to these logos, thereby facilitating a more detailed comprehension of the interaction between the visual presentation of destinations and consumer psychology. In addition to establishing certain design-stimulus guidelines for those managing the destination's corporate image.

Following the introduction, the manuscript is structured into multiple sections. The second section covers a theoretical framework that breaks down the BP dimensions according to Aaker (1997) and explores the application of ET and GSR techniques in the study of tourism destination brand logos. The methodology is detailed in a third section, describing the initial design and selection of stimuli based on tourism destination brand logos representing the five dimensions (sincerity, sophistication, excitement, competence, and ruggedness) of BP, as well as the specific design for ET and measurement parameters. The results are presented in the fourth section, revealing significant differences in attention and emotional reaction towards the logos/dimensions based on gender or BP. The fifth section addresses conclusions and discussions, highlighting the theoretical and practical contributions of the study, and the sixth section notes the limitations and suggests directions for future research, concluding with a reflection on the study's implications in the field of tourism marketing and neuroscience.

## 2. Literature review

### 2.1. Brand Personality dimensions

In the field of branding and brand management, Jennifer Aaker's (1997) brand personality (BP) model emerges as a crucial theoretical foundation, defining five essential dimensions that shape the brand identity from the consumer's perspective. These dimensions, which include Sincerity, Excitement, Competence, Sophistication, and Ruggedness, are characterised by a specific set of humanised traits that brands adopt to establish a deeper and more emotional connection with their audience. Sincerity relates to honesty and authenticity, positioning brands within this spectrum as genuine and trustworthy (Aaker, 1997). Excitement encompasses characteristics such as being exciting and imaginative, describing brands perceived as dynamic and stimulating (Aaker, 1997).

Competence, associated with efficiency and reliability, reflects brands that convey security and high quality (Aaker, 1997). Sophistication, which includes elegance and charm, identifies brands associated with luxury and exclusivity (Aaker, 1997). Lastly, Ruggedness is noted for its strength and resilience, outlining brands recognised for their durability (Aaker, 1997). This model has not only been pivotal in understanding the interaction between brands and consumers in general but has also found specific applications in tourism. Researchers like Hosany *et al.* (2006), Ekinci & Hosany (2006), Murphy *et al.* (2007), and Prayag (2007) have adapted these dimensions to explore the personality of tourist destinations, demonstrating how they influence consumer perception, satisfaction, and visitation intent. Or even in other tourist experiences, such as how customer brand personality influences the dining experience (Ismail, 2022). These studies collectively underscore the relevance of BP in developing tourism marketing strategies, encouraging communicative and positioning strategies that emotionally resonate with the audience, thereby fostering preference and loyalty towards the destination. Integrating these dimensions within tourism marketing enables professionals and academics to design brand experiences that facilitate a more intimate connection with consumers, effectively promoting the choice of one destination over another.

In the tourism context, applying brand personality theory helps understand how destinations can be perceived as entities with human traits, thus affecting destination image and tourist decisions (Ekinci & Hosany, 2006; Hosany *et al.*, 2007). Destination

image is defined as the overall perception that tourists have of a place, encompassing both cognitive aspects (knowledge and beliefs) and affective aspects (emotions and attitudes). In this study, advanced eye tracking and GSR techniques captured both visual attention and emotional arousal of participants observing the AI-generated images of the destinations.

Brand personality consists of five dimensions: competence, excitement, ruggedness, sincerity, and sophistication. These dimensions apply not only to products and services but also to tourism destinations, influencing visitors' perceptions (Aaker, 1997; Ekinci & Hosany, 2006).

The destination image is the perception an individual or a group has of a place, formed by the sum of beliefs, ideas, and impressions about that location (Baloglu *et al.*, 2014). This image is configured as a cognitive construct that involves a subjective knowledge of the destination (Chen & Phou, 2013). In contrast, the destination personality uses human personality traits to describe it, providing an emotional and symbolic framework that complements the physical and tangible characteristics of the place (Ekinci & Hosany, 2006; Chen & Phou, 2013).

Brand personality and destination image are distinct yet interrelated concepts (Hosany *et al.*, 2007; Baloglu *et al.*, 2014; Pereira *et al.*, 2012). The destination image has positive effects on its personality, as brand personality can confirm or refute the image held of it (Chen & Phou, 2013; Pereira *et al.*, 2012). Souiden *et al.* (2017) confirmed that image precedes personality, establishing that a positive destination image can enhance its personality, making the destination more attractive and distinctive to tourists (Qu *et al.*, 2011).

Ekinci and Hosany (2006) argue that destination brand personality is an extension of the destination image, providing an emotional and symbolic framework that resonates with the tourists' personalities and aspirations (Murphy *et al.*, 2007). This coherence between brand personality and destination image contributes to a clearer and stronger perception of the destination (Ekinci & Hosany, 2006). For instance, a destination projecting an image of adventure and nature should have a brand personality that reinforces these attributes (Qu *et al.*, 2011).

Marketing campaigns that highlight brand personality can enhance the destination image by emphasising emotional and symbolic attributes that attract tourists (Pike *et al.*, 2010). Brand personality acts as a narrative framework that encapsulates the destination's identity, allowing tourists to connect on a deeper level (Hosany *et al.*, 2007). For example, a destination promoted as “adventurous” may use images and messages that evoke freedom, challenge, and wilderness, thereby consolidating its image (Boo *et al.*, 2009). Different segments of tourists may perceive and value various dimensions of brand personality and destination image differently (Ekinici *et al.*, 2013). Tailoring marketing strategies according to these segments can maximise tourist attraction and satisfaction (Dolnicar, 2004). For instance, young tourists might be attracted to a destination with a vibrant and modern personality, while older tourists might prefer more relaxed and sophisticated destinations (Smith *et al.*, 2015).

Brand personality and destination image also significantly influence tourist behaviour. A well-defined and positive brand personality can increase familiarity and affection towards the destination, improving its overall image (Hosany & Ekinici, 2003). Tourists are more likely to consider destinations with an attractive brand personality and a positive image, as these destinations appear to offer more rewarding experiences (Jalilvand *et al.*, 2012). A positive destination image enhances tourist satisfaction and their willingness to recommend the destination (Bigné *et al.*, 2001).

Empirical studies have demonstrated that an attractive brand personality can increase tourists' intention to visit and their loyalty (Murphy *et al.*, 2007; Qu *et al.*, 2011). The combination of a strong brand personality and a positive destination image can maximise the impact on attracting and retaining tourists (Pike *et al.*, 2010). Therefore, it is essential for destination managers to understand and manage both brand personality and destination image effectively to attract and retain tourists.

## 2.2. *Eye tracking and GSR*

ET is an advanced tool that enables eye movement tracking, offering a unique window into individuals' cognitive processing and underlying motivations (Rovira, 2016). This technique, grounded in the pioneering research of Just and Carpenter (1980), analyses the direction and fixation of gaze on computer screens, using infrared lights to reveal areas

of interest and attention patterns during various tasks. The ability to determine which parts of the screen capture the user's attention provides valuable insights into visual and cognitive behaviour, underscoring the importance of selecting appropriate metrics and the ability to interpret the collected data (Duchowski, 2002).

In the realm of research, ET has established itself as an effective method for assessing the usability and design of products and services, allowing studies to be conducted before, during, or after their development or commercialisation (Goldberg & Wichansky, 2003). This technique is not limited to the observation of visual behaviour but is also complemented by other neuroscientific and biometric tools for a deeper understanding of human reactions.

The integration of GSR, which measures variations in the skin's electrical conductivity caused by sudomotor activity alongside ET, offers a more comprehensive approach to studying individuals' emotional and cognitive responses (Ngan & Yu, 2019). The synergy between ET and GSR opens new avenues in research, enabling not only an understanding of where and how attention is directed but also the emotions and motivations underlying these visual responses.

### **3. Methodology**

The study addresses the methodology in two main segments: the selection of stimuli and the design of the ET. Initially, tourism destination brand logos accessible from Málaga are preselected for a pretest based on flight frequency and the representation of the BP dimensions. Fifteen logos are chosen after a three-phase process, including generating images with DALL-E to represent these dimensions. Subsequently, an ET experiment was designed with 40 students to assess their visual and emotional reactions to these logos/dimensions, following Aaker's (1997) BP theory. Measures of visual attention and emotional responses are incorporated, with stimuli presented in a random order to avoid biases, highlighting the importance of attention and emotions in the perception of BP. This study used ET and GSR to analyse gender-specific attention and emotional responses to tourism destination brand logos and AI-generated images. Eye tracking precisely measured attentional focus, recording metrics like fixation duration and sequence, which

revealed how different elements of the logos, each representing a dimension of brand personality, captivated and maintained viewer attention.

Simultaneously, GSR assessed arousal levels, which were highly sensitive to emotional stimulation from engaging visual or emotional content, allowing us to track the intensity of responses through changes in skin conductance. Together, these techniques provided a comprehensive view of how brand personality dimensions influence gender-specific reactions, enhancing our understanding of consumer behaviour and informing more effective marketing strategies in the tourism sector. The adoption of psychophysiological techniques has recently increased, partly due to their ability to provide real-time data (Bastiaansen *et al.* 2019). Furthermore, research utilising these measures can yield crucial information that cannot be acquired through conscious introspection or self-reports (Kim *et al.*, 2014).

### 3.1. Eye tracking and GSR

For the selection of stimuli to be incorporated into the experiment, the sample has been delimited to those tourism destination brand logos corresponding to destinations accessible via direct flights from the city of Málaga, operated by low-cost airlines. This preselection is based on the proximity of the destinations, which present a real viability of being visited and that potentially have been or could be visited by the students of the University of Málaga in the future.

For this purpose, a selection was developed through three distinct phases. In phase 1, an exhaustive list of all available destinations and their respective destination brand logos was compiled. Subsequently, this list was organised based on the frequency of direct flights, as detailed in Table 1.

Table 1. Connections and Frequency of Direct Low-Cost Flights from Málaga

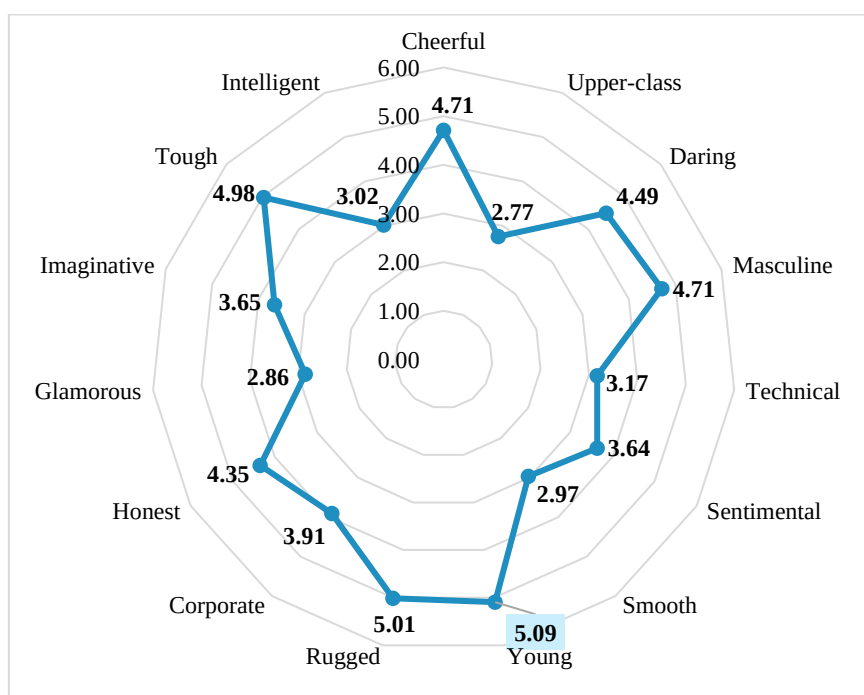
| Destination | Frequency | Airlines                                 |
|-------------|-----------|------------------------------------------|
| London      | 8         | Wizzair, Vueling, Easyjet, Ryanair, Jet2 |
| Stockholm   | 5         | Norwegian, Ryanair, Eurowings            |
| Brussels    | 4         | Vueling, Ryanair, Transavia              |
| Glasgow     | 4         | Easyjet, Ryanair, Jet2                   |
| Lyon        | 4         | Volotea, Vueling, Easyjet, Transavia     |
| Paris       | 4         | Vueling, Transavia, Ryanair, Easyjet     |
| Amsterdam   | 3         | Vueling, Easyjet, Transavia              |
| Berlin      | 3         | Easyjet, Ryanair, Eurowings              |
| Dusseldorf  | 3         | Ryanair, Eurowings                       |
| Manchester  | 3         | Easyjet, Ryanair, Jet2                   |
| Oslo        | 3         | Norwegian, Ryanair                       |
| Rome        | 3         | Wizzair, Vueling, Ryanair                |

During phase 2, the selection of logos for a validation pretest began, focusing on those that, a priori, most adequately represented the dimensions of BP according to Aaker's 1997 scale, which includes Sophistication, Ruggedness, Excitement, Sincerity, and Competence. In phase 3, three pretest surveys were designed to validate the final stimuli to be used. A total of 15 logos were selected, distributed as five for each questionnaire, that is, the five dimensions across the five logos. Questionnaire A included Amsterdam, Paris, Edinburgh, Bilbao, and Gdansk; B included Palma de Mallorca, Stockholm, Manchester, Lyon, and Hamburg; and C included Glasgow, Budapest, Katowice, Berlin, and Cologne.

The pretest questions were structured using a 7-point semantic differential scale, with attributes corresponding to the aforementioned dimensions (for example, for "Sophistication": lower-class to upper-class, ungainly to charming, and plain to glamorous).

The results of the stimulus validation pretest were used to choose the tourism destination brand logos that could most consensually and faithfully represent the different dimensions of Aaker's (1997) BP (see Appendix A). Radar Chart 1 shows an example of the means obtained in the "Excitement" dimension for the Edinburgh logo, with the attribute "Young" being prominent within the same dimension.

Figure 1. Average results of the validation pretest for the Edinburgh logo stimulus



The stimulus validation test was conducted by a diverse group of 260 individuals, highlighting young students' travel preferences and behaviours. In summary, there was a significant female representation (61.65%) and a predominance of Spanish nationality (90.09%). The age distribution revealed a notable concentration of individuals born between 2001 and 2003, indicating a predominantly young population, with 72.22% of students and 22.57% combining studies and work.

In terms of travel expenditure, the majority trend is to invest between €401 and €600, with 29.25% of respondents selecting this range, followed by 26.14% spending between €200 and €400. The most common travel frequency is 2-4 times yearly (61.26%), evidencing a pronounced interest in exploring new destinations. Destination choice is primarily based on online research or consultations (59.97%) and recommendations from friends or family (29.43%), underscoring the importance of social networks and word of mouth in travel planning.

A small validation test was also conducted to select five images generated using artificial intelligence with DALL-E, which faithfully represented the five dimensions of BP in five popular destinations (Amsterdam, Paris, Berlin, London, and Zurich). For this purpose,

images were generated based on prompts containing the dimensions' definitions and key attributes, as detailed in Appendix B.

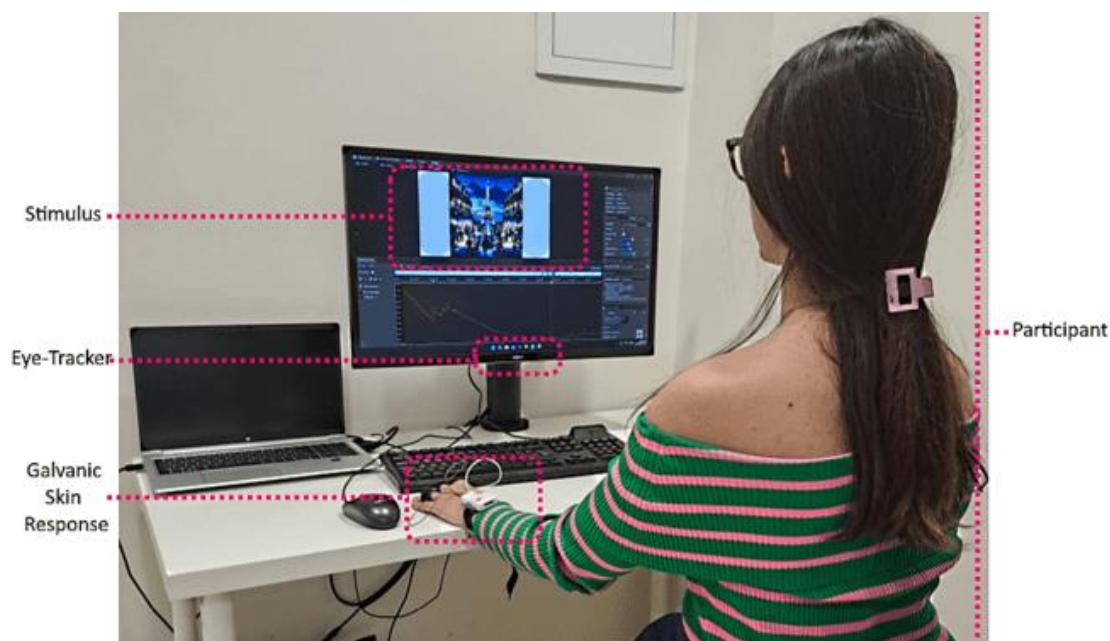
### *3.2. Eye tracking design and parameters*

The study incorporated 40 university students, who were carefully selected based on their prior exposure to global cultures, with each having visited at least three foreign cities. This selection criterion was essential to ensure a broad perspective in their responses to international brands. The participants were evenly distributed by gender, with 20 males and 20 females contributing to a balanced demographic profile. The average age of the male participants was 21.5 years, while the average age for the female participants was slightly higher at 25.0 years, resulting in an overall average age of 23.25 years for the group.

The primary objective of the research was to assess these students' visual and emotional reactions to a series of corporate logos. These logos were strategically chosen to represent various dimensions of brand personality (BP) as proposed by Aaker in 1997, specifically focusing on Sincerity, Sophistication, Excitement, Competence, and Ruggedness. This selection aimed to explore how each dimension influences the attention and emotional response of observers, providing a basis for detailed comparisons between the characteristics associated with each logo.

The experimental procedure was divided into three essential parts, organised to facilitate a systematic comparison between the personality dimensions represented by the logos. Initially, each logo was presented individually, allowing for a detailed observation of the responses evoked by each personality dimension. This phase was followed by a direct comparison between pairs of logos, pitting the personality dimensions against each other to assess comparative reactions. The experimentation concluded with the presentation of artificial intelligence-generated images, representative of each dimension, to examine the responses in an innovative context (see Image 1). Each section was designed to maximise the collection of data on visual attention and emotional responses, incorporating strategic pauses to minimise fatigue and maintain objectivity.

Figure 2. Participant undergoing the experiment with eye-tracker and galvanic skin response sensors to measure reactions to stimuli



To ensure the integrity of the study, stimuli were presented in a random order, thus avoiding any potential bias in the participants' responses. The total duration of the experiment was 450 seconds (7 minutes and 30 seconds), including all phases and rest periods.

The key indicators assessed in this study encompassed both visual metrics and the physiological responses of participants. Among these, the number of fixations was included, indicating how many times a participant's gaze stopped on specific areas, suggesting points of interest or attention. The time to first fixation informs us about the speed with which an element captures attention from the start of the presentation, while the average and total duration of these fixations offers a measure of initial and overall interest towards the presented stimuli. Furthermore, the Skin Conductance Response (SCR) amplitude to emotional stimuli was analysed, providing valuable insight into the intensity of participants' emotional reactions.

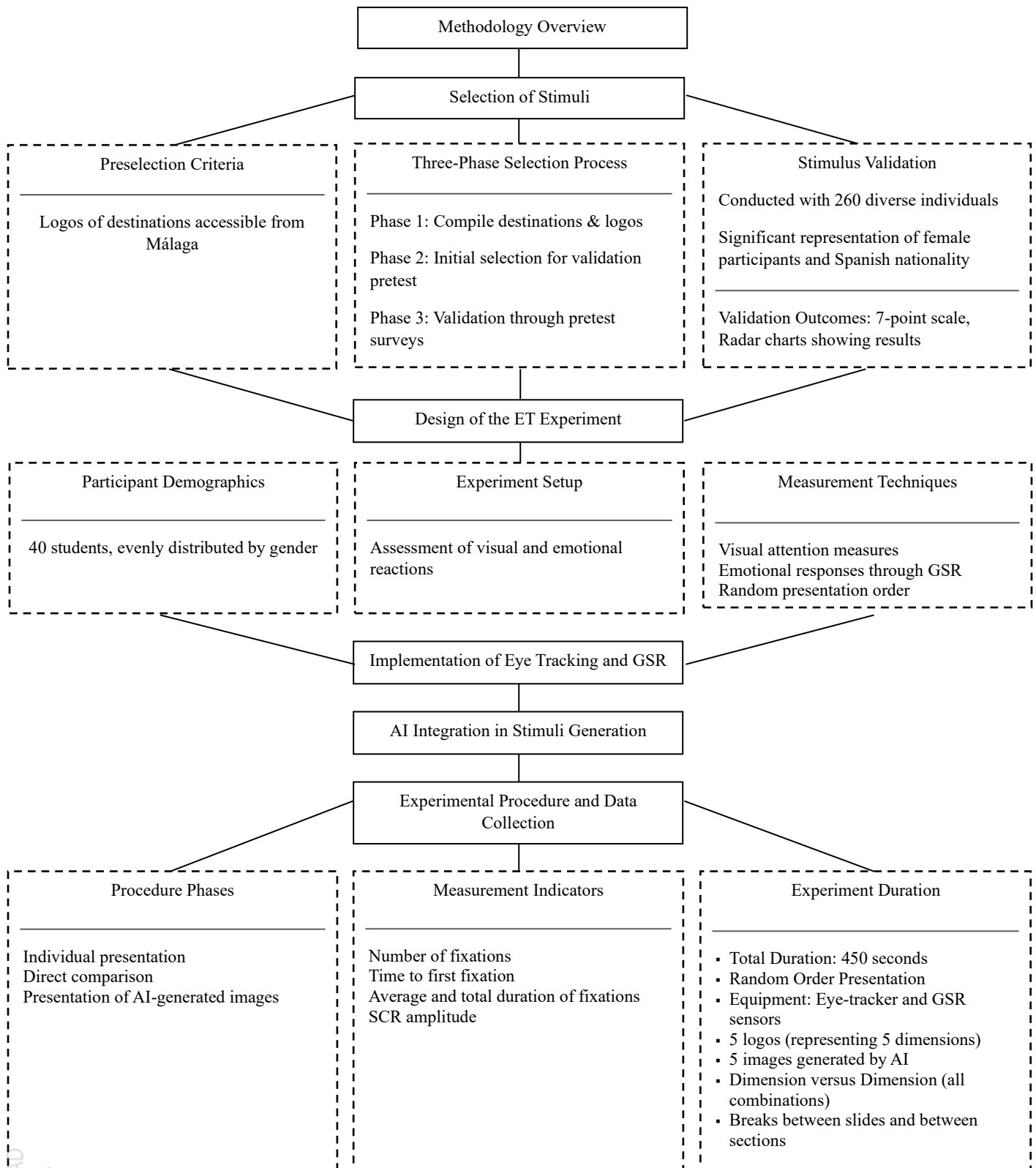
The employment of non-parametric statistical tests in our study is underpinned by the specific nature and characteristics of the collected data. Non-parametric tests such as Mann-Whitney and Wilcoxon were chosen due to the inability to assume normal distributions in the participants' responses, particularly when evaluating emotional and visual reactions to subjective stimuli like corporate logos. These data types, often ordinal

or failing to meet the homogeneity of variance requirements necessary for parametric tests, call for an alternative analytical approach. Non-parametric tests offer robustness in scenarios where data distributions are unknown or likely to be non-normal due to subjective responses. Given the study's relatively small sample size and the repeated measures from the same sample, non-parametric methods provide greater flexibility and more direct interpretation. Therefore, the decision to utilise non-parametric methods is based on statistical appropriateness and robustness concerning the data characteristics, making these tests less susceptible to outliers and skewed distributions, which is crucial in psychological and emotional measurements. Despite perceptions regarding their rigour, non-parametric tests are widely recognised and accepted in behavioural and psychological research under such conditions.

The central purpose of this design was to investigate the differences in visual attention and emotional responses towards the BP dimensions represented by the selected logos, both among the dimensions themselves and the differences between genders.

Figure 1 below provides a succinct summary of the methodology employed in our study. It illustrates the comprehensive process from the initial selection of stimuli to the final execution of the eye tracking (ET) experiment, ensuring a methodological clarity that supports the findings presented.

Figure 3. Methodology overview employed



## 4. Results

Aaker's (1997) brand personality (BP) theory provides a robust framework for interpreting these results. The exploration of emotional and visual responses towards tourism destination brand logos, embodying the dimensions of BP, has revealed significant differences. Analyses conducted through non-parametric statistical tests, such as the Mann-Whitney U test and the Wilcoxon test, have uncovered variations in attention and initial reaction between genders and among the dimensions.

### 4.1. Sophistication vs Sincerity (Stockholm vs Glasgow)

Two of the dimensions that show significant differences between each other are "Sophistication" represented by the Stockholm logo and "Sincerity" represented by the Glasgow logo.

The application of the Mann-Whitney U test reveals that there are significant differences in how genders visually process logos associated with "Sophistication" and "Sincerity". The statistical significance (as seen in Table 2) in measures such as "time to first fixation ( $p=0.043$ )", "number of fixations ( $p=0.003$ )", or "total fixation duration ( $p=0.009$ )" suggests that BP exerts a notable influence on the speed and depth with which visual stimuli are processed, reflecting a distinct emotional or cognitive resonance with the values that each dimension represents.

Table 2. Significant results with independent samples: sophistication vs sincerity

| Technique    | Group                 | Hypothesis testing | Parameter                                  | Statistic | P        | AOI/Dimension vs Dimension  | Logo or combination mark representation |
|--------------|-----------------------|--------------------|--------------------------------------------|-----------|----------|-----------------------------|-----------------------------------------|
| Eye-tracking | Masculine vs Feminine | Mann-Whitney U     | Time to the first fixation                 | 125       | 0.043**  | Sophistication vs Sincerity | Stockholm vs Glasgow                    |
|              |                       |                    | Number of fixations                        | 91        | 0.003*** |                             |                                         |
|              |                       |                    | The average duration in the first fixation | 125       | 0.043**  |                             |                                         |
|              |                       |                    | The total duration of fixation             | 104       | 0.009**  |                             |                                         |

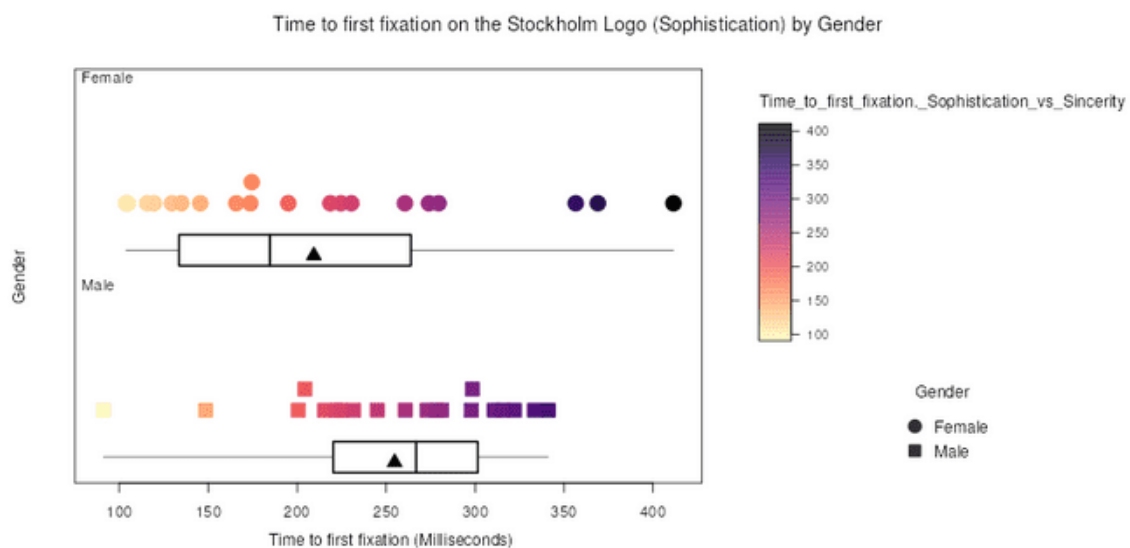
\*\*  $p < .05$ , \*\*\*  $p < .005$

Differences in visual attention and emotional response can be understood through how individuals project their identities and aspirations onto the brands they choose. According to self-categorisation theory (Turner & Onorato, 2014), individuals are drawn to brands that reflect or complement their self-concept. Therefore, the observed differences could reflect variations in how the values associated with "Sophistication" and "Sincerity" align with gender self-perception and cultural norms.

Furthermore, the self-image congruity theory (Sirgy, 1982) suggests that consumers prefer products and brands that are congruent with their ideal image. This could explain why certain BP dimensions capture attention more quickly and elicit stronger emotional responses, as individuals react not only to the logo's aesthetics but also to what the logo represents about themselves and their values.

In the analysis of the "time to first fixation" metric in the comparison between Sophistication vs Sincerity segmented by gender, it is observed that, on average, time to first fixation is shorter in women than in men (see Figure 2). Specifically, the average duration to first fixation recorded for the female gender is 209.3 milliseconds, in contrast to the 254.8 milliseconds average observed for the male gender. These results suggest a predisposition of the female gender to direct their attention more immediately towards logos that evoke the dimensions of "Sophistication", indicating a possible differential resonance with these BP attributes according to gender.

Figure 4. Time to first fixation on Stockholm



In the analysis of the variable "Number of fixations in the comparison between Sophistication vs Sincerity", differences in visual fixation behaviour between genders were also observed. Women displayed a broader range in the number of fixations, with a minimum of 6 and a maximum of 31, and an average of 17.45 fixations, indicating a tendency to inspect these logos more thoroughly or for a longer period (Table 3). The standard deviation within the female group was 7.112, reflecting some variability in their fixation behaviour.

However, men showed a minimum of 1 fixation and a maximum of 29, with an average of 14.70 fixations. The standard deviation in this group was 7.399, also indicating a comparable variability in fixation behaviour among male individuals. These differences suggest a greater inclination by women to devote attention to the visual elements of logos representing "Sophistication" (Stockholm) compared to men. This pattern could indicate variations in attention or interest generated by the characteristics associated with each tourism destination brand logo according to gender.

Table 3. Significant results with independent samples: Sincerity

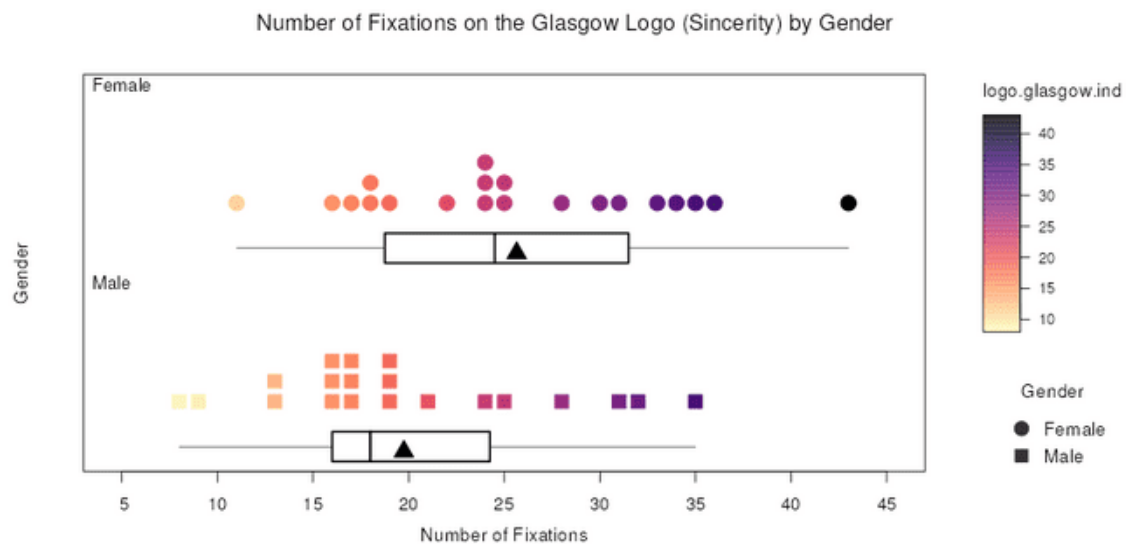
| Technique             | Groups                | Hypothesis testing | Parameter                                  | Statistic | P        | AOI/ Dimension | Logo or combination mark representation |
|-----------------------|-----------------------|--------------------|--------------------------------------------|-----------|----------|----------------|-----------------------------------------|
| Eye-tracking          | Masculine vs Feminine | Mann-Whitney U     | Number of fixations                        | 115.5     | 0.023**  | Sincerity      | Glasgow                                 |
|                       |                       |                    | The average duration in the first fixation | 91        | 0.003*** |                |                                         |
|                       |                       |                    | The total duration of fixation             | 114       | 0.020**  |                |                                         |
| SCR-galvanic response | Masculine vs Feminine | Mann-Whitney U     | ER SCR Amplitude                           | 151       | 0.048**  |                |                                         |

\*\* p < .05, \*\*\* p < .005

The significant differences achieved through the Mann-Whitney U test shown in Table 3 also suggest that the data should be analysed more deeply. On the one hand, women not only exhibited a higher number of fixations, with an average of 25.65 and a wider interquartile range (IQR) (Figure 3), but they also demonstrated a more varied and intense attention to the logo. This trend suggests a more detailed exploration and a heightened affinity towards the values of authenticity, warmth, and reliability that 'Sincerity' suggests, reflecting a gender-based preference or differential valuation. On the other hand, men

displayed a more consistent but less intense attention pattern towards the Glasgow logo, with an average of 19.75 fixations and a narrower IQR. The disparity in both the number of fixations and the total duration of these, indicated by the standard deviations (Women = 8.074, Men = 7.383), not only underscores sustained interest and attention but also a deeper focus on the logo that represents the values of 'Sincerity'. These differences highlight how gender can influence the attention and processing of values transmitted through the tourism destination brand logo, indicating differentiated attention that possibly reflects a distinct emotional or evaluative resonance with the BP attributes.

Figure 5. Number of first fixation on Glasgow



The heat map in Figure 4 illustrates a notable difference in the intensity of attention between the logos of Stockholm and Glasgow, each representative of the BP dimensions: sophistication and sincerity, respectively. The intensity of the heat map over the Stockholm logo suggests that the design elements capture attention in a more dispersed manner, which may indicate that the brand's sophistication requires more complex cognitive processing or invites a more detailed evaluation. In contrast, the greater concentration of attention in the centre of the Glasgow logo reflects more direct communication and possibly more effective transmission of sincerity as a brand value. This focused response could indicate that sincerity is an attribute more immediately recognisable or valued by consumers. The distribution and intensity of the colours on the heat map may be clear indications of attractiveness or interest with the viewers, which in

turn could reflect the effectiveness with which each logo communicates its respective BP dimensions.

Figure 6. Heat map of two dimensions: Sophistication (Stockholm) vs. Sincerity (Glasgow)



Source: Tobii Pro Lab software

The significant difference in the amplitude of the SCR response (SCR Amplitude ER ( $p=0.048$  for "Sophistication" and  $p=0.02$  for "Sincerity")), according to the Mann-Whitney U test shown in Table 4, indicates a distinct physiological reaction to the logos, evidencing an underlying emotional activation. The greater amplitude in response to "Sophistication" might suggest that this dimension elicits a more intense emotional response, possibly due to the perception of exclusivity, elegance, and prestige associated with it. The self-congruity theory (Sirgy, 1982), which suggests that consumers are more drawn to brands whose personality aligns with their own self-image or aspirations, supports this. Moreover, based on the theory of visual information processing (Turvey, 1977; Neisser, 2014), the attributes associated with "Sophistication" could require more complex cognitive processing, reflected in a longer fixation duration and a more intense SCR response, whereas "Sincerity" might evoke a more immediate and direct emotional connection, leading to a greater number of fixations. This dichotomy between sophistication and sincerity illustrates how consumers, influenced by their gender and

associated cultural norms, may tend to identify and emotionally connect with brands that reflect or complement their self-concept.

Table 4. Significant Results in SCR with independent samples: Sincerity and Sophistication

| Technique             | Groups                | Hypothesis testing | Parameter        | Statistic | P       | AOI/ Dimension | Logo or combination mark |
|-----------------------|-----------------------|--------------------|------------------|-----------|---------|----------------|--------------------------|
| SCR-galvanic response | Masculine vs Feminine | Mann-Whitney U     | ER SCR Amplitude | 151       | 0.048** | Sincerity      | Glasgow                  |
|                       |                       |                    |                  | 150       | 0.02**  | Sophistication | Stockholm                |

\*\* p < .05, \*\*\* p < .005

#### 4.2. Excitement vs Ruggedness/Competence (Edinburgh vs Lyon/Gdansk)

Applying the Mann-Whitney U test again to analyse gender differences (male and female) in the reaction to logos representing the BP dimensions "Excitement" versus "Ruggedness" for Edinburgh and Lyon, and "Excitement" versus "Competence" for Edinburgh and Gdansk, reveals statistically significant findings that shed light on how BP influences the initial perception and reaction of men and women.

The test shows significant differences (see Table 5) in how genders visually process the logos associated with "Excitement" in comparison to "Ruggedness" and "Competence", with significance levels of  $p=0.008$  and  $p=0.006$ , respectively, for the number of fixations. This indicates a differentiated attention towards the logos representing these BP dimensions. Moreover, the average duration in the first fixation presents values of  $p=0.047$  and  $p=0.013$ , respectively, suggesting variations in the speed at which visual processing of these stimuli begins. The total duration of fixation, with a value of  $p=0.026$ , points to a divergence in the total time dedicated to examining the logos, suggesting that the BP dimensions "Excitement", associated with Edinburgh, and "Ruggedness" and "Competence", associated with Lyon and Gdansk respectively, significantly influence the depth of visual processing. This analysis allows a deep dive into consumer psychology, applying social psychology, marketing, and visual attention theories to interpret the results.

Table 5. Significant results with independent samples: Excitement vs Ruggedness and Excitement vs Competence

| Technique    | Groups                | Hypothesis testing | Parameter                                  | Statistic | P       | AOI/ Dimension           | Logo or combination mark representation |
|--------------|-----------------------|--------------------|--------------------------------------------|-----------|---------|--------------------------|-----------------------------------------|
| Eye-tracking | Masculine vs Feminine | Mann-Whitney U     | Number of fixations                        | 95.5      | 0.008** |                          |                                         |
|              |                       |                    | The average duration in the first fixation | 119       | 0.047** | Excitement vs Ruggedness | Edinburgh vs Lyon                       |
|              |                       |                    | The total duration of fixation             | 111       | 0.026** |                          |                                         |
|              |                       |                    | Number of fixations                        | 98.5      | 0.006** | Excitement vs Competence | Edinburgh vs Gdansk                     |

\*\* p < .05, \*\*\* p < .005

The intensity of the fixations on the image of the lion seen in Figure 5 suggests that this symbol significantly captures the attention of viewers, which can be justified by its symbolic charge and visual relevance. From the perspective of the optimal arousal theory (Hebb, 1955), the image of the lion could provoke an optimal level of activation that attracts and retains the viewer's attention. As a symbol of strength and power, the lion embodies the essence of "Ruggedness" and could evoke an instinctive response due to its cultural association with bravery and robustness.

Figure 7. Heat map of two dimensions: Ruggedness (Lyon) vs. Excitement (Edinburgh)



Source: Tobii Pro Lab software

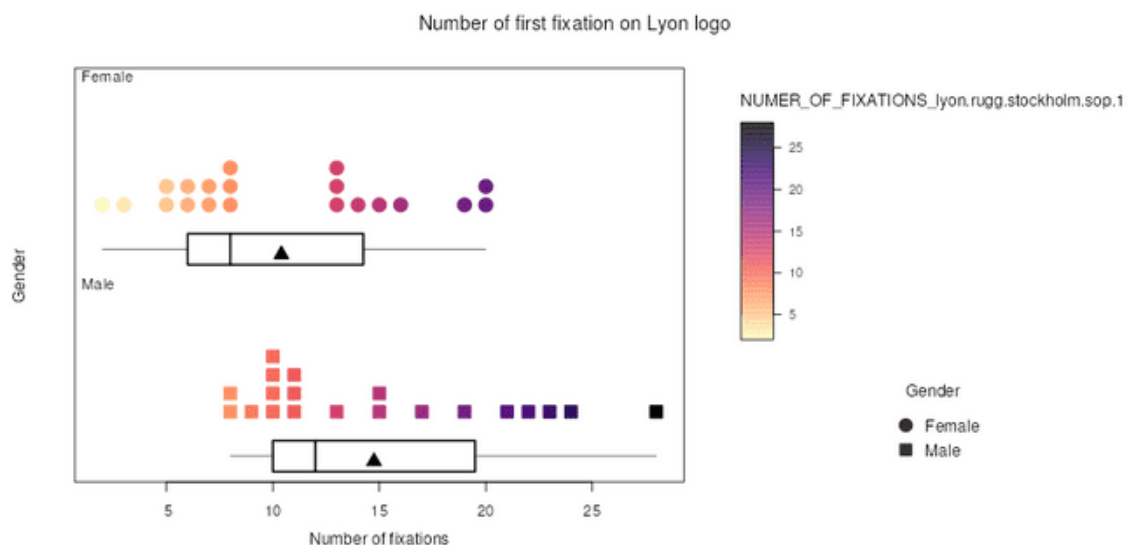
Furthermore, the logo's visual prominence of the lion's head reflects key principles of embodied cognition (Lakoff, 2012), where visual representations that directly connect to human sensory and emotional experiences tend to be processed more deeply. In this case, the lion as an embodied image attracts an emotional response that may be more immediate and visceral, which is consistent with its visual appeal and cultural symbolism.

On the other hand, the Edinburgh logo, representing "Excitement", does not possess an equally distinctive and evocative symbol, and consequently, the same intensity in the ET response. This could explain the lesser presence of intense red areas compared to the Lyon logo, suggesting that while "Excitement" is an attractive quality, it may not compete with the direct visual impact of a powerful image like that of a lion. This analysis reveals how the inclusion of strong and culturally resonant graphic elements in a logo can significantly affect the viewer's attention and emotional connection to the BP dimensions.

#### 4.3. Ruggedness vs Sophistication (Lyon vs Stockholm)

The Mann-Whitney U statistical test yielded a p-value of 0.019, indicating that there is a statistically significant difference in the visual attention that men and women pay to the Lyon logo represented by the Ruggedness dimension. A substantially higher average of fixations was recorded in male subjects (14.75) compared to female participants (10.40) (see Figure 6).

Figure 8. Number of first fixation on Lyon



From the perspective of gender identity as proposed by Money (1985), interpretations in marketing (Hogg & Garrow, 2003), and the gender schema theory of Bem (1984), it is plausible to suggest that there is a greater identification of men with the attributes of "Ruggedness". This identification is potentially reinforced by the symbolism of the lion (see Figure 7), which culturally embodies strength and boldness, traditionally aligned with masculinity. According to this theory, consumer preferences are partly driven by the congruence between gender self-perception and brand image, which may result in a more intensive visual focus towards representations that reinforce one's gender identity (Starr & Zurbriggen, 2017).

In line with the optimal arousal theory (Hebb, 1955; Wirtz *et al.*, 2007), the emblematic figure of the lion could constitute a more powerful stimulus of activation for the male gender, capturing and holding their attention through a level of arousal congruent with an optimal state of alertness. This mechanism aligns with the notion that certain stimuli, by their nature or symbolic meaning, exert a more pronounced effect on the focusing and maintenance of attention.

Figure 9. Heat map of two dimensions: Ruggedness (Lyon) vs. Sophistication (Stockholm)



Source: Tobii Pro Lab software

Furthermore, applying the self-congruity theory (Sirgy, 1982), it could be inferred that men find a stronger alignment between their self-concept and the values projected by the logo. This identification phenomenon could influence the attraction to the brand, manifesting in increased visual attention. Embodied cognition (Lakoff, 2012) provides another layer of interpretation by suggesting that our cognitive responses are deeply rooted in bodily physical and sensory experiences. As a representation of power and strength, the lion might resonate more profoundly with men, evoking a more pronounced response due to the connection with personal and cultural experiences associated with these attributes (see Table 6).

Table 6. Significant results with independent samples: Ruggedness vs Sophistication

| Technique    | Groups                | Hypothesis testing | Parameter           | Statistic | P       | AOI/ Dimension               | Logo or combination mark |
|--------------|-----------------------|--------------------|---------------------|-----------|---------|------------------------------|--------------------------|
| Eye-tracking | Masculine vs Feminine | Mann-Whitney U     | Number of fixations | 106       | 0.019** | Ruggedness vs Sophistication | Lyon vs Stockholm        |

\*\* p < .05, \*\*\* p < .005

#### 4.4. Sophistication vs Competence (Stockholm vs Gdansk)

The analysis also shows significant differences in the visual interaction of participants with the logos of Stockholm and Gdansk, which are representative of the "Sophistication" and "Competence" dimensions, respectively. The statistical values (see Table 7) indicate a higher average number of fixations on the Stockholm logo (27.27) compared to Gdansk (21.82), with a p-value of < .001, and a longer average duration of the first fixation for Gdansk (0.4597 seconds) in relation to Stockholm (0.3187 seconds), with a p-value of 0.005.

Table 7. Significant results with the same group: Sophistication vs Competence

| Technique    | Groups     | Hypothesis testing | Parameter                                  | Statistic | P         | AOI/ Dimension vs Dimension  | Logo or combination mark |
|--------------|------------|--------------------|--------------------------------------------|-----------|-----------|------------------------------|--------------------------|
| Eye-tracking | Same group | Wilcoxon           | Number of fixations                        | 137       | < .001*** | Sophistication vs Competence | Stockholm vs Gdansk      |
|              |            |                    | The average duration in the first fixation | 615       | 0.005**   |                              |                          |

\*\*  $p < .05$ , \*\*\*  $p < .005$

These results can again be interpreted under the light of the optimal arousal theory (Hebb, 1955; Wirtz *et al.*, 2007), suggesting that the Stockholm logo may have reached a level of arousal resulting in a higher number of fixations (see Figure 8), which could be attributed to a visual aesthetic that harmonises with the idea of "Sophistication". The Gdansk logo, although resulting in less frequent fixations, retains attention for longer periods during the first fixation, which could be interpreted as an indication of deeper cognitive processing associated with "Competence". Embodied cognition (Lakoff, 2012) could offer an additional perspective on how participants are experiencing these logos. While "Sophistication" might resonate more with aesthetic experiences or status, evoking quicker but perhaps more superficial attention, "Competence" may require a more thorough and reflective analysis, reflected in a longer duration of the first fixation. Finally, self-congruity (Sirgy, 1982) suggests that the personal aspirations or ideal self-concept of the participants might make "Sophistication" more attractive at first glance, leading to a higher number of initial fixations. On the other hand, "Competence" may resonate on a deeper level, possibly related to the consumer's internal evaluation of reliability and effectiveness, manifesting in more sustained though less frequent attention.

Figure 10. Heat map of two dimensions: Sophistication (Stockholm) vs. Competence (Gdansk)



Source: Tobii Pro Lab software

On the other hand, based on the Information Processing Theory (Miller, 1956), it is suggested that the higher number of fixations on the Stockholm logo could be due to its sophisticated design containing subtle elements, such as the crown or the twist in the letter “f” that require more detailed analysis to be fully processed, highlighting the depth and luxury associated with sophistication. This could align with the Marketing Aesthetics Theory (Bloch, 1995), where the visual and aesthetic appeal inherent to the sophistication dimension could explain why participants devoted more time in their first fixation to the Stockholm logo, as they tend to be drawn towards designs, they perceive as beautiful or luxurious. And with the Visual Persuasion Theory (Meyers-Levy & Peracchio, 1995), which could explain how the design of the Stockholm logo, by communicating quality and exclusivity through its complexity or visual space, requires greater attention from viewers to be fully appreciated and understood.

#### 4.5. *Sophistication vs Excitement (Stockholm vs Edinburgh)*

As summarised in Table 8, there is a statistically significant difference ( $p < .001$ ) in the number of fixations between the logos, indicating a clear divergence in the level of visual attention attracted by each BP dimension. This suggests that sophistication, represented by the Stockholm logo with an average of 27.27 fixations, captures more visual attention compared to excitement, represented by the Edinburgh logo with an average of 21.73 fixations. Furthermore, the average duration of the first fixation remains significantly longer for the logo associated with excitement ( $p = 0.007$ ), with an average duration of 0.4352 seconds, in contrast to 0.1826 seconds for sophistication.

Table 8. Significant results with the same group: Sophistication vs Excitement

| Technique    | Groups     | Hypothesis testing | Parameter                                  | Statistic | P         | AOI/<br>Dimension vs<br>Dimension | Logo or<br>combination<br>mark |
|--------------|------------|--------------------|--------------------------------------------|-----------|-----------|-----------------------------------|--------------------------------|
| Eye-tracking | Same group | Wilcoxon           | Number of fixations                        | 278       | < .001*** | Sophistication vs Excitement      | Stockholm vs Edinburgh         |
|              |            |                    | The average duration in the first fixation | 607       | 0.007**   |                                   |                                |

\*\*  $p < .05$ , \*\*\*  $p < .005$

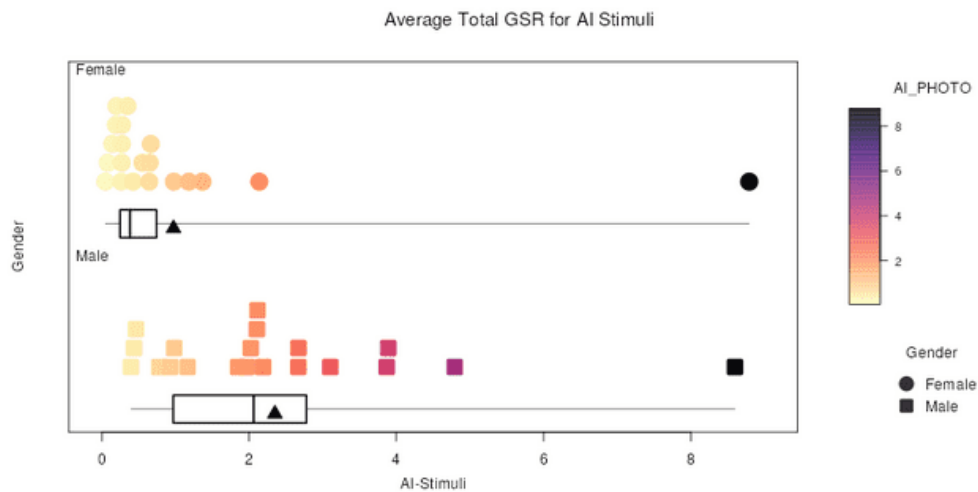
From a psychological and marketing perspective, the significant difference in the number of fixations reinforces the idea that the attributes of sophistication possess a particular ability to capture and hold visual attention, possibly due to their association with aesthetic qualities and an air of exclusivity. This ability to attract more fixations could reflect a greater cognitive load associated with the processing and appreciation of sophistication. Although we did not directly assess working memory capacity in this study, the increased number of fixations suggests greater cognitive effort, aligning with the general principles of Sweller's Cognitive Load Theory (1988).

On the other hand, the longer duration of the first fixation on logos associated with "excitement" suggests deeper initial processing or a higher level of attention with these stimuli. Based on Petty and Cacioppo's (1986) Elaboration Likelihood Model, this finding could indicate that excitement fosters a more elaborate evaluation than sophistication, possibly due to its dynamic and stimulating nature.

#### *4.6. GSR Artificial Intelligence*

The analysis of the GSR to images generated by artificial intelligence representing each dimension (see Appendix C) reveals significant differences in the emotional and physiological reaction between genders (see Figure 9). In the female group, GSR measurements range from 0.0480 to 8.793, reflecting a wide variability in responses, with an average of 0.9741 and a notable standard deviation of 1.911. This variability suggests that, although most responses are moderate, there are cases of extremely high reactions. In contrast, the male group shows a GSR range of 0.3958 to 8.599, with a significantly higher average of 2.3504 and a standard deviation of 1.918. This indicates that, on average, men exhibit a higher physiological activation to the same stimuli, with minimum responses higher than the lowest observed in women and a general trend towards higher galvanic responses. Both groups exhibit a wide dispersion of reactions, highlighting the heterogeneity in the attention and emotional response to AI-generated content, in addition to underlining how gender differences can influence interaction with advanced technologies.

Figure 11. Average total GSR for AI Stimuli



On the other hand, reactions to AI-generated images are analysed, observing distinct patterns of attention and emotional response according to different evaluated dimensions: sincerity, sophistication, ruggedness, and excitement. Specifically, the sincerity dimension exhibits a distinct reaction pattern compared to the dimensions of sophistication, ruggedness, and excitement, as demonstrated by the number of fixations and the average duration of the first fixation, details of which are provided in Table 9. Notably, the excitement dimension significantly differs from ruggedness, particularly regarding the SCR.

Table 9. Significant results with the same group: Sincerity vs Ruggedness

| Technique    | Groups                | Hypothesis testing | Parameter                                  | Statistic | P       | AOI/Dimension               | AI-photo            |
|--------------|-----------------------|--------------------|--------------------------------------------|-----------|---------|-----------------------------|---------------------|
| Eye-tracking | Masculine vs Feminine | Mann-Whitney U     | Duration of the first fixation             | 102       | 0.008** | Ruggedness                  | Berlin              |
|              |                       |                    |                                            | 559       | 0.006** | Sincerity vs Ruggedness     | Amsterdam vs Berlin |
| Eye-tracking | Same group            | Wilcoxon           | Number of fixations                        | 552       | 0.024** | Sincerity vs Sophistication | Amsterdam vs Paris  |
|              |                       |                    |                                            | 557       | 0.007** | Sincerity vs Excitement     | Amsterdam vs London |
|              |                       |                    |                                            | 230       | 0.015** | Sincerity vs Ruggedness     | Amsterdam vs Berlin |
|              |                       |                    | The average duration in the first fixation | 212       | 0.007** | Sincerity vs Sophistication | Amsterdam vs Paris  |
|              |                       |                    |                                            | 218       | 0.009** | Sincerity vs Excitement     | Amsterdam vs London |
| SCR          | Same group            | Wilcoxon           | ER SCR Amplitude                           | 42        | 0.024** | Excitement vs Ruggedness    | London vs Berlin    |

\*\* p < .05, \*\*\* p < .005

Relevant results obtained for the same study group indicate notable differences when comparing the dimensions of sophistication and excitement, both in ocular reactions through ET and emotional responses. The evaluation of the duration of the first fixation revealed a statistically significant difference in the attention of ruggedness between male and female participants, with a p-value of 0.008 in the Berlin images.

The application of the Wilcoxon test to analyse intragroup differences highlighted that the sincerity dimension, compared to those of ruggedness, sophistication, and excitement, generates significant differences both in the number of fixations and the average duration of the first fixation, in the comparisons between Amsterdam with Berlin, Paris, and London, respectively. The p-values range from 0.006 to 0.024, highlighting a differentiated focus and initial reaction towards the sincerity dimension compared to the other dimensions evaluated.

Additionally, concerning SCR, the contrast between the dimensions of excitement and ruggedness between London and Berlin shows a significant difference, with a p-value of 0.024, indicating a distinctive emotional response when contrasting these two dimensions.

The findings of this study suggest that both attention and emotional response to AI-generated images vary significantly depending on the dimension represented, identifying sincerity with a unique response pattern compared to the other dimensions evaluated and highlighting excitement for its prominence in terms of emotional response in contrast to ruggedness.

## 5. Discussion

The integration of neurotourism techniques such as ET and GSR in the study of BP in the tourism context offers a revolutionary perspective on how consumers perceive and react to tourism destination brand logos and AI-generated images. This pioneering approach, inspired by the sparse existing literature on the subject, particularly Lourenção *et al.* (2020), and based on the BP construct proposed by Aaker (1997), underscores the importance of the dimensions of sincerity, excitement, sophistication, competence, and ruggedness in shaping destination image and influencing consumer behaviour (Ekinci & Hosany, 2006; Papadimitriou *et al.*, 2015; Baloglu *et al.*, 2014; Hultman *et al.*, 2015).

The findings of this study corroborate and expand previous understanding of BP, demonstrating how gender differences influence attention and emotional response towards tourism destination brand logos representing these key dimensions. This distinction highlights the relevance of self-image congruity theory (Sirgy, 1982) and self-categorisation theory (Turner *et al.*, 1987), suggesting that the alignment between a destination's BP and consumers' self-perception may be a critical determinant in their attraction and loyalty to the destination. Traditional methods of measuring affective states, such as surveys and questionnaires, often fall short in capturing the complexity of tourist experiences due to their subjective nature and susceptibility to biases (Ziegel *et al.*, 1998; Schwarz, 1999). In contrast, ET and GSR provide objective and precise measurements of visual attention and emotional arousal, respectively. ET tracks where and for how long a participant looks at different elements of a logo, while GSR measures physiological responses that indicate emotional activation.

Previous research has shown that destination image and BP are interrelated yet distinct concepts. The destination image encompasses both cognitive and affective aspects, shaping tourists' overall perception of a place (Baloglu *et al.*, 2014; Chen & Phou, 2013). In contrast, BP uses human personality traits to describe the destination, providing an emotional and symbolic framework that complements its physical and tangible characteristics (Ekinci & Hosany, 2006). Studies by Hosany *et al.* (2006), Murphy *et al.* (2007), and Prayag (2007) have demonstrated how BP influences consumer perception, satisfaction, and visitation intent, underscoring the relevance of BP in tourism marketing strategies.

Our research supports these findings by demonstrating that the BP dimensions, particularly sincerity, excitement, and sophistication, significantly influence tourists' attention and emotional responses. This is consistent with the work of Jalilvand *et al.* (2012) and Qu *et al.* (2011), who found that a well-defined and attractive BP enhances tourists' intention to visit and loyalty to the destination.

The use of ET and GSR techniques in this study has provided a more accurate and objective assessment of the interaction between consumers and the brand's visual elements, avoiding the biases and validity issues associated with self-report instruments (Scott *et al.*, 2020; Schwarz, 1999). This aligns with the argument by Kotsi *et al.* (2018)

that neuroscience offers a promising field to reveal the direct and unconscious reactions of consumers towards brands.

Furthermore, the GSR analysis of AI-generated images representing BP dimensions has shown significant differences in emotional activation between genders. This finding underscores the importance of considering gender differences in designing marketing strategies and visual communications that seek to resonate with a broader audience (Ekinci *et al.*, 2013; Smith *et al.*, 2015).

The coherence between brand personality and destination image contributes to a clearer and stronger perception of the destination (Ekinci & Hosany, 2006). Marketing campaigns that highlight BP can enhance the destination image by emphasising emotional and symbolic attributes that attract tourists (Pike *et al.*, 2010). This is particularly important as tourists are more likely to consider destinations with an attractive BP and a positive image, as these destinations appear to offer more rewarding experiences (Jalilvand *et al.*, 2012).

### *5.1. Theoretical Implications*

This study theoretically contributes to the emerging field of neurotourism by integrating ET and GSR technologies to explore the impact of tourism destination brand logos and AI-generated images on consumer perception and attention. By applying these neuroscientific methods, our research offers novel insights into the complex interaction between visual stimuli and the brand personality (BP) dimensions conceptualised by Aaker (1997): sincerity, excitement, sophistication, competence, and ruggedness. Significantly, it underscores differentiated processing and emotional responses by gender towards these BP dimensions, suggesting nuanced strategies for targeted marketing.

Furthermore, this research extends the theoretical framework of BP in the tourism context by demonstrating the applicability of neuroscientific methods to assess the emotional and cognitive bases of tourism destination brand logos effectiveness. It enriches the academic discourse on BP by providing empirical evidence of how specific visual elements of logos resonate with or diverge from perceived BP traits, thus influencing consumer attitudes and behaviours.

Additionally, by highlighting the different emotional and attentional responses elicited by logos and AI images, the study extends the boundaries of traditional marketing research methodologies. It advocates for a more interdisciplinary approach, combining insights from psychology, marketing, and neuroscience, to better understand the subtleties of consumer-brand interactions in the digital era. This work paves the way for future research on the strategic use of neuroscientific methods to enhance the design and communication of BPs in tourism and beyond.

### *5.2. Practical Implications*

The implementation of advanced neuroscientific methods in this study allows for a more accurate and objective assessment of visual and emotional responses, overcoming the limitations of traditional methods based on self-reports. This methodology provides a solid foundation for the development of more personalised and effective tourism marketing strategies by offering valuable insights into the effectiveness of brand visual elements in communicating their core values.

Furthermore, this study sheds light on the practical applications of these techniques in logo design and brand strategies. By identifying specific attention patterns and emotional responses associated with different BP dimensions, marketing professionals can optimise the visual presentation of destinations to enhance the tourist experience and promote destination choice. The research also offers guidance for creating visual content that effectively aligns BP dimensions with the values and aspirations of the target audience.

This study not only validates the influence of BP dimensions on consumer behaviour but also emphasises the importance of integrating neuroscientific methods into the research of BP and the perception of tourism destination brand logos. The originality of the approach, along with the significant findings, advances our theoretical understanding and has profound practical implications for tourism marketing and destination management. By exploring the complexities of visual and emotional interaction with tourism destination brand logos, this study paves the way towards more effective and consumer-focused branding and marketing strategies, highlighting the need for visual communication that authentically resonates with the expectations and preferences of the target audience. The integration of consumer psychology and neuroscientific insights into

logo design and brand strategies underscores the value of creating more meaningful and lasting connections with the target audience, paving the way for a future where neurotourism plays a crucial role in the evolution of tourism marketing.

## 6. Conclusions

Research on emotional and visual responses to tourism destination brand logos, incorporating the BP dimensions proposed by Aaker, has uncovered significant differences in perception and initial reaction between genders. Through the use of non-parametric statistical analyses, such as the Mann-Whitney U test and the Wilcoxon test, variations in how individuals of different genders process and respond to the attributes associated with certain cities have been identified. These differences highlight the complex interplay between self-perception, aspirations, and cultural norms, particularly in how the logos of Stockholm and Glasgow are perceived and valued. The distinct alignment of brand values with observers' ideal self-image resonates with self-image congruity theory and self-categorisation theory, underlining how "Sophistication" and "Sincerity" evoke a gender-specific emotional or cognitive resonance. This resonance is evidenced in measures such as time to first fixation, the number of fixations, and total fixation duration, emphasising the importance of considering gender differences in marketing and logo design.

Integrating these statistically significant findings broadens our understanding of how certain BP dimensions can influence attention capture and retention and elicit differentiated emotional responses. Moreover, from a neuroscientific perspective, variations in the number of fixations between men and women may reflect intrinsic differences in the neurological processes involved in visual and symbolic perception. In this regard, elements of "Sophistication" and "Excitement" stimulate the brain areas associated with emotional and visual activation differently, which may have implications for logo design and brand strategies that effectively communicate desired personality dimensions and align with the expectations and values of the target audience.

This study emphasises the relevance of employing techniques such as ET to gain insights into the effectiveness of brand visual elements in communicating their core values, revealing the potential of these tools to measure visual attention objectively. A logo's

ability to attract attention and foster a deep emotional connection can significantly impact brand perception and consumer loyalty, highlighting the importance of carefully aligning the brand's visual presentation with desired communication and perception objectives.

## **7. Limitations and future research directions**

Despite the significant findings and contributions of this study to the field of neurotourism and the understanding of emotional responses to brand stimuli, certain limitations need to be acknowledged, paving the way for future research. A key limitation arises from the geographical and demographic focus, as the study centred exclusively on participants and destinations accessible from Málaga, Spain. This focus suggests that specific cultural factors might influence the results, limiting their generalisation to other contexts or populations. Future research could benefit from replicating the study in different geographical and cultural settings to examine the universality of the findings.

Moreover, this study concentrated exclusively on visual and emotional responses measurable through ET and GSR, without considering other psychological or social factors that might influence the perception and reaction towards tourism destination brand logos. As AI technology continues to evolve, future research would benefit from exploring how differences in the perception of authenticity and the quality of AI-generated stimuli affect consumer response.

Finally, this study broke new ground by integrating neuroscientific methods into the research of tourism BP, yet much remains to be explored regarding how different combinations of stimuli (visual, auditory, tactile) might interact to influence consumer perception and behaviour. Future research could adopt a multimodal approach to examine how a combination of stimuli affects the overall consumer experience.

## **Acknowledgements**

This study was supported by the European Regional Development Fund Operational Programme of Andalusia 2014–2020 through the Andalusian Research, Development and Innovation Plan (Plan Andaluz de Investigación, Desarrollo e Innovación) PAIDI 2020 (Grant: P20\_00457), and by the Spanish Ministry of Education, Culture and Sport

(Ministerio de Educación, Cultura y Deporte del Gobierno de España) (Grant: FPU20/00235).

### **Credit author statement**

Víctor Calderón-Fajardo: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing. Rafael Anaya-Sánchez: Investigation, Methodology, Writing – review & editing. Francisco Rejón-Guardia: Investigation, Methodology, Writing – review & editing. Sebastian Molinillo: Funding acquisition, Project administration, Resources, Supervision, Writing – review & editing.

**Declaration of competing interest:** None

## Appendix A: AOI/Dimensions for Logos and Combination Marks

| AOI/Dimension  | Attributes                            | Logo or combination mark                                                             |
|----------------|---------------------------------------|--------------------------------------------------------------------------------------|
| Excitement     | Daring<br>Young<br>Imaginative        |    |
| Ruggedness     | Masculine<br>Tough<br>Rugged          |    |
| Competence     | Intelligent<br>Technical<br>Corporate |   |
| Sincerity      | Honest<br>Cheerful<br>Sentimental     |  |
| Sophistication | Upper-class<br>Charming<br>Glamorous  |  |

## Appendix B: Dimensions of Brand Personality and universal definitions

Table 7: Semantic analysis of the items

| UNIVERSAL DEFINITION |                              |                                                                                                                                                                       | COMMON GROUND                           | DEST.     |
|----------------------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------|
| Items                | Oxford English Dictionary    | Merriam-Webster Dictionary                                                                                                                                            |                                         |           |
| Charming             | Very pleasant or attractive. | Extremely pleasing or delightful.                                                                                                                                     | Pleasing                                |           |
| SOPHISTICATION       | Upper-Class                  | Belonging to or typical of groups of people that are considered to have the highest social status and that have more money and/or power than other people in society. | High status<br>Money - Opulent<br>Power | Paris     |
|                      | Glamorous                    | Especially attractive and exciting, and different from ordinary things or people.                                                                                     | With glamour<br>Attractive<br>Different |           |
|                      | Daring                       | Brave; willing to do dangerous or unusual things; involving danger or taking risks.                                                                                   | Brave<br>Dangers                        |           |
| EXCITEMENT           | Young                        | Suitable or appropriate for young people.                                                                                                                             | Young                                   | London    |
|                      | Imaginative                  | Having or showing new and exciting ideas.                                                                                                                             | Imagination                             |           |
|                      | Cheerful                     | Happy, and showing it by the way that you behave.                                                                                                                     | Happy<br>Joy                            |           |
| SINCERITY            | Honest                       | Not hiding the truth about something                                                                                                                                  | Truth                                   | Amsterdam |
|                      | Sentimental                  | Connected with your emotions, rather than reason                                                                                                                      | Emotions                                |           |

|            |             |                                                                                                                                                    |                                                                                                     |                        |        |
|------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|------------------------|--------|
| COMPETENCE | Intelligent | Good at learning, understanding and thinking in a logical way about things; showing this ability.                                                  | Having or indicating a high or satisfactory degree of intelligence and mental capacity.             | Intelligence<br>Expert | Zurich |
|            | Technical   | Connected with the skills needed for a particular job, sport, art, etc.                                                                            | Marked by or characteristic of specialization                                                       | Skills                 |        |
|            | Corporate   | Of or relating to a large company or business corporation.                                                                                         | Of, relating to, or being the large <u>corporations</u> of a country or region considered as a unit | Business               |        |
| RUGGEDNESS | Rugged      | (Of a person) determined to succeed in a difficult situation, even if this means using force or upsetting other people.                            | Rough and strong in character.                                                                      | Strong                 | Berlin |
|            | Tough       | Strong enough to deal successfully with difficult conditions or situations.                                                                        | Capable of enduring strain, hardship, or severe labour.                                             | Capable<br>Resistant   |        |
|            | Masculine   | Of a personal attribute, an action, etc.: having a character befitting or regarded as appropriate to the male sex; vigorous, powerful. Of a man... | Marked by or having qualities, features, etc. traditionally associated with men                     | Man                    |        |

## Appendix C: Semantic analysis of the items

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### Amsterdam

#### Sincerity

- Cheerful
- Honest
- Sentimental



---

### Berlin

#### Ruggedness

- Rugged
- Tough
- Masculine



---

## London

### Excitement

- Daring
- Young
- Imaginative



---

## Paris

### Sophistication

- Upper-class
- Charming
- Glamorous

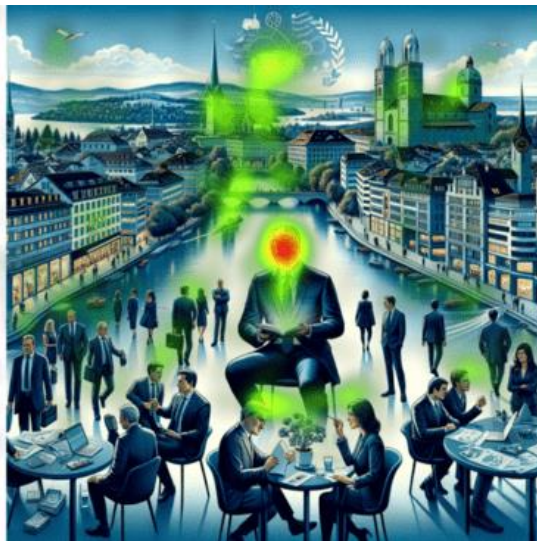


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## Zurich

### Competence

- Intelligent
- Technical
- Corporate



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# CAPÍTULO 5

## *Conclusions*

The initial review of brand personality, through the analysis of 1,051 articles published between 1987 and 2022 in the Scopus database, using quantitative methodological techniques such as data mining, text mining, and clustering, has provided a significant understanding of the state of the art in brand personality research and has helped identify future research directions. The findings reveal the evolution of scientific production on brand personality, its intellectual structure, the most influential works, the most popular themes, how brand personality has been conceptualised and measured, what methodologies have been used, and which emerging topics may attract research in the coming years.

Regarding the evolution of research, it is important to highlight that scientific production, which began in the late 1980s, continues to grow. Although there was significant growth in brand personality research in the first decade (1997-2006), the real turning point occurred in the period from 2007 to 2016, when 44.91% of the total was published. Strong growth continued in the last six years analysed (2017-2022). The results demonstrate that brand personality is a construct of great interest to the scientific community, and its theoretical corpus continues to grow. More than 2,600 authors from seventy-five countries have participated in research on brand personality.

Approximately 30% of the production was carried out by authors affiliated with US institutions, many of whom had a significant impact on the literature (e.g., Aaker, Brakus, Fournier, Schmitt). This finding suggests the need to focus on brand personality in other cultural contexts, such as Asia and Africa, to increase the validity of the construct and better understand how it might operate in other settings. Therefore, the topic is of interest to editors of a wide variety of journals, highlighting the cross-sectional implications for brand management and the potential for future development.

The seminal articles published at the beginning of this period were followed by works that expanded the theoretical framework of brand personality. These addressed issues such as cross-cultural effects, the effects of brand personality on consumer-brand relationships, the relationship between brand personality and emerging constructs (such as consumer-based brand equity), and the application of brand personality in other sectors, such as tourist destinations.

Regarding the driving themes, it was observed that the various topics are organised into four groups. The first group focuses on the theoretical conceptualisation of brand personality, brand personality dimensions, and the development of its scale. The second thematic group relates to brand personality marketing communications, social media, and purchase intention. The third group focuses on the relationships of brand personality with other brand-related constructs (such as attitude, trust, love, and attachment) and methodological choices (such as structural equation modelling).

The fourth group encompasses the tourism sector. Strategic diagrams show that after the theoretical framework of brand personality was established in the first and second periods, the third saw a greater focus on the concept in the tourism field and diversification into other sectors and applications. The most recent period has been characterised by a continued increase in studies related to tourism, examining specific destinations and types of tourism (such as cultural and health tourism) and the internet (such as social media and human-technology interactions).

Specifically, brand personality in tourism has experienced remarkable expansion and diversification in recent years, reflected through several predominant research groups addressing both traditional and emerging aspects of this construct. An initial focus is the conceptualisation and measurement of brand personality in the tourism context, particularly in tourist destinations. Since the emergence of this topic in 2006 by Ekinci and Hosany, significant progress has been made in understanding how brand personality positively influences the perceived image of the destination and the intention to recommend it (Ekinci and Hosany, 2006). It has also been recognised that a well-defined destination personality contributes to differentiating destinations and fostering emotional loyalty and repeat visits (Lin and Roberts, 2019).

Studies on brand personality in tourism have significantly evolved towards understanding how tourists perceive and emotionally connect with destinations through two complementary lines of research: congruence and self-congruence, and brand and tourism experience. Research on congruence and self-congruence has shown that tourists often attribute personality traits to tourist destinations and seek an emotional connection that reflects their self-image.

Similarly, brand personality in tourism has delved into its impact on consumer behaviour, particularly in loyalty and fidelity, as well as in specific tourism contexts to better understand destination branding strategies. These studies have revealed how perceptions of personality influence visitors' preference and repeat behaviour towards a destination. The congruence between the destination's personality and the tourist's personality not only generates positive behavioural intentions but also fosters loyalty towards the destination. Brand personality significantly contributes to positive word-of-mouth and the intention to revisit the destination (Hultman *et al.*, 2015) and confirms that culture and brand experience are key factors affecting tourist loyalty (Unurlu and Uca, 2017).

Brand personality in tourism reveals a dynamic and continuously evolving field that encompasses both the physical and digital aspects of destinations. Studies underline the importance of an integrated strategy that aligns the destination's personality with tourists' expectations and perceptions, thus enhancing their experience and fostering sustained engagement. This strategic integration not only strengthens the destination's image and deepens emotional connections with visitors but also promotes loyalty and increases positive recommendations. In this context, it becomes essential for tourism destination managers to consider the coherence between brand image and personality as a central component of their marketing strategy, ensuring effective communication that cultivates an attractive and enduring image in visitors' minds.

The concept of congruence between the destination's personality and the tourist has been established as a crucial aspect of a destination's brand image, revealing that high congruence between the destination's characteristics and the tourist's self-image positively correlates with their desired holiday experience (Murphy *et al.*, 2007). Studies have found that both actual and ideal congruence positively impact behavioural intentions, such as willingness to pay more, loyalty to hotels, or intention to revisit a destination (Usakli and Baloglu, 2011; Rütelionė *et al.*, 2018; Moons *et al.*, 2020; Yang *et al.*, 2020). Furthermore, congruence has been explored within tourism businesses, linking it to perceptions of job opportunities and the brand personality of tourism-related organisations (Kang *et al.*, 2019; Lam and Dioko, 2015).

Additionally, the analysis shows how destination websites reflect brand personality and its online perception, highlighting the importance of matching the displayed and perceived personality (Sun *et al.*, 2014). The role of electronic word-of-mouth and

collaborative tourism platforms in the development and co-creation of brand personality is emphasised, suggesting that brand managers should address potential gaps in their brand personality strategy (Borges-Tiago *et al.*, 2019; Borges Tiago *et al.*, 2021).

Researchers have adopted and adapted Aaker's scale (1997), simplifying it into dimensions such as sincerity, excitement, and competence, which has facilitated its application in studies on brand personality perception in tourist destinations (Gertner, 2010; Kovačić *et al.*, 2020). The need to align destination image and personality to enhance communication of its characteristics and influence tourists' behaviour is also highlighted (Murphy *et al.*, 2007; Hosany *et al.*, 2007). This body of studies emphasises the importance of adapting existing brand personality frameworks to the tourism context and considering the coherence between brand image and personality in destination marketing strategies (Kumar and Nayak, 2014).

Another approach was online brand personality, highlighting how the internet and social media provide new avenues for developing and communicating brand personality. In this line, many studies investigate how brand personality manifests in digital environments, using tools such as Aaker's scale (1997) to examine brand personality communication through social media and how certain traits are associated with followers (De Moya and Jain, 2013). It is noted that social media enhance the perception of brand personality and its positive impact on customer engagement with the brand (Peco-Torres *et al.*, 2020).

Regarding the methodologies employed, the analysis indicated that survey-based methodologies with samples from the United States predominated, and to a lesser extent, from Europe and Asia. This lack of methodological diversity limits the contributions made to the study of the construct. In the last decade, other methodologies such as netnography, sentiment analysis, and machine learning have been introduced into the marketing discipline, which can improve the understanding of how consumers perceive various characteristics and dimensions of brand personality and how these influence their behaviours.

Future studies could therefore examine brand personality using mixed methods (such as focus groups, experimental design) across various cultural contexts. For example, employing unconscious data collection techniques (such as neuronal activity,

electrodermal activity, and projective techniques) would allow for the identification of how consumers respond to different dimensions of brand personality.

The second study focuses on brand experience and, in response to the lack of methodological diversity in recent research on brand personality, the brand experience construct has employed more advanced techniques such as sentiment analysis and machine learning to enrich the research. This study constitutes a seminal contribution to the academic discourse on brand experience, introducing a deep and contextualised understanding through an advanced, contemporary, and multidimensional methodology.

Regarding brand experience and tourism, where the destination's personality plays an essential role, studies suggest that the satisfaction derived from the brand experience at the destination contributes to word-of-mouth communication, and tourists' narratives, such as those found in blogs, are fundamental for analysing and redirecting these experiences (Bhattacharya and Dutta, 2016; Kim and Stephenkova, 2017). Tourist destinations are considered complex products, not only due to the diversity of offerings they encompass but also because of the subjective interpretation of consumers (Buhalis, 2000). In the tourism industry, the multisensory, fantastical, and emotional aspects of consumer behaviour are particularly significant (Hirschman and Holbrook, 1982; Govers *et al.*, 2007). Applying the brand experience construct to tourist destinations provides a formal, rigorous, and systematic approach to evaluating the brand experiences of destinations. This comprehensive approach makes the destination brand experience construct a valuable tool for the tourism industry, allowing for the evaluation and enhancement of travellers' experiences with destination brands (Barnes *et al.*, 2014).

In previous studies on destination brand experience, the use of SEM (Structural Equation Modelling) and PLS (Partial Least Squares) has prevailed, highlighting their usefulness in identifying and validating relationships between variables in the context of destination brand experience (Boo *et al.*, 2009; Barnes *et al.*, 2014; Khan and Rahman, 2017; Kumar and Kaushik, 2018; Bhattacharya and Dutta, 2016). However, methodological questions arise about the adaptability of these traditional techniques to the current context, characterised by the abundance of digital data sources, such as social media and online reviews, which have significantly increased the volume of available data on brand experiences in tourist destinations (Westland, 2014). The ability of SEM and PLS to handle large data volumes and detect non-linear patterns and complex interactions is

questioned, suggesting the need for more agile and comprehensive methodologies. Although few studies exist, some, such as those by Koo *et al.* (2023), have begun to use artificial intelligence to explore the characteristics of brand experiences in smart hotels.

It seems that the evolving nature of destination brand experience in the digital era and traditional methodologies do not fully capture emerging trends or changes in tourists' perceptions. Consequently, data mining and machine learning techniques have been proposed as innovative alternatives. Data mining is perceived as a useful tool for discovering meaningful patterns and relationships in large datasets, revealing previously undetected facets of the destination brand experience. Machine learning, with its adaptability and ability to handle unstructured data, such as text and images, is presented as a powerful tool for gaining deeper and more dynamic insights into the destination brand experience. In the tourism industry, the use of machine learning is increasingly prevalent as an indispensable tool for identifying the most relevant details of searches and significantly improving the accuracy of predictions in the tourism and hospitality fields (Li *et al.*, 2020). This growing trend is exemplified in studies such as those by Zhang *et al.* (2023) on destination perception and Li *et al.* (2023) on tourism demand.

Leveraging a vast set of real data generated by visitors, the study transcends conventional techniques by integrating five types of analysis: sentiment analysis, topic modelling, multi-thesaurus analysis, statistical analysis through hypothesis testing, and classification based on machine learning. The flexible approach of the Latent Dirichlet Allocation model and tools like VADER and SentiART enhance the understanding of destination brand experience, providing robust means to analyse visitor reviews and identify key thematic areas. This multifaceted approach provides an overview of the destination brand experience, setting a new benchmark for future research.

The development of a unique set of thesauri to measure the destination brand experience of a city through user-generated content represents an innovative method for quantifying the original dimensions of brand experience proposed by Brakus *et al.* (2009) in visitor comments. This new way of measuring city destination brand experience offers a clear and weighted representation of the sensory, behavioural, intellectual, and affective dimensions, providing versatile tools for future research and methodologies.

This second study marks a transformative shift in destination brand experience studies, both theoretically and methodologically. It introduces a model that recognises intricate differences in destination brand experience, offering valuable insights for destination marketing experts. For the first time, a more comprehensive view of the destination brand experience is presented, integrating sentiment analysis and identifying key themes.

In terms of destination management, the findings reveal significant differences in the affective dimension between iconic elements of the city of Turin (used as a model), such as the Egyptian Museum and the Mole Antonelliana, suggesting the need for managers to reconsider strategies for shaping a renewed destination brand experience. This involves understanding and enhancing sensory experiences at key access points, recognising that the sensory experience at both locations is similar, which may influence the overall image tourists have of Turin.

On the other hand, the implementation of a machine learning model to classify reviews demonstrates how technology can assist in monitoring the dimensions of destination brand experience and automate the classification of new opinions. The use of cross-validation ensures the robustness of the model, enhancing its ability to generalise on new data and, thus, providing managers with reliable tools to design experiences that connect with diverse tourist profiles.

Regarding social implications, the study highlights how cultural and linguistic differences impact the perception of destinations, emphasising the need for inclusive and sensitive marketing strategies. It reveals that women tend to experience more intense emotions than men, which could influence the affective dimension of perception. Cultural differences significantly affect perceptions, necessitating culturally adapted marketing strategies (Pogosyan and Engelmann, 2011). Additionally, the impact of cultural dimensions on visit intentions underscores the need for culturally sensitive marketing strategies for tourist destinations (Matzler *et al.*, 2016).

Concerning gender differences in emotional intensity, women generally report experiencing more intense emotions than men. Studies have shown that women report greater arousal for both positive and negative images compared to men across different cultures (Gong *et al.*, 2018). Normative expectations and gender roles significantly

influence emotional intensity, with women tending to report and exhibit greater emotional intensity than men, influenced by social expectations (Grossman and Wood, 1993).

The observed increase in positive sentiment towards the Shroud of Turin during the pandemic year of 2020 suggests that global events can significantly influence the perception of destinations. This has broader social implications for how destinations can respond and adapt to changing circumstances and visitor needs.

This second transformative study on the destination brand experience in the city of Turin offers a comprehensive and multidimensional approach that integrates advanced textual analysis with machine learning, providing theoretical, managerial, and social perspectives. The methodological innovations and practical applications of this study set a new precedent for understanding and enhancing brand experience, guiding future research and destination management strategies. It recognises the complex differences in destination brand experience and offers practical insights for destination marketing managers, paving the way for personalised experiences that better connect with diverse demographic profiles of tourists and respond to the evolving global landscape.

The findings of the first bibliometric study on brand personality conclude that this construct has been predominantly dominated by quantitative survey-based methodologies, mainly using samples from the US. Consequently, it becomes evident that a methodological renewal could generate new approaches and findings. Therefore, the proposal to rejuvenate the methodology of the construct is carried out with neuromarketing techniques, specifically eye tracking and galvanic skin response, in the third study that concludes the thesis. Part of the focus of this work is grounded in the limited existing literature, notably Lourenção *et al.* (2020), and based on Aaker's (1997) brand personality construct.

In the field of tourism and hospitality, previous studies have demonstrated how affective states crucially influence tourists' motivations, actions, decisions, and satisfaction levels (Goossens, 2000; Tsai, 2007). However, measuring these emotions with subjective tools such as surveys and questionnaires often proves insufficient to capture the complexity of tourist experiences (Ziegel *et al.*, 1998). In this context, neuro-tourism emerges as a pioneering application of neuroscience within the tourism sector, aimed at refining marketing strategies targeted at tourists (Panyik and Gonçalves, 2017; Alsharif *et al.*,

2023). Neuroscience is positioned as a revolutionary interdisciplinary tool and approach that seeks to transform our understanding of tourists' decisions and preferences, providing an objective basis for designing and implementing more enriching and satisfying tourist experiences (Agarwal and Dutta, 2015).

Psychophysiological techniques such as eye tracking and galvanic skin response are emerging as valuable methods for analysing how tourists visually process destination images, providing significant advantages in understanding the underlying psychological and emotional processes behind booking decisions (Boz and Koç, 2022; Kim and Kim, 2024; Xie, Zhang, and Ma, 2023).

Our study on emotional and visual reactions to tourist destination brand logos, applying Aaker's (1997) brand personality dimensions, reveals notable differences in perceptions and initial responses by gender. Using non-parametric statistical methods such as the Mann-Whitney U and Wilcoxon tests, we highlight significant variations in how different genders process and react to attributes associated with certain cities. These differences underline the intricate relationship between self-perception, aspirations, and cultural norms, especially in how tourist destination brand logos such as Stockholm and Glasgow are interpreted and valued.

The specific connection of brand values with the ideal self-image of observers correlates with Sirgy's (1982) self-image congruence theory and Turner *et al.*'s (1987) self-categorisation theory, showing how attributes such as “sophistication” and “sincerity” trigger particular emotional or cognitive resonance according to gender. This resonance is reflected in metrics such as time to first fixation, the number of fixations, and total fixation duration, underscoring the need to consider gender differences in marketing and logo design.

Incorporating these statistically significant findings is key to deepening our understanding of how certain brand personality dimensions affect attention capture and retention, as well as the induction of differentiated emotional responses. From a neuromarketing perspective, differences in the number of fixations between men and women could reflect fundamental divergences in the neurological processes involved in visual and symbolic perception. In this context, elements such as “sophistication” and “excitement” distinctively activate brain areas related to emotional and visual arousal, which may have

implications for logo design and branding strategies that effectively communicate the desired personality dimensions and align with the expectations and values of the target audience.

This study highlights the importance of using techniques like eye tracking to obtain data on the effectiveness of brand visual elements in communicating core values, revealing the potential of these tools to measure visual attention and emotional engagement objectively. A logo's ability to capture attention and establish a deep emotional connection can significantly influence brand perception and consumer loyalty, emphasising the need to carefully align the brand's visual presentation with the desired communication and perception objectives.

In terms of practical contributions, the application of advanced neuromarketing methods in this final study concluding the thesis enables a more detailed and objective assessment of visual and emotional responses, overcoming the inherent limitations of conventional self-assessment methods. This technique establishes a solid platform for developing more personalised and effective tourism marketing strategies, providing valuable insights into the capability of brand visual elements to convey their essential values. Additionally, the study illuminates the practical applications of these techniques in logo design and brand strategy formulation. By discerning specific patterns of attention and emotional reactions linked to different brand personality dimensions, marketers can refine the visual presentation of destinations to enrich the tourist experience and promote destination selection.

The results of this study affirm and expand existing understanding of brand personality, illustrating how gender differences affect attention and emotional response to destination brand logos representing these essential dimensions. This differentiation accentuates the relevance of self-image congruence theory (Sirgy, 1982) and self-categorisation theory (Turner *et al.*, 1987), suggesting that congruence between a destination's brand personality and consumers' self-image can be a crucial factor in their attraction to the destination and their loyalty. Traditional approaches to measuring affective states, such as surveys and questionnaires, often fail to capture the complexity of tourist experiences due to their subjective nature and susceptibility to biases (Ziegel *et al.*, 1998; Schwarz, 1999). In contrast, eye tracking and galvanic skin response provide objective and precise metrics of visual attention and emotional arousal. Eye tracking monitors where and for

how long a participant looks at different elements of a logo, while galvanic skin response records physiological responses indicating emotional arousal.

Previous research has shown that destination image and brand personality are interrelated but distinct concepts. Destination image includes both cognitive and affective elements, shaping tourists' overall perception of a place (Baloglu *et al.*, 2014; Chen and Phou, 2013). On the other hand, brand personality uses human personality traits to describe the destination, offering an emotional and symbolic framework that complements its physical and tangible characteristics (Ekinci and Hosany, 2006). Research by Hosany *et al.* (2006), Murphy *et al.* (2007), and Prayag (2007) has demonstrated how brand personality influences consumer perception, satisfaction, and visit intention, highlighting the importance of brand personality in tourism marketing strategies.

Our research corroborates these findings by showing that brand personality dimensions, particularly “sincerity,” “excitement,” and “sophistication,” significantly affect tourists' attention and emotional responses. This aligns with the studies of Jalilvand *et al.* (2012) and Qu *et al.* (2011), which found that a well-defined and attractive brand personality enhances tourists' visit intentions and loyalty to the destination.

The use of eye tracking and galvanic skin response techniques in this study has allowed for a more precise and objective evaluation of the interaction between consumers and brand visual elements, overcoming the biases and validity issues associated with self-report instruments (Scott *et al.*, 2020; Schwarz, 1999). This supports Kotsi *et al.*'s (2018) argument that neuroscience has great potential to uncover direct and unconscious consumer reactions to brands.

Additionally, the analysis of galvanic skin response to AI-generated images representing brand personality dimensions has revealed significant differences in emotional arousal between genders. This finding underscores the need to consider gender differences in the design of marketing strategies and visual communications aimed at connecting with a broader audience (Ekinci *et al.*, 2013; Smith *et al.*, 2015).

Marketing campaigns that focus on brand personality can enhance the destination's image by highlighting emotional and symbolic attributes that appeal to tourists (Pike *et al.*, 2010). This is especially important since tourists tend to prefer destinations with an

attractive brand personality and a positive image, as these destinations appear to offer more satisfying experiences (Jalilvand *et al.*, 2012).

By examining the complexities of visual and emotional interaction with tourist destination brand logos, this study paves the way for more effective and consumer-focused marketing and branding strategies, emphasising the importance of visual communication that genuinely connects with the expectations and preferences of the target audience. The integration of consumer psychology and neuromarketing insights into logo design and brand strategies highlights the importance of forging deeper and more lasting connections with the audience, laying the foundation for a future where neuro-tourism plays a crucial role in the evolution of tourism marketing.

The thesis concludes with a theoretical contribution to the emerging field of neuro-tourism by integrating eye tracking and galvanic skin response technologies to explore how tourist destination brand logos and AI-generated images affect consumer perception and emotional engagement. The application of neuromarketing techniques offers new perspectives on the complex interaction between visual stimuli and the brand personality dimensions proposed by Aaker (1997), emphasising gender differences in the processing and emotional responses to these personality dimensions and suggesting specific marketing strategies.

This study expands the theoretical framework of brand personality in tourism, demonstrating the applicability of neuromarketing tools to assess the emotional and cognitive foundations of brand effectiveness and enriching the academic discourse on how certain visual elements of logos align with or diverge from perceived personality traits, thus influencing consumer attitudes and behaviours. This interdisciplinary approach combines insights from psychology, marketing, and neuroscience, enhancing our understanding of consumer-brand interactions in the digital age and opening pathways for future research on the strategic use of neuromarketing techniques to improve the design and communication of brand personality in the tourism sector and beyond.

The present doctoral thesis has comprehensively explored two fundamental constructs in tourism marketing: brand personality and destination brand experience. Through three interrelated studies, a cohesive narrative has been constructed that advances from

identifying theoretical needs to applying innovative methodologies, making a significant contribution to the overall research objectives.

One of the gaps identified in Study 1 (Chapter 2) was the need to explore new methodologies that enable a deeper and more objective understanding of how consumers perceive and respond to brand personality, particularly in the tourism context. Limitations were noted in traditional methodologies, predominantly survey-based and relying on quantitative techniques such as SEM and PLS, which may not fully capture consumers' unconscious and emotional responses.

Addressing these identified needs and opportunities, Study 3 (Chapter 4) was directly built upon the findings of Study 1 by incorporating neuroscientific techniques to analyse Brand Personality perception in destination brands and logos. Specifically, eye-tracking and galvanic skin response techniques were used to explore how logos and tourism destination brands, as well as AI-generated images, influence consumers' visual attention and emotional responses.

This methodological innovation in Study 3 responds to the call for future research highlighted in Study 1, emphasising the importance of integrating emerging technologies and interdisciplinary approaches to advance understanding of brand personality. By applying neurotourism techniques, Study 3 captured consumers' subconscious and emotional responses that are not readily accessible through traditional methods, revealing significant patterns of attention and emotional response associated with Aaker's (1997) five brand personality dimensions: sincerity, excitement, sophistication, competence, and ruggedness.

Also responding to the gaps identified in Study 1, Study 2 (Chapter 3) focused on destination brand experience and developed an innovative methodology using data mining and machine learning techniques. By analysing visitor opinions, the sensory, affective, intellectual, and behavioural dimensions of destination brand experience were measured. Aware of the cultural limitation noted in Study 1, this study incorporated content generated by visitors from Eastern cultures, thereby expanding the cultural diversity of the research and providing a more global understanding of how destination brand experience is perceived and experienced across different cultural contexts. This

approach revealed significant differences influenced by factors such as gender and culture, enhancing the applicability of the findings.

It is important to note that both Study 2 and Study 3 incorporated gender as a variable in their analyses and found significant differences in two related constructs: destination brand experience and brand personality, respectively. In Study 2, it was revealed that gender influences how tourists perceive and experience the sensory, affective, intellectual, and behavioural dimensions of destination brand experience, indicating that men and women may have distinct experiences and expectations regarding a tourist destination. Similarly, Study 3 demonstrated that there are significant gender-based differences in visual attention and emotional response to tourism destination logos and brands, linked to brand personality dimensions. These findings underscore the importance of considering gender as a factor in brand personality and brand experience in the tourism context.

Finally, the thesis establishes a clear and significant relationship between both constructs: brand personality shapes the expectations and perceptions that tourists have of the destination, while destination brand experience reflects how these expectations are met or exceeded during the visit. By integrating the findings from the three studies, the thesis reinforces a cohesive narrative, evidencing a logical progression from identifying theoretical needs to applying innovative methodologies that address key factors such as gender and cultural differences, including studies with content generated by visitors from Eastern cultures. This integration is essential for understanding and enhancing tourist satisfaction and the effectiveness of marketing strategies, consolidating the importance of considering brand personality and destination brand experience in an integrated and culturally inclusive manner in tourism destination management and promotion.

In the past two years (2023-2024), several studies have emerged that help to address the research gaps identified and support key avenues of inquiry in these two related constructs, particularly within the context of emerging technologies and tourism.

For instance, research has explored how integrating emerging technologies, such as AI, AR, VR, and the metaverse, into tourism marketing can create more immersive and personalised experiences that enhance customer satisfaction and strengthen brand loyalty. Recent articles address this topic. For example, Ku's (2024) study examines how AI-

assisted interactions in contactless tourism services impact customer satisfaction and willingness to pay more. Wongkitrungrueng and Suprawan (2024) investigate how experiential value within the metaverse influences brand perception and consumer responses. Bogicevic et al.'s (2024) research demonstrates that virtual reality enhances brand experience and word-of-mouth among Generation Z. Likewise, Ku's (2023) study examines the impact of anthropomorphic chatbots and virtual reality experiences on the brand experience of online travel agencies.

Additionally, studies have begun to measure the long-term effects of virtual experiences. Kostyk et al. (2024), for example, investigate how brand experiences in virtual reality form episodic and semantic memories and how these evolve over time. Steriopoulos et al. (2024) explore how emotional engagement enhances brand experience at heritage tourism sites, even in the presence of negative or mixed emotions.

The thesis specifically opens two distinct future research pathways concerning brand personality and brand experience in tourism destinations, beyond the emerging technologies mentioned. First, comparative studies across multicultural contexts could examine how brand personality and experience are perceived in different cultural settings, including comparisons between Western and Eastern cultures, to identify significant variations in consumer responses and perceptions. This would address current studies' limitations, which are often Western-focused, and contribute to a more global and culturally inclusive understanding. By better understanding how different cultures interpret brand personality and experience attributes, tourism destinations could adapt their marketing strategies more effectively for international audiences.

Second, multimodal studies on sensory responses to tourism destinations could integrate multisensory stimuli (visual, auditory, and tactile) to analyse how a combination of sensory inputs influences tourists' perceptions and experiences regarding a destination's brand personality and brand experience.

This research direction is particularly relevant for developing immersive, multisensory tourism experiences within the context of emerging technologies in tourism. These proposed pathways would significantly enhance the effectiveness of tourism marketing strategies, aligning them with global trends and the growing demand for personalised and multisensory experiences in tourism.

## Conclusiones

La revisión inicial de la personalidad de marca, a través del análisis de 1.051 artículos publicados entre 1987 y 2022 en la base de datos Scopus, utilizando técnicas metodológicas cuantitativas como el *data mining*, *text mining* y *clustering*, ha permitido una comprensión significativa del estado del arte en la investigación sobre la personalidad de marca y ha ayudado a identificar direcciones futuras de investigación. Los hallazgos revelan la evolución de la producción científica sobre personalidad de marca, su estructura intelectual, las obras más influyentes, los temas más populares, cómo se ha conceptualizado y medido la personalidad de marca, qué metodologías se han utilizado y qué temas emergentes podrían atraer investigaciones en los próximos años.

En cuanto a la evolución de la investigación, es importante destacar que la producción científica, que comenzó a finales de los años ochenta, sigue creciendo. Aunque hubo un crecimiento significativo en la investigación sobre personalidad de marca en la primera década (1997-2006), el verdadero punto de inflexión ocurrió en el período de 2007 a 2016, cuando se publicó el 44,91% del total. El fuerte crecimiento continuó en los últimos seis años analizados (2017-2022). Los resultados demuestran que la personalidad de marca es un constructo de gran interés para la comunidad científica y que su corpus teórico sigue creciendo. Más de dos mil seiscientos autores de setenta y cinco países han participado en investigaciones sobre la personalidad de marca.

Aproximadamente el 30% de la producción fue realizada por autores afiliados a instituciones estadounidenses, muchos de los cuales tuvieron un impacto significativo en la literatura (por ejemplo, Aaker, Brakus, Fournier, Schmitt). Este hallazgo sugiere la necesidad de centrarse en la personalidad de marca en otros contextos culturales, como Asia y África, para aumentar la validez del constructo y comprender mejor cómo podría operar en otros entornos. Por lo tanto, el tema es de interés para editores de una amplia variedad de revistas, destacando las implicaciones transversales para la gestión de marcas y el potencial de desarrollo futuro.

Los artículos seminales publicados al inicio de este período fueron seguidos por trabajos que ampliaron el marco teórico de la personalidad de marca. Estos abordaron cuestiones como los efectos interculturales, los efectos de la personalidad de marca en las relaciones entre consumidor y marca, la relación entre la personalidad de marca y constructos

emergentes (como el *brand equity* basado en el consumidor), y la aplicación de la personalidad de marca en otros sectores, como destinos turísticos.

En cuanto a los temas motores, se observó que los diversos temas se organizan en cuatro grupos. El primer grupo se centra en la conceptualización teórica de la personalidad de marca, las dimensiones de la personalidad de marca y el desarrollo de su escala. El segundo grupo temático se relaciona con las comunicaciones de marketing de la personalidad de marca, las redes sociales y la intención de compra. El tercer grupo se enfoca en las relaciones de la personalidad de marca con otros constructos relacionados con la marca (como la actitud, la confianza, el amor y el apego) y las elecciones metodológicas (como el modelado de ecuaciones estructurales).

El cuarto grupo abarca el sector turístico. Los diagramas estratégicos muestran que, tras establecerse el marco teórico de la personalidad de marca en los primeros y segundos períodos, el tercero vio un mayor enfoque en el concepto en el ámbito del turismo y una diversificación hacia otros sectores y aplicaciones. El período más reciente se ha caracterizado por un aumento continuo en los estudios relacionados con el turismo, que examinan destinos y tipos específicos de turismo (como el cultural y el de salud) y el internet (como las redes sociales y las interacciones humano-tecnología).

Específicamente, la personalidad de marca en el turismo ha experimentado una notable expansión y diversificación en los últimos años, reflejada a través de varios grupos de investigación predominantes que abordan tanto aspectos tradicionales como emergentes de este constructo. Un enfoque inicial es la conceptualización y medición de la personalidad de marca en el contexto turístico, particularmente en los destinos turísticos. Desde la aparición de este tema en 2006 por Ekinci y Hosany, se ha avanzado significativamente en la comprensión de cómo la personalidad de marca influye positivamente en la imagen percibida del destino y en la intención de recomendarlo (Ekinci y Hosany, 2006). También se ha reconocido que una personalidad del destino bien definida contribuye a diferenciar destinos y fomentar la lealtad emocional y las visitas repetidas (Lin y Roberts, 2019).

Los estudios sobre la personalidad de marca en el turismo han evolucionado significativamente hacia la comprensión de cómo los turistas perciben y se relacionan emocionalmente con los destinos, a través de dos líneas de investigación

complementarias: la congruencia y la auto-congruencia, y la experiencia de marca y turismo. La investigación sobre congruencia y auto-congruencia ha demostrado que los turistas frecuentemente atribuyen rasgos de personalidad a los destinos turísticos y buscan una conexión emocional que refleje su autoimagen.

Igualmente, la personalidad de marca en el turismo ha profundizado en su impacto en el comportamiento del consumidor, particularmente en la lealtad y fidelidad, así como en contextos turísticos específicos para comprender mejor las estrategias de *branding* de los destinos. Estos estudios han revelado cómo las percepciones de la personalidad influyen en la preferencia y el comportamiento repetitivo de los visitantes hacia un destino. La congruencia entre la personalidad del destino y la del turista no solo genera intenciones de comportamiento positivas, sino que también fomenta la lealtad hacia el destino. La personalidad de marca contribuye significativamente al boca a boca positivo y a la intención de volver a visitar el destino (Hultman *et al.*, 2015) y confirma que la cultura y la experiencia de marca son factores clave que afectan la lealtad del turista (Unurlu y Uca, 2017).

La personalidad de marca en el turismo revela un campo dinámico y en continua evolución que abarca tanto los aspectos físicos como digitales de los destinos. Los estudios subrayan la importancia de una estrategia integrada que alinee la personalidad del destino con las expectativas y percepciones de los turistas, mejorando así su experiencia y fomentando un compromiso sostenido. Esta integración estratégica no solo fortalece la imagen del destino y profundiza las conexiones emocionales con los visitantes, sino que igualmente promueve la lealtad e incrementa las recomendaciones positivas. En este contexto, se vuelve esencial que los gestores de destinos turísticos consideren la coherencia entre la imagen y la personalidad de marca como un componente central de su estrategia de marketing, asegurando una comunicación eficaz que cultive una imagen atractiva y duradera en la mente de los visitantes.

El concepto de congruencia entre la personalidad del destino y el turista se ha establecido como un aspecto crucial en la imagen de marca de un destino, revelando que una alta congruencia entre las características del destino y la autoimagen del turista se correlaciona positivamente con su experiencia deseada de vacaciones (Murphy *et al.*, 2007). Los estudios han encontrado que tanto la congruencia real como la ideal impactan positivamente en las intenciones de comportamiento, como la disposición a pagar más, la

lealtad hacia los hoteles o la intención de volver a visitar un destino (Usakli y Baloglu, 2011; Rütelionè *et al.*, 2018; Moons *et al.*, 2020; Yang *et al.*, 2020). Además, la congruencia ha sido explorada dentro de las empresas turísticas, vinculándola con las percepciones sobre oportunidades laborales y la personalidad de marca de las organizaciones relacionadas con el turismo (Kang *et al.*, 2019; Lam y Dioko, 2015).

Adicionalmente, el análisis muestra cómo los sitios web de destinos reflejan la personalidad de marca y su percepción en línea, evidenciando la importancia de la correspondencia entre la personalidad mostrada y la percibida (Sun *et al.*, 2014). Se subraya el papel del boca a boca electrónico y las plataformas colaborativas de turismo en el desarrollo y la co-creación de la personalidad de marca, lo que sugiere que los gestores de marcas deben abordar posibles brechas en su estrategia de personalidad de marca (Borges-Tiago *et al.*, 2019; Borges Tiago *et al.*, 2021).

Los investigadores han adoptado y adaptado la escala de Aaker (1997), simplificándola en dimensiones como sinceridad, emoción y competencia, lo que ha facilitado su aplicación en estudios sobre la percepción de la personalidad de marca en destinos turísticos (Gertner, 2010; Kovačić *et al.*, 2020). También se destaca la necesidad de alinear la imagen y la personalidad del destino para mejorar la comunicación de sus características e influir en el comportamiento de los turistas (Murphy *et al.*, 2007; Hosany *et al.*, 2007). Este cuerpo de estudios enfatiza la importancia de adaptar los marcos de personalidad de marca existentes al contexto turístico y considerar la coherencia entre la imagen y la personalidad de la marca en las estrategias de marketing de destinos (Kumar y Nayak, 2014).

Otro enfoque fue la personalidad de marca en línea, destacando cómo internet y las redes sociales proporcionan nuevas vías para desarrollar y comunicar la personalidad de marca. En esta línea, muchos trabajos investigan cómo se manifiesta la personalidad de marca en entornos digitales, utilizando herramientas como la escala de Aaker (1997) para examinar la comunicación de la personalidad de marca a través de las redes sociales y cómo ciertos rasgos se asocian con los seguidores (De Moya y Jain, 2013). Se observa que las redes sociales mejoran la percepción de la personalidad de marca y su impacto positivo en el compromiso del cliente con la marca (Peco-Torres *et al.*, 2020).

En cuanto a las metodologías empleadas, el análisis indicó que las metodologías basadas en encuestas con muestras de Estados Unidos predominaron, y en menor medida, de Europa y Asia. Esta falta de diversidad metodológica limita las contribuciones realizadas al estudio del constructo. En la última década, se han introducido otras metodologías como la netnografía, el *sentiment analysis* y el *machine learning* en la disciplina del marketing, lo que puede mejorar la comprensión de cómo los consumidores perciben diversas características y dimensiones de la personalidad de marca y cómo estas influyen en sus comportamientos.

Por lo tanto, los trabajos futuros podrían examinar la personalidad de marca utilizando métodos mixtos (como grupos focales, diseño experimental) en varios contextos culturales. Por ejemplo, emplear técnicas de recolección de datos inconscientes (como la actividad neuronal, actividad electrodermal, técnicas proyectivas) permitiría identificar cómo los consumidores responden a diferentes dimensiones de la personalidad de marca.

El segundo estudio se centra en la experiencia de marca, y en respuesta a la ausencia de diversidad metodológica en las investigaciones recientes sobre la personalidad de marca, en el constructo de experiencia de marca se ha empleado técnicas más avanzadas como el *sentiment analysis* y el *machine learning* para enriquecer la investigación. El estudio constituye una contribución seminal al discurso académico sobre la experiencia de marca, introduciendo una comprensión profunda y contextualizada a través de una metodología avanzada, contemporánea y multidimensional.

En cuanto a la experiencia de marca y turismo, donde la personalidad del destino juega un papel esencial, los estudios sugieren que la satisfacción derivada de la experiencia de marca en el destino contribuye a la comunicación boca a boca, y los relatos de los turistas, como los encontrados en *blogs*, son fundamentales para analizar y redirigir estas experiencias (Bhattacharya y Dutta, 2016; Kim y Stepchenkova, 2017). Los destinos turísticos se consideran productos complejos, no solo por la diversidad de ofertas que abarcan, sino también por la interpretación subjetiva de los consumidores (Buhalis, 2000). En la industria del turismo, los aspectos multisensoriales, fantásticos y emocionales del comportamiento del consumidor son particularmente significativos (Hirschman y Holbrook, 1982; Govers *et al.*, 2007). Aplicar el constructo de experiencia de marca a los destinos turísticos proporciona un enfoque formal, riguroso y sistemático para evaluar las experiencias de marca de los destinos. Este enfoque integral convierte al constructo de

experiencia de marca de destino en una herramienta valiosa para la industria turística, permitiendo la evaluación y mejora de las experiencias de los viajeros con las marcas de destinos (Barnes *et al.*, 2014).

En los estudios previos sobre la experiencia de marca de destino ha prevalecido el uso de SEM (*Structural Equation Modeling*) y PLS (*Partial Least Squares*), destacándose su utilidad para identificar y validar relaciones entre variables en el contexto de la experiencia de marca de destino (Boo *et al.*, 2009; Barnes *et al.*, 2014; Khan y Rahman, 2017; Kumar y Kaushik, 2018; Bhattacharya y Dutta, 2016). No obstante, surgen preguntas metodológicas sobre la adaptabilidad de estas técnicas tradicionales al contexto actual, caracterizado por la abundancia de fuentes de datos digitales, como redes sociales y reseñas en línea, que han incrementado significativamente el volumen de datos disponibles sobre las experiencias de marca en destinos turísticos (Westland, 2014). Se cuestiona la capacidad de SEM y PLS para manejar grandes volúmenes de datos y detectar patrones no lineales e interacciones complejas, lo que sugiere la necesidad de metodologías más ágiles y completas. Aunque son pocos los estudios, algunos como los de Koo *et al.* (2023) han comenzado a utilizar inteligencia artificial para explorar las características de las experiencias de marca en hoteles inteligentes.

Parece que la naturaleza evolutiva de la experiencia de marca de destino en la era digital y las metodologías tradicionales no captan plenamente las tendencias emergentes ni los cambios en las percepciones de los turistas. En consecuencia, se han propuesto técnicas de *data mining* y *machine learning* como alternativas innovadoras. El *data mining* se percibe como una herramienta útil para descubrir patrones significativos y relaciones en grandes conjuntos de datos, revelando facetas previamente no detectadas de la experiencia de marca de destino. El *machine learning*, con su adaptabilidad y capacidad para manejar datos no estructurados, como texto e imágenes, se presenta como una herramienta poderosa para obtener conocimientos más profundos y dinámicos sobre la experiencia de marca de destino. En la industria del turismo, el uso del *machine learning* es cada vez más prevalente como una herramienta indispensable para identificar los detalles más relevantes de las búsquedas y mejorar significativamente la precisión de las predicciones en los ámbitos del turismo y la hostelería (Li *et al.*, 2020). Esta tendencia creciente se ejemplifica en estudios como los de Zhang *et al.* (2023) sobre la percepción del destino y Li *et al.* (2023) sobre la demanda turística.

Aprovechando un vasto conjunto de datos reales generados por los visitantes, el estudio trasciende las técnicas convencionales al integrar cinco tipos de análisis: *sentiment analysis*, *topic modeling*, análisis multi-tesauro, análisis estadístico mediante pruebas de hipótesis, y clasificación basada en *machine learning*. El enfoque flexible del modelo *Latent Dirichlet Allocation* y herramientas como VADER y SentiART mejoran la comprensión de la experiencia de marca del destino, ofreciendo medios sólidos para analizar reseñas de visitantes e identificar áreas temáticas clave. Este enfoque multifacético proporciona una visión general de la experiencia de marca del destino, estableciendo un nuevo referente para futuras investigaciones.

El desarrollo de un conjunto único de tesauros para medir la experiencia de marca del destino de una ciudad a través del contenido generado por el usuario representa un método innovador para cuantificar las dimensiones originales de la experiencia de marca propuestas por Brakus *et al.* (2009) en los comentarios de los visitantes. Esta nueva forma de medir la experiencia de marca del destino de las ciudades propone una representación clara y ponderada de las dimensiones sensorial, conductual, intelectual y afectiva, ofreciendo herramientas versátiles para futuras investigaciones y metodologías.

Esta segunda investigación marca un cambio transformador en los estudios sobre la experiencia de marca del destino, tanto teórica como metodológicamente. Introduce un modelo que reconoce diferencias intrincadas en la experiencia de marca del destino, ofreciendo conocimientos valiosos para los expertos en marketing de destinos. Por primera vez, se presenta una visión más global de la experiencia de marca del destino, integrando el *sentiment analysis* e identificando temas clave.

En términos de gestión de destinos, los hallazgos revelan diferencias significativas en la dimensión afectiva entre elementos icónicos de la ciudad de Turín (como ejemplo de modelo), como el Museo Egipcio y la Mole Antonelliana, lo que sugiere la necesidad de que los gestores reconsideren las estrategias para conformar una renovada experiencia de marca del destino. Esto implica comprender y mejorar las experiencias sensoriales en los puntos de acceso clave, reconociendo que la experiencia sensorial en ambos puntos es similar, lo que puede influir en la imagen general que los turistas tienen de Turín.

Por otro lado, la implementación de un modelo de *machine learning* para clasificar reseñas demuestra cómo la tecnología puede ayudar a monitorear las dimensiones de la

experiencia de marca del destino y automatizar la clasificación de nuevas opiniones. El uso de la validación cruzada asegura la robustez del modelo, mejorando su capacidad para generalizar sobre nuevos datos y, de esta manera, ofreciendo a los gestores herramientas confiables para diseñar experiencias que conecten con diversos perfiles de turistas.

En cuanto a las implicaciones sociales, el estudio destaca cómo las diferencias culturales y lingüísticas impactan la percepción de los destinos, enfatizando la necesidad de estrategias de marketing inclusivas y sensibles. Revela que las mujeres tienden a experimentar emociones más intensas que los hombres, lo que podría influir en la dimensión afectiva de la percepción. Las diferencias culturales influyen significativamente en las percepciones, lo que requiere estrategias de marketing adaptadas culturalmente (Pogosyan y Engelmann, 2011). Además, el impacto de las dimensiones culturales en las intenciones de visita subraya la necesidad de estrategias de marketing culturalmente sensibles para los destinos turísticos (Matzler *et al.*, 2016).

En cuanto a las diferencias de género en la intensidad emocional, las mujeres generalmente reportan experimentar emociones más intensas que los hombres. Los estudios han demostrado que las mujeres reportan mayor activación tanto para imágenes positivas como negativas en comparación con los hombres en diferentes culturas (Gong *et al.*, 2018). Las expectativas normativas y los roles de género influyen significativamente en la intensidad emocional, con las mujeres tendiendo a reportar y exhibir mayor intensidad emocional que los hombres, influenciadas por las expectativas sociales (Grossman y Wood, 1993).

El aumento observado en el sentimiento positivo hacia la Sábana Santa de Turín durante el año de la pandemia de 2020 sugiere que los eventos globales pueden influir significativamente en la percepción de los destinos. Esto tiene implicaciones sociales más amplias sobre cómo los destinos pueden responder y adaptarse a circunstancias cambiantes y a las necesidades de los visitantes.

Este segundo estudio transformador sobre la experiencia de marca del destino en la ciudad de Turín ofrece un enfoque integral y multidimensional que integra análisis textual avanzado con *machine learning*, proporcionando perspectivas teóricas, gerenciales y sociales. Las innovaciones metodológicas y las aplicaciones prácticas de este estudio establecen un nuevo precedente para comprender y mejorar la experiencia de marca,

orientando futuras investigaciones y estrategias de gestión de destinos. Reconoce las diferencias complejas en la experiencia de marca del destino y ofrece conocimientos prácticos para los gestores de marketing de destinos, allanando el camino para experiencias personalizadas que conecten mejor con los diversos perfiles demográficos de turistas y que respondan al panorama global en evolución.

Los hallazgos del primer estudio bibliométrico sobre personalidad de marca concluyen que este constructo ha sido dominado principalmente por metodologías cuantitativas basadas en encuestas, usando predominantemente muestras de los EE. UU. En consecuencia, se hace evidente que una renovación metodológica podría generar nuevos enfoques y hallazgos. Por ello, la propuesta de rejuvenecer la metodología del constructo se lleva a cabo con técnicas de neuromarketing, específicamente el *eye tracking* y la *galvanic skin response*, en el tercer estudio que concluye la tesis. Parte del enfoque de este trabajo se fundamenta en la limitada literatura existente, notablemente Lourenção *et al.* (2020), y basada en el constructo de personalidad de marca de Aaker (1997).

En el ámbito del turismo y la hostelería, estudios previos han demostrado cómo los estados afectivos influyen de manera crucial en las motivaciones, acciones, decisiones y niveles de satisfacción de los turistas (Goossens, 2000; Tsai, 2007). Sin embargo, medir estas emociones con herramientas subjetivas como encuestas y cuestionarios a menudo resulta insuficiente para capturar la complejidad de las experiencias turísticas (Ziegel *et al.*, 1998). En este contexto, el neuroturismo emerge como una aplicación pionera de las neurociencias dentro del sector turístico, orientada a refinar las estrategias de marketing dirigidas a los turistas (Panyik y Gonçalves, 2017; Alsharif *et al.*, 2023). La neurociencia se posiciona como una herramienta y enfoque interdisciplinario revolucionario que busca transformar nuestra comprensión de las decisiones y preferencias de los turistas, ofreciendo una base objetiva para el diseño e implementación de experiencias turísticas más enriquecedoras y satisfactorias (Agarwal y Dutta, 2015).

Técnicas psicofisiológicas como el *eye tracking* y la *skin galvanic response* están emergiendo como métodos valiosos para analizar cómo los turistas procesan visualmente las imágenes de destinos, proporcionando ventajas significativas en la comprensión de los procesos psicológicos y emocionales subyacentes a las decisiones de reserva (Boz y Koç, 2022; Kim y Kim, 2024; Xie, Zhang y Ma, 2023).

Nuestro estudio sobre reacciones emocionales y visuales a los logotipos de marcas de destinos turísticos, aplicando las dimensiones de personalidad de marca de Aaker (1997), revela notables diferencias en las percepciones y respuestas iniciales por género. A través del uso de métodos estadísticos no paramétricos como las pruebas Mann-Whitney U y Wilcoxon, se destacan variaciones significativas en cómo los diferentes géneros procesan y reaccionan a los atributos asociados con ciertas ciudades. Estas diferencias subrayan la relación intrincada entre la auto-percepción, las aspiraciones y las normas culturales, especialmente en cómo se interpretan y valoran los logotipos de marcas de destinos turísticos como Estocolmo y Glasgow.

La conexión específica de los valores de marca con la autoimagen ideal de los observadores se correlaciona con la teoría de la congruencia de la autoimagen de Sirgy (1982) y la teoría de la autocategorización de Turner *et al.* (1987), mostrando cómo atributos como “sofisticación” y “sinceridad” desencadenan una resonancia emocional o cognitiva particular según el género. Esta resonancia se refleja en métricas como el tiempo hasta la primera fijación, el número de fijaciones y la duración total de la fijación, lo que subraya la necesidad de considerar las diferencias de género en el marketing y el diseño de logotipos.

Incorporar estos hallazgos estadísticamente significativos es clave para profundizar en la comprensión de cómo ciertas dimensiones de personalidad de marca afectan la captación y retención de la atención, así como en la inducción de respuestas emocionales diferenciadas. Desde una perspectiva de neuromarketing, las diferencias en el número de fijaciones entre hombres y mujeres podrían reflejar divergencias fundamentales en los procesos neurológicos involucrados en la percepción visual y simbólica. En este contexto, elementos como “sofisticación” y “entusiasmo” activan de manera distintiva áreas cerebrales relacionadas con la activación emocional y visual, lo que puede tener implicaciones para el diseño de logotipos y las estrategias de marca que comuniquen eficazmente las dimensiones de personalidad deseadas y se alineen con las expectativas y valores del público objetivo.

Este estudio destaca la importancia de utilizar técnicas como el *eye tracking* para obtener datos sobre la efectividad de los elementos visuales de la marca en la comunicación de valores fundamentales, revelando el potencial de estas herramientas para medir la atención visual y el compromiso emocional de manera objetiva. La capacidad de un

logotipo para captar la atención y establecer una conexión emocional profunda puede influir significativamente en la percepción de la marca y la lealtad del consumidor, destacando la necesidad de alinear cuidadosamente la presentación visual de la marca con los objetivos de comunicación y percepción deseados.

En el contexto de las contribuciones prácticas, la aplicación de métodos avanzados de neuromarketing en este estudio final que concluye la tesis permite una evaluación más detallada y objetiva de las respuestas visuales y emocionales, superando las limitaciones inherentes a los métodos convencionales de autoevaluación. Esta técnica establece una plataforma sólida para el desarrollo de estrategias de marketing turístico más personalizadas y efectivas, proporcionando conocimientos valiosos sobre la capacidad de los elementos visuales de la marca para transmitir sus valores esenciales. Además, el estudio ilumina las aplicaciones prácticas de estas técnicas en el diseño de logotipos y la formulación de estrategias de marca. Al discernir patrones específicos de atención y reacciones emocionales vinculadas a diferentes dimensiones de personalidad de marca, los especialistas en marketing pueden refinar la presentación visual de los destinos para enriquecer la experiencia turística y promover la selección de destinos.

Los resultados de este estudio afirman y amplían la comprensión existente sobre la personalidad de marca, ilustrando cómo las diferencias de género afectan la atención y la respuesta emocional a los logotipos de marcas de destinos turísticos que representan estas dimensiones esenciales. Esta diferenciación acentúa la relevancia de la teoría de la congruencia de la autoimagen (Sirgy, 1982) y la teoría de la autocategorización (Turner *et al.*, 1987), sugiriendo que la congruencia entre la personalidad de marca de un destino y la autoimagen de los consumidores puede ser un factor crucial en su atracción hacia el destino y en su lealtad. Los enfoques tradicionales para medir los estados afectivos, como encuestas y cuestionarios, a menudo no logran captar la complejidad de las experiencias turísticas debido a su naturaleza subjetiva y a su susceptibilidad a sesgos (Ziegel *et al.*, 1998; Schwarz, 1999). En contraste, el *eye tracking* y la *skin galvanic response* proporcionan métricas objetivas y precisas de atención visual y activación emocional. El *eye tracking* monitoriza dónde y durante cuánto tiempo un participante observa distintos elementos de un logotipo, mientras que la *skin galvanic response* registra las respuestas fisiológicas que indican activación emocional.

Investigaciones previas han demostrado que la imagen del destino y la personalidad de marca son conceptos interrelacionados pero distintos. La imagen del destino incluye elementos tanto cognitivos como afectivos, moldeando la percepción general que los turistas tienen de un lugar (Baloglu *et al.*, 2014; Chen y Phou, 2013). Por otro lado, la personalidad de marca utiliza rasgos de personalidad humana para describir el destino, ofreciendo un marco emocional y simbólico que complementa sus características físicas y tangibles (Ekinci y Hosany, 2006). Investigaciones de Hosany *et al.* (2006), Murphy *et al.* (2007) y Prayag (2007) han mostrado cómo la personalidad de marca influye en la percepción del consumidor, su satisfacción y la intención de visita, destacando la importancia de la personalidad de marca en las estrategias de marketing turístico.

Nuestra investigación corrobora estos hallazgos al mostrar que las dimensiones de la personalidad de marca, particularmente “sinceridad”, “emoción” y “sofisticación”, afectan significativamente la atención y las respuestas emocionales de los turistas. Esto se alinea con los estudios de Jalilvand *et al.* (2012) y Qu *et al.* (2011), que encontraron que una personalidad de marca bien definida y atractiva mejora la intención de visita de los turistas y su lealtad al destino.

El uso de técnicas de *eye tracking* y *skin galvanic response* en este estudio ha permitido una evaluación más precisa y objetiva de la interacción entre los consumidores y los elementos visuales de la marca, superando los sesgos y problemas de validez asociados con los instrumentos de autoinforme (Scott *et al.*, 2020; Schwarz, 1999). Esto respalda el argumento de Kotsi *et al.* (2018) de que la neurociencia tiene un gran potencial para descubrir reacciones directas e inconscientes de los consumidores hacia las marcas.

Adicionalmente, el análisis de la *skin galvanic response* a las imágenes generadas por la inteligencia artificial que representan dimensiones de la personalidad de marca ha revelado diferencias significativas en la activación emocional entre géneros. Este hallazgo subraya la necesidad de considerar las diferencias de género en el diseño de estrategias de marketing y comunicaciones visuales destinadas a conectar con una audiencia más amplia (Ekinci *et al.*, 2013; Smith *et al.*, 2015).

Las campañas de marketing que se centran en la personalidad de marca pueden mejorar la imagen del destino al resaltar atributos emocionales y simbólicos que atraen a los turistas (Pike *et al.*, 2010). Esto es especialmente importante, ya que los turistas tienden

a preferir destinos con una personalidad de marca atractiva y una imagen positiva, ya que estos destinos parecen ofrecer experiencias más satisfactorias (Jalilvand *et al.*, 2012).

Al examinar las complejidades de la interacción visual y emocional con los logotipos de marcas de destinos turísticos, este estudio allana el camino para estrategias de marketing y *branding* más efectivas y centradas en el consumidor, subrayando la importancia de una comunicación visual que realmente conecte con las expectativas y preferencias del público objetivo. La integración de conocimientos de psicología del consumidor y neuromarketing en el diseño de logotipos y estrategias de marca destaca la importancia de forjar conexiones más profundas y duraderas con el público, sentando las bases para un futuro en el que el neuroturismo juegue un papel crucial en la evolución del marketing turístico.

La tesis concluye con una aportación teórica al emergente campo del neuroturismo mediante la integración de tecnologías de *eye tracking* y *skin galvanic response* para explorar cómo los logotipos de marcas de destinos turísticos y las imágenes generadas por la inteligencia artificial afectan la percepción y el compromiso emocional de los consumidores. La aplicación de técnicas de neuromarketing ofrece nuevas perspectivas sobre la compleja interacción entre los estímulos visuales y las dimensiones de personalidad de marca propuestas por Aaker (1997), enfatizando las diferencias en el procesamiento y las respuestas emocionales por género hacia estas dimensiones de personalidad, y sugiriendo estrategias de marketing específicas.

Este estudio amplía el marco teórico de la personalidad de marca en el turismo, demostrando la aplicabilidad de las herramientas de neuromarketing para evaluar los fundamentos emocionales y cognitivos de la efectividad de la marca, y enriqueciendo el discurso académico sobre cómo ciertos elementos visuales de los logotipos se alinean o divergen de los rasgos de personalidad percibidos, influyendo así en las actitudes y comportamientos del consumidor. Este enfoque interdisciplinario combina conocimientos de la psicología, el marketing y la neurociencia, mejorando nuestra comprensión de las interacciones consumidor-marca en la era digital y abriendo caminos para futuras investigaciones sobre el uso estratégico de técnicas de neuromarketing para mejorar el diseño y la comunicación de la personalidad de marca en el sector turístico y más allá.

La presente tesis doctoral ha explorado de manera exhaustiva dos constructos fundamentales en el marketing turístico: la personalidad de marca y la experiencia de marca de destino. A través de tres estudios interrelacionados, se ha construido una narrativa cohesiva que avanza desde la identificación de necesidades teóricas hasta la aplicación de metodologías innovadoras, lo que contribuye significativamente a los objetivos generales de la investigación.

Una de las brechas identificadas en el Estudio 1 (Capítulo 2) fue la necesidad de explorar nuevas metodologías que permitieran una comprensión más profunda y objetiva de cómo los consumidores perciben y responden a la personalidad de marca, especialmente en el contexto turístico. Se señalaron limitaciones en las metodologías tradicionales, predominantemente basadas en encuestas y en técnicas cuantitativas como SEM y PLS, que pueden no capturar plenamente las respuestas inconscientes y emocionales de los consumidores.

Atendiendo a estas necesidades y oportunidades identificadas, el Estudio 3 (Capítulo 4) se construyó directamente sobre los hallazgos del Estudio 1 al incorporar técnicas neurocientíficas para analizar la percepción de la personalidad de marca en los destinos turísticos y sus logotipos. Específicamente, se utilizaron técnicas de *eye tracking* y *skin galvanic response* para explorar cómo los logotipos y marcas de destinos turísticos, así como las imágenes generadas por inteligencia artificial, influyen en la atención visual y las respuestas emocionales de los consumidores.

Esta innovación metodológica en el Estudio 3 responde a la llamada a futuras investigaciones señalada en el Estudio 1, enfatizando la importancia de integrar tecnologías emergentes y enfoques interdisciplinarios para avanzar en la comprensión de la personalidad de marca. Al aplicar técnicas de neuroturismo, el Estudio 3 capturó respuestas subconscientes y emocionales de los consumidores que no son fácilmente accesibles mediante métodos tradicionales, revelando patrones significativos de atención y respuesta emocional asociados a las cinco dimensiones de la personalidad de marca propuestas por Aaker (1997): sinceridad, emoción, sofisticación, competencia y rudeza.

También en respuesta a las brechas identificadas en el Estudio 1, el Estudio 2 (Capítulo 3) se centró en la experiencia de marca de destino y desarrolló una metodología innovadora utilizando técnicas de minería de datos y aprendizaje automático. Al analizar

las opiniones de los visitantes, se midieron las dimensiones sensorial, afectiva, intelectual y conductual de la experiencia de marca de destino. Consciente de la limitación cultural señalada en el Estudio 1, este estudio incorporó contenido generado por visitantes de culturas orientales, ampliando así la diversidad cultural de la investigación y proporcionando una comprensión más global de cómo se percibe y experimenta la experiencia de marca de destino en diferentes contextos culturales. Este enfoque reveló diferencias significativas influenciadas por factores como el género y la cultura, aumentando la aplicabilidad de los hallazgos.

Es importante destacar que tanto el Estudio 2 como el Estudio 3 incorporaron el género como variable en sus análisis y encontraron diferencias significativas en dos constructos relacionados: la experiencia de marca de destino y la personalidad de marca, respectivamente. En el Estudio 2, se reveló que el género influye en cómo los turistas perciben y experimentan las dimensiones sensorial, afectiva, intelectual y conductual de la experiencia de marca de destino, indicando que hombres y mujeres pueden tener experiencias y expectativas distintas respecto a un destino turístico. De manera similar, el Estudio 3 demostró que existen diferencias significativas basadas en el género en la atención visual y la respuesta emocional hacia los logotipos y marcas de destinos turísticos, vinculadas a las dimensiones de la personalidad de marca. Estos hallazgos subrayan la importancia de considerar el género como un factor en la personalidad de marca y la experiencia de marca en el contexto turístico.

Finalmente, la tesis establece una relación clara y significativa entre ambos constructos: la personalidad de marca configura las expectativas y percepciones que los turistas tienen del destino, mientras que la experiencia de marca de destino refleja cómo se cumplen o superan esas expectativas durante la visita. Al integrar los hallazgos de los tres estudios, la tesis refuerza una narrativa cohesiva, evidenciando una progresión lógica desde la identificación de necesidades teóricas hasta la aplicación de metodologías innovadoras que abordan factores clave como el género y las diferencias culturales, incluyendo estudios con contenido generado por visitantes de culturas orientales. Esta integración es esencial para comprender y mejorar la satisfacción del turista y la efectividad de las estrategias de marketing, consolidando la importancia de considerar la personalidad de marca y la experiencia de marca de destino de manera integrada y culturalmente inclusiva en la gestión y promoción de destinos turísticos.

En estos últimos dos años (2023-2024) han surgido algunos estudios que ayudan a respaldar los vacíos de investigación identificados y las líneas de trabajo fundamentales en estos dos constructos relacionados, en gran parte dentro del contexto de las tecnologías emergentes y el turismo.

Por ejemplo, sobre cómo la integración de tecnologías emergentes, como la IA, AR, VR y el metaverso, en el marketing turístico puede crear experiencias más inmersivas y personalizadas que mejoren la satisfacción del cliente y fortalezcan la lealtad a la marca. Algunos artículos recientes abordan este tema. Por ejemplo, el trabajo de Ku (2024) explora cómo las interacciones asistidas por IA en servicios turísticos sin contacto afectan la satisfacción y la disposición a pagar más. Wongkitrungrueng y Suprawan (2024) investigan cómo el valor experiencial en el metaverso influye en la percepción de marca y las respuestas del consumidor. El estudio de Bogicevic et al. (2024) demuestra que la realidad virtual mejora la experiencia de marca y el boca a boca entre la Generación Z. Asimismo, el estudio de Ku (2023) aborda el impacto de chatbots antropomórficos y experiencias de realidad virtual en la experiencia de marca de agencias de viajes en línea.

De igual forma, existen estudios que miden el efecto a largo plazo de las experiencias virtuales. Por ejemplo, el estudio de Kostyk et al. (2024) investiga cómo las experiencias de marca en realidad virtual forman memorias episódicas y semánticas y cómo evolucionan con el tiempo. Por su parte, Steriopoulos et al. (2024) tratan sobre cómo el compromiso emocional mejora la experiencia de marca en sitios turísticos patrimoniales, incluso cuando hay emociones negativas o mixtas.

Específicamente, la tesis abre dos caminos futuros muy claros relacionados con la personalidad y la experiencia de marca en los destinos turísticos, además de las tecnologías emergentes ya mencionadas. Por un lado, estudios comparativos entre contextos multiculturales con el propósito de analizar cómo se perciben la personalidad y la experiencia de marca en distintos contextos culturales, incluyendo una comparación entre culturas occidentales y orientales, para detectar variaciones significativas en las respuestas y percepciones de los consumidores. Esto respondería a las limitaciones de los estudios actuales en cuanto al enfoque occidental y contribuiría a una comprensión más global y culturalmente inclusiva. Supondría que, al estudiar mejor cómo distintas culturas interpretan los atributos de personalidad y experiencia de marca, se podría adaptar mejor la promoción de destinos turísticos a públicos internacionales.

Por otro lado, estudios multimodales de la respuesta sensorial a los destinos turísticos, con el propósito de integrar estímulos multisensoriales (visuales, auditivos y táctiles) para analizar cómo una combinación de estímulos afecta la percepción y la experiencia de los turistas hacia la personalidad y experiencia de marca de un destino.

Esta línea es particularmente relevante para el desarrollo de experiencias turísticas inmersivas y multisensoriales en el contexto de las tecnologías emergentes en turismo. Estas direcciones propuestas contribuirían significativamente a mejorar la efectividad de las estrategias de marketing turístico, adaptándolas a las tendencias globales y a las crecientes expectativas de experiencias personalizadas y multisensoriales en el turismo.

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