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Canal Boat Tourism: An Application of Complexity Theory

Abstract

This study applies complexity theory to explain how a cognitive-affective model indicates canal boat tour participants' desired behaviour. An *in-situ* survey was administered to collect data from 202 boat tour participants following a tour of the Canal du Faux-Rempart in Strasbourg, France. The study applies an asymmetrical analysis to investigate the cognitive-affective factors deriving participants' intentions to recommend canal boat tours. This study uses an asymmetrical approach to explore causal recipes from three configurations of socio-demographic factors with prior experience and cognitive and affective factors, leading to both high and low scores of recommendation intention. An analysis of necessary conditions was performed to identify the factors required to achieve the expected outcome. The results revealed that complexity theory supports causal interactions, leading to intention to recommend. Overall image, perceived quality, emotion and satisfaction are necessary factors to recommend canal boat tours. We discuss the theoretical and practical implications.

Key words

Canal boating; complexity theory; cognitive-affective; fsQCA; necessary conditions; emotion

1. Introduction

The socio-economic and cultural essence of canal boat tour recreations remains an exceptional topic in service research. Canals are frequently adjacent to charming natural environments that contribute to human health and psychological well-being (Pretty et al., 2007; Völker and Kistemann, 2011) Canals are a subsection of coastal expansion that have been artificially constructed to provide a favourable attraction of waterside living and leisure. The benefits of using canals for 'green' recreation might include long-term changes in attitudes towards nature and the environment and wider support for pro-sustainability policies and practices (Pretty et al., 2007). On the one hand, a socio-psychological analysis of the consumer's perception is essential for encouraging and promoting pro-environmental ways as tourism affects the long-standing success of eco-friendly products and services at the destinations.

Previous research has focused on the effect of eco-friendly activities on favourable outcomes of consumers' post-purchase behaviours and the predictions of consumers' intention to recommend eco-friendly destinations and/or activities (Castellanos-Verdugo et al., 2016;

Craggs and Schofield, 2011; Papadimitriou et al., 2015). Related to heritage tourism, Holly et al. (2016) used the Rideau Canal to test the sustainable tourism marketing model. Pretty et al. (2007) examined the psychological and mundane aspects of canal boat travel as an eco-friendly activity. Despite the vital role of water-based leisure activities in human life and their popularity as worldwide, epochal and sustainable recreation, socio-psychological analysis that examines the marketing of canal boat tours is scant (Gon et al., 2016; Lukovic, 2013), and to the best of our knowledge, no previous study models the post-purchase behaviour of canal boat tour participants.

Theoretically, the importance of cognitive and affective processes in explaining consumers' decisions has been studied in existing literature (e.g. Han et al., 2018), specifically, whereby satisfaction is influenced by the individual's cognitive judgments and emotions derived from the consumption experience. On the other hand, consumer attitudes and behaviours comprise a complex process of cognitive and affective sequences, and their responses are based on a complex combination of indicators that formulate expected behavioural intentions (Mehran and Olya, 2018; Olya and Akhshik, 2019). Accordingly, existing literature indicates that contact with canal boat travel as an eco-friendly activity generates physical and psychological health benefits (Pretty et al., 2007), and canal boat tour participants' behavioural intention, as a complex component of consumer psychology, may play a predominant role in destination success and the sustainable development of tourism.

Moreover, the effect of external factors and their interactions with the socio-demographic and psychological characteristics of participants increase the complexities of consumer behaviours towards services. Several empirical studies have used and recommended augmentation of socio-demographic variables to address the complexity of tourists' intentional behaviours (Olya and Akhshik, 2019; Olya and Gavilyan, 2017) and consumer behaviours towards environmental issues (Lezak and Thibodeau, 2016) in the service sector. However, compared to the large body of work examining canals' environmental issues (e.g. water contamination of canals), few studies have focused on socio-psychological, cultural, political and economic concerns related to the management of canals and adjacent features (Stocker et al., 2016).

Various theories, such as the theory of planned behaviour (TPB; Ajzen 1985), have been employed to provide theoretical support for explaining the behaviour of consumers

in the service sector, which has focused on investigations of the 'net effect' of indicators on consumers' behaviour. According to the review of relevant literature, the aforesaid theories have failed to explain the complexity of causal interaction of predecessor antecedents as they have overlooked the fact that behaviour will not alter until the complex derivatives shaping the behaviour reach a certain 'tipping point level' (Armstrong, 2012; Olya and Akhshik, 2019). This study contributes to the existing body of knowledge in several ways. Initially, it aims to advance the existing theory and methodology on the behaviour of canal boat tour participants using complexity theory and a cognitive-affective model.

Despite the tremendous amount of research on modelling of consumer behaviour, no study to date has contemplated and measured the extent to which consumers have a desire to recommend boat tours. **This empirical study intends to fill this research gap by addressing the following questions: Does complexity theory explain complex interactions of cognitive and affective configurations with socio-demographic configurations in predicting consumer behaviour? What factors (i.e. sufficient conditions) affect participants' intentions to recommend a canal boat tour? What causal configurations (i.e. sufficient combination of demographic, cognitive and affective factors) are sufficient to indicate desirable behaviours of canal boat tour participants as well as their undesirable behaviour? What factors are necessary for achieving high intention and low intention to recommend canal boat tours?**

This study argues that complexity theory can offer theoretical support for socio-demographic configurations and cognitive and affective configurations, along with prior canal boat tour experience, in formulating the satisfaction, emotion and intention to recommend this service. This study uses a systematic process comprising seven steps to meet the research objectives. After designing the questionnaire, a pilot study was conducted to check the ambiguity of the scale items and to highlight possible issues with the survey. The main field survey was then administered, and the questionnaire was distributed to individuals who had participated in boat tours at the Canal du Faux-Rempart, in Strasbourg, France. Next, the data were scanned and screened, and a rigorous set of measurements for model testing was established to evaluate the reliability and validity of the study measures. We use Structural Equation Modelling (SEM) to investigate the sufficient and distinct links of the cognitive-affective model to indicate intention to recommend the canal boat tour to others. Sufficient configurations based on cognitive-affective and socio-demographic factors (i.e. causal recipes)

for predicting the outcome of the proposed configurational model were explored using fsQCA. After performing the NCA to identify the cognitive and affective factors required to attain the expected outcome, we evaluated the results in light of the key tenets of complexity theory.

In conventional symmetrical approaches (e.g. regression), multicollinearity issues, non-normality of datasets, disregard of occurrences of contrarian cases and ignorance/control of other factors that affect the model are some issues that can provide misleading results (Woodside, 2015). Using fsQCA as an asymmetrical approach, this study extends the body of knowledge to determine under what conditions (i.e. causal solutions) participants are reluctant to recommend canal boat tours as causal solutions for low score outcomes, which may not be mirror opposites of solutions for the stimulation of high outcome scores. Practically, the outcomes of this study will provide valuable information for canal boat tour operators, service managers, the local government and marketers to improve desired behavioural outcomes of consumers in destinations where canal boats form one of the major tourist attractions.

2. Theoretical background and model development

2.1.Canal boat tourism

Scholars have described canal boating as a type of leisure boat tourism that refers to single-day cruising or short trips along canals on small boats (Gon et al., 2016). Canal boat tourism is a pro-environment leisure activity that improves the economic development of destinations and generates physical and psychological health benefits for canal boat participants (Jugović et al., 2011; Pretty et al., 2007). In terms of socioeconomic growth prospects, leisure boating is mentioned as an underexplored research area (Gon et al., 2016; Lukovic, 2013). As boats offer a means of transportation, accommodation, recreation and leisure (Diakomihalis, 2007), the activity of a single day of boating is a predominant type of leisure tour in numerous destinations (e.g. Leeds and Birmingham in the United Kingdom, Amsterdam in the Netherlands, Hamburg in Germany, Venice in Italy, Disneyland in California, Dotonbori Osaka in Japan and Suzhou in China). The images of the above destinations have been tailored with canal boat tour activity. Strasbourg is a charming French city that is well known for canal cruising (Ward, 2015) and that allows participant visitors to see a number of famous attractions from the city boat tours lasting 45–70 minutes (https://www.tourisme-alsace.com/en/223008552-Batorama-boat-tour.html).

2.2. Cognitive-affective model

The cognitive-affective approach is a holistic empirical model that is used to explain the consumer's decision-making process (del Bosque and San Martín, 2008; Juarrero, 1999; Oliver, 1993). One of the desired behavioural outcomes of consumers is the intention to recommend to others. Important drivers of intention to recommend are documented in the extant literature and involve overall image (Alcañiz et al., 2009; Melo et al., 2017; Papadimitriou et al. 2015; Prayag et al., 2017; Rodríguez Molina et al., 2013), perceived quality (Al-Kilani et al., 2017; Hwang and Sim, 2016) and alternative attractiveness (McKercher and Ho, 2006) as cognitive variables and satisfaction (Koklic et al., 2017; Ogbeide et al., 2017; Olya and Al-ansi, 2018) and emotion (Prayag et al., 2017) as affective variables. Current literature has also acknowledged the complexity of consumer behaviour (Woodside 2013, 2015, 2017). Considering the complexity of consumers' behavioural intentions, a cognitive-effective model would be appropriate for examining canal boat tour participants' intention to recommend the activity to others.

2.3. Perceived quality

The importance of quality as perceived by customers has spurred extensive research in the service industry. Quality of performance, which is controlled by a service provider, refers to the attributes of a service. The positive association of quality and satisfaction in the diverse context of consumer behaviour is supported in general fields (e.g. marketing, tourism, psychology) (Andersson et al., 2017). Similarly, consumers' perceptions of quality can affect their behavioural intentions (Jang and Namkung, 2009). In this regard, service quality is affiliated with the concept of evaluation through satisfaction and emotion as affective concepts (Chen and Tsai, 2007; Um et al., 2006, Žabkar et al., 2010). Um et al. (2006) found that perceived quality increased the satisfaction and behavioural intentions of visitors to Hong Kong, Chen and Tsai (2007) used the framework to operationalize trip quality and Cole and Illum (2006) measured the indirect role of perceived performance quality on the intentional behaviour of festival goers through satisfaction. **With this realisation, this study employs perceived quality as a predictor of satisfaction and emotion related to behavioural intentions of the participants of Strasbourg's canal tours. Therefore, we propose two following hypotheses:**

H1. Perceived quality significantly affects satisfaction.

H2. Perceived quality significantly affects emotion.

2.4. Alternative attractiveness

Alternative attractiveness refers to the perceived possibility of a customer attaining more satisfactory services from an alternative service provider that offers higher quality but lower priced services or more attractive services than the destination they visit or activity in which they participate (Keaveney, 1995; Kuo et al., 2013). In today's highly competitive environment, customers can easily switch to alternative service providers they might find more attractive (Bansal et al., 2004). This competitive essence of the alternative attractiveness factor has caused researchers to explore the impact of this variable on the intentional behaviour of customers in various disciplines, such as the airline industry (Jung et al., 2017), hotel industry (Han et al., 2011) and gaming industry (Hou et al., 2011).

Existing tourism and service marketing literature discusses the direct effect of alternative attractiveness on customers' switching behaviour (Hou et al., 2011), which could weaken the customer's post-purchase behavioural intention through satisfaction and emotion. However, not all alternative services are attractive for customers due to the perceived risks involved in switching or unfamiliarity with those service providers (Kuo et al., 2013).**As customers' responses towards alternative attractiveness are heterogeneous and typically vary across diverse activities in different destinations, it is worth investigating the extent to which alternative attractiveness influences participants' satisfaction, emotion and intention to recommend a canal boat tour service. Thus, we propose following hypotheses:**

H3. Alternative attraction significantly affects satisfaction.

H4. Alternative attraction significantly affects emotion.

2.5.Overall image

The concept of overall image has been extensively defined in various contexts of business and marketing subjects, and the role of overall image in the decision-making process has been well researched (Baloglu and McCleary, 1999; Castro et al., 2007; Prayag et al., 2017). Nevertheless, the role of overall image requires significant research because it will lead to improved consumer satisfaction and thus raise consumers' willingness to recommend the activities and events to others (Chen and Tsai, 2007; Lee et al., 2005; Ryu et al., 2008). Today, as tourists expect to be offered multiple choices, overall image is an important driving force in the decision-making process across choices as it involves a subjective interpretation of reality constructed in visitors' minds and shaped based on their actual experiences. Toudert and Bringas-Rábago (2016) found that destination image enhanced cruise passengers' satisfaction

and their word-of-mouth intention. Furthermore, Ryu et al. (2008) reported the overall image significantly influences consumers' behavioural intentions. **This study therefore assumes that examining effects of overall image on canal boat participants' affective conditions (i.e. satisfaction and emotion) would depict the extent to which the overall image, along with other study variables, could influence their intention to recommend canal boat tours to others. Therefore, two hypotheses proposed as follow:**

H5. Overall image significantly influences satisfaction.

H6. Overall image significantly influences emotion.

2.6. Satisfaction

According to the cognitive-affective model, satisfaction is the consumer's response to the congruence between performance and comparison standards (Oliver, 1980), which were conceived of in previous literature as the key to business success in competitive landscapes (Dayarathna et al., 2017; George, 2013; Too, 2010). A cognitive-affective view in the literature proposes that satisfaction is influenced by an individual's cognitive judgments of the consumption experience (Mano and Oliver, 1993; Oliver, 1993). Accordingly, behavioural intentions are among the most pertinent consequences of customer satisfaction in the literature on tourism and service studies (Melo et al., 2017; Le Chi, 2016; Ozturk and Gogtas, 2016). In other words, customer satisfaction leads to positive referrals and recommendations for the service provider in tour performance evaluation (Rajaguru, 2016; Koklic et al., 2017). In the case of tour activities, customer satisfaction with the tour service relates to behavioural intention, such as the intention to recommend (Castellanos-Verdugo et al. 2016; Lee, 2015). Consumers' recommendations and purchase intentions are heterogeneous based on the type of activity and context focused on in the study. Therefore, the tourist satisfaction process within diverse tourism activities requires further investigation (Pranić et al., 2013; Toudert and Bringas-Rábago, 2016). **This study proposes following hypothesis to extend our knowledge on the association of satisfaction with the behavioural intentions of participants of canal boat tour service:**

H7. Satisfaction has a significant impact on intention to recommend

2.7. Emotion

Consumers' emotional reactions play a central role in defining memorable experiences, which relate to post-consumption behaviours, such as the intention to recommend (Tung and Ritchie, 2011). Völker and Kistemann (2011) highlight the impact of blue spaces, such as those encompassing canals, in creating positive emotional benefits for visitors. Emotion, as an instance of affect (Cohen and Areni, 1991), is considered a predictor of tourists' intentions to recommend in the tourism literature (e.g. Jang and Namkung, 2009). The role of emotion in the context of service and tourism needs to be explored in various contexts because tourists' perceptions and experiences vary according to the different activities available at the destinations. **To best of our knowledge, this is the first empirical study that assesses the link of emotion with tourists' behavioural responses in the context of canal boat tour service. Therefore, we propose below hypothesis:**

H8. Emotion has a significant impact on intention to recommend.

Apart from the proposed structural equation model conducted to test proposed eight hypotheses, this research develops a configurational model to explore the casual configurations from cognitive (i.e., overall image, perceived quality and alternative attractiveness), prior experience and socio-demographic of canal boat participants leading to affective configuration (i.e., satisfaction and emotion). Three above configurations are involved to model intention to recommend of canal boat tour service to others. Configurational modelling accommodates practical explanations for canal tourism in service industry to develop canal boat tour marketing perception through allocation of a combination of the cognitive, affective and socio-demographic antecedents leading to desired behavioural outcomes of the canal boat tour participants. This research also investigates necessary conditions to achieve expected outcomes of the research model by application of necessary condition analysis (NCA).

2.8. Socio-demographic antecedents

According to the review of the literature, demographic and psychological characteristics of travellers strongly influence consumer satisfaction and emotion. As the participation of consumers in service-based programs like environmental tour activities and festivals is growing, understanding the causal solution that includes the participants' socio-demographic deference is an important theme in explaining consumer behaviour in service contexts. For example, recent studies recommend the inclusion of demographics as a causal configuration of

consumer behaviour (e.g. Olya et al., 2019). Olya and Akhshik (2019) included the combination of consumer demographics with their beliefs and values to describe the complex pro-environmental behaviours of tours participants.

Furthermore, the behaviour of consumers is considered a complex system that cannot be understood by examining the individual system components in symmetric modelling (Byrne and Callaghan, 2013). As an instance, associations of socio-demographics with consumer behaviour are heterogeneous (Mehran and Olya, 2018). Similarly, recommendation intention and repeat purchase are not triggered by a specific predictor (Matzler et al., 2019). Gannon et al. (2019) also indicate that word of mouth varies among consumers with and without prior experience of a service. Such inconsistencies are reported in the literature due to a complex set of socio-demographic characteristics (Wang and Davidson, 2010). This study therefore seeks to extend our knowledge on the association of socio-demographic configuration with prior experience and cognitive and affective configurations to predict the behavioural intentions of participants of a canal boat tour.

2.9. Why complexity theory and configurational modelling?

Many researchers have empirically confirmed that consumer attitudes and behaviours comprise a complex process of cognitive and affective sequences (Arvola et al., 2008; Brun et al., 2017; del Bosque and San Martín, 2008; Han et al., 2016; Trafimow and Sheeran, 1998). Individuals' responses are based on the complex interactions of several indicators that may contribute to the formulation of expected behavioural intentions (del Bosque and San Martín, 2008; Han et al., 2016; Han et al., 2018**). This study uses complexity theory as a core theoretical underpinning of the proposed research model to predict participants' intentions to recommend canal boat tours. Baggio (2008) describes complexity theory as a set of theoretical and conceptual tools for modelling the world in a non-linear fashion. Complexity theory is used to explain the non-linear, heterogeneous and dynamic process of the complex phenomena and has developed across a range of disciplines (e.g. natural and social sciences, politics, mathematics), especially in modelling consumer behaviour in marketing (Han et al., 2019; Olya and Altinay, 2016) and tourism expenditure (Mehran and Olya, 2018; Olya and Mehran, 2017).**

Complexity theory offers the toolkit required for the paradigm shift in social theory, in which socially complex phenomena are created partly through individual action and yet are not entirely reducible to human intentionality (Byrne, 1998; Walby, 2007).

Although complexity theory has been advocated by various sources as an alternative conceptual foundation, Baggio (2013, p. 222) asserts that it is 'still scarcely employed' in tourism and service research. According to Woodside (2017), complexity theory, which is an interdisciplinary field encompassing the complex behavioural and social sciences (e.g. psychology, economics), may serve as a theoretical underpinning of models for predicting travellers' behaviours.

Recent tourism and service marketing studies have applied complexity theory to model the complex behaviour of tourists. For example, Pappas et al. (2016) used complexity theory to predict tourists' online shopping behaviour based on their cognitive and affective perceptions. Similarly, Olya and Al-ansi (2018) used complexity theory to explain the complexity of halal consumers' intention to use and recommend halal products. Furthermore, Olya and Altinay (2016) used complexity theory to test an empirical model and deepen the understanding of causal patterns of factors stimulating tourists' behaviours in purchasing tourism weather insurance, revisiting a destination or recommending to others.

However, relying solely on the symmetric modelling of tourists' attitudes and behaviours might offer misleading implications (Olya and Gavilyan, 2016; Woodside, 2013; 2017). In conventional symmetrical approaches, multicollinearity issues, non-normality of datasets, disregard of occurrences of contrarian cases and ignorance of other factors that affect the model are some reported issues related to providing misleading results (Olya and Mehran, 2017). Woodside (2013, p. 2) contends that 'considering net effects in asymmetric methods is misleading because cases counter to the observed net effects nearly always occur, [and] not all the cases in the data support a negative or positive relationship between the independent and dependent variables. Thus, it is necessary to show the combinatory conditions for which X is a positive influence on Y as well as the combinatory conditions when X is a negative influence on Y'. For example, existing literature supports a negative association between alternative attractiveness and desirable behavioural intention (Bansal et al., 2004; Jung et al., 2017; Hou et al., 2011). Nevertheless, alternative attractiveness might play a positive role in tourists' loyalty if they perceive a high risk in switching to other activities or destinations (Kuo et al., 2013; Liu et al., 2007). The role of alternative attractiveness should thus be examined in combination with other predictors to identify the sufficient and consistent solutions leading to tourists' desirable behavioural responses.

Therefore, by exploring cognitive and affective beside socio-demographic configurations, we can elucidate the tourists' psychological process (del Bosque and San Martín, 2008). This study therefore applies an integrated model of a cognitive-effective model to examine participants' high as well as low scores of intention to recommend canal boat tours. The proposed research model consists of five socio-demographic factors, including age, gender, income level, marital status, education level and also prior experience with canal boat touring, as well as three cognitive factors: overall image, perceived quality and alternative attractiveness and two affective factors: satisfaction and emotion. Figure 1 illustrates the conceptual research model, which includes a structural model (i) and a configurational model (ii). The structural model determines the net effect of overall image, perceived quality and alternative attractiveness on the participants' satisfaction and emotion towards a canal boat tour. The model also assesses the net effects of satisfaction and emotion on the canal boat tour participants' intention to recommend. Using symmetrical modelling (e.g. SEM), this study evaluates the net effect of each factor on the model outcome. We used correlation analysis to investigate the relationship among socio-demographic factors, prior experience and outcomes of the structural model.

In the configurational model, we calculate the causal effect of consumers' socio-demographic variables and prior experience on their satisfaction and emotion. The causal effect of the cognitive configuration (consisting of overall image, perceived quality and alternative attractiveness) on satisfaction and on emotion is explored. We investigate the causal effect of affective configuration (i.e. combination of satisfaction and emotion) on recommendation intentions. We also explore causal recipes from a combination effect of the cognitive-affective antecedents and socio-demographic antecedents, which are indicated by the dotted line, in predicting the outcome.

Unlike symmetrical approaches, causal recipes for high intention to recommend this service are unique and different than mirror opposites of causal recipes for low levels of recommendation intention. The fsQCA helped with calculating the causal recipes for both high and low scores of model outcomes. The proposed configurational model was tested for both high and low scores of recommendation intention of canal boat tour participants. Combining asymmetrical modelling with complexity theory enables a sufficient configuration of factors to predict the behavioural intentions of the canal boat tour participants. We applied NCA to identify the factors required to achieve the desired behavioural intentions of canal boat

tour participants. NCA was conducted to identify the factors required to achieve the desired behavioural intentions of canal boat tour participants.

[Insert Figure 1 here.]

3. Methodology

3.1. Measurement instruments

The structured survey measured behavioural intentions as well as three cognitive factors, two affective factors, five socio-demographic factors and prior experience with canal boat touring. The employed measures were extracted from validated scales used in previous research (Campón-Cerro et al., 2017; Jung et al., 2017; Prayag et al., 2017), which were adapted for the setting of our study. Three items for intention to recommend and two items for overall image were extracted from Prayag et al. (2017). Perceived quality was gauged using two items from Campón-Cerro et al. (2017). Emotion was measured using four items (Prayag et al., 2013). Alternative attractiveness was measured using three items, and satisfaction was gauged using three items that were adapted from Jung et al. (2017). All items were measured using a 7-point Likert scale. The socio-demographic variables, namely age, gender, education level, income level and prior experience with canal boat tours, which were presented in the last section of questionnaire, were measured.

3.2. Data collection procedures

A field survey using a convenience-sampling technique was applied to collect the views of participants of a canal boat tour in Strasburg, France. Canal boat participants were approached directly and invited to participate in the survey. The survey spanned six weeks (January 3 to February 14, 2017). Questionnaires were handed out to tour boat participants and collected upon completion. Survey participants were instructed to read the brief description about the research purposes and were notified of the importance of filling out all questions. To ensure a usable response rate, the completeness of the questionnaire was checked onsite. We retrieved 240 completed questionnaires. Questionnaires with 20% of the total items missing were excluded, leaving 202 valid cases, which were subjected to further data analyses using SPSS 22.0, AMOS 22.0 and fsQCA 2.5 software. This revealed a usable response rate of 84%.

Among the 202 respondents, 93 (49%) were female, and 109 (51%) were male. In terms of age, 35 (17.3%) respondents were 16–26 years old, 87 (43%) were 27–37 years old, 42 (20.7%) were 38–47 years old, 23 (11.3%) were 48–58 years old and 15 (7.4%) were older

than 58 years. According to the descriptive statistics, 10 (4.9%) respondents had not completed high school, eight (3.9%) had a high school diploma, 53 (26.2%) had a partial college degree, 93 (46%) respondents had a college degree and 38 (18.8%) had a postgraduate degree. The income level of 63 (31.1%) respondents was under €23,750, 110 (54.4%) had an income of €23.751–€38,000, 24 (11.8%) had an income of €38,001–€57,000 (6%), four (1.9%) had an income of €57,001–€76,000 and one (.4%) had an income higher than €76,000. Concerning marital status, 110 (54.4%) respondents were single, and 92 (41.8%) were married or in a relationship. The participants were asked to state their experience with canal boat tours. The majority of participants (175, 86.6%) reported that it was their first experience, and 27 participants (13.3%) had participated in a boat tour in Strasbourg at least twice.

3.3.Analytical methods

To analyse the collected data, three types of software were used. SPSS was used to calculate the Cronbach's alpha (α), which is used for checking the reliability, and Harman's single-factor test was used, which for testing potential common method bias. **Furthermore, to check existence of outliers in dataset, the Grubbs' outlier test was (Grubbs, 1969). According to results of Grubbs outlier test, data is normal as absolute values for medium sample is higher than the critical value calculated in the tables of percentage points for significance reported in Grubbs and Beck (1972) (Appendices).** AMOS was used to conduct confirmatory factor analysis (CFA) to confirm the scale composition of the items. The key objectives of the present study were three-fold: First, SEM was applied using AMOS to investigate the net effects of overall image, perceived quality and alternative attractiveness on satisfaction and emotion and the effects of two affective factors on the participants' intentions to recommend the canal boat tour to others. Second, the configurational model was tested using fsQCA to explore the causal recipes (i.e. sufficient combination of factors) from the cognitive and affective configurations used in formulating the participants' intentions to recommend the canal boat tour to others (Ragin, 2008). In fsQCA, data is calibrated from crisp values to fuzzy set that range from 0 (full non-membership~1 in Likert scale) to 1 (full membership~ 7 in Likert scale). Following Pappas et al.'s (2016) study, value of 2 is considered as the full non-membership, 4 as the cross-over point, and 6 as the full membership. Third, NCA was performed to identify the necessary cognitive and affective conditions to achieve the desired behavioural intentions of the participants. The fsQCA and NCA were performed using the fsQCA program (Olya and Al-ansi, 2018). The results of the configurational model testing were evaluated based on the six tenets of complexity theory (Woodside, 2014).

4. Results and discussion

4.1.Reliability and validity

Internal consistency of the scale items was assessed based on the Cronbach's alpha and composite reliability values. As shown in Table 1, the values of Cronbach's alpha were all greater than the cut-off of .7, which confirmed the reliability of the study measure. The results of Harman's single-factor analysis revealed that no general factor (i.e. component with high variance percentage) emerged, indicating that the study measures were unaffected by potential common method bias seriously (Podsakoff et al., 2003). The results of the CFA showed that items were sufficiently and significantly loaded under the assigned factors, and thus there was no need to drop a scale item to ensure the validity of the measures. Factor loadings ranged from .749 to .911 (Bagozzi and Yi, 1988). The results showed that the model satisfactorily fit the empirical data obtained from the canal boating tour setting (fit indices: X^2: 259.773 (df: 104); X^2/df: 2.498; comparative fit index: .928; incremental fit index: .929; parsimonious goodness of fit: .580; root mean square error of approximation: .086) (Table 1).

The construct validity, including convergent and discriminate validity, was checked. Based on Hair et al. (1998), average variance extracted (AVE) values for variables were all above the suggested cut-off of .5, thus providing evidence of convergent validity. As shown in Table 1, the AVE values of all constructs were greater than the corresponding maximum shared squared variance (MSV) and the average shared square variance (ASV). These results approved the discriminate validity of the study construct (Fornell and Larcker, 1981).

[Insert Table 1 here.]

4.2.Results of structural model testing

Figure 2 presents the results of SEM, which showed sufficient antecedents of intention to recommend. Satisfaction of the canal boat participants was influenced by perceived quality (**H1:** β=.539, p<.001), alternative attractiveness (**H3:** β=.278, p<.001) overall image **and** (**H5:** β=.324, p<.001)**.** Similarly, emotion was affected by perceived quality (**H2:** β=.729, p<.001), alternative attractiveness (**H4:** β=.257, p<.001) and overall image (**H6:** β=.237, p<.001). Intention to recommend canal boat tours was driven by the participants' satisfaction (**H7:** β=.466, p<.001) and emotion (**H8:** β=.346, p<.001). **All eight hypotheses are supported.** Based on the fit statistics (X^2:259.773 (df: 104), X^2/df: 2.498, RMSEA: .086), the structural model fit the data. The SEM results on the effects of the cognitive and affective factors associated with individual attitudes and behavioural responses were in line with previous

research findings (Anjos et al., 2017; del Bosque and San Martín, 2008; Guan and Jones, 2015; Han et al., 2016; Han et al., 2018; Silva and Correia, 2017). Associations between socio-demographics and prior experience with canal boat tours with model outcomes was calculated using a correlation test, which is presented in Table I (Appendices).

Recent studies explaining consumer's complex behavioural intentions have claimed that conventional methods (i.e. SEM) are important but insufficient for tackling such complexities (Olya and Al-ansi, 2018; Olya and Altinay, 2016; Olya et al., 2017; Pappas et al., 2016). For example, individuals may experience both positive and negative emotions during the same activity because they have multiple interactions with the resources of the destination. Consumers' positive or negative emotions might result in high or low levels of intention to recommend the activity (del Bosque and San Martín, 2008). According to Yen and Hung (2017), the alternative attractiveness of competing suppliers affects buyer market competitiveness and is negatively related to consumers' behavioural intention and loyalty; however, this significance decreases in a situation with high switching barriers (Chuah et al., 2017). These complex results could be explained by the role of each antecedent in combination with other antecedents in the model, suggesting that each of these occurrences would be occasioned for different solutions for outcomes (Olya and Gavilyan, 2016). Furthermore, configurational modelling helps to evaluate causal recipes, leading to low scores of the outcome (e.g. low intention to recommend), which are not simply the opposite mirrors of functions for high scores in an outcome condition. Non-linear interactions of motivations with loyalty of consumer behaviours have been reported in past studies as being a complex system (e.g. Olya et al., 2019). The following section, which provides the fsQCA results, explains the occurrence of heterogeneity. In other words, the role of each antecedent (positive, negative or neutral) depends on the attribute of other indicators in the sufficient configuration (causal recipes). We argue that a conventional research approach (i.e. SEM) is not sufficient to explain the complexity of the social phenomena of canal boat participants' intentions to recommend the activity and tour. **This study acknowledges that past theories are necessary but insufficient to explain the complex and heterogeneous nature of cognitive factors and socio-demographics factors, along with consumer satisfaction, emotion and intention to recommend.**

[Insert Figure 2 here.]

4.3.Results of configurational model testing

The fsQCA results advised sufficient causal recipes to predict intention of canal boat tour participants to recommend participants (Tables 2–5). Table 2 presents the fsQCA results from the demographics for predicting satisfaction and emotion. According to the results, two causal recipes described the condition of the participants' satisfaction (coverage: .452, consistency: .911), and two causal recipes explained the condition of participants' emotion (coverage: .461, consistency: .927). Coverage and consistency in asymmetrical modelling are respectively equivalent to the coefficient of determination and the correlation in symmetrical modelling. These two metrics (coverage and consistency) are used to refine sufficient and consistent causal recipes explored through the configurational modelling. As shown in Table 2, the high satisfaction of canal boat participants was obtained for single, less-educated participants who are younger and have a low income but have prior experience with canal boat tours (see M1). The second model indicates that coupled male participants who are less educated and have a low income but have prior experience with canal boat tours are satisfied (see M2). Similarly, two causal recipes are offered to predict the participants' emotion (c.f., Table 2).

[Insert Table 2 here.]

Table 3 presents the fsQCA results from the cognitive configuration for modelling satisfaction and emotion. According to the results, two causal recipes described the condition of the participants' satisfaction (coverage: .948, consistency: .851), and two causal recipes explained the condition of participants' emotion (coverage: .950, consistency: .849). The results showed that a combination of high perceived quality and high alternative attractiveness improves the satisfaction of canal boat tour participants (see M1). The second model indicates that high overall image leads to participant satisfaction (see M2). Similarly, two causal recipes are offered to predict the participants' emotion (c.f., Table 3).

[Insert Table 3 here.]

Table 4 presents the fsQCA results from the affective configurations, a combination of cognitive-affective configurations and a combination of cognitive-affective factors with socio-demographic configurations to predict high intention to recommend. The results show that a combination of low satisfaction and high emotion would lead participants to highly recommend the canal boat tour (coverage: .309, consistency: .953). The fsQCA results from the combination of cognitive and affective factors for predicting intention to recommend suggest

two causal models (coverage: .828, consistency: .934). Model 1 shows that high levels of satisfaction, emotion, overall image, perceived quality and alternative attractiveness lead to participants' intention to recommend canal boat tours. As shown in Table 4, the XY plot for M1 demonstrates the asymmetrical relationship of X (M1: SAT*EMO*PQ*ALT Models 1) and Y (intention to highly recommend). The association of the causal model (X) and intention to highly recommend canal boat tours (Y) is asymmetrical. Additionally, a combination of high overall image, high level of perceived quality and low alternative attractiveness contributes to participants' high intention to recommend canal boat tours to others (see Model 2 in Table 4). Two causal models from the cognitive-affective and socio-demographic configurations with prior experience explain conditions leading to high intention to recommend (coverage: .332, consistency: .978). The first model indicates that young, less educated males with low income and prior experience and who have high levels of satisfaction, emotion, overall image and perceived quality and low alternative attractiveness are most likely to recommend canal boat tours (see M1). The second model indicates that young, less educated, single females with low income and who have prior experience with high levels of satisfaction, emotion, overall image and perceived quality would highly recommend canal boat tours to others (see M2).

[Insert Table 4 here.]

Table 5 presents causal models from affective configuration, the combination of cognitive-affective factors and the combination of cognitive-affective factors with socio-demographic factors with prior canal boat tour experience to predict low scores of intention to recommend. The results show that a combination of low satisfaction and emotion lead to low scores of intention to recommend canal boat tours (coverage: .693, consistency: .860). The fsQCA results from the combination of cognitive and affective factors for predicting low intention to recommend suggest two causal models (coverage: .620, consistency: .870). Model 1 shows that low satisfaction, emotion, overall image, perceived quality and low alternative attractiveness result in low intention to recommend canal boat tours (see M1). As shown in Table 5, the XY plot for M1 demonstrates the asymmetrical relationship of X (M1: ~SATI*~EMO*~IMG*~PQ*~ALT) and Y (low intention to recommend). The association of the causal model (X: Models 1) and low intention to recommend canal boat tours (Y) is an asymmetrical one. This means that a combination of cognitive-affective factors with the intention to recommend does not follow a symmetrical pattern. With this realisation, the fsQCA is a powerful and pragmatic technique to model consumer behaviours using complex

configurations of cognitive-affective and socio-demographic factors with prior canal boat tour experience.

The second model indicates that low intention to recommend canal boat tours results from low levels of satisfaction, emotion and alternative attractiveness and high levels of overall image and perceived quality (see M2). Based on the inclusion of cognitive-affective factors and demographic factors, low score of intention to recommend was achieved by four causal models (coverage: .226, consistency: .927). According to Table 5, the first model suggested that older, educated, single male participants with lower incomes and with prior experience who have low levels of satisfaction, overall image, emotion, perceived quality and alternative attractiveness are reluctant to recommend this activity (see M1). The second solution implies that younger, less educated, single female participants with lower incomes and prior experience who have low levels of satisfaction, emotion and alternative attractiveness and have high overall image and perceived quality are less likely to recommend this service (see M2).

The third model shows that older, less educated, single male participants with lower incomes and with prior experience who have low levels of satisfaction, emotion and perceived quality and have high overall image and alternative attractiveness might not intend to recommend this tour (see M3). The last causal solution for low recommendations of canal boat tours is describing the category of participants with this complex configuration: younger, educated, coupled female participants with lower income and with prior tour experience who have high levels of satisfaction and overall image and low levels of emotion, perceived quality and alternative attractiveness. These results are in accordance with Gannon et al. (2019), who identified, through a comparison with first-time visitors, that repeat visitors have more flexibility towards service operations, such that more solutions (recipes) explain the model, leading to their desired behaviours.

[Insert Table 5 here.]

4.4.Results of the NCA

Table 6 shows the results of the NCA, which was conducted to identify which cognitive and/or affective factor is necessary to achieve the desired responses from canal boat tour participants. A condition with a consistency value larger than .9 is subject to necessary conditions (Dul, 2016; Olya & Al-ansi, 2018). According to Dul (2016), if a single necessary condition is not in place, the outcome will not occur. According to the results of the NCA, overall image and perceived quality are considered necessary conditions for attaining satisfaction, emotion and

intention to recommend. Satisfaction and emotion are also necessary conditions for achieving intention to recommend.

[Insert Table 6 here.]

Although the alternative attractiveness condition was not necessary for the canal boat participants to highly recommend this activity, the extent of the availability of alternative attractiveness at the destination would sufficiently influence the expected behavioural intention of the participants to recommend the canal boat activity (Table 3). Similarly, the combination of socio-psychological configurations sufficiently affects both the high and low recommendation intention of the tour participants (Tables 4 and 5). To understand the causal complexities in business-related research, 'single necessary (but not sufficient) conditions are critically important for business theory and practice' (Dul, 2016, p. 1516). Therefore, the necessary conditions identified in this study for predicting high intention to recommend could provide useful guidelines for managers to achieve canal boat participants' emotion, satisfaction and intention to recommend this eco-friendly activity.

4.5.Evaluation of complexity theory

Using the six tenets of complexity theory, we evaluate the results of the configurational model (Woodside, 2014). According to the results of the fsQCA, emotion is a necessary condition, but merely it is insufficient to predict a high score for intention to recommend (Model 1 in Table 4). **Thus, tenet 1 is supported. The recipe principle assumes that a complex combination of overall image, perceived quality and attractiveness of alternative antecedents is sufficient for a consistently high score of intention to recommend (e.g. Model 2 in Table 4). Thus, tenet 2 is supported. According to the equifinality principle, a model that is sufficient is unnecessary for achieving an outcome. The fsQCA results confirmed tenet 3 (i.e. the equifinality principle). Specifically, two alternative models are suggested for predicting satisfaction (Table 3), two alternative models are suggested for predicting emotion (Table 3) and four alternative models are suggested for predicting a low score of intention to recommend (Table 5).**

Regarding tenet 4, the so-called causal asymmetry principle, the fsQCA results showed that recipes that indicate a satisfaction outcome are unique and are not the mirror opposites of recipes of intention to recommend canal boat tours. Since the role of each antecedent depends on the role of other cognitive and/or affective antecedents and/or socio-demographic factors, that single antecedent might contribute both positively and

negatively to predicting an expected outcome. For example, alternative attractiveness plays both negative (Model 2) and positive (Model 1) roles in achieving a high level of desired outcome conditions (c.f., Table 4). Therefore, tenet 5 is supported. According to tenet 6, for achieving high outcome scores, a given recipe is relevant for some but not all cases; coverage should be less than 1.00 for any single solution. The fsQCA results shown in Tables 3 and 4 reveal that coverage is less than 1 for any recipe, which supports tenet 6. XY plots in Tables 4 and 5 is also an evidence to support tenet 6. Therefore, the results of the configurational model testing support the six tenets of complexity theory, and complexity theory explains the interactions among the cognitive, affective and socio-demographic antecedents in predicting the participants' intentions to recommend canal boat tours. As Woodside (2017, p.145) states, 'deepening understanding of what causes discretionary travel is achievable by embracing complexity theory…. Thus, understanding outcomes in case-based models in tourism research benefits by using configural and not a single outcome'.

5. Conclusion and implications

This empirical study deepens our knowledge of the behavioural intentions of canal boat tour participants, which is a service that has received less attention. As an eco-friendly, water-based activity, canal boat tours are enjoyable leisure activities that play a key role in forming destination images worldwide. Thus, more empirical studies are needed to understand consumers' perspectives towards the crucial conditions of sustainable management for this memorable and eco-friendly leisure activity.

This study adopts complexity theory to understand how consumers' complex behaviours can lead them to recommend this activity to others. This study further contributes to the current literature by investigating a cognitive-affective model with the inclusion of socio-demographic variables and prior experience for predicting both desirable and undesirable behavioural intentions of canal tour participants in Strasbourg, France. Modelling the behaviour of canal tour participants is important because this activity contributes to the destination's economic growth. European cities (e.g. Venice and Amsterdam) are among the most well-known destinations for canal boating; nevertheless, canal boating is a global activity that is also recognised as a valuable tourism source in the US (e.g. New York), Panama, Japan, China, Russia and Thailand. However, this empirical study is among the few attempts to elucidate consumer behaviour towards such eco-friendly activities that may interest service providers (e.g. canal boat tour operators, marketers, destination planners and Destination Marketing

Organisations: DMOs). The outcome of this study will help the aforementioned stakeholders improve canal boat tours by enabling them to organise boat tours that satisfy the sufficient and necessary conditions leading to participants' intentions to recommend the tour to others. As consumers rely heavily on non-commercial sources of information, such as recommendations from friends and family, when choosing a holiday, modelling the expected behaviour of tour participants is key for the sustainable management of a destination.

This study attempts to advance current knowledge of consumer behaviours in the service context in several ways. First, the study uses complexity theory to explain a cognitive-affective model using a symmetrical approach (i.e. SEM) to investigate the effects of overall image, alternative attractiveness and perceived quality on satisfaction and emotion, which influence intention to recommend canal boat tours. The satisfaction and emotion of tour participants were significantly affected by perceived quality, overall image and alternative attractiveness. Intention to recommend canal boat tours was significantly influenced by participants' satisfaction and emotion and demographic variables.

This empirical study is among the first service marketing studies that uses a combination of socio-demographic characteristics with prior experience as antecedent configurations for stimulating satisfaction, emotion and the recommendation intention of canal boat participants. Specifically, different demographics (e.g. age) resulted in divergent causal solutions in desirable and undesirable outcomes, which would be of significance for target marketing strategies. As an instance, as shown in Table 4, prior experience of tour participants in combination with other predictors is sufficient for high intention, while for low intention, as shown in Table 5, both with and without prior experiences, different casual situations lead to low intention to recommend this activity. As socio-demographic factors could be considered under social classes of consumers, segmenting and targeting strategies would be of interest for the target marketing of canal boat tours. In addition, exclusive public relation strategies for increasing the satisfaction and emotion of participants are needed as these two variables are necessary conditions for prediction high recommendation intention.

Second, this study applies asymmetrical modelling (i.e. fsQCA) to tackle the complexity of canal boat participants' behaviour. The complex configurations of the cognitive and affective antecedents were used to explore the causal recipes for simulating satisfaction, emotion and intention of the canal boat tour participants to recommend. **The positive and negative role of each cognitive and affective factor, in combination with other antecedents**

in a model, confirmed the complex nature of participants' willingness to recommend canal boat tours, which was explored using configurational modelling. Practitioners can benefit from the causal models used in this study to enhance the satisfaction, emotion and desired behavioural intention of participants based on sufficient configurations. Specifically, sufficient configurations would guide the operators in knowing how to simulate the conditions required to promote participants' recommendation of intention in situations of antecedent negation (e.g. satisfaction in M1 in Table 3).

The fsQCA results supports the six tenets of complexity theory. **Drawing on complexity theory, fsQCA is recognised as a set-theoretic approach that could contribute to the literature by generating knowledge through exploring causal recipes for both high and low scores of consumer behavioural intention and the interactions of cognitive-affective and socio-demographic factors and prior experience in predicting the expected behavioural intention of canal tour participants. According to the asymmetrical results, there are alternative solutions that lead to the same desired responses (satisfaction, emotion and intention to recommend); that is, a combination of all variables, rather than a net effect of a single variable, must be used as a causal solution for indicating the desired intention of behaviour of canal boat participants.**

Third, this study identifies the necessary conditions of tour participants' responses. **While SEM and fsQCA show sufficient net effect and combinations of the factors, NCA helps in identifying necessary predictors of desired model outcomes. This offers practical implications for prioritising available resources to provide necessary conditions to attain the expected outcome. According to findings from the NCA, overall image and perceived quality are two necessary factors to satisfy canal boat tour participants, elicit the desired emotion and encourage participants to recommend the tour. Planners should invest in overall image and perceived quality of tourists as two essential conditions of intention to recommend. This study focuses on the demand-side view of canal boat tours, which has previously received little attention in the tourism and service industry from academics and practitioners**.

We believe that service providers' and consumers' awareness of such green activities have been increasing. However, businesses and service providers can promote public awareness about canal boat tours because this pro-environmental leisure activity increases visitors' satisfaction and emotion. To promote positive images among participants, DMOs

could advise stakeholders (e.g. tour operators, advertising firms and destination managers) to host events and festivals related to canal boat tour activities to support peaceful and healthy touristic adventures. Furthermore, promoting the romantic aspects of canal cruising could attract couples to experience unique and refreshing moments. Customers' perceived quality of boat tours (e.g. facilities, convenience) could also be enhanced to increase participants' satisfaction and emotion, which are necessary conditions to recommend canal boat tours.

Considering alternative attractiveness in this activity, our study discusses the extent to which alternative tour activities (e.g. sightseeing tours with vehicles or public transportation) at the destinations could compete with boat tours and affect participants' intention to recommend. Marketers could benefit from the results of this study to improve the willingness to recommend this eco-friendly activity in a situation with both high and low alternative attractiveness (see Table 4) at the destination. Notably, the solution (see M1, Table 4) for high recommendation indicates that in a situation with high satisfaction, high emotion and high perceived quality, alternative attractiveness must be high to achieve willingness to recommend canal boat activities. Specifically, alternative tours would create a competitive situation, which would stimulate consumers to recommend canal boat tours; while overall image and perceived quality are high (see M2, Table 4), the alternative attractiveness tours should be low to attain a high intention to recommend.

This study has limitations regarding the application of data obtained in a cross-sectional study that measured the perceptions of participants of a canal boat tour in Strasbourg, France. To generalise the findings, we call for more empirical studies on canal boat tours from various destinations that offer different services and experiences. Furthermore, the results of this study can be improved by examining other predictors of participants' behaviours, such as perceived risk and motivations. The findings of this study offer insights into determining the emotion, satisfaction and behavioural outcomes of canal boat participants based on their cognitive and affective perceptions towards this green activity. Future studies should examine tour operators' perspectives on canal boating and establish how to ensure the sustainability of such activities.

[Insert Appendices here.]

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Table 1. Results of measurement model testing

Scale items	**FL**	**AVE**	**MSV**	**ASV**
Intention to recommend (α: .857, CR: .767)		.678	.511	.325
I will recommend Strasbourg's boat trip to other people	.834***			
I will say positive things about Strasbourg's boat trip to other people	.882***			
I will encourage friends and relatives to experience Strasbourg's boat trip.	.749***			
Satisfaction (α: .885, CR: .783)		.732	.588	.365
Overall, I am happy with my decision to select Strasbourg's boat tour.	.806***			
I believe I did the right thing when I selected this tour.	.911***			
Overall, I am satisfied with the decision to attend this tour.	.846***			
Emotion (α: .861, CR: .696)		.615	.588	.403
I felt fascinated about the Strasbourg's canal boat tour	.808***			
I felt surprised about the canal boat tour	.661***			
I felt a sense of amazement toward the canal boat tour	.825***			
I felt a sense of astonishment toward the canal boat tour.	.831***			
Overall image (α: .750, CR: .774)		.623	.408	.250
Unfavorable … Favorable	.867***			
Very negative … Very positive.	.703***			
Perceived quality (α: .839, CR: .788)		.731	.579	.336
I perceived the quality of Strasbourg's boat tour	.899***			
This tour offers quality experiences.	.808***			
Alternative attractiveness (α: .867, CR: .733)		.688	.081	.043
I believe that other tours provide much better fascination	.803***			
I have been attracted to tours other than the one I recently attended	.839***			
Other tours offer more joy.	.846***			
Fit indices: X^2:259.773 (df:104), X^2/df:2.498, comparative fit index:.928, incremental fit index:.929, parsimonious goodness of fit:.580, root mean square error of approximation:.086.				

Note: FL: factor loading, AVE: average variance extracted, MSV: maximum share variance, ASV: average share variance, CR: composite reliability. ***: p<.001.

Table 2. Recipes from demographics to predict satisfaction and emotion

Models for predicting satisfaction *SAT = f(gen, age, inc, edu, ms, exp)*	**Raw Coverage**	**Unique Coverage**	**Consistency**
M1: ~age*~inc*~edu*~ms*exp	.272	.272	.895
M2: ~gen*~inc*~edu*ms*exp	.179	.179	.936
Solution coverage: .452			
Solution consistency: .911			
Models for predicting emotion			
EMO = f(~age*~inc*~edu*~ms*exp)			
M1: ~age*~inc*~edu*~ms*exp	.281	.281	.921
M2: ~gen*~inc*~edu*ms*exp	.180	.180	.936
Solution coverage: .461			
Solution consistency: .927			

Note: SAT: satisfaction, EMO: emotion, gen: gender (male:0; female:1), inc: income level, edu: education level, ms: marital status, exp: experience of canal boat trip.

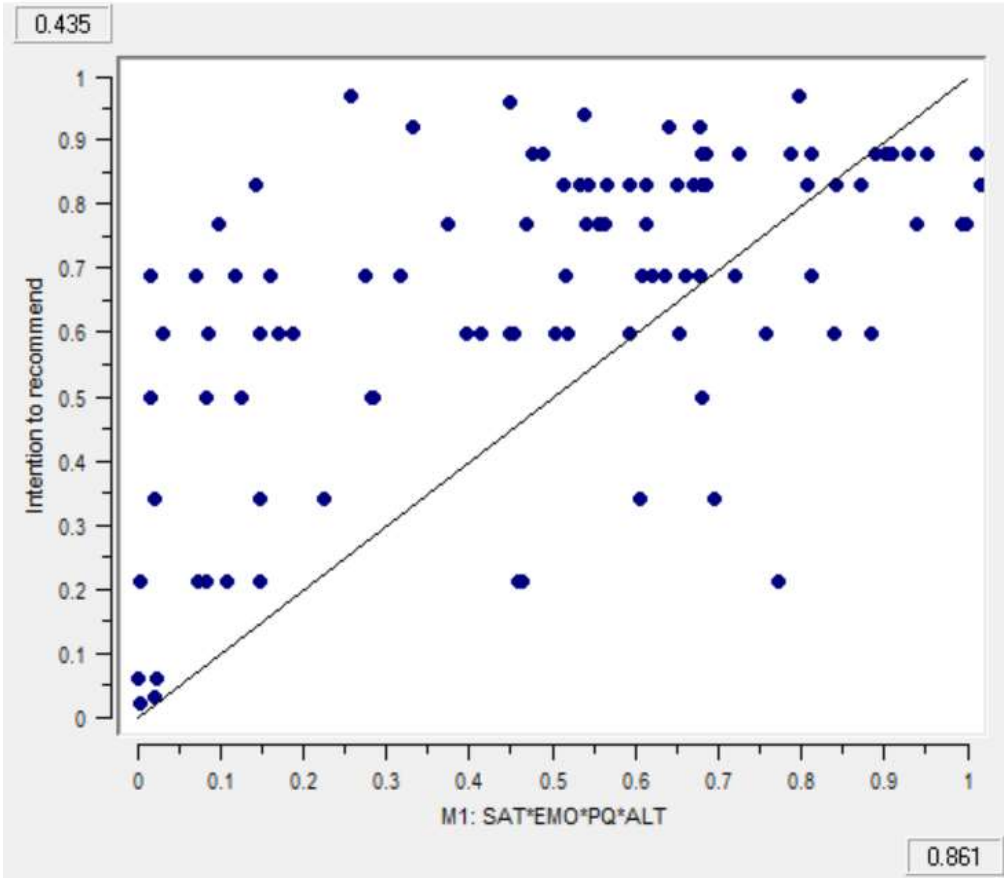
Table 3. Sufficient causal recipes to predict satisfaction and emotion

Models for predicting satisfaction *SAT = f(IMG, PQ, ALT)*	**Raw Coverage**	**Unique Coverage**	**Consistency**
M1: PQ*ALT	.552	.016	.958
M2: IMG	.932	.396	.853
Solution coverage: .948			
Solution consistency: .851			
Models for predicting emotion			
EMO = f(IMG, PQ, ALT)			
M1: PQ*ALT	.557	.017	.962
M2: IMG	.933	.393	.850
Solution coverage: .950			
Solution consistency: .849			

Note: SAT: satisfaction, EMO: emotion, IMG: overall image, PQ: perceived quality, ALT: alternative attractiveness.

Table 4. Sufficient causal recipes for predicting intention to recommend

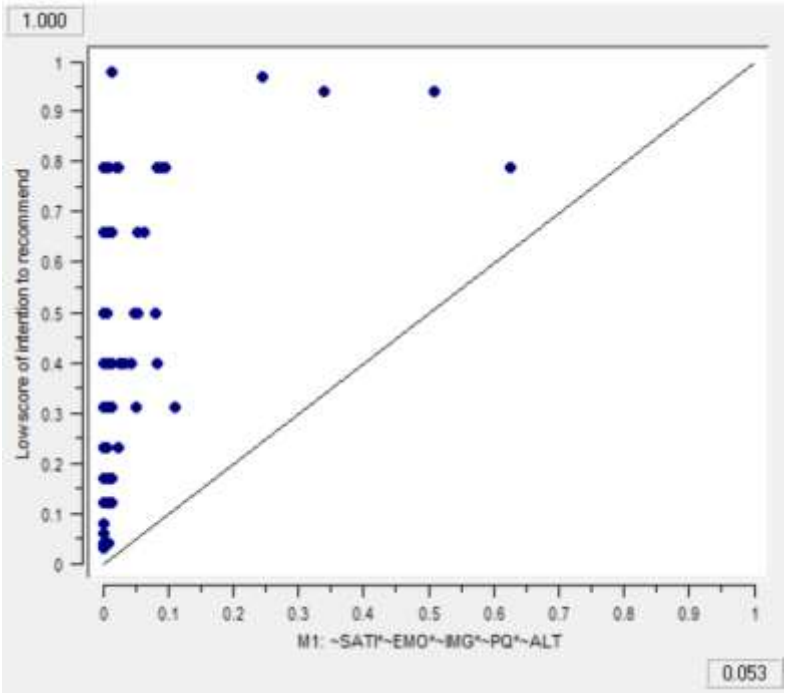
Models for predicting intention to recommend REC = f(SAT, EMO)	**RC**	**UC**	**Con.**
M1: ~SAT*EMO	.309	.309	.953
Solution coverage: .309			
Solution consistency: .953			
REC = f(SAT, EMO, IMG, PQ, ALT)			
M1: SAT*EMO*PQ*ALT	.528	.190	.979
M2: IMG*PQ*~ALT	.637	.299	.928
Solution coverage: .828			
Solution consistency: .934			
REC = f(SATI, EMO, IMG, PQ, ALT, gen, age, inc, edu, ms, exp)			
M1: SATI*EMO*IMG*PQ*~ALT*~gen*~age*~inc*~edu*exp	.185	.185	.980
M2: SATI*EMO*IMG*PQ*Gen*~age*~inc*~edu*~MS*exp	.147	.147	.976
Solution coverage: .332			
Solution consistency: .978			



Note: RC: raw coverage, UC: unique coverage, con: consistency, REC: intention to recommend, SAT: satisfaction, EMO: emotion, IMG: overall image, PQ: perceived quality, ALT: alternative attractiveness, gen: gen (male:0; female:1), inc: income level, edu: education level, ms: marital status, exp: experience of canal boat trip.

Table 5. Sufficient causal recipes for predicting low score of intention to recommend

Models for predicting intention to recommend ~REC = f(SAT, EMO)	**RC**	**UC**	**Con.**
M1: ~SAT*~EMO	.693	.693	.860
Solution coverage: .693			
Solution consistency: .860			
~REC = f(SAT, EMO, IMG, PQ, ALT)			
M1: ~SATI*~EMO*~IMG*~PQ*~ALT	.432	.051	.954
M2: ~SATI*~EMO*IMG*PQ*~ALT	.569	.187	.868
Solution coverage: .620			
Solution consistency: .870			
~REC = f(SATI, EMO, IMG, PQ, ALT, gen, age, inc, edu, ms, exp)			
M1: ~SATI*~EMO*~IMG*~PQ*~ALT*~gen*age*~inc*edu*~ms*exp	.056	.012	.993
M2: ~SATI*~EMO*IMG*PQ*~ALT*gen*~age*~inc*~edu*~ms*exp	.122	.122	.926
M3: ~SATI*~EMO*IMG*~PQ*ALT*~gen*age*~inc*~edu*~ms*exp	.071	.027	.900
M4: SATI*~EMO*IMG*~PQ*~ALT*gen*~age*~inc*edu*ms*~exp	.019	.019	.990
Solution coverage: .226			
Solution consistency: .927			



Note: RC: raw coverage, UC: unique coverage, con: consistency, REC: intention to recommend, SAT: satisfaction, EMO: emotion, IMG: overall image, PQ: perceived quality, ALT: alternative attractiveness, gen: gen (male:0; female:1), inc: income level, edu: education level, ms: marital status, exp: experience of canal boat trip.

Table 6. Results of analysis of necessary condition

Antecedent condition	*Satisfaction*		*Emotion*		*Intention to recommend*	
	Consistency	Coverage	Consistency	Coverage	Consistency	Coverage
Overall image	**.932**	.853	**.933**	.850	**.935**	.859
~Overall image	.263	.859	.266	.866	.262	.860
Perceived quality	**.938**	.868	**.948**	.874	**.934**	.868
~Perceived quality	.274	.862	.271	.850	.277	.873
Alternative attractiveness	.571	.923	.575	.925	.567	.919
~ Alternative attractiveness	.666	.854	.663	.846	.670	.863
Satisfaction					**.913**	.916
~Satisfaction					.330	.831
Emotion					**.905**	.912
~Emotion					.337	.840

Note: Necessary condition is highlighted in bold (Consistency > .9).

Mehran, J., & Olya, H. (2019). Canal Boat Tourism: Application of Complexity theory, Journal of Retailing and Consumer Services, 53, 1-15. Doi: 10.1016/j.jretconser.2019.101954.

Appendices

Result of Grubbs' outlier test

Extreme Values

			Case Number	Value
Image.ABS	Highest	1	172	3.16
		2	46	3.27
		3	100	2.68
		4	195	2.68
		5	23	2.09[a]
	Lowest	1	187	.00
		2	165	.00
		3	82	.00
		4	67	.20
		5	57	.20
Qualt.ABS	Highest	1	50	3.05
		2	100	3.03
		3	66	2.97
		4	123	2.97
		5	172	2.97[b]
	Lowest	1	200	.00
		2	145	.00
		3	142	.00
		4	57	.00
		5	41	.00[c]
Alt.ABS	Highest	1	83	2.46
		2	100	2.46
		3	138	2.46
		4	193	2.46
		5	79	2.34
	Lowest	1	200	.00
		2	57	.00
		3	41	.00
		4	40	.00
		5	38	.00
Sat.ABS	Highest	1	195	3.40
		2	100	3.14
		3	172	3.14
		4	46	2.79

		5	50	2.43[d]
	Lowest	1	200	.00
		2	57	.00
		3	41	.00
		4	38	.00
		5	119	.01
Emo.ABS	Highest	1	100	4.09
		2	127	4.09
		3	50	2.86
		4	172	2.86
		5	131	2.62[e]
	Lowest	1	200	.00
		2	57	.00
		3	41	.00
		4	38	.00
		5	181	.08[f]
Int.ABS	Highest	1	100	3.21
		2	195	3.08
		3	46	2.69
		4	50	2.69
		5	26	2.39[g]
	Lowest	1	191	.04
		2	187	.04
		3	184	.04
		4	181	.04
		5	167	.04[h]
Age.ABS	Highest	1	6	2.09
		2	21	2.09
		3	31	2.09
		4	38	2.09
		5	57	2.09[i]
	Lowest	1	199	.27
		2	198	.27
		3	191	.27
		4	187	.27
		5	185	.27[j]
Gen.ABS	Highest	1	1	1.02
		2	2	1.02
		3	3	1.02

		4	5	1.02
		5	7	1.02[k]
	Lowest	1	201	.98
		2	199	.98
		3	197	.98
		4	196	.98
		5	194	.98[l]
Educ.ABS	Highest	1	173	3.14
		2	202	3.04
		3	50	2.57
		4	66	2.57
		5	172	2.57[m]
	Lowest	1	171	.03
		2	170	.03
		3	168	.03
		4	165	.03
		5	161	.03[n]
Inc.ABS	Highest	1	12	1.92
		2	29	1.92
		3	56	1.92
		4	58	1.92
		5	59	1.92[o]
	Lowest	1	202	.08
		2	201	.08
		3	200	.08
		4	197	.08
		5	195	.08[p]
MS.ABS	Highest	1	4	1.10
		2	5	1.10
		3	7	1.10
		4	9	1.10
		5	10	1.10[q]
	Lowest	1	202	.90
		2	200	.90
		3	199	.90
		4	198	.90
		5	197	.90[r]
Tim.ABS	Highest	1	8	2.59
		2	16	2.59

		3	27	2.59
		4	33	2.59
		5	34	2.59[s]
	Lowest	1	202	.38
		2	201	.38
		3	200	.38
		4	198	.38
		5	197	.38[t]

Table I. Correlation analysis

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Age	1											
2. Gender	-.055	1.000										
3. Education level	.060	.084	1.000									
4. Income level	.205**	-.013	-.282**	1.000								
5. Marital status	-.040	-.151*	-.010	-.067	1.000							
6. Prior experience	.010	.036	-.026	.105	.043	1.000						
7. Overall image	.097	-.035	-.340**	.325**	-.071	.095	1.000					
8. Perceived quality	.038	-.040	-.291**	.137	.031	.176*	.487**	1.000				
9. Alternative attraction	.066	-.072	.069	-.124	-.043	-.001	.046	.128	1.000			
10. Emotion	.018	-.020	-.084	.055	.003	.185**	.331**	.571**	.296**	1.000		
11. Satisfaction	.060	-.104	-.102	.141*	.049	.144*	.394**	.463**	.278**	.620**	1.000	
12. Recommendation intention	.094	-.114	-.160*	.094	-.035	.022	.396**	.452**	.246**	.568**	.586**	1.000
Mean	2.708	.490	2.035	2.084	.450	.870	5.495	5.431	4.208	5.129	5.312	5.351
Std. Deviation	1.097	.501	1.153	.996	.499	.337	.854	.896	.907	.883	.945	.852

Note: **. Correlation is significant at the 0.01 level (2-tailed), *. Correlation is significant at the 0.05 level (2-tailed). Gender (male:0; female:1).

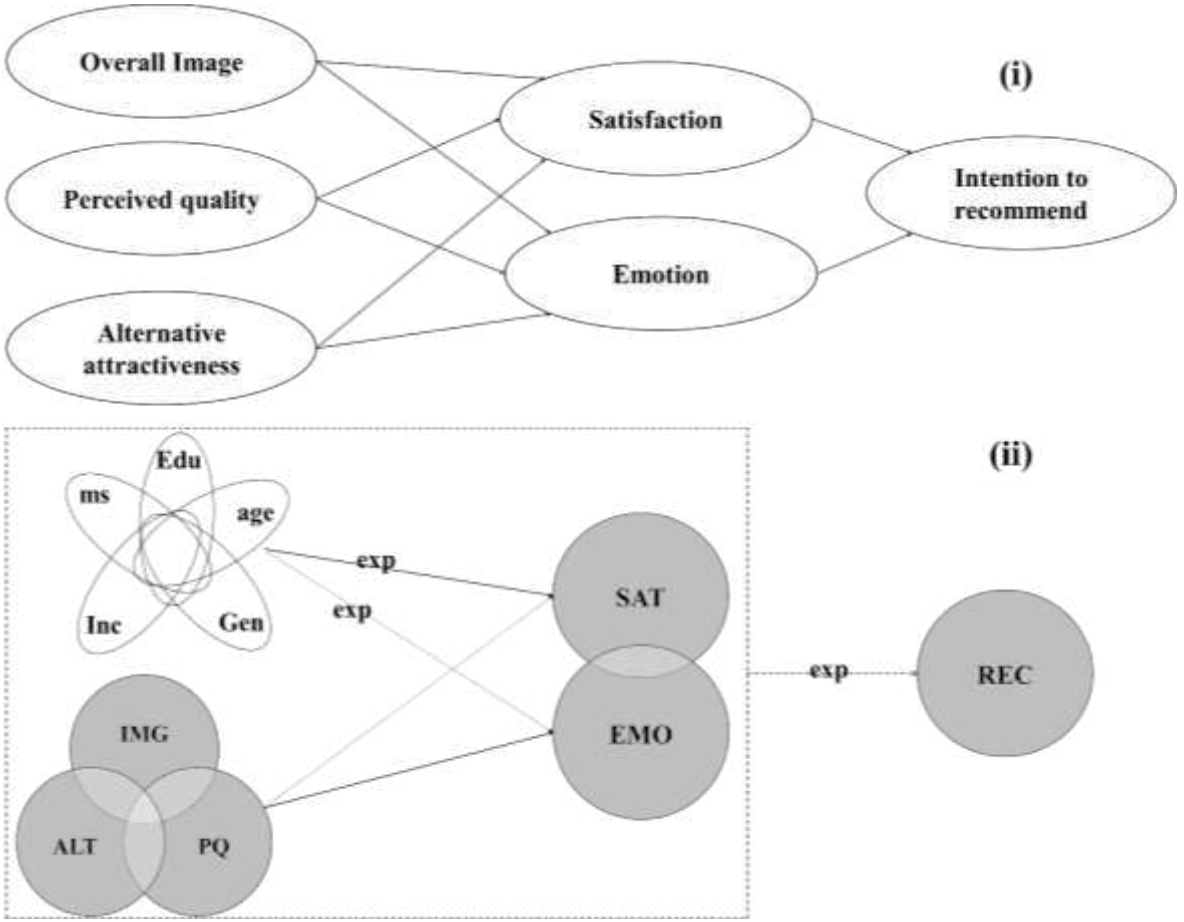
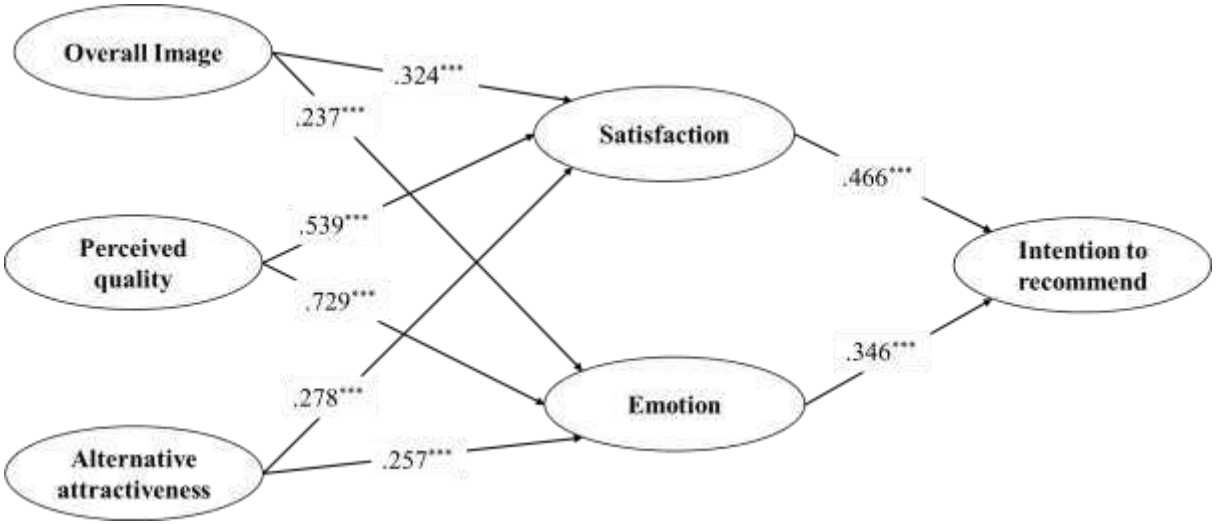


Figure 1. Proposed conceptual models: structural model (i) and configurational model(ii)



Note: ***: $p<.001$.

Figure 2. Results of structural equation modeling