"Sensing" the destination: Development of the destination sensescape index

Daniela Buzova [*], Silvia Sanz-Blas, Amparo Cervera-Taulet

Department of Marketing, University of Valencia, Avda de Los Naranjos S/n, 46022, Valencia, Spain

ABSTRACT

Despite the increasing academic interest in the sensory dimension of the tourist experience, the quantitative empirical research in the field is limited by a lack of measurement instruments for evaluating the sensory stimuli perceived by tourists during a destination visit. The study addresses this gap by developing a composite index to assess the sensory destination panorama, termed as "destination sensescape". The construct is conceptualised as a formative multidimensional variable with 5 dimensions (visualscape, smellscape, tastescape, soundscape, and hapticscape). The psychometric validity and reliability of the 17 items integrating the formative index were established by a rigorous multi-step procedure based on three empirical studies. The instrument was tested with data collected from visitors of a Mediterranean urban destination. The operationalisation of the destination sensescape construct not only paves the way for future quantitative sensory studies, but also yields a useful tool for Destination Marketing Organisations (DMOs).

"The sky is brisk blue, the sun, escaping its golden likeness beneath the foot of San Giorgio, sashays over the countless fish scales of the lagoon's lapping ripples; behind you, under the colonnades of the Palazzo Ducale, a bunch of stocky fellows in fur coats are revving up Eine Kleine Nachtmusik, just for you, slumped in your white chair and squinting at the pigeons' maddening gambits on the chessboard of a vast piazza. The espresso at your cup's bottom is the only small black dot in, you feel, a miles-long radius."

Brodsky (1993).

1. Introduction

When visiting a destination, tourists encounter themselves in a new place, surrounded by a blend of sensory stimuli: e.g. a new landscape, the touch of the sunlight, the music played by local performers, the taste of an *espresso*. Regardless of the previously formed destination image based on travel guides, the internet or friends, visitors grasp the place through the senses in a process called "embodiment" (Crouch, 2000). Once the sensory cues embedded in the external environment are processed, the initially neutral space of a destination becomes a sensorily organized setting, i.e. a sensescape (Halloy & Servais, 2014).

The tourism literature has acknowledged visitors' connection to destinations at a sensory level (Agapito et al., 2013, 2014; Buzova et al.,

2020; Gretzel & Fesenmaier, 2010; Kock & Ringberg, 2019; Pan & Ryan, 2009). However, the multisensory dimension of tourism experiences is still an emerging topic in the tourism literature (Agapito, 2020). Few studies have discussed all five sensory dimensions of the tourist destination experience (i.e. visual, aural, gustatory, olfactory, and tactile) (Agapito et al., 2017; Lv et al., 2020), with most of the existing research focusing on one or several senses (e.g. taste (Everett, 2008), smell (Dann & Jacobsen, 2013), sight and hearing (Qiu et al., 2018)).

The process of sensory perceptions is well defined at a theoretical level, but the empirical research on multisensory tourism interactions is scarce (Cohen & Cohen, 2019). Past studies have mainly used qualitative descriptive methods to capture tourists' polysensual experiences in a destination (e.g. Agapito et al., 2014; Gretzel & Fesenmaier, 2010). Most of the research is exploratory in nature and context-specific (e.g. Rakić & Chambers, 2012; Son & Pearce, 2005; van Hoven, 2011; Xiong et al., 2015). For example, Xiong et al. (2015) conducted interviews with open-ended questions to uncover tourists' sensory image of the ancient town of Phoenix. Drawing on online reviews, Lv and McCabe (2020) identified tourists' sensory impressions of a Chinese heritage town. The findings of extant multisensory tourism studies reveal that not all sensory cues contribute equally to tourists' experience (Agapito et al., 2014; Lv & McCabe, 2020; Mehraliyev et al., 2020; Xiong et al., 2015). In a rural destination context, Agapito et al. (2014) found that, next to visual elements, auditory impressions were most frequently reported. In

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* Corresponding author.
E-mail addresses: daniela.buzova@uv.es (D. Buzova), silvia.sanz@uv.es (S. Sanz-Blas), amparo.cervera@uv.es (A. Cervera-Taulet).

contrast, the content analysis of visitors' reviews on a heritage town uncovered a significant number of gustatory appreciations, second only to visual elements (Lv & McCabe, 2020).

While the aforementioned studies were designed for exploratory research purposes and thus, their results are meaningful for a particular destination/attraction, the current sensory tourism literature is limited by the lack of quantitative instruments allowing to model the relationships between sensory destination impressions and further attitudinal and behavioural constructs. Furthermore, in addition to surveys inquiring tourists about the specific sensory stimuli induced by the destination environment, DMOs (destination management organisations) will benefit from a tool capturing the magnitude of each dimension of the destination sensescape for monitoring and benchmarking purposes.

Despite the acknowledged importance of tourists' multisensory destination experience, to the best of the authors' knowledge, there have been no previous efforts in designing an instrument for the quantitative assessment of the sensory destination stimuli. Considering the lack of measures, the research aims to develop a composite index for evaluating destination sensescapes. The study offers two contributions: (1) it advances the tourism literature by operationalising the destination sensescape concept in line with Cohen and Cohen's (2019) call for further research on sensory tourism experiences; (2) unlike prior research which has primarily examined sensory appreciations in nature-based destinations, the study provides empirical evidence for the existence of multiple sensory stimuli in an urban setting. In terms of practical contribution, the tool allows DMOs to gain a greater insight into the formation of the destination sensescape, which also enables a more efficient destination experience planning.

2. Literature review

2.1. Destination sensescape

The term "sensescape", coined by Porteous (1985), reflects the idea of a sensorily-constructed environment. Although the name of the concept bears a certain analogy with the ocular-centric "landscape" term, the sensescape extends the range of sensory interactions with a place beyond the mere visual consumption (Rodaway, 1994). A destination sensescape is underpinned by the information received by each of the senses (Medway, 2015, pp. 191–209; Urry, 2002) and hence, can be defined as an aggregate of five "-scapes": visualscape (sense of sight), smellscape (sense of smell), tastescape (sense of taste), soundscape (sense of hearing), and hapticscape (sense of touch).

The visualscape, shaped by the information received through the eyes, can be defined as the spatial representation of the physical entities present in the external environment (Llobera, 2003; Zhu & Mehta, 2017). The configuration of the visualscape is conditioned by objects' properties such as shape, colour, and texture (Porteous, 1996). In a travel destination context, the visualscape is closely associated with Urry's "tourist gaze" (2002), which alludes to the predominantly visual nature of the tourist experience. As a passive action, looking at historical and natural landscapes even behind the windows of a car/coach is undoubtedly the easiest way to practice tourism (Perkins & Thorns, 2001). The quest for picturesque and aesthetically pleasing sceneries, different from the everyday home environment, is central to the tourism activity (Knudsen et al., 2015). Hence, it is not surprising that most studies inquiring tourists' multisensory destination experiences report a prevailing number of visual impressions over the rest of sensory perceptions (e.g. Buzova et al., 2020; Lv & McCabe, 2020; Xiong et al., 2015). For example, an analysis of travel blog entries on Mediterranean destinations revealed a wide range of visual cues which can be summarised in two major groups: (i) buildings (e.g. churches, fortresses, cathedrals, palaces, towers) (ii) natural landscape elements (e.g. trees, parks, gardens, hills, flowers, rivers, sky) (Buzova et al., 2020).;

A soundscape is described as the "acoustic environment as perceived or experienced and/or understood by a person or people, in context" (ISO, 2014). Destinations offer a unique mixture of auditory stimuli that accompany the tourist during the whole visit (He et al., 2019; Liu et al., 2018; Son & Pearce, 2005). Depending on the destination setting, tourists are exposed to a different set of acoustic stimuli, which can be grouped in four main categories: urban, rural, wilderness, and underwater (Brown et al., 2011). Thus, the soundscape of an urban destination is shaped by various aural inputs including (1) human activity (e.g., speech, social events) or facilities (e.g. transport, installations); and (2) nature (e.g. wind, water, trees, animals). In contrast, the soundscape of a natural setting is shaped mostly by natural elements such as the sound of a waterfall, the wind, birdsongs, the babbling of streams, with a limited influence of human auditory inputs (Qiu et al., 2018). Destination soundscape has received increasing academic interest recently, with scholars exploring its impact on tourists' overall experience such as satisfaction with the visit (Jiang et al., 2018; Liu et al., 2018), as well as its interaction with the landscape perception (He et al., 2019).

The smellscape concept, as understood by Porteous (1985), reflects the idea of spatially-ordered olfactory impressions. For Henshaw (2013, p. 5), a smellscape embodies "the totality of the olfactory landscape", including both episodic and background scent cues. A further and more recent definition of the term is given by Xiao et al. (2018), who broadens the concept beyond the characteristics of the smell environment to include individuals' interpretation of the stimuli based on previous experience and valid in a specific context. A review of the extant sensory literature indicates that the olfactory dimension of the tourist experience has been largely neglected with only a handful of studies dedicated specifically to the analysis of the smell cues perceived by destination visitors (e.g. Dann & Jacobsen, 2003). Prior research exploring the holistic multisensory destination experience identifies numerous smell references, such as those associated with food (e.g. Kim & Fesenmaier, 2017; Son & Pearce, 2005) or the flora in a rural environment (e.g. Agapito et al., 2017). However, the studies consistently report that the olfactory references represent the lowest number of all sensory descriptors (Agapito et al., 2017; Lv & McCabe, 2020; Pan & Ryan, 2009).

Another component of the destination sensescape is its tastescape, defined as the outcome of the gustation process, in which a place is perceived through the gustatory sensory channel (Everett, 2008). Destinations often capitalize on the unique taste of the local food in their branding strategies (e.g. "Taste the Island", "Taste of Wales", "Get a taste for Poland"). Although tasting local gastronomy is regarded as an essential component of the travel experience (Berg & Sevón, 2014; Björk & Kauppinen-Räisänen, 2019; Kim & Eves, 2012; Park et al., 2020), there have been few empirical investigations into tastescapes. Extant research on multisensory destination experiences has revealed an interaction between the senses of taste and smell as gastronomic experiences trigger the activation of both sensory receptors (Agapito et al., 2014; Buzova et al., 2020, Xiong et al., 2015). Thus, local food and beverage have often been documented as elements present in both destination's tastescape and smellscape. Nevertheless, gustatory impressions seem to prevail over the olfactory ones judging by the respective number of sensory descriptors found in tourists' destination experience narratives (Lv & McCabe, 2020; Pan & Ryan, 2009; Xiong et al., 2015).

The last component of a destination sensescape is "the landscape of touch" (Kabat-Zinn, 2013), representing the somatic interaction between the individual and the external environment. The hapticscape is formed by the sense of touch, which is underpinned by the kinaesthetic and cutaneous subsenses (Klatzky, 2011). The kinaesthetic sense relies on body movements to gather information about objects, while the cutaneous system uses the skin receptors (Kim & Fesenmaier, 2017). As for the former, the marketing literature has developed several taxonomies of consumer touch. Peck (2011) argues that there are two broad categories of touch: (a) hedonic (the aim is the enjoyment of the touch experience); and (b) instrumental (related to a need for object information). An alternative classification is proposed by Klatzky (2011),

who distinguishes among five categories of touch: aesthetics-elicited, hedonic, information-seeking, social, and compulsive. Travel destinations are full of haptic stimuli starting from the atmospheric conditions perceived through the skin to the unfamiliar material objects (e.g. an ornament, a monument) encountered by tourists during their stay. The extant multisensory tourism research reveals that the haptic perceptions reported by tourists have mainly hedonic and aesthetics-elicited nature such as, for example, touching the sand (Agapito et al., 2017), the ruins (Buzova et al., 2020), and the animals (Son & Pearce, 2005). Cutaneous impressions such as the heat or the touch of the wind are also frequently reported in both rural (Agapito et al., 2017) and heritage settings (Lv & McCabe, 2020).

2.2. Approaches to assessing sensory destination perceptions

Measuring sensory perceptions has been a continuing challenge for both marketing (Haase & Wiedmann, 2018) and tourism scholars (Kim & Fesenmaier, 2017; Mehraliyev et al., 2020). The mainstream marketing literature has tried to design universal measurement instruments such as the sensory perception item set (Haase & Wiedmann, 2018). However, the tool is not easily applicable to intangible contexts.

A review of the multisensory tourism literature reveals three main approaches to assessing sensory destination perceptions: (i) qualitative, (ii) quantitative descriptive, and (iii) quantitative psychometric techniques. The qualitative methods applied to uncover sensory destination impressions mainly include interviews (e.g. Prazeres & Donohoe, 2014; Xiong et al., 2015), observation (e.g. Rakić & Chambers, 2012) and online reviews (e.g. Buzova et al., 2020), with discourse/content analysis being the most frequently conducted data analysis technique. The quantitative descriptive approach aims to identify and quantify the sensory destination perceptions through open-ended questions based on direct elicitation (e.g. Agapito et al., 2014, 2017). The findings are usually presented through descriptive statistics indicating the frequency of each type of sensory descriptors reported by respondents (e.g. Son & Pearce, 2005; Xiong et al., 2015). Only a few studies have used the collected data to determine the impact of the sensory impressions on other constructs such as satisfaction and loyalty (e.g. Agapito et al., 2017; Lv & McCabe, 2020). However, the assessments produced by both approaches are context-specific and thus cannot be used by further research. The third approach to assessing sensory appreciations involves the use of psychometric instruments such as the sensory dimension of the destination brand experience scale developed by Barnes et al. (2014). The scale captures the overall sensory destination experience (e. g. "The destination makes a strong impression on my senses, visually and in other ways") and has proved useful in a wide range of tourism settings (e.g. nature destinations (Lee & Jan 2019), festivals (Chen & Lin, 2018), cruises (Ahn & Back, 2019)). Despite the universal applicability of the instrument, it does not distinguish the relative contribution of each of the five senses to the overall sensory panorama (Mehraliyev et al., 2020).

The lack of a universal and integrating measure to evaluate the multisensory stimuli of a tourism destination stands out as a significant gap in the tourism literature. Thus, the following section presents the development of a holistic measurement instrument for assessing destination sensescapes.

3. Development of the destination sensescape index

Given the multi-component nature of the destination sensescape, the scale development process followed the index construction procedure established by Diamantopoulos and Winklhofer (2001), combined with the most recent formative construct validation guidelines (Cheah et al., 2018; Petter et al., 2007). The rationale behind the choice of a formative measurement model is informed by the four rules developed by Jarvis, MacKenzie, and Podsakoff's (2003). First, the assessment of the direction of causality between the sensory items and the destination

sensescape construct shows that the latter is formed by the combination of visual, auditory, olfactory, gustatory, and haptic sensory inputs. Therefore, the direction of the causal flow is from the indicators to the latent variable. The formative specification of the destination sensescape is also supported by the lack of item interchangeability. For instance, an indicator representing an auditory sensory element cannot be used to measure destination's smellscape. Third, a change in the destination soundscape is not necessarily related to a change in the hapticscape, for example. That is, the pleasant ambient sounds tourists can hear during a visit do not imply that the objects encountered in the destination are appealing to touch. The fourth criteria, related to the nomological net of the indicators, also confirms the formative structure of the construct, as the antecedents of the sensory stimuli that underlie the destination sensescape differ. For example, the scent cues comprising the olfactory dimension of the destination sensory perception have no influence on the formation of the destination's soundscape.

On the basis of the above considerations and following Jarvis et al.'s (2003) classification, the destination sensescape is operationalised as Type IV second-order formative construct with five first-order formative components (visualscape, tastescape, smellscape, soundscape, and hapticscape). Fig. 1 presents an overview of the methodological process of the formative index development.

3.1. Step 1: index development

3.1.1. Domain definition and dimensionality

The starting point for developing a formative measure is the delineation of its content (Diamantopoulos & Winklhofer, 2001). The correct domain definition of a composite factor is essential, as the omission of any of its constituting elements will result in an undermined construct validity. Thus, the domain of content of the destination sensescape construct is defined as the visual, gustatory, olfactory, auditory, and haptic cues perceived during a destination visit. Accordingly, the destination sensescape index is conceived as a multidimensional construct comprised of five subconstructs (visualscape, smellscape, tastescape, soundscape, and hapticscape).

3.1.2. Item generation

Following Diamantopoulos and Winklhofer (2001) index development guidance, once the scope of the construct is specified, a comprehensive set of items to cover the domain of the variable is required. To this end, a thorough review of the extant multisensory tourism literature was performed. While no previous scaling efforts were found, the sensory descriptors yielded by the existing qualitative studies were used for the operationalisation of the destination sensescape construct. The review of the literature resulted in a list of 194 sensory words, some of which were reported more than once (e.g. "trees" (Buzova et al., 2020; Son & Pearce, 2005)). Furthermore, not all the identified sensory items were universally applicable. For instance, "homemade Amish food" was revealed as a component of the tastescape of a rural destination in the United States (Gretzel & Fesenmaier, 2010), but an equivalent gustatory element in the Chinese town of Phoenix was "Hunan noodles" (Xiong et al., 2015). Thus, references to local food had to be grouped into a single overarching sensory item. The categorisation of the sensory descriptors condensed the initial pool of items to 21 indicators.

To evaluate the validity of the developed items, an expert panel of five tourism marketing scholars and three experienced tourism professionals were consulted. After examining the suitability of the proposed indicators, the expert judges recommended removing one of the items ("The destination displays a diversity of colours"), as representing an attribute and not a source of visual sensory impression. Alternative wordings for some of the indicators were also suggested. Consequently, based on the experts' recommendations, 20 items remained for further examination.

In addition, to maximise the face validity of the proposed measurement index, 32 international students of a master's degree programme in
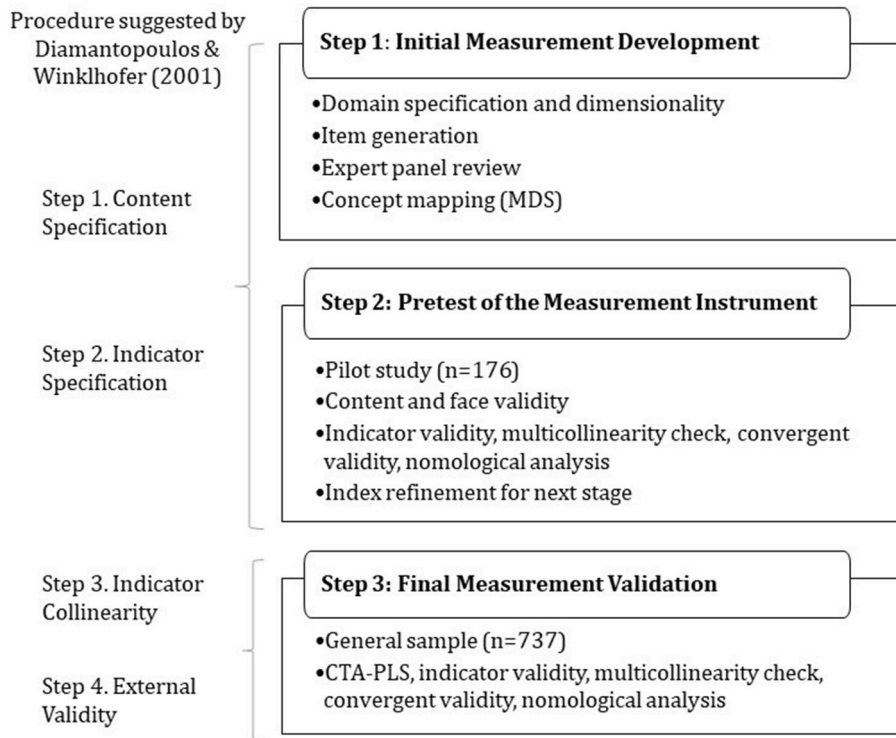
Fig. 1. Index development process.

Tourism Management and Planning were invited to review the items' clarity and comprehension.

3.1.3. Concept mapping

To further establish the content validity of the proposed measurement instrument and its dimensionality, a concept mapping procedure was applied (Bigné et al., 2002; Rosas & Ridings, 2017). For this purpose, 12 individuals with extensive tourism experience were invited to take part in a concept mapping session. The participants received the items printed on cards in a random order and were instructed to group those that belonged together.

The sort data was used as input for the construction of a total similarity matrix, which was then analysed using the ALSCAL (Alternating Least Squares Scaling) multidimensional scaling (MDS) algorithm. The stress value of the ALSCAL analysis was 0.0097, which can be classified as an excellent goodness of fit according to Kruskal's (1964) criterion. Next, the item coordinates from the MDS solution were analysed using agglomerative hierarchical clustering employing the Ward's method
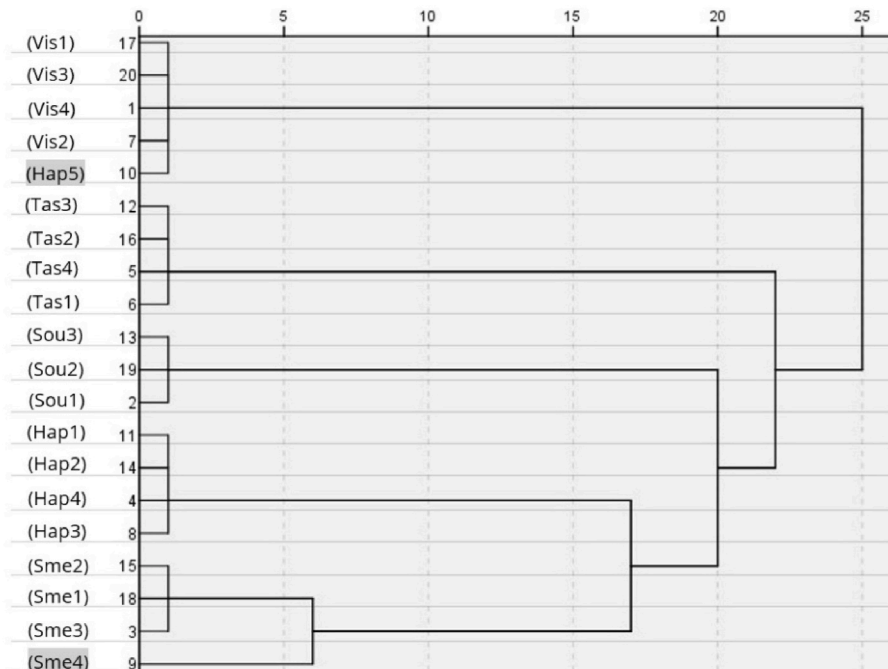

Fig. 2. Dendrogram of the agglomerative hierarchical clustering.

(Fig. 2). The dendrogram confirmed the five-cluster structure of the data (one per each of the sensescapes), but also revealed that two of the twenty items were not unanimously associated with the corresponding sensory dimension. Those were the items Hap 5 ("The presence and contact with other people in the destination is tolerable") and Sme4 ("The air in the destination is fresh"). To reduce the content ambiguity of the measurement instrument, the respective items were excluded and thus the index was trimmed down to 18 indicators.

3.2. Step 2: pre-test of the measurement index

Once the initial list of items had been refined, the destination sensescape index was pilot tested with 176 same-day visitors to the Spanish city of Valencia, a Mediterranean urban destination, which received more than 2 million tourists in 2019. Same-day visitors were deemed more appropriate for the purposes of this study since previous research has found that length of stay moderates the exposure to sensory destination stimuli (Kastenholz et al., 2020). Thus, to avoid possible bias in the data due to extensive length of stay differences (tourists staying for the weekend versus those who spend a week), only same-day visitors were approached. The data collection was conducted by a market research company which intercepted visitors on their departure from the destination. The respondents were invited to complete a questionnaire including the 18 items yielded by the previous scale development step, as well as several additional reflective indicators required to establish the validity of the destination sensescape index. The items were formulated as statements and were assessed on a seven-point Likert scale.

The collected data was then used to assess the psychometric properties of the proposed measurement index. Partial least squares structural equation modelling (PLS-SEM) was used for data analysis, since it allows the estimation of both formative and reflective factors in a single model (Hair et al., 2017).

The existing guidelines on evaluating formative measurement models include assessing 1) convergent validity, 2) collinearity among indicators, 3) significance and magnitude of item weights, and 4) nomological validity (Cenfetelli & Bassellier, 2009; Diamantopoulos et al., 2008; Petter et al., 2007).

3.2.1. Convergent validity

Following Cheah et al. (2018), the convergent validity of the formative index was tested through a redundancy analysis, in which the construct is associated with a conceptually equivalent reflective scale. The sensory dimension of the destination brand experience scale (Barnes et al., 2014) was deemed appropriate for this purpose, as it is assessed through a three-item reflective measure. Thus, a redundancy analysis designating the destination sensescape index as causal to the destination sensory brand experience variable was conducted using SmartPLS software. The magnitude of the structural link between the two constructs was 0.74 (RSQ = 0.55), which is above the 0.7 threshold recommended by Hair et al. (2017) and thus supports the convergent validity of the proposed set of items.

3.2.2. Multicollinearity

Next, the absence of collinearity among the formative indicators had to be evaluated at both first and second-order item level. The variance inflation factor (VIF) with a cut-off value of 3.3 (Diamantopoulos & Siguaw, 2006) was used to detect multicollinearity. All but one of the eighteen VIF values corresponding to the first-order indicators fulfilled the established criteria. Therefore, to ensure that no two indicators tap into the same aspect of the construct, the item Tas4 "The taste of local beverage is unique" was merged with Tas3 under the item "The taste of local gastronomy is unique". As a result, the set of indicators was reduced to seventeen. No collinearity issues were identified for the second-order measurement model, with VIF values ranging from 1.81 to 2.72.

3.2.3. Significance and magnitude of outer weights

The evaluation of an indicator's contribution to a formative measurement model involves the assessment of the significance and relevance of its outer weights. Since the destination sensescape construct is operationalised as a hierarchical component model, the specification of its measurement model required the application of the two-stage approach (Hair et al., 2017). In the first stage, the latent variable scores of the first-order constructs (i.e. the five sensescapes) were obtained. Then, the scores were employed as manifest indicators of the second-order destination sensescape construct.

The evaluation of the first-order indicators revealed that all seventeen outer weights were significant except for one. However, the existing guidelines on developing formative measures suggest that an indicator should be removed only if both its weight and associated outer loading are non-significant (Cenfetelli & Bassellier, 2009). In this case, the loading of the haptic item was above 0.5, and therefore, it was not removed from the list of items. As for the second-order measurement model, the weight corresponding to the smellscape dimension was non-significant, but it was retained after establishing the significance of its outer loading.

3.2.4. Nomological validity

To demonstrate the nomological validity of the destination sensescape index, the construct had to be positively and strongly related to an outcome variable suggested by the literature. Accordingly, a structural model was built linking the destination sensescape to future behavioural intentions, since destination loyalty was documented as a consequence of favourable sensory appreciations (Agapito et al., 2017; Lv et al., 2020). To assess visitors' future behavioural intentions toward the destination, the 2-item measure used by Chen and Tsai (2007) was adopted (revisit and recommendation likelihood). The structural path between the two constructs indicated a positive association (β = 0.504), which proves the nomological validity of the index.

3.3. Step 3: final index validation

The 17-indicator solution derived from the pilot testing was re-examined in a final survey with a total sample size of 737 same-day visitors to the Spanish city of Valencia. The same market research company as in the pilot study was responsible for data collection. The availability of the questionnaire in several languages other than English (Italian, German, and Spanish) facilitated the fieldwork. Respondents received a small incentive in return for their participation in the survey: a sample of a local drink and snack together with promotional products (e.g. candies, pens) sponsored by the local DMO. Table 1 presents the socio-demographic profile of the respondents.

3.3.1. Confirmatory tetrad analysis

Previous to evaluating the psychometric characteristics of the proposed measurement model, the formative specification of the destination sensescape index was further validated by a confirmatory tetrad analysis (CTA) (Gudergan et al., 2008). The CTA procedure, which provides empirical foundation for the reflective or formative operationalisation of higher order-constructs, was performed in SmartPLS. The results of the analysis rejected the null hypothesis of a reflective measurement, as more than one of the model implied non-redundant tetrads was different from zero. Hence, the formative measurement model of the destination sensescape index was supported by the CTA-PLS analysis.

3.3.2. Assessment of the destination sensescape measure

The descriptive statistics of all the indicators composing the final destination sensescape index are shown in Table 2. Regarding data distribution, skewness and kurtosis indexes for all items were within the recommended ranges proposed by Kline (2015) (i.e., −3 to 3; −7 to 7 respectively), thus indicating no normality violations. The potential

Table 1
Descriptive statistics of the main study sample.

		Frequency	Percentage
Gender	Female	415	56.3
	Male	322	43.7
Age	18-25	33	4.5
	26-35	42	5.7
	36-45	72	9.8
	46-55	93	12.6
	56-65	210	28.5
	Older than 65	287	38.9
Level of education	Basic qualifications	38	5.1
	Secondary studies	235	31.9
	University degree	464	63.0
Main occupation	Employed	232	31.5
	Self-employed	82	11.1
	Retired/Pensioner	379	51.4
	Housework	16	2.2
	Student	19	2.6
	Unemployed	9	1.2
Geographical residence	United Kingdom	265	36.0
	USA	133	18.0
	Germany	118	16.0
	Italy	71	9.6
	Canada	35	4.7
	Australia	27	3.7
	Others	88	12.0

common method bias was assessed through Harman's single-factor test to ensure that respondents did not provide socially desirable answers. The results of the factor analysis yielded five factors with eigenvalues greater than 1, the largest of which explained 32.6% of the total variance. Hence, no evidence of common method bias was found.

Following the commonly accepted guidelines for assessing formative indexes, convergent validity, collinearity, significance and magnitude of item weights, as well as nomological validity were examined (Cenfetelli & Bassellier, 2009; Diamantopoulos et al., 2008; Petter et al., 2007). As in the pilot study, the convergent validity of the index was estimated through a redundancy analysis, in which the destination sensescape construct was used as an exogenous variable to the reflectively operationalised sensory destination experience measure (Barnes et al., 2014). The results of the analysis provided evidence for the convergent validity of the proposed measurement model since a significant and strong structural relationship between the two variables was established ($\beta = 0.7$, $p < 0.001$).

Next, the multicollinearity test was performed and no problematic VIF values were found both on the first and second-order measurement level (Table 2). For the validation of the individual indicators, the two-stage procedure for identifying higher-order constructs was followed. As observed in Table 2, all first-order indicators were significant, except for the items Vis3, Hap2 and Hap4. Despite the non-significant weights, their respective loadings were above the 0.5 threshold recommended by Hair et al. (2017) and thus, were retained to ensure content validity. The assessment of the second-order indicators revealed non-significant weights of the destination smellscape and soundscape. However, their validity was demonstrated by their significant outer loadings. Lastly, the significant and positive structural link with the future behavioural intentions construct, measured as in Chen and Tsai (2007) supported the nomological validity of the index ($\beta = 0.58$; $p < 0.001$).

3.3.3. Assessment of the reflective measures
The evaluation of the measurement models of the rest of the variables used in the study (i.e. sensory destination experience and future behavioural intentions) followed the established criteria for reflectively operationalised constructs. As shown in Table 3, the reliability and validity of the scales was supported by the significant and high indicator loadings, Cronbach's alpha and composite reliability scores higher than 0.7, and average variance extracted (AVE) values above 0.5 (Hair et al., 2010).

Table 2
Assessment of the destination sensescape measurement model.

Item	Mean (SD)	Outer weight	Outer loading	VIF
First-order indicators				
Visualscape				
Vis 1. The architecture of the destination (e.g. buildings, monuments, ornaments) is attractive.	6.32 (0.99)	0.406***	0.816	1.53
Vis 2. The natural landscape of the destination (trees, flowers, sky, etc.) is beautiful.	5.79 (1.15)	0.298***	0.658	1.34
Vis3. The seafront of the destination is attractive.	5.48 (1.31)	0.082	0.616	1.50
Vis 4. The destination has a wide variety of things to see.	6.06 (1.07)	0.490***	0.863	1.64
Soundscape				
Sou 1. The sound of the nature in the destination (e.g. birdsong, wind, trees, waves) is pleasant.	5.49 (1.19)	0.412***	0.768	1.33
Sou 2. The music you can hear in the destination (e.g. street musicians, concerts, local songs) is nice to listen to.	5.39 (1.31)	0.292**	0.793	1.70
Sou 3. The voices of people on the street, bars, squares, etc. Allow to perceive the local ambience.	5.65 (1.15)	0.518***	0.873	1.66
Smellscape				
Sme1. Local food (e.g. traditional dishes, fruits, vegetables) smells nice.	5.97 (1.07)	0.342**	0.811	1.84
Sme2. Local beverage (e.g. coffee, wine, typical local drinks) spreads a nice smell.	5.86 (1.16)	0.372***	0.829	1.88
Sme3. The smell of plants, flowers, trees, sea in the destination is pleasant.	5.66 (1.14)	0.501***	0.828	1.34
Tastescape				
Tas1. Local food tastes good.	6.00 (1.18)	0.488***	0.918	2.18
Tas2. Local beverage tastes good.	5.45 (1.42)	0.275*	0.886	1.86
Tas3. The taste of local gastronomy is unique.	5.82 (1.29)	0.372**	0.812	2.23
Hapticscape				
Hap 1. The warmth of the sun in this destination feels good on my skin.	5.96 (1.41)	0.323***	0.712	1.74
Hap2. The touch of the wind/breeze in this destination is gentle on my skin.	5.42 (1.52)	0.073	0.658	1.79
Hap 3. The material heritage of this destination (e.g. monuments, stones, etc.) is appealing to touch.	5.63 (1.26)	0.691***	0.918	1.43
Hap4. Touching the sand and sea water in this destination is pleasant.	5.30 (1.42)	0.139	0.63	1.45
Second-order indicators				
Visualscape		0.583***	0.897	1.81
Soundscape		0.025	0.646	1.99
Smellscape		0.049	0.706	2.73
Tastescape		0.260***	0.751	2.10
Hapticscape		0.378***	0.796	1.67

Note: All first and second-order indicators' outer loadings are significant at the 0.001 level.

4. Conclusions

Sensory stimulation has been widely acknowledged as a key element of the experience economy. Nevertheless, despite the highly experiential nature of the tourism activity, its sensory dimension has been understudied. The limited empirical multisensory tourism research might be due to the lack of adequate operationalisation and measurement of the construct. In this regard, the purpose of this study was to bridge this gap in the tourism literature by developing a psychometric measure that

Table 3
Assessment of the reflective measures.

Construct	Mean (SD)	Loading	Cronbach's alpha	CR	AVE
Destination sensory brand experience			0.95	0.97	0.91
Dsbe1. The destination makes a strong impression on my senses, visually and in other ways.	5.60 (1.27)	0.948 ***			
Dsbe2. I find the destination interesting in a sensory way.	5.53 (1.32)	0.959***			
Dsbe3. The destination appeals to my senses.	5.50 (1.31)	0.954***			
Behavioural intentions			0.82	0.92	0.85
BI1. I would recommend the destination to my friends and relatives.	6.02 (1.27)	0.934***			
BI2. I would visit the destination again.	5.65 (1.53)	0.906***			

Note: CR= Composite reliability; AVE = Average Variance Extracted; ***p < 0.001.

captures destination sensescape perceptions in a holistic manner. The construction of the index followed a rigorous multi-stage process as recommended by Diamantopoulos and Winklhofer (2001). The extensive literature review of multisensory tourism studies identified a wide range of sources of visual, auditory, gustatory, olfactory, and haptic impressions during a destination visit. Accordingly, a composite measurement model was designed with five dimensions (visualscape, tastescape, smellscape, soundscape, and hapticscape) assessed by a set of 17 indicators. A series of validity and reliability checks proved the destination sensescape index as a statistically sound measurement instrument.

In this regard, the study makes an original contribution to the sensory tourism research by delineating the elements underpinning a destination sensescape and developing a measurement tool for its empirical assessment. Importantly, the newly created index lays the basis for advancing the current body of empirical research on the sensory dimension of the tourist experience. The proposed operationalisation of the destination sensescape construct facilitates modelling the interrelationships among multisensory destination impressions, tourist attitude and behaviour. Furthermore, unlike the existing general measures of sensory appeal, the index allows to distinguish the contribution of each of the five sensory scapes to the overall perceived attractiveness of the destination sensory panorama. The study is also novel in the context in which the destination sensescape index was empirically validated (i.e. an urban coastal destination), given that existing multisensory research has been mainly conducted in rural settings.

As for the conclusions derived from the application of the index to the urban coastal destination used as a research setting, several findings should be highlighted. First, although all five senses made a significant contribution to the overall destination sensescape of Valencia, their relevance was different. Not surprisingly and in line with the pre-eminence of vision over the rest of the sensory triggers, the visualscape was identified as the most important component of the configuration of the destination sensescape. This finding corroborates the results of previous multisensory tourism studies documenting visual impressions as the most salient ones reported by tourists (Kastenholz et al., 2020; Lv et al., 2020; Xiong et al., 2015). The results showed that the diversity of visual elements composing the landscape of the destination, together with the architectural sightseeing captured the most of tourists' visual attention. The natural landscape was the third most important source of visual impressions, which can be explained by the predominantly urban profile of the chosen destination.

Interestingly, though, the haptic input was revealed as the second most relevant element of the sensescape of Valencia. Existing research

has consistently documented the limited role of the sense of touch in tourists' interactions with a destination (Agapito et al., 2014; Kastenholz et al., 2020; Son & Pearce, 2005). More specifically, the hapticscape was underpinned not only by the hedonic and aesthetics-elicited touch of material objects, but also by the favourable atmospheric conditions of the destination that translate into pleasant somatosensory experiences.

The tastescape was documented as third in importance in determining the attractiveness of the overall destination sensescape, followed by the limited contribution of the olfactory and auditory appreciations. These findings differ from the results obtained by past studies conducted in nature-based settings (Agapito et al., 2014; Kastenholz et al., 2020). For example, the content analysis of rural tourists' reports on their sensory experience revealed that the second most frequently mentioned sensory category referred to the sense of hearing (Agapito et al., 2014). As for the low impact of the scent cues on the overall destination sensescape perception, a plausible explanation might be found in Henshaw et al.'s (2016) research on the use of smell in city marketing. The authors identify several urban odour management processes, namely: separation of smells, deodorization, masking, and scenting. Hence, it can be argued that if the local DMO has not purposefully designed a scenting marketing strategy, tourists might not perceive any strong olfactory triggers while visiting the destination.

Besides delineating the configuration of the destination sensory environment, the study documented a positive and strong association between an attractive sensescape and visitors' intention to return and recommend. The finding further emphasises the role of sensory stimulation in cultivating destination loyalty (Agapito et al., 2017; Lv et al., 2020).

5. Managerial implications, limitations, and future research directions

The development of the destination sensescape index is not only useful in future empirical sensory research but can also be employed by DMOs as a diagnostic instrument allowing the holistic assessment of the destination's sensory profile. The instrument offers a comprehensive inventory of the main sources of sensory stimuli in a destination setting, which practitioners may further adapt to reflect the specific characteristics of each location. The tool allows to quantify the composition of a destination sensescape, which is key for tourism marketers, given the positive impact of sensory experiences on visitor outcomes. Moreover, the measures of each of the five sensescapes can be used as separate tools to uncover the contribution of each individual sensory cue. For example, DMOs could know which exact olfactory element is most relevant for the smellscape of the destination. In this way, the destination sensory performance can be monitored and importantly, the potential of its sensory resources can be maximised.

In addition to assisting DMOs in identifying the current state of the destination sensescape, the index can be helpful in evaluating the effectiveness of sensory-based promotional efforts. For instance, a DMO could use the measure to inquire tourists' perception of the destination before and after implementing a sensory-focused communication campaign. Furthermore, given the cross-cultural differences in sensory perception (Krishna, 2011), the marketing managers could also use the tool to assess the composition of the destination sensescape across the main international target markets and adapt their promotional campaigns accordingly. For example, the subjective perception of the overall destination experience might be affected by specific somatic sensations due to dissimilarities between home country and destination weather conditions (Denstadli et al., 2011). An analysis of travel blog narratives revealed that "warm weather has its limits in terms of comfort" (Jeuring & Peters, 2013). Thus, although DMOs might use hot weather as a positive sensory experience in their promotional campaigns, an overall assessment of the contribution of each sensory cue to the destination sensescape may reveal a negative impression in certain international tourism segments. If that is the case, DMOs should try to ameliorate this

effect by suggesting the best hours to visit the destination, design tourist signs indicating the location of water fountains and shade, etc.

Overall, DMOs should be cognizant of the importance of visitors' sensory stimuli since a favourable assessment of the destination sensescape strengthens tourists' intention to return and recommend it to others. Creating opportunities for sensory interaction with the destination through, for example, the design of sensory itineraries or the development of sensory qualifications (e.g., a local restaurant can be labelled as offering an "authentic taste sensation") can contribute to enhancing destination loyalty.

In view of the novelty of the proposed formative index, the findings should be interpreted with caution. First, the developed scale is the first attempt to quantify the composition of a destination sensescape based on visitors' perceptions and as such it has to be further validated and refined by future studies. Second, the index was tested in a single location, which represents a specific type of destination: a coastal urban one. Therefore, the validity of the proposed index should be established in other contexts such as rural destinations. Also, the sample of respondents in this study was dominated by Western English-speaking visitors, which might have introduced a bias in the results. Hence, obtaining data from Asian and African tourists is essential to further validate the index. Moreover, the characteristics of the destination used as a setting for the study might limit the universal applicability of the sensescape items. Although most of the indicators are valid for any destination context, some of them might have to be adapted to reflect the specific features of each setting. For example, the item "Touching the sand and sea water in this destination is pleasant" will not be applicable to an inland destination and should be either eliminated or replaced by another relevant haptic cue. While the study aimed to create a measure that covers all main sources of sensory impressions during a destination visit, there might be destination-specific sensory cues, not documented by the extant literature, which have not been considered. Thus, before applying the destination sensescape index, an exploratory multisensory study might be useful in adapting the items to the context of destination setting. Furthermore, the study proposed a self-reported measure, which might be biased. In this regard, the questionnaire assessments can be complemented with wearable biophysical sensors as suggested by Kim and Fesenmaier (2017). Future studies adopting the proposed destination sensescape index should be cognizant of the possible acquiescence bias associated with positively worded Likert-type scales despite their common usage in the tourism literature (e.g., Fetscherin & Stephano, 2016, Hosany & Gilbert, 2010; Kim et al., 2012). A semantic differential response format might be used as an alternative (Friborg et al., 2006).

The availability of the destination sensescape index paves the way for further empirical research on sensory destination experiences. Determining the antecedents and consequences of an attractive destination sensescape constitute fruitful avenues for future research. Another future research line could explore the dynamics of the interaction among the five sensory modalities by determining their mutual influence. While some research in this direction has already been conducted by He et al. (2019), who uncovered a positive relationship between soundscape and landscape perceptions, the association among the rest of sensory modalities is understudied. A better understanding of the cross-cultural differences in evaluating destination sensory stimuli is also needed. For example, Lwin and Wijaya (2010) found that the same scent evokes different emotional responses across cultures. Therefore, it is evident that there is extensive scope for research in the sensory domain of the tourist experience.

Credit author statement

Daniela Buzova: Conceptualization, Writing-Original draft, Methodology, Formal analysis; **Silvia Sanz-Blas:** Methodology, Resources, Supervision, Project Administration; **Amparo Cervera-Taulet:** Supervision, Project administration, Funding acquisition

Impact statement

Given the lack of previous scaling efforts in the sensory domain of the tourist destination experience, the paper develops and empirically validates the destination sensescape formative index. Thus, the study contributes to the sensory tourism literature by providing conceptual clarification and operationalisation of the construct. In this regard, the newly developed destination sensescape index paves the way for future quantitative research on the sensory dimensions of the destination experience and its influence on tourist behaviour. The destination sensescape index also presents relevant managerial implications, as it can serve destination marketing organisations in assessing the sensory panorama of the destinations and modifying it accordingly.

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Daniela Buzova, PhD in Marketing, is Lecturer in the Department of Marketing at the University of Valencia (Spain). Her main research interests include destination marketing, travel eWOM and cruise tourism.

Silvia Sanz-Blas is Associate Professor in the Department of Marketing at the University of Valencia (Spain). She holds a PhD in Business and Economics from the University of Valencia. Her research lines include consumer behaviour in the tourism and ICT domains, as well as tourism and digital marketing.

Amparo Cervera-Taulet is Professor in Marketing and Head of the Institute of International Economics at the University of Valencia. She is director of the SIV R&D Group (Service + Innovation + Value) and her main research lines are: strategic marketing resources and capabilities for sustainable innovation; branding; services marketing with sectorial applications (tourism, sports and culture); and consumer behaviour.