

# The environmentally friendly role of edible insect restaurants in the tourism industry: applying an extended theory of planned behavior

Role of edible insect restaurants

3581

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## Abstract

**Purpose** – This study aims to examine diners' behavioral intention to visit an edible insect restaurant, which is known to play an important role in sustainability, by integrating the theory of planned behavior and the norm activation theory.

**Design/methodology/approach** – A total of 439 samples were collected in South Korea. Structural equation modeling was used to test hypotheses.

**Findings** – The attitudes were influenced by subjective norms. Intentions were affected by the attitudes, the subjective norms and the perceived behavioral control. In addition, the five dimensions of cognitive triggers, which include environmental awareness, ascribed responsibility, biospheric value, environmental concern and perceived effectiveness, positively affected personal norms, and the personal norms positively influenced behavioral intentions.

**Practical implications** – It is an important practical implication of this study that tourism practitioners were delivered with the knowledge of establishing marketing strategies based on the destination's green image of insect restaurants.

**Originality/value** – This study is expected to contribute to the extant knowledge, which will enable an understanding of the sustainability values of edible insect restaurants, and it will guide tourism practitioners to establish effective sustainable practices for the tourism industry.

**Keywords** Theory of planned behavior, Norm activation theory, Personal norm, Cognitive triggers, Edible insect restaurants

**Paper type** Research paper



## Introduction

Edible insect restaurant research has become one of the most important topics to discuss with the hope that edible insects can be a promising solution for food security and a more sustainable form of future food production (Gamborg *et al.*, 2018). The human consumption of insects, namely, entomophagy, has a long history and is regarded as a normal practice in

some parts of the world (Pambo *et al.*, 2018). For instance, *beondaegi*, the boiled silkworm pupa, and *inago*, the sautéed grasshoppers with soya sauce, have long been consumed and are commercially available in Korea and Japan, respectively (Meyer-Rochow and Hakko, 2018). Restaurant entrepreneurs and chefs around the world are also developing new ways to use edible insects to make delicious dishes for customers (Halloran *et al.*, 2018). Tourists with strong food neophilia tendencies snack on insects at tourist locations as part of their ecotourism holidays (Yen *et al.*, 2013).

More consumers are interested in participating in sustainability through their food consumption choices (Lu and Chi, 2018). Consumers also appreciate a restaurant's efforts to conserve resources and implement green practices (Hornig *et al.*, 2018). In this regard, environmentally responsible edible insect restaurants encourage customers to engage in sustainable practices through edible insect consumption. Several problems regarding the existing studies on entomophagy have been identified. First, many studies on entomophagy have been conducted from a perspective of nutrition or quality control (Van Huis *et al.*, 2013). Second, the lack of studies on the perception of consumers from psychological and social perspectives is a limitation that prevents practitioners from comprehensively understanding their customers. There are only handful of studies that have been conducted from the consumer perspective such as topics regarding consumers' preference or acceptance for edible insect food product (Cicatiello *et al.*, 2016; Delicato *et al.*, 2020). However, consumers could choose to eat a certain food not only because of their personal evaluation of the attributes of the food, but also because of cultural, social and environmental factors. Exploring the customers' behavioral intention to use an edible insect restaurant from the environmental and the socio-cultural perspectives can provide useful information to industry practitioners as customers nowadays are more interested in sustainability values and want to be more involved in sustainable consumption.

Theory of planned behavior (TPB) put importance on individuals' self-interest motives (Han, 2015), while the norm activation theory (NAT) emphasizes that personal norm is an influential factor to determine pro-social behavior (Schwartz and Howard, 1981). Both theories have been applied to understand individuals' eco-friendly behaviors. However, the possible interplays among key dimensions from TPB and NAT to explain potential customers' behavioral intention to use an edible insect restaurant have not been investigated. Combining TPB and NAT is necessary to clearly understand customers' pro-environmental decision-making process in the context of edible insect restaurant.

Therefore, the objectives of this study are as follows. The first objective is to test TPB explore the relationships among key variables of TPB in an edible insect restaurant context. The second objective is to identify the impact of cognitive triggers on personal norms, and the third objective is to investigate the relationships among subjective norms, personal norms and behavioral intentions to visit an edible insect restaurant. In terms of theoretical contribution, this study is unique and different from previous entomophagy studies because it can provide a comprehensive understanding of diners' decision-making process for visiting an edible insect restaurant. Moreover, we expect the findings of the current study to contribute to the extant knowledge, enabling an understanding of the sustainability values of edible insect restaurants. Practically, the tourism industry can gain useful insights that can assist them in developing effective sustainable practices that can deliver appropriate sustainability values to consumers in relation to edible insect food.

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## Literature review

### *Edible insect restaurants and sustainability characteristics*

An edible insect restaurant provides customers cuisines consisting of edible insects. Using edible insects could be a promising solution for food security, and it could be a more sustainable form of food production from the economic, social and environmental perspectives (Yen, 2009). First, edible insects have the potential to reduce problems caused by malnutrition, and they can significantly contribute to human health. For example, edible insects contain more nutrients such as minerals, omega-3 and fiber than beef (Michaelsen *et al.*, 2011; Yen *et al.*, 2013). Second, edible insect farming is eco-friendly as its level of global warming potential is the lowest among the diverse animal sources, which includes beef, lamb and chicken (Halloran *et al.*, 2017). In terms of transportation, edible insects are more efficient, because they can be densely packed, and they require less water at the slaughter and contribute to a lower environmental impact (Gamborg *et al.*, 2018). Finally, an edible insect farm can be managed on a small scale, which has significant advantages for low-income countries. For example, farmers can build rearing facilities with low-cost materials that are locally accessible (Chaalala *et al.*, 2018). Therefore, small-scale edible insect farming can contribute to the sustainable development of communities and villages (Chaalala *et al.*, 2018).

Regardless of the aforementioned benefits of edible insect consumption, some people are willing to visit an edible insect restaurant because of unfamiliarity with edible insect consumption (Baker *et al.*, 2016; Cicatiello *et al.*, 2016). However, the perception of edible insect restaurants is slowly changing. In the past, edible insects were only available in small-scale street restaurants, which are sometimes cramped and unclean. Therefore, only tourists who enjoy adventure with high food neophilic tendencies would visit the restaurants. However, edible insects now appear on the menus of five-star restaurants. Edible insects are enjoyed at restaurants by tourists who seek high-quality cuisines and by those who are aware of the sustainability issues (Ramos-Elorduy, 2009).

In Thailand, the *Insects in the Backyard* restaurant is a trendy upscale restaurant where customers can enjoy an entire menu devoted to edible insects, such as crickets, grasshoppers, worms, caterpillars and beetles (Abbie, 2017). The restaurant was operated by Chef Thitiwat Tantragarn. Tantragarn started the business because of a high level of consciousness of the crisis regarding food security and the sustainability issues (Abbie, 2017). Contemporary diners also believe that entomophagy is highly associated with the environment and sustainability issues. For example, in a study conducted by Alemu *et al.* (2017), more than 48% of respondents positively and significantly associated edible insects with nutritious and environmentally friendly cuisines. Similarly, Pambo *et al.* (2017) found that environmental concern and responsibility will motivate consumers to seek out food made from edible insects. Thus, visiting an edible insect restaurant is a way of educating customers to recognize the value of edible insects as a future resource.

### *Extended theory of planned behavior and norm activation theory*

The TPB has been applied to understand consumers' behavioral intentions in various situations (Ajzen, 1991; Park *et al.*, 2017). The key concept of TPB is that attitude, subjective norms and perceived behavioral control determine consumers' behavioral intention (Ajzen, 1985).

While the TPB is widely used to predict the individuals' general behaviors, the NAT was initially developed to predict one type of behavior, which is altruism (Schwartz and Howard, 1981). The basic assumption of NAT is that people help others if they feel morally obligated to help in a given situation, which emphasizes the role of personal norms. According to

Thøgersen (1999), environmental behavior is not only totally determined by the individuals' cost-benefit calculations, which is explained by the TPB, but it is also decided by the moral beliefs as to whether the behavior in question is right or wrong. Following Thøgersen's (1999) argument, the NAT has been often used in number of studies to explain the pro-environmental intentions/behaviors in diverse contexts, which includes tourism (Onwezen *et al.*, 2013).

To summarize, even though the TPB has been used to predict a variety of deliberate behaviors, the NAT is generally used to explain ethical behavior (Liu *et al.*, 2017). One might question whether visiting an edible insect restaurant is completely motivated by self-interest motives or by pro-social motives. In the current study, we assumed that the non-moral motivations will be captured by the TPB, and the moral drivers of visiting an edible insect restaurant will be explained by the NAT. It is expected that the combined research framework will provide comprehensive and complementary perspectives to explain the customers' behaviors to visit an edible insect restaurant.

Attitude is "psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (Eagly and Chaiken, 1993, p. 1). In this study, attitude refers to a psychological tendency conveyed by a summary evaluation of an edible insect restaurant that contains some degree of favor or disfavor. Consumers may feel pressure by others to perform a particular behavior (Liu *et al.*, 2017). In the present study, the subjective norms refer to important referent individuals' or groups' opinions with regard to the use of an edible insect restaurant. Behavioral control refers to "the perceived ease or difficulty of performing the behavior" (Ajzen, 1991, p. 188). To understand the customers' behavioral intentions to eat at an edible insect restaurant, it is important to investigate the customers' perceptions regarding their resources, time and opportunities to use an edible insect restaurant.

Previous studies have provided empirical evidence, which shows that the subjective norms positively influence the attitude (Hsieh *et al.*, 2016; Ryu and Jang, 2006; Shin and Hancer, 2016). For example, in Ryu and Jang's (2006) study, the subjective norms were found to be an important predictor of attitude toward the destination's food. Teng *et al.* (2015) indicated that when there is social pressure, which includes staying at green hotels is desirable, tourists are more likely to form a positive attitude of staying at a green hotel while traveling. Hence, the first hypothesis is proposed:

*H1.* Subjective norms influence attitude.

Second, behavioral intentions can be described as willing to perform the behavior (Ajzen, 1991). The empirical findings in the previous studies have confirmed that a positive attitude toward a particular product will increase the consumers' intention to use or purchase the product (Choe and Kim, 2018; Menozzi *et al.*, 2017). For example, Choe and Kim (2018) found that tourists who have positive attitude toward Hong Kong food are more likely to have positive intentions, which include recommending the destination's food and visiting the destination to try the food there. From an entomophagy context, Menozzi *et al.* (2017) found that attitude was a significant factor to form the behavioral intention to try edible insect products as chocolate chip cookies made of crickets. Therefore, we propose the second hypothesis:

*H2.* Attitude influences behavioral intentions.

Furthermore, the literature shows that the subjective norms are positively associated with the behavioral intentions (Ham *et al.*, 2015; Pambo *et al.*, 2018). For instance, in

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Ham *et al.*'s (2015) study, they examined the process of the consumers' decision to purchase green foods in Southeast Europe, and they found that the subjective norm represented statistically significant predictors of green food purchases. In Pambo *et al.*'s (2018) study, Kenyans showed a high level of intentions to eat edible insects when the influence of the subjective norms was obvious. Likewise, it can be inferred that when customers feel normative pressure regarding visiting an edible insect restaurant, they are more likely to show a high level of intention to visit an edible insect restaurant. Thus, the following hypothesis is proposed:

*H3.* Subjective norms influence behavioral intentions.

In addition, a person's actual control over the behavior in question is important, because non-motivational factors, such as time, skills and the cooperation of others might sometimes influence the actual behavior (Ajzen, 1991). Previous studies have shown that the consumers' actual control over the behavior in question has a positive impact on the actual behavior or the intention (Han and Hyun, 2017; Liu *et al.*, 2017; Mancini *et al.*, 2019; Pambo *et al.*, 2018). For example, Mancini *et al.* (2019) found that when young Italian consumers believe that eating edible insects is possible and available, they are willing to try eating edible insects. Based on the previous studies, the following hypothesis is proposed:

*H4.* Perceived behavioral control influences behavioral intentions.

#### *Personal norms*

Personal norm refers to an individual's own moral responsibility to perform or not perform a specific behavior, which is differentiated from the perceived social pressure (Schwartz and Howard, 1981; Steg *et al.*, 2005). The personal norms have been identified as one of the most important variables to understand the pro-social behaviors (Han and Hyun, 2017). The previous literature attempted to combine the NAT and the TPB to explain the consumers' eco-friendly behaviors or pro-environmental behaviors, and they proved that subjective norms are positively related to personal norms. For example, Liu *et al.* (2017) integrated the NAT to explain the individuals' intention to reduce car use in China, and they confirmed that subjective norms positively influence the personal norms. In Han and Hyun's (2017) study, the subjective norms positively affected the personal norms, which confirmed that the social pressure to engage in sustainable environmental behavior will lead individuals to feel obligated to engage in this type of behavior. In the current study, we propose that the social pressure to visit an edible insect restaurant is more likely to lead to customers experiencing personal obligations to visit an edible insect restaurant. Hence, the following hypothesis can be made:

*H5.* Subjective norms influence personal norms.

#### *Cognitive triggers*

Previous studies that adopted the NAT to explain the pro-environmental behaviors show that it is important to investigate the cognitive triggers, which include environmental awareness, ascribed responsibility, biospheric value and environmental concerns (Steg *et al.*, 2005). Previous literature shows that the cognitive triggers, which include the perceived effectiveness, are critical to explain the individuals' moral obligation to enact specific behaviors (Kim and Han, 2010).

First, environmental awareness refers to “the perception and understanding of threats, changes, and the options available about the environment” (Takala, 1991, p. 591). Thus, people who have high levels of environmental awareness are mindful of the natural environment, and they are very aware of the effects of pollution on the environment (Teng *et al.*, 2018). Liu *et al.* (2017) found that if people are aware of negative consequences of car use, they are more likely to show the high responsibility not to engage in car travel. In addition, Steg and De Groot (2010) attempted to explain prosocial intentions by testing causal relationships based on NAT. Their study showed that awareness significantly affected personal norm. For example, when residents thought that they would be less satisfied with their living conditions when a methadone clinic was to be established in their neighborhood, individuals felt more morally obliged to demonstrate against its establishment in their city. Based on these previous studies of the relationship between environmental awareness and personal norm, the *H6* is proposed as:

*H6.* Environmental awareness influences personal norms.

Second, ascribed responsibility refers to a “feeling of responsibility for performing the specific behavior” (Onwezen *et al.*, 2013, p. 142). Consumers with a high level of ascribed responsibility feel that they are responsible for environmental problems. Previous studies showed that ascribed responsibility is associated with individuals’ moral obligation to perform a specific behavior (Han *et al.*, 2017; Liu *et al.*, 2017). For example, in Han *et al.*’s (2017) study, they confirmed that if tourists feel more responsible for the environmental problems in conventions, they are more likely to think that they should act in eco-friendly ways when they attend a convention regardless of what other people do. Accordingly, the following hypothesis is proposed:

*H7.* Ascribed responsibility influences personal norms.

Third, biospheric value is defined as “being concerned about nature and the biosphere itself” (Klößner, 2013, p. 1030). Those who have biospheric values believe that it is very important to preserve nature and respect the Earth because it is valuable in itself (Klößner, 2013). Those people take care about well-being of environment and others. Roos and Hahn (2019) applied extended TPB to examine consumers’ belief structure about collaborative consumption. In their study, biospheric value was proven to be a significant factor to affect personal norm. Meanwhile, Klößner (2013) used a meta-analysis to understand consumers’ environmental behavior. According to his study, the personal norms are predicted by not only the awareness of the consequences and the ascribed responsibility but also the biospheric value (Klößner, 2013). Thus, it can be assumed that if protecting the environment and preventing pollution is very important to customers, they are more likely to feel it is important to use an edible insect restaurant. Based on the previous discussion, *H8* is proposed as:

*H8.* Biospheric value influences personal norms.

Fourth, environmental concern refers to a strong attitude in regard to protecting the environment (Crosby *et al.*, 1981). Consumers with a higher degree of concern toward the environment believe that people abuse the environment seriously. Eriksson *et al.* (2006) found that pro-environment orientation was important for personal norm, which affect consumers’ intentions not to use car. More recently, Han *et al.* (2017) confirmed that environmental concern is significantly related to personal norm in the convention tourism context. Therefore, the following hypothesis is proposed:

H9. Environmental concern influences personal norms.

Fifth, individuals with a high level of perceived effectiveness believe that their attempts and efforts to protect environments will generate positive effect on the environment (Han *et al.*, 2017). Kim and Han (2010) confirmed that if customers think that it is worthwhile for them to do something about pollution, they are more likely to be involved in environmentally conscious behaviors. In the current study, it is proposed that perceived customer effectiveness has an impact on personal obligation to use an edible insect restaurant. Therefore, the following hypothesis is proposed:

H10. Perceived effectiveness influences personal norms.

Furthermore, the contribution of the personal norms to explain the environmentally friendly behavioral intentions have been well documented in previous studies, which include the intentions to reduce car use (Liu *et al.*, 2017), water savings (Harland *et al.*, 2007) and organic food consumption (Klößner and Ohms, 2009). For example, Shin *et al.* (2018) found that the personal norms positively affect the intentions to choose organic menu items, and they subsequently affect the intentions to visit a restaurant that features organic menus. The positive relationship between the personal norms and the behavioral intentions was also confirmed using a meta-analytical structural equation modeling approach (Klößner, 2013). Thus, we propose the following hypothesis:

H11. Personal norms influence behavioral intentions.

Figure 1 depicts a graphical representation of the theoretical framework.

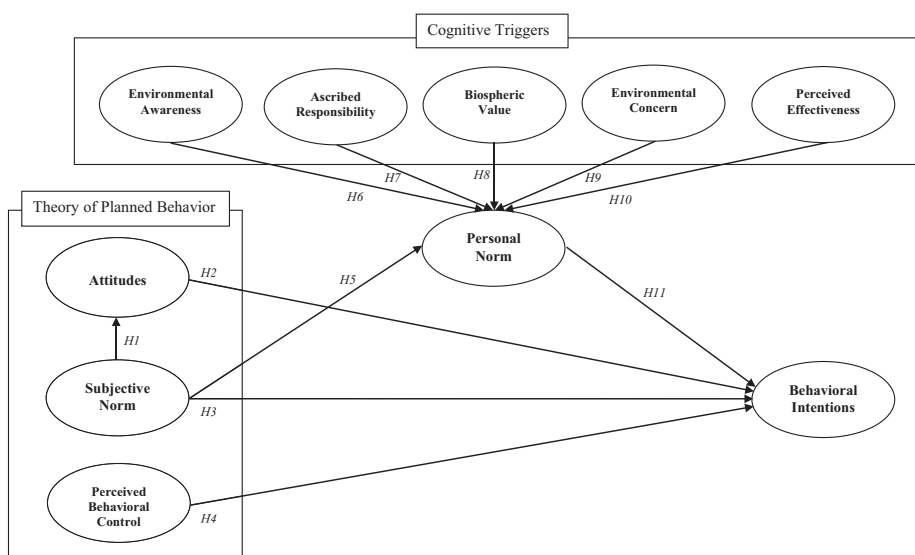


Figure 1. Proposed conceptual model

## Methodology

### *Measurement*

The multiple-item measurement scales, which have been developed and validated by previous studies, were used to measure ten constructs. First, the TPB, which include attitudes, subjective norms and perceived behavioral control, was measured with nine measurement items that were adapted from previous studies (Ajzen, 1991; Ajzen and Fishbein, 1980; Han and Hyun, 2017). Second, the cognitive triggers were measured using 15 measurement items from previous literature (Han *et al.*, 2017; Kim and Han, 2010; Ryan and Spash, 2008). Third, the personal norms were adopted from previous studies (DeGroot and Steg, 2009; Han and Hyun, 2017). Fourth, the behavioral intentions were measured with three items used by Ajzen (1991) and Han and Hyun (2017). A seven-point Likert's scale was used, where 1 indicates "strongly disagree" while 7 means "strongly agree."

### *Data collection*

This study used an online survey to collect the data that used a survey company in South Korea. The company, which is one of the biggest in South Korea, sent invitation emails to 6,479 panels. In South Korea, the respondents do not have a good understanding of edible insect restaurants, because the restaurants of this type are not active there. For this reason, the survey was conducted on an unspecified number of people. In addition, this study provided the respondents with two news articles and a video, so the participants' could gain a clear understanding of the edible insect restaurants before respondents answer to the questions. The news articles explained the growth of the edible insect market and the eco-friendly role of edible insects. In addition, the video showed the process of cooking using insects and the operating system of an insect restaurant. As a result of the data collection, 450 samples were obtained, but 11 samples were deleted because of multicollinearity problems. Finally, 439 samples were used for the statistical analysis.

## Data analysis

### *Demographic variables*

Table 1 shows that 50.1% ( $n = 220$ ) of the respondents were male. The average age of the respondents was 38.08 years. The respondents with a monthly household income between \$1,001 and \$2,000 accounted for 29.6% ( $n = 130$ ) of the participants. The majority of the respondents were married (52.4%,  $n = 230$ ). In regard to the educational levels, those with bachelor's degrees represented 56.7% ( $n = 249$ ) of participants, which was followed by those with associate degrees (17.5%,  $n = 77$ ).

### *Confirmatory factor analysis*

The reliability and validity of the data were assessed. As presented in Table 2, the goodness-of-fit measures to check the overall model fit reported a satisfactory level ( $\chi^2 = 708.977$ ,  $df = 360$ ,  $\chi^2/df = 1.969$ ,  $p < 0.001$ , normed fit index [NFI] = 0.955, comparative fit index [CFI] = 0.977, Tucker-Lewis index [TLI] = 0.973 and root mean square error of approximation [RMSEA] = 0.047) (Byrne, 2001). The lowest score of the factor loading was 0.717. All the factor loadings were significant at the  $p < 0.001$  level (Table 2).

The scores of the average variance extracted (AVE) for all the domains were greater than 0.50 (Table 3), which indicates high levels of convergent validity (Fornell and Larcker, 1981). In addition, all the values of the composite reliabilities were higher than 0.70. They ranged from 0.859 to 0.977, which suggests that all the constructs also had a satisfactory internal consistency (Hair *et al.*, 2006). Next, AVE values for each construct were higher than the



Variable	<i>n</i>	(%)	Role of edible insect restaurants
<i>Gender</i>			
Male	220	50.1	
Female	219	49.9	
<i>Monthly household income</i>			
US\$6,001 and over	16	3.6	<b>3589</b>
US\$5,001–US\$6,000	23	5.2	
US\$4,001–US\$5,000	43	9.8	
US\$3,001–US\$4,000	60	13.7	
US\$2,001–US\$3,000	123	28.0	
US\$1,001–US\$2,000	130	29.6	
Under US\$1,000	44	10.0	
<i>Marital status</i>			
Single	204	46.5	
Married	230	52.4	
Widowed/divorced	5	1.1	
<i>Education level</i>			
Less than high school diploma	63	14.4	
Associate degree	77	17.5	
Bachelor's degree	249	56.7	
Graduate degree	50	11.4	
Mean age = 38.08 years			

**Table 1.**  
Profile of the survey respondents (*n* = 439)

corresponding inter-construct correlations, confirming discriminant validity (Fornell and Larcker, 1981).

### Structural equation modeling

As presented in Table 4, the model had an adequate fit ( $\chi^2 = 1069.439$ , *df* = 373,  $\chi^2/df = 2.867$ ,  $p < 0.001$ , NFI = 0.932, CFI = 0.955, TLI = 0.947 and RMSEA = 0.065) (Byrne, 2001). The results indicated that all the 11 hypotheses were statistically accepted at the 0.05 level (Figure 2).

More specifically, *H1*, which proposed the relationship between the subjective norm and the attitude, was supported ( $\beta = 0.602$  and  $p < 0.05$ ). The attitude influenced behavioral intentions ( $\beta = 0.458$  and  $p < 0.05$ ). The subjective norms affected behavioral intentions ( $\beta = 0.196$  and  $p < 0.05$ ). Perceived behavioral control affected behavioral intentions ( $\beta = 0.097$  and  $p < 0.05$ ). Therefore, *H2*, *H3* and *H4* were supported. The results of the data analysis indicated that the subjective norms play an important role in the formation of the personal norms ( $\beta = 0.535$  and  $p < 0.05$ ). Hence, *H5* was supported. In terms of the effects of the five dimensions of the cognitive triggers, environmental awareness ( $\beta = 0.365$  and  $p < 0.05$ ), ascribed responsibility ( $\beta = 0.137$  and  $p < 0.05$ ), biospheric value ( $\beta = 0.200$  and  $p < 0.05$ ), environmental concern ( $\beta = 0.238$  and  $p < 0.05$ ) and perceived effectiveness ( $\beta = 0.424$  and  $p < 0.05$ ) positively affect the personal norms. Therefore, *H6–H10* were supported. The personal norms positively affected behavioral intentions ( $\beta = 0.373$  and  $p < 0.05$ ), so *H11* was supported.

## Discussion and implications

### Theoretical implications

First, the present study closely fills the void in the extant literature of sustainable innovations in the restaurant industry. Sharma *et al.* (2020) indicated that in the future, more

Construct and scale item	Standardized loading <sup>a</sup>
<i>Attitudes toward using an edible insect restaurant</i>	
Unfavorable – favorable	0.925
Bad – good	0.890
Negative – positive	0.928
<i>Subjective norm</i>	
Most people who are important to me think I should dine at an edible insect restaurant	0.947
Most people who are important to me would want me to dine at an edible insect restaurant	0.987
People whose opinions I value would prefer that I dine at an edible insect restaurant	0.964
<i>Perceived behavioral control</i>	
Whether or not I dine at an edible insect restaurant is completely up to me	0.894
I am confident that, if I want, I can dine at an edible insect restaurant	0.982
I have the resources, time and opportunities necessary to dine at an edible insect restaurant	0.717
<i>Environmental awareness</i>	
The effects of pollution on public health are worse than we realize	0.825
Over the next several decades, thousands of species will become extinct	0.815
Claims that current levels of pollution are changing the Earth's climate are not exaggerated	0.817
<i>Ascribed responsibility</i>	
I believe that consumers are partly responsible for environmental problems	0.940
I feel that consumers are jointly responsible for environmental deterioration	0.932
I believe that every consumer is partly responsible for environmental problems	0.763
<i>Biospheric value</i>	
Please indicate to what extent the following are important as guiding principles in your life. (Very unimportant: 1 and very important: 7)	
Preventing pollution (e.g. conserving natural resources)	0.939
Respecting the Earth (e.g. harmony with other species)	0.961
Protecting the environment (e.g. preserving nature)	0.947
<i>Environmental concern</i>	
The balance of nature is very delicate and easily upset	0.798
Humans are severely abusing the environment	0.971
The Earth is like a spaceship, with limited room and resources	0.853
<i>Perceived effectiveness</i>	
It is worthless for one individual to do anything about pollution (reverse coded)	0.914

(continued)

**Table 2.**  
Confirmatory factor  
analysis: items and  
loadings

Construct and scale item	Standardized loading <sup>a</sup>
As one person cannot have any effect upon pollution and natural resource problems, it does not make any difference what I do (reverse coded)	0.935
Each individual's eco-friendly behaviors can have a positive effect on the environment	0.953
<i>Personal norms</i>	
I feel an obligation to choose an edible insect restaurant	0.926
Regardless of what other people do, because of my own values/principles, I feel that I should use an edible insect restaurant	0.950
I feel it is important that consumers use an edible insect restaurant	0.916
<i>Behavioral intentions</i>	
I will dine at an edible insect restaurant	0.950
I am willing to dine at an edible insect restaurant	0.961
I am likely to dine at an edible insect restaurant	0.964
Goodness-of-fit statistics: $\chi^2 = 708.977$ , $df = 360$ , $\chi^2/df = 1.969$ , $p < 0.001$ , NFI = 0.955, CFI = 0.977, TLI = 0.973 and RMSEA = 0.047	

**Notes:** <sup>a</sup>All factor loadings are significant at  $p < 0.001$ . NFI = normed fit index; CFI = comparative fit index; TLI = Tucker–Lewis index; RMSEA = root mean square error of approximation

**Table 2.**

research is needed to explore environmental practices and improvement on restaurant menus containing ecological food sources and consumers' buying behaviors of such food items. With this respect, this study successfully acceded to that request in academia. In addition, the amount of eco-innovation research in the restaurant sector is relatively small, which is only 10% of total articles in hospitality (Sharma *et al.*, 2020). Thus, this study has contributions to the existing literature.

Second, this research differs from the extant studies pertaining to green practices in the hospitality. Indeed, the existing studies endeavored to determine the driving forces of consumers' behavioral intentions, but they mainly centered on one specific aspect such as value (Lu and Chi, 2018; Teng *et al.*, 2018). Unlike these prior studies, this research took the comprehensive approach that encompasses various factors simultaneously influencing the formation of individuals' behavioral intentions. Moreover, the theoretical originality of the present research is invaluable, as little is known about the formation of consumers' behavioral intentions in the field of edible insect restaurants. The extant literature is mainly focused on the individual perceptions, preferences or personality traits regarding edible insect consumption (Clarkson *et al.*, 2018; Mancini *et al.*, 2019; Pambo *et al.*, 2018). In this respect, the current study successfully explored how customers' environmentally responsible behavioral intentions are generated from the standpoint of social psychology. Meanwhile, this study is among the first to examine the key determinants toward edible insect restaurant subject to the consumers in Korea which the results addressed a point of similarity and difference with other samples in prior studies. In fact, there are different determining factors driving consumer behavior by different geographical regions. For instance, people in both rural and urban areas in Kenya were found to highly prefer insects-based food products and it is further strengthen when there are recommendations from peers and officials (Alemu *et al.*, 2017). Whereas, when rural communities in Kenya were only tested, sustainability and environmental concerns were the main forces of consumer behavior toward edible insects (Pambo *et al.*, 2017). In this respect, this study validates the

**Table 3.**  
Descriptive statistics  
and associated  
measures

Variables	Mean (SD)	AVE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Attitude	4.06 (1.49)	0.836	0.939 <sup>a</sup>	0.599 <sup>b</sup>	0.436	0.237	0.025	0.110	0.046	0.153	0.811	0.838
(2) Subjective norm	3.91 (1.28)	0.933	0.359 <sup>c</sup>	0.977	0.159	0.074	0.220	0.002	0.184	0.100	0.534	0.627
(3) Perceived behavioral control	4.88 (1.17)	0.759	0.190	0.025	0.903	0.310	0.263	0.237	0.145	0.271	0.481	0.448
(4) Environmental awareness	5.33 (1.15)	0.671	0.056	0.005	0.096	0.859	0.697	0.651	0.545	0.686	0.254	0.118
(5) Ascribed responsibility	5.82 (1.12)	0.778	0.001	0.048	0.069	0.486	0.913	0.522	0.597	0.610	0.016	0.056
(6) Biospheric value	5.43 (1.15)	0.901	0.012	0.001	0.056	0.424	0.272	0.965	0.545	0.719	0.146	0.090
(7) Environmental concern	5.75 (1.10)	0.769	0.002	0.034	0.021	0.297	0.356	0.297	0.908	0.627	0.054	0.140
(8) Perceived effectiveness	5.56 (1.10)	0.873	0.023	0.010	0.073	0.471	0.372	0.517	0.393	0.954	0.248	0.112
(9) Personal norm	4.14 (1.26)	0.866	0.658	0.285	0.231	0.065	0.001	0.021	0.003	0.062	0.951	0.809
(10) Behavioral intentions	3.70 (1.39)	0.918	0.702	0.393	0.201	0.014	0.003	0.008	0.020	0.013	0.654	0.971

**Notes:** SD = standard deviation and AVE = average variance extracted. <sup>a</sup>Composite reliabilities are along the diagonal; <sup>b</sup>correlations are above the diagonal; <sup>c</sup>squared correlations are below the diagonal

Table 4.

Standardized parameter estimates for structural model

Variables		Standardized estimate	t-value	Hypothesis
H1. Subjective norm	→ Attitude	0.602	14.068*	Supported
H2. Attitude	→ Behavioral intentions	0.458	12.057*	Supported
H3. Subjective norm	→ Behavioral intentions	0.196	4.872*	Supported
H4. Perceived behavioral control	→ Behavioral intentions	0.097	3.378*	Supported
H5. Subjective norm	→ Personal norm	0.535	13.309*	Supported
H6. Environmental awareness	→ Personal norm	0.365	4.764*	Supported
H7. Ascribed responsibility	→ Personal norm	0.137	2.077*	Supported
H8. Biospheric value	→ Personal norm	0.200	3.248*	Supported
H9. Environmental concern	→ Personal norm	0.238	4.293*	Supported
H10. Perceived effectiveness	→ Personal norm	0.424	6.159*	Supported
H11. Personal norm	→ Behavioral intentions	0.373	10.727*	Supported

Notes: Goodness-of-fit statistics:  $\chi^2 = 1069.439$ ,  $df = 373$ ,  $\chi^2/df = 2.867$ ,  $p < 0.001$ ,  $NFI = 0.932$ ,  $CFI = 0.955$ ,  $TLI = 0.947$  and  $RMSEA = 0.065$ . \* $p < 0.05$ . NFI = normed fit index; CFI = comparative fit index; TLI = Tucker–Lewis index and RMSEA = root mean square error of approximation

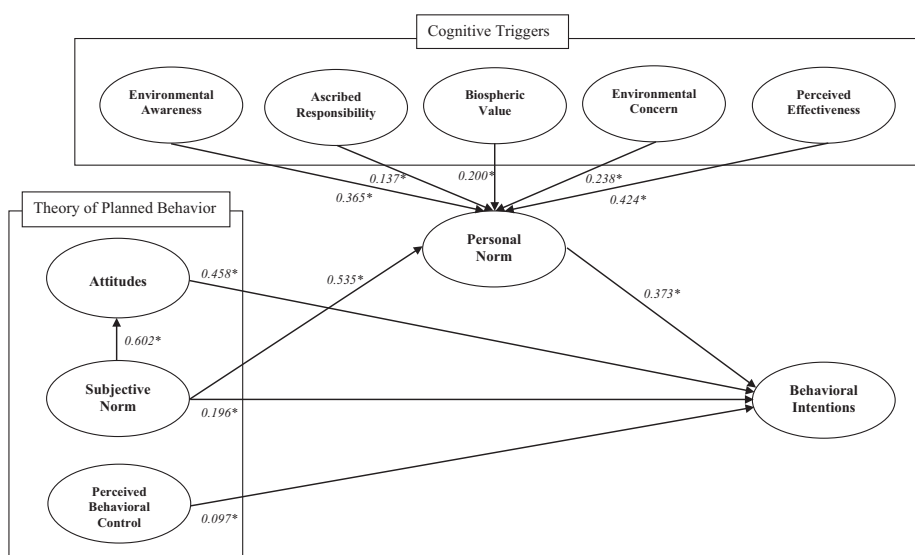


Figure 2. Standardized theoretical path coefficients

Note: \* $p < 0.05$

importance to take account of consumers' demographic profiles including cultural diversity as how people perceive entomophagy and the triggers for their buying behavior vary by their backgrounds.

Third, the current study is one of few attempts to incorporate the TPB and the NAT to comprehend the determinants of the customers' behavioral intentions toward an edible insect restaurant. Many pro-environmental behaviors or behavioral intentions have been tested by adopting either the TPB or the NAT (Onwezen et al., 2013). Even though the recent studies have begun to integrate the existing social psychology theories to better predict the

customers' behavioral intentions (Han and Hyun, 2017; Liu *et al.*, 2017), similar attempts have not been made in the context of edible insect restaurants. The current study encompasses both the non-moral drivers of intentions and the moral drivers of intentions to visit an edible insect restaurant, and it provides more comprehensive and complementary perspectives. Moreover, this study extends the existing theories by adopting additional environmental and socio-cultural variables, which include biospheric value, environmental concerns and perceived effectiveness, beyond the TPB and the NAT. Following the empirical findings of the cognitive triggers of the sustainable behavioral intentions in other contexts, the results of our study enhance the theoretical value by confirming the effects of the cognitive drivers in the edible insect restaurant context.

Fourth, the analysis results of this study revealed that there are significant associations between the subjective norm and the attitude ( $\beta = 0.602$  and  $p < 0.05$ ) and the subjective norm and the personal norm ( $\beta = 0.535$  and  $p < 0.05$ ). It is assumed that the beliefs and the opinions of the people play a crucial role in the eco-friendly behavioral intentions, which is in line with the studies conducted by Pambo *et al.* (2018) and Videras *et al.* (2012). The individuals' behaviors are embedded in a social context, and the social relationships are related to the environmentally friendly behaviors. In addition, this study provides the empirical evidence that the individuals' intentions to visit an edible insect restaurant are formed and activated by both volitional and non-volitional processes. In particular, attitude ( $\beta = 0.458$  and  $p < 0.05$ ) was found to be the most important factor among the existing variables of the TPB. This result is coherent with the previous studies conducted by Menozzi *et al.* (2017).

Last, the relationship between the cognitive triggers and the personal norm is significant, and it has been established in previous studies (Klößner, 2013; Roos and Hahn, 2019) and in this study. Moreover, our results support research that demonstrates the meaningful contribution of the formed personal norms to the pro-environmental behavioral intentions (Klößner, 2013; Steg *et al.*, 2005). The results of our analysis confirmed the meaningfulness of the cognitive triggers in the field of edible insect restaurants, because it generates increased personal norms that will in turn lead to increased behavioral intentions toward an edible insect restaurant. In particular, perceived effectiveness ( $\beta = 0.424$  and  $p < 0.05$ ) showed the strongest impact on personal norms, which illustrates that people who recognize themselves as being capable of making a meaningful impact on the environment tend to behave in favor of the environment.

#### *Managerial implications*

This study enables tourism practitioners to advance their knowledge of individuals' social psychology perspective and accordingly establish strategic marketing plans to cope with the challenge of sustainability in the tourism industry. For example, professionals in edible insect restaurants should work in close partnership with environmental activists to imprint their ecological image in the minds of the people. Environmental activists are not only engaged in pro-environmental behavior but also highly committed to encourage the broader populations to improve the sustainability (Dono *et al.*, 2010; Hwang *et al.*, 2020). Hence, this study recommends that practitioners support environmental activists' demonstrations demanding environmentally responsible behavior and offer sponsorships toward their green movements in the tourism industry. By having been recognized as strong partners in persuading ecological behavior, the sustainability values would entrench the position of edible insect restaurants as one of the ideal solutions to protect the environment.

Second, the current study suggests that there are many opportunities for an edible insect restaurant to become popular by stimulating the cognitive triggers. Thus, it is of great

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importance to inspire individuals' moral beliefs constantly to reduce the environmental burden in the tourism industry. Furthermore, because of analysis results which validated the significant link between subjective norm and attitude as well as subjective norm and personal norm that eventually induce behavioral intentions, the tourism practitioners should emphasize the sustainable value of edible insects to activate the consumers' sense of the subjective norm. That is, our results imply that the initiatives to build greater pro-environmental attitudes and personal norms can be accelerated through the collaboration with the local bureaus or world organizations, such as the United Nations, which are envisioned as leading the pro-environmental behaviors of humankind. As such, educational programs in communities across the nation, campaigns led by environmentalists and the production of informative videos from expert speakers would be powerful forces to emphasize the sustainable value of edible insects. This would affect the formation of a subjective norm that exerts a force on the favorable attitudes and the personal norms, which would eventually lead to increased behavioral intentions toward an edible insect restaurant. In addition, influencers' enthusiastic endorsements are necessary for more individuals to be conscious of the environmental issues and how they can contribute to sustainability in their dining experiences.

Third, from a practical viewpoint, establishing a favorable consumer attitude is of great importance for the success of edible insect restaurants. Consumers' attitudes in food and restaurant settings have been examined as a result of quality, and more specifically the taste of the food in question (House, 2016; Kim and Eves, 2012). Edible insects are widely known for their great taste (Van Huis *et al.*, 2013), so edible insect restaurant operators should therefore emphasize the superior taste of edible insects to form customers' favorable attitudes toward edible insect restaurants. In consideration of the current unpopular presence of edible insect restaurants in many regions, holding culinary events with edible insects would offer multiple opportunities for the potential consumers to try edible insects. For instance, people may enjoy various fun events where participants are requested to identify the taste of insects or indicate the greater taste among different pieces of edible insect foods while they are blindfolded and hold their noses. Alternatively, promotions or pop-up stores that feature edible insects could appeal to the customers and stimulate their interest and motives. Furthermore, their low environmental impact is one of the substantial benefits of edible insects, and the consumers' positive evaluations of edible insects in regard to the environment is a significant indicator to build a favorable attitude toward them (Menozzi *et al.*, 2017). From the tourism destination perspective, it is expected that a positive attitude toward an edible insect restaurant can enhance the destination's green image and contribute to sustainable tourism. Thus, it would be effective to advertise the concept of edible insect restaurants in conjunction with a sustainability standpoint.

Fourth, tourism practitioners are recommended to build each individual with a higher degree of perceived effectiveness to stimulate the individuals' moral obligation to behave in an eco-friendly manner in regard to the consumers' dining choices. An outburst of smart technology would enable the measurement of the individuals' endeavors and outcomes from a sustainability perspective, and an edible insect restaurant could be a pioneer to adopt innovative technology to display their outstanding contributions to sustainability. For example, an edible insect restaurant can provide electronic menu books with a carbon footprint, which informs diners to what extent they contribute to reducing the total greenhouse gas by choosing edible insect dishes in real time. Customers would be encouraged to recognize that their dining experience impacts the environment by doing this.

Finally, the individuals' food choices are regarded as an expression of their integral expression of their identity, such as in regard to who they are and what they believe in;

consumers are beginning to become more conscious of the environmental impact of current food production (Halloran *et al.*, 2018; Fox and Ward, 2008). Contemporary consumers are more sensitive about what they eat. Based on the empirical findings of the intricate and significant association between the cognitive triggers and the customers' behavioral intentions in this study, the professionals in the edible insect restaurant industry should analyze their customers in detail, so they are able to conduct a more customized approach and strategically activate the potential consumers' cognitive triggers. Even though food consumption has been disparately reported to some extent among different type of people such as animal lover, vegetarian or health-conscious eater (Herzog and Golden, 2009; House, 2016), it is suggested to interview or survey patrons who visit edible insect restaurants to identify the segment that consumers belong to and use the data for future marketing strategies.

#### *Limitations and future research*

First, our study has a limitation, because we tested the behavioral intention but not the actual behavior, which is because of the lack of edible insect restaurants in South Korea at present. Hence, future research is advised to examine the behavior in reality by incorporating respondents who have experienced eating at an edible insect restaurant. Second, our samples are all from the place where a long history of edible insects exists, and thus, it is hard to apply the findings of the current study to contexts and thus, cross-cultural comparative analysis in future is suggested. Third, which was previously stated, a substantial amount of the population still hesitates to visit an edible insect restaurant (Baker *et al.*, 2016). It would be meaningful to conduct experimental studies to capture barriers in minute detail, so the operators are able to mitigate the potential challenges in the market penetration of the restaurant industry. Lastly, it is important to consider the formative indicators as an antecedent of the TPB (Ajzen, 2006), so future research is necessary to use the formative indicators to explain how to form attitude, subjective norm and perceived behavioral control.

#### **Conclusions**

The current paper was the first attempt to investigate diners' behavioral intentions to visit an edible insect restaurant by integrating TPB and NAT. The results of data analysis showed that all proposed hypotheses were statistically supported. In this regard, the findings of this paper would be important in the theoretical aspect. Furthermore, the findings of the paper provide the significant practical implications to make potential consumers have a high level of behavioral intentions to visit an edible insect restaurant.

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