**Expanding theory of tourists' destination loyalty: The role of sensory impressions.**

**ABSTRACT:**

What shapes tourist's attitudes towards destinations most, abstract destination image or concrete sensory impressions? This exploratory research investigates the unique role played by sensory impressions in understanding destination loyalty through a multi-level validation process utilizing three progressive studies. Study 1, based on online reviews found that positive sensory impressions have a positive effect on loyalty while negative sensory impressions have a negative effect. A field study then revealed that sensory impressions can be distinguished from destination image and provides incremental explanatory power on loyalty. Through a survey of actual tourists, Study 3 verified the robustness of the conclusions of the first two studies and provides evidence that sensory impressions are related to other outcome concepts (perceived quality, value and satisfaction). This research illustrates the mechanisms behind the influence of this emerging construct on destination loyalty, and more importantly, verifies its importance and necessity through a more rigorous multi-level validation.

## 1. INTRODUCTION

Tourists' commitment to a destination, also known as destination loyalty, is considered the cornerstone of tourism destination brand equity, which determines the competitiveness of destinations (Krishna & Schwarz, 2014). Theoretically, the creation of a distinctive destination image is considered to be an effective means to enhance tourists' loyalty (Chi & Qu, 2008). In reality, however, even destinations with a positive image and successful branding may experience challenges in understanding what contributes to loyalty, not all of which are attributable to novelty-seeking behaviors. Indeed, there appears to be no consensus in the literature on the magnitude and direction of the relationships between different components of destination image (cognitive or affective, or global) and tourists' destination loyalty (Zhang, Fu, Cai & Lu, 2014). For example, tourists may hold a clear and positive image of a particular destination, but not a strong enough involvement in and emotional attachment to the place, thought an antecedent to loyalty (Prayag & Ryan, 2012). However, the methods and models used to explore these relationships have come under criticism recently (Dolnicar 2018), highlighting proneness to bias in responses and poor test retest reliability rates amongst others. Therefore, recent research has begun to explore new constructs that look beyond conventional destination image concepts, such as the differences in image types and processing in working memory (Cardoso, Dias, de Araújo, & Marques, 2019). These offer potential to enrich theory and increase our understanding of the range of factors that contribute to tourist loyalty behavior.

Another recently introduced construct, sensory impressions, which has been developed in the field of sensory marketing, offers similar potential. It has been widely acknowledged that we cannot understand human behavior without recognizing that we connect with the world through the senses (Krishna & Schwarz, 2014). Unlike the predominant approach, which posits that individuals form perceived images through the interpretation of inputs from the external environment, sensory impression theory takes a bottom-up perspective, emphasizing that the external world reaches individuals through the senses and

that the resultant long-term memories of physical experiences have a direct impact on people's attitudes and behaviors (Agapito, Valle, & Mendes, 2014).

Research on destination image highlights that experiencing the destination produces a stronger and more complex, holistic psychological image (Echtner & Ritchie, 1993). However, that is not a necessary predictor of loyalty. Indeed, in one of the earliest papers on differences in image amongst first time and repeat visitors to destinations, Beerli and Martin (2004) found that repeat visitors scored some cognitive image attributes much more negatively than first time visitors to Lanzarote, suggesting that the links to loyalty are not automatically associated with strong, positive images of the destination through experience. Recent studies have sought to evidence the potential links between sensory impressions and destination loyalty (Agapito, et al., 2017). However, this research is at an early stage and based on snapshot cross-sectional survey design which merely tested the *criterion validity* of sensory impressions on loyalty. In order to understand more fully whether sensory impressions are linked to destination loyalty and in what ways, we need more detailed research that examines how such impressions compare with traditional destination loyalty measures and concepts.

Fundamental questions arise regarding the relationships (and differences) between the influence of sensory impressions compared to destination image measures, and whether sensory impressions can be integrated into existing theoretical models of destination loyalty. Specifically, does sensory impression provide additional predictive power to explain destination loyalty if the effect of destination image is controlled (i.e. *incremental validity*)? More importantly, we ask whether this new concept can be embedded into existing conceptual relationships including; perceived quality, perceived value, satisfaction and loyalty, to form a more stable and holistic theoretical network, also known as the *nomological validity* of a new construct. Only by answering these questions can we better understand this concept and its role in the theoretical development of tourism destination choice.

To address these questions, taking Huanglongxi, a well-known heritage tourism destination in southwest China, as a focus, we conducted three progressive studies based on different types of data to explore the threefold, theoretical significance (criterion, incremental and nomological validity, as above) of this emerging concept. The ultimate aim is to explore the potential role played by sensory impression in the theory of destination loyalty by theoretically and empirically distinguishing it with the conventional antecedent of destination loyalty (destination image) and testing its suitability and stability. The following section provides the theoretical background and research questions (section 2). In section 3, the purposes for each of the three studies and the relationship among them were outlined. From section 4 to section 6, the detailed methods and results of the threes studies were presented, followed by a general discussion and conclusion (section 7).

## 2. THEORETICAL BACKGROUND

### 2.1 Destination loyalty and its antecedents

Loyalty can be defined as a commitment to a particular product (Baker & Crompton, 2000; Rivera & Croes, 2010; Moore, Rodger & Taplin, 2017). Thus, destination loyalty means tourists' commitment toward a destination (Chen & Gursoy, 2001; Chi & Qu, 2008). There are two fundamental reasons offered as a rationale for continued examination of destination loyalty in tourism research. Firstly,

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loyalty promotes a sustainable income for destinations through word of mouth and lower marketing costs (Almeida-Santana & Moreno-Gil, 2018). Secondly, since tourist destination choice is often motivated by novelty seeking which, together with the complexity of the decision-making process (Chew & Jahari, 2014), means that destination loyalty is harder to obtain than general customer loyalty, greater marketing efforts are required.

Oliver (1999) defined four stages of customer loyalty, namely; cognitive loyalty where the consumer is aware of the product; affective loyalty, which implies increased commitment; conative loyalty, referring to the behavioral intentions, and; action loyalty, where intentions are realized. Subsequently, Zhang, Fu, Cai, & Lu (2014) summarized three main definitions of destination loyalty based on the tourism literature; attitudinal, behavioral and composite loyalty. Attitudinal loyalty refers to tourists intentions to recommend the destination. Behavioral loyalty includes patronage or intention to revisit, while composite loyalty is a mix of both. This classification has been substantiated by subsequent studies (Meleddu, Paci & Pulina, 2015; Almeida-Santana & Moreno-Gil, 2018), whereby a mixed method approach to loyalty measurement has been considered an appropriate tool to assess tourist loyalty (Bigné, Sánchez, & Sánchez 2001; Chi & Qu 2008; Yoon and Uysal 2005). Despite the deficiencies in such research to predict actual behaviors from measures of intentions, the 'attitude-behavior' gap across marketing and tourism research fields. This has resulted in intentions to recommend and revisit a destination as the most common measurement items in studies of destination loyalty (Meleddu, Paci & Pulina,2015).

Due to the practical importance of destination loyalty, continued efforts have been made to explore the range of influences that might affect tourists loyalty, which for simplification, can be summarized as: (1) tourist-related factors such as motivations, demographic characteristics and past experiences (Almeida-Santana & Moreno-Gil, 2018), (2) destination-related factors involving destination image (Chi & Qu, 2008; Zhang et al, 2014), service quality (Lee, Jeon & Kim, 2011; Kim, Holland & Han, 2013) and value for money (Rivera & Croes, 2010; Kim, Holland & Han, 2013; Moore, Rodger & Taplin, 2017ref.), and (3) travel outcome-related factors, including perceived quality, perceived value and satisfaction, which are normally explained as mediators of the former two types of factors and destination loyalty (Bigné, Sánchez, & Sánchez, 2001; Castro, Armario, & Ruiz, 2007; Song, Su & Li, 2013). Based on these antecedents, a number of theoretical models have been proposed to explain the formation of destination loyalty (Prayag & Ryan, 2012; Chen & Phou, 2013; Hultman, Skarmeas, Oghazi & Beheshti, 2015). A common assumption in the literature is that when the destination image perceived by tourists is consistent and congruent with a positive experience, the result is a high level of satisfaction, which then leads to revisit or recommend intentions (Chi & Qu, 2008). The basic model (destination image → satisfcation → loyalty ) proposed by Chi & Qu (2008) has been developed by subsequent studies by further integrating two mediators, perceived quality and perceived value (Kim, Holland & Han, 2013; Rodger, Taplin & Moore, 2015).

Although a positive relationship between perceived destination image and loyalty (i.e. revisit intention or revisit behavior) has been found in a range of different studies (cf Ramseook-Munhurrun, Seebaluck & Naidoo, 2015; Pike, 2002), the strength of the relationship is much weaker than its influence on attitudinal loyalty (i.e. willingness to recommend), according to the meta-analysis conducted by Zhang et al (2014). The unique nature of tourism consumption, which may be driven by constraints of time and financial resources and a whole range of other factors, such as ticking off a 'bucket list' of destinations

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(Thurnell-Read, 2017), last chance tourism (Eijgelaar, Thaper, & Peeters, 2010), socio-demographic factors (Prayag, 2012), or significant life stages, means that revisit intentions may be tempered even where tourists report a highly positive destination image. Veasna et al. (2013) suggested that destination image has to translate into destination attachment before it can lead to loyalty. But destination image is merely a mental representation (Baloglu & McCleary, 1999; Kock, Josiassen, & Assaf, 2016; Cardoso, Dias, Araújo, & Marques, 2018), a good destination image does not lead to physical or necessarily emotional attachment to a place. Therefore further exploration is required for other possible predictor and one potentially relevant concept is that of sensory impressions.

*2.2 The definition, distinction and outcome of sensory impression*

The senses are the basic means through which humans explore and understand the world. Any information communicated to consumers is received through the five senses. In theory of embodied cognition, there is a strong connection between physical experience and psychological state (Krishna, 2012) and sometimes physical sensations can directly influence consumer's attitudes and behaviors in an unconscious way (Krishna & Schwarz, 2014). A sensory impression is a perception about the extent (from intense to barely registered) of stimulation of each sense (Cioffi, 1991; Krishna, 2012). In recent years, research has developed on the role played by sensory components in tourism experience (e.g. Pan & Ryan, 2009; Small, Darcy, & Packer, 2012; Kim & Kerstetter, 2014; Ghosh & Sarkar, 2016). Tourism experience is a process of acquiring sensory stimulation through all of the senses (Pan & Ryan, 2009), and physical sensations have a great impact on tourist experience (Agapito et al., 2017). It has been claimed that they directly reflect the quality of tourism experiences and provide value through tourist's physical attachment to a destination. For example, Agapito et al. (2017) found evidence for the positive influence of sensory impressions on destination loyalty. Both sensory impressions and destination image are perceptions related to the destination, but the differences between them have not been empirically tested. Based on a review of both literatures, the differences between destination image and sensory impressions can be summarized in terms of two factors, the mechanisms and, the sources through which they are formed.

A destination image is the sum of beliefs, ideas and perceptions that people hold of places (Crompton 1979). A range of different types of information sources contribute independently to the formation of a holistic image in the minds of individuals (Gartner, 1993, 1994), thus there is consensus that image is a mental representation. Kotler, Haider and Rein (1993) defined destination images as simplified representations of a large number of associations and pieces of information connected with a place. Much research over the last four decades has assessed how individuals mentally form, store and use representations of destinations (Kock, Josaiason & Assaf, 2016). The formation of destination image has two characteristics: an interpretation process, which implies a conscious mental processing of the destination, including categorizing, essentializing and understanding (Kock et al., 2016); together with an abstraction process, which describes a totality of the perceptions of a place accumulated over time (Kim & Richardson, 2003). In contrast, sensory impressions are the perceived extent of physical sensation caused by the stimulation of the five senses during the experience (Cioffi, 1991; Krishna, 2012). Therefore, a mental interpretation of information is not involved in the formation of a sensory impression, rather, it is a direct and concrete perception of a bodily sensation.

For example, during their experience, tourists may sample many local delicacies, leading to a gastronomic image of the destination. The colors, smells and tastes of the food could lead to a lasting impression. The intensity of the stimulation of sight, smell and taste are sensory impressions. Both destination image and sensory impressions may exist simultaneously, but they have different psychological mechanisms (see Figure 1), indicating varying potential associations with behavioral outcomes. This drives our motivation to investigate sensory impressions as an independent variable to compare its relevance to destination image and its potential role in behavioral outcomes from tourist experience.
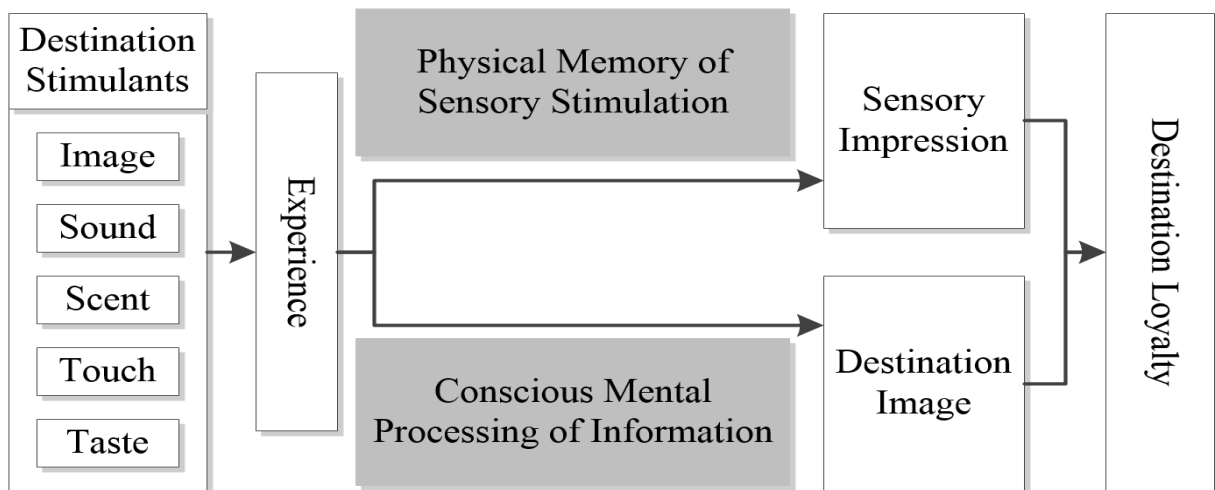


*Figure 1.* Difference of psychological mechanism between sensory impression and destination image.

Sensory impressions are the result of tourists sensory experiences (Agapito, Mendes, & Valle, 2013), and so it is less likely that individuals form clear and comprehensive sensory impressions of a destination without real experience. However, the channels through which tourists to acquire destination images are now much more diverse, including rich video content created by Destination Marketing Organizations and Augmented or Virtual Reality, which offer the potential for more immersive sensory engagement with destinations in the future (e.g. Cho, Wang & Fesenmaier, 2002; Hyun & O'Keefe, 2012). Therefore, there is potential that sensory impressions may be useful as a relevant concept beyond the post-visit experience in the future. Yet, destination images are formed through conventional information search and imagination routes (Bigné, Sánchez, & Sánchez, 2001; Chen & Tsai, 2007; Castro, Armario, & Ruiz, 2007), and so can be conceived as having different sources, meaning that the relationship with loyalty outcomes may differ. Destination image may be expected to have a greater influence on decision making prior to the trip, whereas sensory impressions could be expected to play a more important role in influencing revisit intension as an outcome to travel experience.

*2.3 New construct validation and research questions*

Trochim and Donnelly (2006) indicate that the investigation of a new concept or construct should begin with a specification of the relationships between the concepts measured and more importantly, further asks whether the new constructs correspond to the connections or differences that they should have with other constructs. A number of studies in tourism research have focused on the first step of construct validation, to verify whether a construct can accurately reflect or predict the dependent variable (Brakus, Schmitt & Zarantonello, 2009; So, King & Sparks, 2012; Agapito, et al., 2017). These efforts provide

an important foundation for the introduction of a new concept, but this falls short of true theory development for the following reasons.

First, the proposed new construct may be simply a new name for an existing idea, which could signal significant overlaps with existing concepts. If existing measures already predict a phenomenon, it is unnecessary to develop additional predictors that map overlapping variance (Vaughan-Johnston, Quickert & Macdonald, 2017). Thus incremental validity is required to be verified for a new construct to ensure it brings additional variance in the prediction of a dependent variable after the effects of other factors are controlled (Burtăverde, Chraif & Aniţei, et al., 2016). Hierarchical regression is the most common method applied to test the incremental validity of a new predictor (Kim, & Agrusa 2011). Therefore, it is only if sensory impressions can explain additional variance in destination loyalty, beyond that already explained by destination image, may we conclude its incremental validity as an independent predictor of loyalty.

Moreover, in order to prevent the risk that the relationship between the measured construct and the dependent variable is merely a statistical coincidence, Cronbach & Meelh (1955) identified that the necessary condition for a construct to be recognized is that it should exist in a nomological net, a logical network of related concepts. Nomological validity means that a new construct should not only associate with the variable in question but also have significant correlations with other constructs that have been proven to be theoretically related to the variable in question (Rode, Mooney & Arthaud-Day, et al., 2008). It is only recently that tourism researchers have begun to emphasize the importance of nomological validity for new construct development and empirical verification through SEM (Busser, & Shulga 2018; Hanks & Line, 2018; Lu, Cai & Gursoy, 2019). Therefore, as a new potential construct of tourist destination loyalty, sensory impressions should not be isolated, but integrated into the theoretical system of destination selection and satisfaction, and connected with the existing network of established variables and their relationships.

Although the importance of sensory impressions has been acknowledged (Brakus, Schmitt & Zarantonello, 2009; Dohee & Perdue, 2013) and its relationship with destination loyalty has been empirically tested (Agapito, et al., 2017), to the best knowledge of the authors, this study is the first attempt that aims to clearly distinguish it with an existing predictor (i.e. destination image) and to develop a logical network in which sensory impression are associated with other key variables including perceived quality, perceived value and satisfaction that have been repeatedly proved highly related to loyalty. This multi-level validation approach advances the theoretical understanding of sensory impressions and its influence on loyalty by establishing the validity of this construct as being relevant to important consumer outcomes. In order to establish this relationship between the new construct and its role in the nomological network, three stepwise studies based on different types of data were utilized to verify its criterion, incremental and nomological validity, and provide a more rigorous theoretical construction of this emerging concept.

Accordingly, three research questions have been formulated in line with these goals:
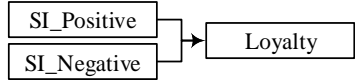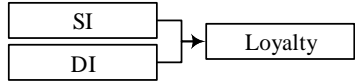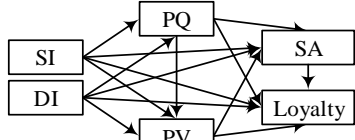*Research question 1:* Whether sensory impressions have an impact on destination loyalty?
*Research question 2:* Whether sensory impression can be distinguished from perceived destination image and provide incremental explanation on destination loyalty?

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*Research question 3:* Whether sensory impression can be integrated into existing nomological network to explain destination loyalty?

## 3. EMPIRICAL APPROACH

In line with these research aims, three interrelated studies were conducted in Huanglongxi, China. Huanglongxi is a heritage town located in the suburbs of Cheng Du, a large city in western China. It receives over 7 million tourists annually and has been designated a national AAAA tourist attraction. Huanglongxi was selected for the following reasons: 1) 'ancient town' is a common type of heritage tourism destination, which increases the generalizability of the study's findings. 2) It has a rich natural landscape as well as a wealth of cultural tourism resources, which enables us to investigate tourist's multi-sensory experiences. Furthermore, 3) due to the early development of local tourism, Huanglongxi has established a relatively clear destination image, which facilitates the comparison between destination image and sensory impressions.

*Table 1.* Research Framework

| Study | Research objective | Level of validation | Data source | Model | Model Verification |
|---|---|---|---|---|---|
| Study 1 | Verify the explanatory power of SI on loyalty | Criterion validity | Online reviews | SI_Positive, SI_Negative → Loyalty | One-Way ANOVA & Regression analysis |
| Study 2 | Distinguish SI from DI in explanation of loyalty | Incremental validity. | Field study | SI, DI → Loyalty | Hierarchical regression analysis |
| Study 3 | Test if SI can be embedded into the existing nomological network of loyalty | Nomological validity. | Survey | SI, DI → PQ, PV → SA, Loyalty | Structural equation analysis |

SI_Positive=Positive sensory impression, SI_Negative=negative sensory impression, SI=Sensory impression, DI=Destination image, PQ=Perceived quality, PV=Perceived value, SA=Satisfaction.

As a pilot exercise, study 1 used online reviews of Huanglongxi to examine the existence of tourist's sensory impressions and their influence on loyalty. Online reviews are records of travel experiences. If tourists have deep sensory impressions of the destination during the visit, they should be reflected in such reviews. Compared with questionnaires used in a previous study (Agapito et al., 2017), online destination reviews are characterized by openness and autonomy, as tourists do not have to follow a prescribed format and can fully express their feelings. In addition, they are written without any influence from researchers, and so reflect tourist's genuine opinions. Content analysis was used to code sensory impressions and regression analysis was used to test for the influence of sensory impression on tourist loyalty.

Study 2 consisted of a field study in which longitudinal data were collected from a student sample, to test for differences between sensory impressions and destination image in terms of their origins as well as their association with destination loyalty. Competition models and hierarchical regression were used to test the incremental validity of sensory impressions, indicating the extent to which the measure (i.e.

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sensory impression) can increase the ability to predict an outcome, destination loyalty in this case (Haynes & Lench, 2003).

Study 3 replicated and generalized the results of study 1 and study 2 by utilizing an online survey. Furthermore, the SEM was conducted twice (with and without sensory impression) in study 3 to test whether sensory impressions can be embedded into the existing nomological network of relevant key constructs that links to loyalty.

## 4. STUDY 1: INFLUENCE OF SENSORY IMPRESSIONS ON DESTINATION LOYALTY

*4.1 Method*

Web Spider software was used to obtain online review data posted between January 1, 2017 and January 1, March 31, 2018 for Huanglongxi from the Mafengwo website, which is a leading self-service travel platform including travel notes, travel tips and travel reviews in China. It has over 100 million registered users and information covering more than 60,000 destinations worldwide with more than 180 million travel reviews posted by reviewers so far (www.mafengwo.cn) . After excluding duplicate and irrelevant reviews, 1151 valid reviews were obtained. If multiple comments were posted by the same reviewer, we only used the earliest. Initially, content analysis was used to code each review, and to extract all expressions relating to each type of sensory feelings and destination loyalty. Based on the definition of sensory impression together with specific destination attributes and sensory impressions identified in a previous study (Agapito et al., 2017), three PhD students with research experience of online reviews conducted the coding independently based on the definition of sensory impression together with specific destination attributes and sensory impressions identified in previous study (Agapito et al., 2017). The coding consistency coefficient is 0.871, suggesting good reliability. No new codes of sensory impressions appeared in the last third of the reviews, which indicated the data reached saturation and that validity of the variables identified was confirmed. In total, 31 items of sensory impressions (both positive and negative) were extracted from the reviews and the frequency of each sensory impression was counted.

*Table 2*. Coding of sensory impressions

| Sensory impression | Content | % of Coding | % of Sample |
|---|---|---|---|
| **Visual** | | **53.72%** | **56.21%** |
| SI1 Architecture | Local architecture, ancient buildings, man-made buildings, etc. | 11.81% | 21.37% |
| SI2 Landscape | Natural scenery, blue sky, pastoral, etc. | 9.65% | 17.46% |
| SI3 Street | Alley, flagstone road, street view | 8.02% | 14.51% |
| SI4 Stream | Huanglongxi stream, river water | 7.63% | 13.81% |
| SI5 Waterscape | Hydrological landscape, waterwheel, water mill, pier, bamboo raft, lounge bridge, ferry, etc. | 4.46% | 8.08% |
| SI6 People | Human activity landscape, residents, tourists, daily life scenes of residents | 3.60% | 6.52% |
| SI7 Performance | Featured performances (fire-dragon dancing), craftsmen, food production performances, etc. | 1.87% | 3.39% |
| SI8 Flowers | Rape flowers, garlands, flowers | 1.73% | 3.13% |
| SI9 Trees | Ancient trees, green shades, bamboo forests, etc. | 1.68% | 3.04% |
| SI10 Night scene | Night scenes, night lights, red lanterns, etc. | 1.25% | 2.26% |
| SI11 Rain | Misty rain, rain scenes, etc. | 1.10% | 2.00% |
| SI12 Ancient costume | Ancient costume display, ancient costume photo, etc. | 0.91% | 1.65% |
| **Aural** | | **5.04%** | **7.21%** |

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| | | | | |
|---|---|---|---|---|
| SI13 Silence | Quiet atmosphere of the ancient town | | 2.78% | 5.04% |
| SI14 Noisy | The noise of the crowd | | 1.30% | 2.35% |
| SI15 Murmuring | The sound of streams and rivers | | 0.67% | 1.22% |
| SI16 Music | Folk songs, opera, local music | | 0.29% | 0.52% |
| **Olfactory** | | | **0.48%** | **0.78%** |
| SI17 Fresh air | Fresh air, good air quality | | 0.38% | 0.70% |
| SI18 Flowery | Floral displays | | 0.10% | 0.17% |
| **Gustatory** | | | **23.28%** | **31.54%** |
| SI19 Local food | Local specialties, snacks, etc. | | 13.01% | 23.54% |
| SI20 Single-strand noodle | Locally famous noodle dish with only one long strand of noodle in a bowl and a unique taste | | 3.60% | 6.52% |
| SI21 Tea | Tea beverage | | 3.55% | 6.43% |
| SI22 Aquatic food | Local aquatic products, fish and shrimp, etc. | | 1.63% | 2.95% |
| SI23 Fruit | Local fruits, strawberries, etc. | | 1.01% | 1.82% |
| SI24 Local beverage | Fresh juice, Drink brewed from fresh juice | | 0.48% | 0.87% |
| **Haptic** | | | **17.47%** | **24.67%** |
| SI25 Water | All kinds of water-related activities | | 9.03% | 16.33% |
| SI26 Coolness | Cool climate, especially in summer | | 5.42% | 9.82% |
| SI27 Sunshine | Sunlight and warmth in spring and winter | | 0.91% | 1.65% |
| SI28 Moisture | The feeling of wetness in wet climates or after water-related activities | | 0.82% | 1.48% |
| SI29 Fish spa | Fish massage, fish therapy | | 0.67% | 1.22% |
| SI30 Ear cleaning | Ear-cleaning service | | 0.34% | 0.61% |
| SI31 Wind | Comfort in breeze | | 0.29% | 0.52% |
| **Loyalty** | Recommendation to others or future willingness to revisit | | | **21.29%** |

For the sensory impressions variable, an occurrence of the relevant expression of any of the five senses corresponded to an increase of 1 point in positive sensory impressions or negative sensory impressions. The review score was used as a quantitative indicator of satisfaction. Destination loyalty was assessed using the common measurement of previous tourism literatures, which is explicit expressions of intentions to recommend or revisit. The descriptive statistics of the coding results are presented in Table 3.

*Table 3.* Data descriptive statistics

| Variables | Sample size | Number of non-zero samples | Proportion | Min | Max | Mean | Std. |
|---|---|---|---|---|---|---|---|
| SI_Positive | 1151 | 795 | 69.07% | 0 | 11 | 1.65 | 1.71 |
| SI_Negative | 1151 | 155 | 13.47% | 0 | 3 | 0.16 | 0.43 |
| Satisfaction | 1151 | 1151 | 100.00% | 1 | 5 | 4.15 | 0.82 |
| Loyalty | 1151 | 245* | 21.29% | -1 | 1 | 0.16 | 0.43 |

*The 245 comments on loyalty consist of 214 positive intentions and 31 negative intentions. SI_Positive: positive sensory impressions; SI_Negative: negative sensory impressions.

*4.2 Results*

In total, 69% of the sample of reviews contained positive sensory impressions, 13% contained negative sensory impressions and 6% of the sample contained both positive and negative sensory impressions. Overall, 76% had a clear expression of sensory impressions, with an average of 1.81 sensory impressions per review. Visual impressions were dominant, accounting for 54% of the codes, and 56% of the sample contained some sort of visual impression. Gustatory impressions were the second most common, followed by haptic, aural and olfactory.

In order to examine the associations between sensory impressions, satisfaction and loyalty behavior, positive and the negative impressions were used as independent variables. Loyalty was used as the dependent variable, and the number of pictures in the review was used as a control variable. Satisfaction was used as a mediator variable between sensory impressions and destination loyalty. The regression equations were as follows:

*Loyalty=C + β1 Picture + β2 SI_Positive + β3 SI_Negative + β4 Satisfaction + ε*

*Table 4.* Regression analysis results

| Model Dependent variable | Model 1 Loyalty | Model 2 Satisfaction | Model 3 Loyalty |
|---|---|---|---|
| Pictures | -0.052 (-1.795) | 0.008 (0.322) | -0.053 (-1.872) |
| SI_Positive | 0.150** (5.122) | 0.275** (10.992) | 0.097** (3.207) |
| SI_Negative | -0.276** (-9.757) | -0.473** (-19.542) | -0.186** (-5.762) |
| Satisfaction | | | 0.191** (5.601) |
| F | 48.126** | 205.935** | 44.893** |
| F Change | | | 31.371** |
| $R^2$ | 0.112 | 0.350 | 0.135 |
| $\triangle R^2$ | | | 0.023 |

* indicates $p<0.05$; ** indicates $p<0.01$. SI_Positive: positive sensory impressions; SI_Negative: negative sensory impressions.

According to the three-step regression method proposed by Baron and Kenny (1986), the results of the hierarchical regression is presented in Table 4. The results of models 1 and 2 indicate that both positive and negative sensory impressions are associate with tourist satisfaction and destination loyalty. But negative sensory impressions have greater effects. Model 3 added satisfaction as the mediator, which with a coefficient of 0.191, is highly significant (t=5.601, Sig.=0.000). Combined with the results of model 2 and model 3, the mediation effect of satisfaction is supported. With a further observation of the independent variables of SI_Positive (β=0.097, t=3.207, Sig.=0.001) and SI_Negative (β=-0.186, t=-5.762, Sig.=0.000), it was found that regression coefficients were not 0 and significant, indicating that satisfaction was a partial mediator.

Based on these results, we can argue that reviews of destinations left by tourists on review websites, do show evidence of sensory impressions and that they seem to be influential factors in tourist satisfaction and loyalty attitudes. However, some online reviews can be biased due to certain external factors such as sponsored posts and the review data used in study 1 contained a limited number of valid codes of loyalty, which could explain the rather low outcomes of the regression model ($R^2$). Thus, further evidence was required to explore the associations between sensory impressions and loyalty behavior. In addition, online review data cannot be used to examine the differences between sensory impressions and destination image at the conceptual level of their links to loyalty behavior. Therefore, by using more rigorous experimental data, study 2 was required to confirm these relationships and to compare the two constructs empirically.

# 5. STUDY 2: COMPARISON BETWEEN SENSORY IMPRESSIONS AND DESTINATION IMAGE

*5.1 Method*

A field study was adopted to compare the differences between sensory impressions and destination image. Participants travelled to Huanglongxi for a one-day tour. Forty undergraduate students (18 males, 22 females, age range 20-22 years) were recruited for the study. All the recruited students are Chinese and from the same grade, school and university in Chengdu. A homogeneous student sample was used in order to minimize the interference of other factors (Li, Pan, & Zhang, et al., 2009). However, to ensure they can be considered actual tourists, all of them have not visited Huanglongxi before and their hometowns are all in cities other than Chengdu, among which, 7 students are from other cities in Sichuan province, 4 are from Chongqing municipality, 3 from Guangxi province, 3 from Yunnan province, the remaining 23 participants are from 14 other provinces of mainland China.

A week before the tour, participants were asked to search for information on the destination. On the way to the destination, participants were asked to fill out a questionnaire about destination image and sensory impressions of Huanglongxi. On their return, participants were required to complete the questionnaire again. This time, in addition to the questions related to destination image and sensory impressions, the questionnaire also included items measuring satisfaction and loyalty.

Drawing on destination image research, we deployed a standard approach to identify both cognitive and affective image types (Kim & Richardson, 2003). Since destination image is more abstract and covers a whole range of aspects of the destination, travel notes with more words and detailed descriptions are the commonly used data resources in previous studies to extract the variables of destination image. To be consistent with existing research, 50 travel notes (around 100,000 words in total) obtained from the Mafengwo website were used to extract image attributes of Huanglongxi and then the online reviews obtained in study 1 were used to verify that the encoded data regarding destination image was complete and accurate. These encoded image attributes were further compared with the attribute types identified in the literature and then filtered and modified. This yielded 12 cognitive (Table 5) and four affective image items, which were incorporated into the questionnaire (Table 6). The criterion for inclusion was that each item had to appear in at least 5% of the sample. The items used to measure sensory impressions were replicated from study 1 (see Table 2) and the analysis of the 50 travel notes indicated that the coding of sensory impressions reached data saturation. Loyalty was measured by asking about "willingness to revisit" and "intentions to recommend to others" (Baker & Crompton, 2000; Bigné, et al., 2001; Chen & Tsai, 2007; Castro, Armario & Ruiz, 2007). Participants rated all the items on a 7-point Likert scale.

In order to control for common methods bias, this study adopted the widely used procedural remedies reviewed by Tehseen, Ramayah and Sajilan (2017) for questionnaire design and distribution such as using multiple items to measure the same variable, avoiding vague expressions, making it hard for respondents to guess research objectives and the relationships between variables, and providing anonymity for respondents. In addition, the statistical approach was also utilized to assess common method bias. Harman's single-factor test was used to analyze the variance proportion of a single factor (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). The results show that the first component with the

Exploratory factor analysis was used to ensure the validity of the measurement scale for destination image of Huanglongxi. The 16 items were divided into four factors: attractions, community, comfort, and affective image. The cumulative variance interpretation rate reached 81.047% (KMO=0.778, Sig.=0.00), indicating that scale validity was good. Confirmatory factor analysis showed adequate model fit: $\chi^2$=105.789，df=98，p=0.278>0.05，$\chi^2$/df=1.079，RMSEA=0.045，GFI=0.98>0.9，CFI=0.98>0.9，IFI=0.99>0.9. Composite reliability of the four factors ranged from 0.899 to 0.948, exceed 0.7, which indicate high reliability. All item-to-factor loadings ranged from 0.764 to 0.937 and the values of AVE for each dimension ranged from 0.634 to 0.859, which were greater than the cut-off value of 0.50 (Fornell & Larcker, 1981), indicating that the scale had good convergent validity. The inter-correlations between constructs were consistently smaller than the square root of AVE for all constructs (Fornell & Larcker, 1981) indicating that the scale had good discriminating validity. For the regression analysis, the average of all 16 destination image items was used, but the four factors were used as observed variables of destination image for the structural equation model used in study 3. The average mean of the 31 items was used to represent tourist's sensory impressions.

*Table 5.* Cognitive image and overall image extracted from travel notes

| **Destination image** (Cognitive image) | **% of coding** | **% of sample** |
|---|---|---|
| Well-preserved cultural monument | 13.42% | 62.00% |
| Abundant local cuisine | 10.07% | 54.00% |
| Antique architectural style | 9.73% | 50.00% |
| Historical cultural heritage | 7.38% | 38.00% |
| Simple and relaxed lifestyle | 7.38% | 38.00% |
| Beautiful environment | 6.04% | 32.00% |
| Good for water activities | 6.04% | 28.00% |
| Delicate handicrafts | 5.70% | 30.00% |
| Kind local residents | 5.03% | 28.00% |
| Wonderful folk performances | 4.03% | 24.00% |
| Traditional folk customs | 3.69% | 20.00% |
| Pleasant climate | 2.01% | 10.00% |

*Table 6.* Factor Analysis of Cognitive and affective Image Items

| | Mean | SD (*n*=40) | Factor Loading (EFA) | Variance explained (%) | Cronbach' α | Factor Loading (CFA) | AVE | Composite reliability |
|---|---|---|---|---|---|---|---|---|
| **Factor Ⅰ: Attractions** | | | | 38.786 | 0.910 | | 0.634 | 0.912 |
| DI1 Antique architectural style | 5.70 | 1.067 | 0.847 | | | 0.823 | | |
| DI2 Historical cultural heritage | 5.25 | 1.171 | 0.837 | | | 0.753 | | |
| DI3 Well-preserved cultural monument | 5.38 | 1.055 | 0.822 | | | 0.847 | | |
| DI4 Abundant local cuisine | 5.55 | 1.239 | 0.822 | | | 0.819 | | |
| DI5 Wonderful folk performances | 5.48 | 1.109 | 0.793 | | | 0.752 | | |
| DI6 Delicate handicrafts | 5.35 | 1.001 | 0.764 | | | 0.778 | | |
| **Factor Ⅱ: Community** | | | | 12.329 | 0.946 | | 0.859 | 0.948 |
| DI7 Kind local residents | 5.23 | 1.459 | 0.896 | | | 0.976 | | |
| DI8 Simple and relaxed lifestyle | 5.35 | 1.610 | 0.864 | | | 0.938 | | |
| DI9 Traditional folk customs | 4.92 | 1.347 | 0.861 | | | 0.863 | | |
| **Factor Ⅲ: Comfort** | | | | 8.744 | 0.897 | | 0.749 | 0.899 |
| DI10 Pleasant climate | 5.85 | 1.122 | 0.885 | | | 0.909 | | |

| | Mean | SD | Loading | Variance (%) | α | | | |
|---|---|---|---|---|---|---|---|---|
| DI11 Beautiful environment | 6.32 | .971 | 0.836 | | | 0.788 | | |
| DI12 Hydrophilic places | 5.80 | 1.091 | 0.836 | | | 0.894 | | |
| **Factor IV: Affective image** | | | | 21.188 | 0.932 | | 0.783 | 0.935 |
| DI13 Unpleasant - Pleasant | 5.77 | 1.527 | 0.937 | | | 0.806 | | |
| DI14 Gloomy - Exciting | 6.13 | 1.453 | 0.911 | | | 0.819 | | |
| DI15 Distressing - Relaxing | 5.73 | 1.768 | 0.906 | | | 0.978 | | |
| DI16 Sleepy - Arousing | 5.95 | 1.260 | 0.900 | | | 0.924 | | |
| **Total** | | | | **81.047%** | | | | |

*5.2 Results*

In order to compare the change of destination image and sensory impression before and after the trip, a paired sample t-tests was conducted to reveal the differences between the two concepts. The paired sample t-tests showed that destination image ($M_{Before}=5.13$, $M_{After}=5.61$, t=-5.256, Sig.=0.00) and sensory impressions ($M_{Before}=4.38$, $M_{After}=5.26$, t=-6.150, Sig. t =0.00) changed significantly after travel, but sensory impressions changed to a much larger degree. Moreover, only 6 out of 16 destination image items differed significantly ($p<0.05$) following the trip. In contrast, 22 out of 31 items (71%) of sensory impression items changed significantly ($p<0.05$). Compared with the means of destination image items, the means of sensory impression items increased significantly, especially for the aural, olfactory, gustatory and haptic impressions, which, unlike the visual impressions, are difficult to obtain prior to the trip (16 of these 19 items changed significantly).

*Table 7. Regression analysis results*

| **Model** | **Model 4** | **Model 5** | **Model 6** |
|---|---|---|---|
| **Dependent variable** | **Loyalty** | **Loyalty** | **Loyalty** |
| Gender | -0.114 (-1.278) | 0.355 (0.725) | -0.033 (-0.400) |
| SI | 0.827** (9.299) | | 0.571** (5.133) |
| DI | | 0.790** (7.449) | 0.376** (3.272) |
| *F* | 44.956** | 29.036** | 41.401** |
| *F Change* | | | 26.347** |
| *$R^2$* | 0.708 | 0.611 | 0.775 |
| *$\triangle R^2$* | | | 0.164 |

\* indicates $p<0.05$; ** indicates $p<0.01$.

Considering that the size of the sample in the field study was relatively small, regression analysis was adopted, with sensory impressions as the independent variable, gender as the control variable and loyalty as the criterion variable (dependent variable). In Table 7, the $R^2$ value in model 4 is 0.708, and the standardization coefficient of sensory impression on loyalty was 0.827 (Sig.<0.01), indicating that sensory impressions can be linked very strongly to loyalty, which is consistent with the theoretical expectations outlined earlier.

In order to examine whether sensory impressions have advantages over destination image in predicting loyalty outcomes from tourism, a competing model (model 5) was constructed. The $R^2$ value in model 5 was 0.611 with a standardization coefficient of 0.790 (Sig.<0.01), indicating that destination image also has good explanatory power for loyalty. However, comparing the two models, the $R^2$ value and the

coefficient are both smaller in the model based on destination image compared with the model with sensory impressions. Thus, we conclude that sensory impressions performs better in explaining destination loyalty than destination image in this study.

In order to run further validity checks on the role of sensory impressions (Sechrest, 1963), we used a stepwise regression to add sensory impressions as an explanatory variable to model 5 (model 6). Compared with model 5, the significance level of F change in model 6 was under 0.01. The standardization coefficient of sensory impressions in model 6 was 0.571 (Sig.<0.01), which is higher than the coefficient of destination image (0.376). VIF values of sensory impressions and destination image are 2.115 and 1.983, which indicates that there is no multicollinearity. Additionally, the $\triangle R^2$ was 0.164, indicating that adding sensory impressions greatly improved the explanatory power of the model.

Although this study was useful in comparing the influence of sensory impressions to destination image, as a field study it is limited by the type and size of the sample. Whether the conclusions are applicable to more general populations requires further examination. We wanted to understand whether sensory impressions as a new concept could be integrated into the established theorization of destination image and it's associations with loyalty outcomes. Therefore, study 3 used a survey designed to replicate the results of study 2 and compare how sensory impressions relates to image and loyalty as theoretical constructs.

## 6. STUDY 3: INTEGRATING SENSORY IMPRESSIONS INTO ESTABLISHED NETWORK OF LOYALTY

*6.1 Method*

We devised a survey instrument that was based on that used in study 2, with the addition of common concepts explaining destination loyalty (Li & Petrick, 2010), including destination image as the independent variable, perceived quality, perceived value (Chen & Tsai, 2007) and satisfaction as the mediators, and loyalty as the dependent variable. Referring to the previous literature, a single question was used to measure perceived quality: "How would you describe the stay in relation to what you had expected, on a scale of 1 to 7?" (Bigné et al., 2001). Perceived value consists of three dimensions: time value, money value and effort value (Bolton & Drew, 1991; Chen & Tsai, 2007). Satisfaction was measured by asking for an "overall evaluation of this journey" (Bigné et al., 2001; Sirakaya, Petrick, & Choi, 2004; Chen & Tsai, 2007). The data were collected by randomly distributing questionnaires to tourists in the car park at Huanglongxi who were just returning to their vehicles following their visit. A total of 509 questionnaires were distributed, of which 323 valid questionnaires were collected. Of the respondents, 48.3% were male and 51.7% female; 24.5% were under 18 years old, 27.2% were aged 18–25 years, 30.7% 25–45 years, 12.4% 45–60 years, and 5.3% over 60 years; 30.3% had an education level below undergraduate, 44.0% undergraduate and at 25.7% masters degree or above. All respondents were first-time visitors, which helped to avoid survivor bias caused by surveying repeat tourists. This study adopted the same procedural and statistical remedies as study 2 to avoid common method bias. The Harman test shows that the first component with the largest eigenvalue explains 43.977% of all variance (<50%), suggesting the common method bias is at an acceptance level.

*6.2 Results*

The Cronbach's α of the variables of destination image, perceived value and loyalty were 0.870, 0.891 and 0.871 respectively, demonstrating a high level of reliability. Confirmatory factor analysis (CFA) was used to test the validity of the destination image, perceived value and loyalty measures. The CFA model ($\chi^2$/df=0.826<2, RMR=0.013<0.05, RMSEA=0.000<0.08, GFI=0.987>0.9, NFI=0.991>0.9, SRMR=0.016) achieved a good degree of fit, among which the factor loadings of four measurement items of destination image (DI) were in the range 0.763~0.833, the loadings of three measurement items of perceived value (PV) were in the range 0.839~0.875, and the loadings of two measurement items of loyalty (LY) were 0.877 and 0.880. The factor loadings of all measurement items were higher than 0.7, indicating that the scale had good convergent validity. The AVE values of the three variables were higher than the square of the correlation coefficient among the variables, indicating that the scales had good discriminant validity (Table 8).

*Table 8.* The results of CFA

| Variance & Items | Mean | SD | Standardized factor loading | t-value | Construct reliability | Average variance extracted |
|---|---|---|---|---|---|---|
| **1. Destination image** | 5.37 | .721 | | | 0.87 | 0.63 |
| DI1 Attractions | 5.39 | .787 | 0.833 | - | | |
| DI2 Community | 5.44 | .880 | 0.763 | 15.477 | | |
| DI3 Comfort | 5.59 | .915 | 0.803 | 16.553 | | |
| DI4 Affective image | 5.11 | .848 | 0.771 | 15.634 | | |
| **2. Perceived value** | 5.20 | .823 | | | 0.89 | 0.73 |
| PV1 Time value | 5.21 | .958 | 0.857 | - | | |
| PV2 Money value | 5.15 | .865 | 0.875 | 20.398 | | |
| PV3 Effort value | 5.23 | .899 | 0.839 | 18.867 | | |
| **3. Loyalty** | 4.92 | .963 | | | 0.87 | 0.77 |
| LY1 Willingness to revisit | 4.95 | 1.031 | 0.877 | - | | |
| LY2 Intention to recommend to others | 4.89 | 1.016 | 0.880 | 21.950 | | |

*Table 9.* Regression analysis results (criterion validity and incremental validity)

| Model | Model 4' | Model 5' | Model 6' |
|---|---|---|---|
| Dependent variable | Loyalty | Loyalty | Loyalty |
| Gender | -0.051 (-1.918) | -0.006 (-0.167) | -0.033 (-1.374) |
| Age | 0.041 (1.432) | -0.033 (-0.887) | 0.015 (0.597) |
| Education | -0.006 (-0.219) | -0.007 (-0.188) | -0.010 (-0.391) |
| SI | 0.879** (32.953) | | 0.640** (18.484) |
| DI | | 0.797** (23.363) | 0.327** (9.395) |
| *F* | 272.575** | 137.134** | 295.554** |
| *F Change* | | | 341.643** |
| $R^2$ | 0.774 | 0.633 | 0.823 |
| $\triangle R^2$ | | | 0.190 |

* indicates $p<0.05$; ** indicates $p<0.01$.

Sensory impressions were measured using the same procedure as in study 2. As the sample population was now more diverse, age and educational background were added as control variables to the regression equation. The results (Table 9) showed that sensory impressions in model 4' can be strongly associated with loyalty ($R^2$=0.774, β=0.879). Compared with model 5', the addition of sensory impressions in model 6' increased the relationship effects (F change=341.643, $\triangle R^2$ = 0.190). Above all, sensory impressions could be seen to have good relationships with loyalty outcomes, as was also shown in study 2.

In this model, destination image is the independent variable, perceived quality, perceived value and satisfaction are the mediators, and loyalty is the dependent variable (Figure 2). The overall model indicator was $\chi^2$/df=0.849<2.0. Other indicators of goodness of fit were RMR=0.012<0.05, SRMR=0.015<0.05, RMSEA=0.000<0.05, GFI=0.983>0.9, NFI=0.990>0.9, indicating an adequate fit. The coefficients were significant in each path, which means the data confirms relationships among variables previously found significant in destination image and loyalty theory.
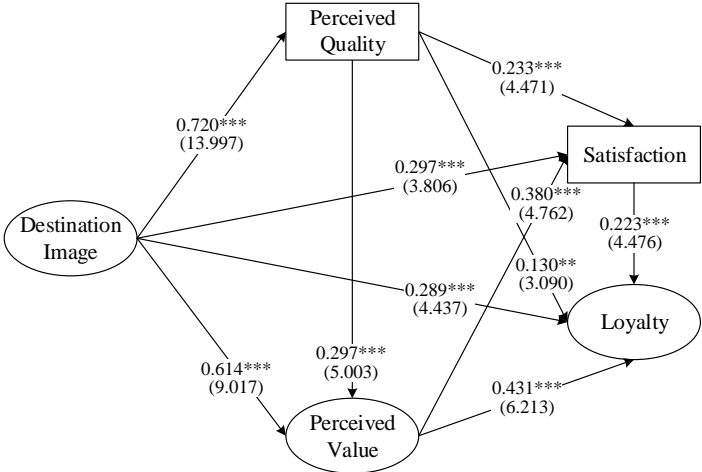


*Figure 2*. Theoretical model without sensory impression

Sensory impressions was subsequently added into the structural model (Figure 3) and the new model with sensory impressions also had a good model fit ($\chi^2$/df=1.436<2.0). Other indicators of goodness of fit are RMR=0.013<0.05, SRMR=0.018<0.05, RMSEA=0.037<0.05, GFI=0.972>0.9, NFI=0.983>0.9. Compared with the destination image model, the explanatory power derived from the addition of sensory impressions was enhanced significantly ($\triangle\chi^2$=29.723, $\triangle$df=6, Sig.<0.01). The effects of each path were highly significant. Perceived quality, perceived value and satisfaction mediated the effect of destination image on loyalty, producing values of 0.056, 0.128 and 0.020 respectively; they also mediated the effect of sensory impressions on loyalty with mediation effects of 0.068, 0.164 and 0.025. Moreover, the direct-effect coefficients of sensory impressions to other variables were significant, which means that sensory impressions has good explanatory power on all the other variables in the model. In addition, the comparison of path coefficients between sensory impressions and destination image reconfirmed that both the direct ($\beta_{SI}$=0.323, $\beta_{DI}$=0.255) and indirect effect ($\beta_{SI}$=0.259, $\beta_{DI}$=0.202) of sensory impressions on loyalty are greater than that of destination image.
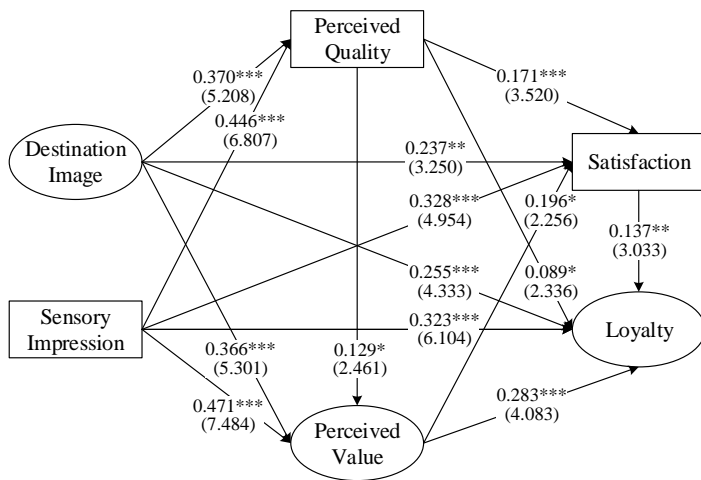
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*Figure 3.* Theoretical model with sensory impression.

## 7. DISCUSSION AND CONCLUSIONS

### 7.1 Discussion of Main findings

Despite the broad consensus around the importance of sensory and bodily experiences as fundamental to our understanding of human cognition, there is much less agreement about what this implies and how it can be best conceptualized (Krishna, 2012). Based on user generated content, the first study of this research showed that tourists are able to form content-rich sensory impressions of the destination spontaneously, adding further evidence that sensory impressions could directly influence tourist destination loyalty, consistent with results generated from survey data (Agapito, et al., 2017).

Although destination-image has received a great deal of attention and is confirmed as a key antecedent of destination loyalty (Bigné, Sánchez, & Sánchez 2001; Castro, Armario, & Ruiz, 2007; Chi & Qu, 2008; Prayag & Ryan, 2012), this research (study 2) found that sensory impressions can provide additional predictive power to explain destination loyalty when the effect of destination image is controlled and an even bigger influence on intentions to revisit than destination image at the post-trip stage. One possible reason for these findings is that physical memory is a better and direct reflector of travel experience compared with cognitive and emotional perceptions (e.g. Brakus, Schmitt, & Zarantonello, 2009; Gentile, Spiller, & Noci, 2007). Thus, the sensory impressions after travel experience have more power than abstract destination image in stimulating tourists' intention to re-experience.

Moreover, building on previous literature, a nomological network of destination loyalty has been established, in which perceived quality, perceived value and satisfaction are highly associated with destination loyalty (Bigné, Sánchez, & Sánchez, 2001; Castro, Armario, & Ruiz, 2007; Kim, Holland & Han, 2013; Song, Su & Li, 2013). Study 3 revealed that both sensory impression and destination image can be integrated into the existing nomological network to explain the formation of destination loyalty. The nomological network with sensory impressions has a better model fit than the one without it, which indicates the necessity to include sensory impressions into the theoretical network of destination loyalty to advance knowledge development.

*7.2 Theoretical implications*

The investigation of sensory impressions presented in this study provides an embodied cognition perspective adapted from sensory marketing research (Krishna & Schwarz, 2014) to understand the formation of destination loyalty. Unlike the predominant approach that has focused on the influence of conscious mental processing (e.g. destination image perception) on tourists behavior (Chen & Phou, 2013; Song, Su & Li, 2013; Zhang, et al., 2014; Hultman, et al., 2015), the embodied cognition perspective argues for the direct influence of bodily feelings on tourists' attitudes and subsequent behavior. It emphasizes the importance of the senses as information-receiving instruments and, more importantly, these bodily feelings can be thought of as subconscious triggers leading to outcomes such as satisfaction, or loyalty behaviors (Krishna, 2012; Agapito, Mendes, & Valle, 2013; Dohee & Perdue, 2013). This adds a new perspective enabling a more comprehensive understanding of destination loyalty and provides promising directions for future studies.

Continuing with the investigations into sensory impressions conducted by Agapito, et al.(2014, 2017), this research is one of the first attempts to demonstrate the differences between sensory impressions and destination image, revealing that both physical sensations and cognitive perceptions can affect destination loyalty and that the two paths co-exist. This finding provides empirical evidence for the dual-system destination choice model proposed by McCabe, Li and Chen (2016) which highlights that destination choice may be based not only on a rational assessment but can also be understood as an intuitive response based on physical memory.

Furthermore, this research is also the first to test the nomological validity of sensory impressions by integrating it into the existing nomological network of destination loyalty. The re-established network with sensory impressions has a better model fit, which confirmed that sensory impressions are not only related to destination loyalty but also associate with other concepts highly related to destination loyalty. Thus, the findings rule out the possibility that the relationship between sensory impressions and destination loyalty is merely a statistical coincidence and more importantly, the improved nomological network revealed the mediators (i.e. perceived quality, perceived value and satisfaction) and the process through which sensory impressions influence destination loyalty. In addition, the multi-level validation (criterion, incremental and nomologcial validation) approach adopted by this research is a conventional route for new construct development (Yang, Watkins, & Marsick, 2004), but one rarely employed in tourism research, which provides a more rigorous approach for new concept or construct establishment.

*7.3 Managerial implications*

Although the purpose of our study was largely conceptual, there are many possible managerial applications for sensory impressions. Sensory marketing theory has demonstrated the marketing potential of the sensory experience, especially for tourism destinations which have diversified their tourism resources and developed enriched sensory experiences as integral to the offer. Firstly, destination marketing organizations should build sensory impressions into the design of tourist experiences. According to our results, sensory impressions are highly associated with perceived quality, value, satisfaction and, more importantly, loyalty. Particularly after the trip, the influence of sensory impressions on tourists recommend and revisit intentions is greater than that of destination image.

Specifically, visual impressions account for the highest proportion of the sensory impressions, which confirms their importance in terms of influence on preferences and behaviors. However, in the online reviews, we found that all four of the other types of sensory impressions – auditory, olfactory, gustatory and haptic, also influence satisfaction and loyalty. Therefore, in the future, destinations should pay attention not only to the construction of visual landscape, but also consider creating a variety of sensory landscapes, such as the soundscape advocated by Jiang, Zhang, and Zhang, et al (2017). In this way, the sensory experience of tourists can be expanded to create multidimensional sensory impressions, which could help destinations to gain competitive advantage.

By understanding tourist's sensory impressions, destination managers can identify the source of perceived value. This provides new tools for destination resource management and development as well as market segmentation. For example, we found that the most commonly mentioned haptic impressions came from water-related activities, which implies that Huanglongxi should perhaps pay more attention to the cleanliness of water or the carrying capacity of water-based attractions to ensure positive haptic experiences.

Furthermore, sensory impressions can also be used as a basis for marketing segmentation. For instance, Agapito et al. (2014) identified four types of tourists through an analysis of their sensory experiences when visiting southwest Portugal. This kind of classification can facilitate better-targeted and better-designed destination experiences in response to the sensory experience preferences of different tourist groups.

*7.4 Limitation and future study*

This study focused on whether sensory impressions, a new construct, has new and unique features compared with the conventional antecedent, destination image, in the explanation of destination loyalty. Three studies were designed to test the criterion validity, incremental validity and nomological validity of this new construct. As a progressive validation process, all the studies were conducted on the same destination in China to ensure consistency regarding the content used to measure sensory impression. This, however, may limit the generalizability of the research. Future studies based on other types of destinations could be conducted to expand the external validity of the research findings. As for data collection and sample selection, other platforms such as TripAdvisor and more diversified tourist groups (e.g. nationality and travel experience) should be considered in follow-up research to verify the robustness of these conclusions.

Additionally, this research investigated the impact of sensory impressions only on destination loyalty after travel experience. Although we found that sensory impressions has a stronger explanatory power in relation to destination loyalty than does destination image, it does not imply a superiority to destination image construct at all stages of tourism decision making. In study 2, we found that the sensory impressions of potential tourists was thin and inaccurate before visiting. This is because it is difficult to transmit sensory experiences of the destination, apart from visual impressions and to a lesser extent auditory impressions.

Therefore, sensory impressions may have a limited impact on the willingness of potential tourists to visit prior to the trip. In contrast, the formation of destination image does not rely on real experiences,

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although images are stronger post-visit, as tourists mostly obtain images through information search, advertising, (e-) word of mouth and other destination-related information prior to travel. This means that in the pre-visit stage, destination image may have a stronger influence on the willingness to travel than sensory impressions. In future studies, a longitudinal design could be adopted to examine differences in the explanatory powers of sensory impressions and destination image at different stages of decision making.

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