Journal of Hospitality and Tourism Management 47 (2021) 365–376

Contents lists available at ScienceDirect

Journal of Hospitality and Tourism Management

journal homepage: www.elsevier.com/locate/jhtm

Sustainable intelligence, destination social responsibility, and pro-environmental behaviour of visitors: Evidence from an eco-tourism site

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ARTICLE INFO

Keywords:
Sustainable intelligence
Biospheric value
Destination social responsibility
Pro-environmental behaviour
Ecotourism

ABSTRACT

This empirical research contributes to the current knowledge of sustainable destination management by applying nudge and value belief norm theories. The objective of this study is to investigate the effects of sustainable intelligence, destination social responsibility (DSR), biospheric value, and visit experience on pro-environmental behaviour in the eco-tourism site of Upo Wetland, South Korea. This study also compares pro-environmental behaviour across two DSR segments (high and low DSR clusters). Results reveal that sustainable intelligence, biospheric value, DSR, and visit experience at ecotourism sites significantly influence pro-environmental behaviour. Sustainable intelligence exerts the highest effect on pro-environmental behaviour among the variables. The impact of the high DSR group on pro-environmental behaviour is stronger than that on the low DSR group. Thus, managers of ecotourism sites should engage in the high DSR group that does care about sustainable intelligence and biospheric value in environmentally friendly activities.

1. Introduction

Sustainable management depends on supports of all stakeholders. Many researchers studied pro-environmental behaviours from stakeholders including visitors (Han, McCabe, Wang, & Chong, 2018; Kim & Stepchenkova, 2020), residents (Su, Huang, & Pearce, 2018b; Wang, Wang, & Yang, 2020; Zhang, Xie, Morrison, & Zhang, 2020), and other communities (Liu, Lin, Wang, & Chen, 2019; Xu, Lin, Gordon, Robinson, & Harder, 2016). Studies reveal that people often incur a personal cost to benefit the environment (Steg, Bolderdijk, Keizer, & Perlaviciute, 2014). Steg et al. (2014) worked on private pro-environmental behaviour and asserted that individuals are intrinsically motivated by pro-environmental behaviour although somewhat costly. Research on pro-environmental behaviour in a private sphere also underlines the importance of biospheric value as a distinct concept that motivates people to engage in pro-environmental behaviour (Honkanen & Verplanken, 2004; Stern, Dietz, Abel, Guagnano, & Kalof, 1999).

Organizations are adopting sustainable business practices that emphasize the increasing concerns of stakeholders and firms (El-Kassar & Singh, 2019). Su and Swanson (2017) coined the term destination social responsibility (DSR) to refer to stakeholder activities and the economic interest of organizations for sustainable destination development. Su et al. (2018a, 2018b) asserted that DSR represents and focuses on stakeholder activities that minimize the stakeholders' negative impacts on the local environment and generate additional economic, social, and environmental benefits for the local community. Thus, DSR can improve positive tourism impacts on the community and reduce perceived negative tourism impacts on residents. Byrd, Bosley, and Dronberger (2009) and Su et al. (2018b) insisted that stakeholders are key actors and destinations largely depend on stakeholders' DSR behaviours, which also influence destination environment and their pro-environmental behaviour. Similarly, stakeholder theory suggests that local residents as stakeholders can reap the benefits of DSR (Liu et al., 2019). In addition, social exchange theory suggests that two groups make an exchange decision only if their anticipated benefits are greater than the cost (Su et al., 2018b). Thus, the maximum benefits of DSR can only be achieved if residents and visitors demonstrate pro-environmental behaviour.

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https://doi.org/10.1016/j.jhtm.2021.04.010
Received 17 November 2020; Received in revised form 15 March 2021; Accepted 10 April 2021
Available online 24 April 2021

Biospheric value is a term derived from the biosphere, a site where all the living systems exist (Hirsch, Kett, & Trefil, 2002). Biospheric value emphasizes the importance of the environment and the quality of nature (Steg, Van Den Berg, & De Groot, 2013). Individuals with strong biospheric value are generally concerned about nature and environment (Steg et al., 2013) and emphasize pro-environmental behaviour. Van der Werff, Steg, and Keizer (2014) argued that past environmental behaviour and visitors' biospheric value influence their self-identity and behavioural intention to engage in pro-environmental activities. They also highlighted that self-identity and past environmental behaviour vary from individual to individual and may conflict with biospheric value, indicating that individuals may behave differently.

Sustainable intelligence refers to visitors' knowledge and experience of the impact of tourism on the environment and their ability to apply that knowledge and experience in demonstrating proactive behaviour towards sustainable tourism (López-Sánchez & Pulido-). Much scholarly attention is paid to sustainable tourism (Edgell Sr, 2016; Higgins-Desbiolles, 2018), sustainable destination development (Kato & Progano, 2017; Stevenson, 2016), sustainable heritage tourism (Kim, Whitford, & Arcodia, 2019; Zhang et al., 2020), and other aspects of sustainability in tourism from the perspective of stakeholders. Stanford (2008) argued that tourists' significance and contribution to sustainable tourism are often neglected in the literature. López-Sánchez and Pulido-Fernández (2016) emphasized the exploration of the tourist perspective of destination sustainability. They particularly focused on the tourist perception of the issues and how they react to generate useful information for destination management. Moreover, sustainable intelligence is helpful for destination managers to understand customers and their needs for better assistance. Thus, the relationship between DSR and pro-environmental behaviour is incomplete without considering sustainable intelligence. Despite several studies on DSR and pro-environmental behaviour (Su et al., 2018b; Su & Swanson, 2017), how biospheric value and sustainable intelligence contribute to sustainable tourism is not fully understood.

In terms of methodological advances, while previous research investigated the role of DSR in shaping pro-environmental behaviours of individuals using structural equation modelling (Su et al., 2018b; Su & Swanson, 2017), the current study conducts cluster analysis as a powerful approach to classify visitors into mutually exclusive groups of high and low DSR because cluster analysis enables destination managers to promote specific segments that contribute to preserving ecotourism destinations (Choi, Kim, Sawitri, & Lee, 2020; Fernández-Hernández, León, Araña, & Díaz-Pére, 2016). With regard to analytic advantages of cluster analysis, Begg and Parides (2003) stated that "one key advantage is the ability to separate effects at the individual (or item-specific) level and the group (or cluster-specific) level" (p. 2591). Analysis of covariance (ANCOVA) is a useful analytical technique to identify main effect by controlling other potential influential variables (Lee, Back, Williams, & Ahn, 2015). Investigating the differences in pro-environmental behaviour between the two DSR clusters (low and high DSR) after controlling potential influencers is limited in the literature of DSR. Furthermore, unlike the multiple regression analysis, the impact of DSR on pro-environmental behaviour is not conflated with the effects of other predictors (e.g., biospheric value, sustainable intelligence) by using generalised linear model (GLM) due to multicollinearity issues (Olya, 2020).

Meanwhile, market segmentation using cluster analysis can play a key role in identifying which group is more likely to contribute to preserving ecotourism destinations. The high environmental attitude group was more likely to be significantly higher in attitudes and behavioural intention than the low environmental attitude group (Kim & Weiler, 2013). However, studies focusing on market segmentation in the DSR context and investigating any difference in ecotourist behaviour between segments are limited.

A paucity of the research proposed advanced theories by applying a new theory (e.g., nudge theory) in combination with another theory (e.g., value belief norm (VBN) theory) when explaining the relationship of visitors' pro-environmental behaviour with DSR, biospheric value, sustainable intelligence, and visit experience at eco-tourism sites. The relationship between biospheric value and sense of reasonability (sustainable intelligence) with visitors' pro-environmental behaviours is supported by VBN theory. In addition to the perceptions and attitudes of visitors, this study also uses nudge theory to understand the effects of destination managers on shaping visitor's pro-environmental behaviours. According to nudge theory, if managers behave responsibly in managing a destination, then visitors will engage in pro-environmental activities. This event will also influence visitors' behaviour when they revisit an eco-tourism site. Therefore, this study postulates that nudge theory in combination with VBN theory describes how DSR by tourism organizations along with tourists' biospheric value, sustainable intelligence and visit experience can affect pro-environmental behaviour in ecotourism destinations.

To fill these research gaps, this study employs both nudge theory and VBN theory. The objectives are twofold. First, the study aims to explain how the pro-environmental behaviour of visitors in eco-tourism sites differs across DSR clusters (high and low groups) using cluster analysis and ANCOVA. Second, this study aims to investigate the variation of pro-environmental behaviour of visitors based on their biospheric value, sustainable intelligence, DSR, and visit experience at eco-tourism sites using GLM. Further elaboration on the theoretical framework is provided in the next section, followed by the methods, results, and discussion sections and ended by the theoretical and managerial implications section.

2. Literature review

2.1. Theoretical research framework

2.1.1. VBN theory

Stern et al. (1999) proposed VBN theory, which interlinks two important theories, namely, value theory (Schwartz, 1992) and norm activation model (Schwartz, 1977), which explain environmentally friendly behaviour. Stern (2000) highlighted the importance of VBN theory, which employs three variables from the norm activation model and two variables, which are values and ecological worldview. According to VBN theory, pro-environmental behaviour is the consequence of pro-social norm, which is the consequence of certain beliefs (ecological worldview). Norm is further developed by certain values, which guide principles that reflect an individual's personality (biospheric, altruistic or egoistic) (Han, 2015; Stern, 2000) and overall behaviour (Schwartz & Bilsky, 1990). From another perspective, beliefs are comprised of three main components, namely, ecological worldview, awareness of consequences, and ascription of responsibility (Choi, Jang, & Kandampully, 2015). VBN theory has been employed in various contexts to explain the pro-environmental behaviour of tourists (Sharma & Gupta, 2020), last chance tourism (Denley et al., 2020), nature base tourism (Kim & Stepchenkova, 2020), travel intentions (Kiatkawsin & Han, 2017), and sustainable heritage tourism (Megeirhi, Woosnam, Ribeiro, Ramkissoon, & Denley et al., 2020). VBN theory relies on cognitive and affective perceptions of visitors as drivers of their pro-environmental behaviours (Han, Olya, Kim, & Kim, 2018). Based on VBN theory, we assume that visitors with a high level of biospheric values and sustainable intelligence tend to support pro-environmental behaviour (Fig. 1).

2.1.2. Nudge theory

VBN theory is necessary to support the effects of individuals' perceptions and attitudes towards their values, knowledge and emotions on pro-environmental behaviours. Nonetheless, this theory does not fully capture the effects of environmental factors (e.g., DSR) that are triggered by other stakeholders (e.g., eco-tourism site managers, tourism organizations). Hence, to include personal and environmental factors, this

Fig. 1. Theoretical framework.

study employs nudge theory to support the relationship between DSR and prior experience of visiting an eco-tourism site with visitors' pro-environmental behaviour (Fig. 1). Nudge theory, which is developed by Richard Thaler, explicates the effects of nudges in forming people's behaviours (Selinger & Whyte, 2011). Marjanovic (2017) defines nudge theory as "libertarian paternalism—that the nudger steers individuals' behavior in a given direction but never forces them to choose or limit their access to undesirable choices" (p. 309). Nudge theory offers a pragmatic approach that serves as alternatives for traditional tactics (e.g., training or legal reinforcement) in making behavioural changes. Traditional tactics stress on direct stimulus, whereas nudge theory contends that individuals engaged in an activity (visiting an eco-tourism site) can behave responsibly if they are exposed by indirect stimuli, such as DSR.

Nudge theory is frequently applied by researchers and policymakers from public health, business and economics, and politics because this theory well described the process of behavioural changes in these disciplines (Cai, 2019; Haq, Cambridge, & Owen, 2013). Several tourism studies recently have used nudge theory as the theoretical underpinning of models to predict pro-environmental behaviours. For example, Kim and Hyun (2020) applied nudge theory to explain the impact of green tax on stimulating sustainable behaviours in the aviation context. Olya (2020) recommended nudge theory to support models predicting pro-environmental behaviours of local communities in heritage sites. Thus, the current study postulates that nudge theory in combination with VBN theory can describe how environmental, socio-cultural, and economic responsibilities by tourism organizations along with visitor's biospheric value, sustainable intelligence, and visit experience can affect pro-environmental behaviours of eco-tourism site visitors (Fig. 1).

2.2. Major concepts

2.2.1. Pro-environmental behaviour

Pro-environmental behaviour receives great attention from consumer psychology scholars, covering multiple domains, such as eco-friendly product purchasing (Barbarossa & De Pelsmacker, 2016), customer loyalty (Chen, 2015), altruistic value (Kim & Stepchenkova, 2020), green behavioural intention (Mancha & Yoder, 2015), local resident engagement (Wang et al., 2020), corporate social responsibility (Parsa, Lord, Putrevu, & Kreeger, 2015), and national culture (He & Filimonau, 2020). Steg et al. (2014) defined pro-environmental behaviour as a set of actions that imporve the quality of the environment and contribute to sustainably developing a destination. Moreover, Dean, Raats, and Shepherd (2012) identified two important constructs for the measurement of pro-environmental behaviour, namely, self-identify and personal values. Kim and Stepchenkova (2020) highlighted that altruistic values and environmental knowledge are important triggers of pro-environmental behaviour. Similarly, Wang et al. (2020) examined the relationship between motivations and local residents' engagement in pro-environmental behaviour and found that both forms of motivations (egoistic and altruistic) are directly related to pro-environmental behaviour.

2.2.2. Biospheric value

Values refer to the guiding principles of life and may vary according to the importance of desirable goals (Schwartz, 1992). Values are typically developed in early childhood and remain stable over time (Steg et al., 2013; Stern & Dietz, 1994). The concern about biosphere refers to biospheric value, which highlights the concerns about the environment and emphasizes on the quality of nature (De Groot & Steg, 2008; Steg et al., 2013). Van der Werff, Steg, and Keizer (2013) highlighted the importance of biospheric value in terms of enhancing predictability and understanding pro-environmental behaviour. The literature shows that individuals with strong biospheric value care for nature and environmental initiatives (Bridgewater, 2002; Martin & Czellar, 2017). Biospheric value provides people with strong judgement basis to analyse their behavioural consequences and direct the nature and environment related to decisions to involve in specific actions. Van der Werff et al. (2013) stated that biospheric value is strongly related to environmental self-identity and influences a decision to engage in certain environmentally friendly activities. Recently, Sharma and Gupta (2020) found that biospheric values and environmental concerns are related to each other. Similarly, Biel, Dahlstrand, and Grankvist (2005) stressed that many people endorse biospheric value, but only some people engage in pro-environmental activities and regards this value as important as a part of their identity. Moreover, Ruepert et al. (2016) stated that biospheric value is a significant antecedent of predicting environmental self-identity, which subsequently influences pro-environmental behaviour. That is, those who endorse biospheric value and possess a strong environmental identity engage in pro-environmental behaviour.

2.2.3. DSR

The concept of social responsibility has recently given attention in the tourism sector, specifically in the DSR context. Su and Huang (2012) defined DSR as obligations and activities of stakeholders of a tourist destination. These stakeholders include visitors, local government, local community, tourism service providers, and other businesses connected with tourism. Then, Su et al. (2018a) further defined DSR as "collective ideology and efforts of destination stakeholders to conduct socially responsible activities as perceived by local residents" (p. 1041).

Moreover, Su and Huang (2012) stressed that stakeholders should improve and protect destination interests (e.g., social, environmental, cultural, economic interests). Rodríguez and Cruz (2007) also asserted that social environmental responsibility affects tourist loyalty with the destination. Fatma, Rahman, and Khan (2016) developed three sub-scales (economic, social, and environmental) that can measure consumers' perceptions of corporate social responsibility in the tourism industry. Although the scales were mainly developed for DSR of tourist destinations, they would be useful for tourists to assess DSR activities in tourist destinations. Moreover, the DSR literature mainly focuses on different outcomes of DSR, including destination reputation (Su & Huang, 2012), and environmental responsibility (Su et al., 2018b). However, studies considering the economic, socio-cultural, and

environmental aspects of DSR and their impacts on the outcomes of DSR are limited. Therefore, the current study broadens the DSR literature by considering the socio-cultural, economic, and environmental aspects of DSR.

Recently, Hassan and Soliman (2021) examined the relationship between DSR and destination reputation amid fear arousal as a moderator. They found that DSR is positively related to destination reputation, whereas fear arousal is negatively related to destination reputation. In addition, Su, Gong, and Huang (2020) examined the relationship between DSR and visit intention. They introduced two DSR strategies (i.e., proactive and reactive approaches) and found that when a destination applies proactive strategies, visit intention tends to be higher. Similarly, Su, Lian, and Huang (2020) examined the impact of extrinsic and intrinsic DSR motives on intention to visit. They found that in the case of high destination reputation, intrinsic motives of DSR tend to be stronger, whereas, in the case of average destination reputation, both DSR motives are insignificant. Then, Hu, Tuou, and Liu (2019) investigated the relationship between DSR and resident pro-environmental behaviour amid place attachment as a mediator. They found that place attachment significantly mediates the relationship between DSR and pro-environmental behaviour. Kim and Yoon (2020) also employed DSR as a moderator on emotions (sympathy and anger) among two groups (low and high perceived spatial crowding). They found that DSR positively influences sympathy and negatively influences anger in the case of high perceived spatial crowding. On the contrary, in the case of the low spatial crowding group, DSR has no relationship with sympathy but negatively affects anger.

Meanwhile, some studies conducted market segmentation of ecotourists. For instance, Choi et al. (2020) conducted market segmentation of ecotourism in Bali, Indonesia. Their study revealed that nature-seeking and wellness-seeking responsible tourists are likely to possess higher motives and more responsible attitude than general and nature-cohesion seeking tourists. They also asserted that the segmentation of the two former clusters could sustain the symbiotic relationship between ecotourism site and its visitors and attract tourists with similar characteristics, indicating contribution to sustainable tourism. Fernández-Hernández et al. (2016) conducted a cluster analysis to segment rural tourism in La Palma, Canary Islands. They found that the segment of generating greater economic impact and satisfaction demonstrates a higher level of environmental behaviour, contributing to economic performance and at the same time to environmental concern. Kim and Weiler (2013) conducted market segmentation at an environmentally sensitive tourism destination (Charmouth coastal area, South West of England) and examined differences in demographics, attitude, and behavioural intention. Their study showed that significant differences exist in demographics (gender and age), attitudes, and behavioural intention between the two segments. They found that the high environmental attitude group is significantly higher in attitude and behavioural intention than the low environmental attitude group. The above literature suggests that market segmentation enables ecotourism destination managers to attract a specific group of tourists who contributes to preserving ecotourism sites by greatly demonstrating pro-environment behaviour. However, research focusing on market segmentation in the DSR context is limited. Therefore, the current study fills the research gap by implementing market segmentation using cluster analysis and examining any differences in pro-environmental behaviour between these segments using ANCOVA.

2.2.4. Sustainable intelligence

López-Sánchez and Pulido-Fernández (2016) defined sustainable intelligence as "an inherent capacity for a certain type of tourist, the possession of which conditions their motivation, expectations, and behaviours" (p. 61). This definition implies that sustainable intelligence focuses on visitor's ability to apply his/her knowledge and experience of sustainable tourism development and his/her proactive behaviour towards sustainable tourism, considering the production and consumption aspects of tourism. Silvestre and Fonseca (2020) highlighted that visitors who have high sustainable intelligence engage in sustainable tourism development initiatives in their destinations. Moreover, their intellectual understanding of sustainability is helpful when adopting and incorporating sustainable processes of tourism consumption. Silvestre and Fonseca (2020) also underlined the importance of sustainable intelligence for corporate sustainability strategies. They stated that sustainable intelligence helps visitors overcome the destination sustainability challenges and adapt their behaviour, motivation, and expectations responsively and sensibly. López-Sánchez and Pulido--Fernández (2016) divided sustainability into three groups on the basis of tourist knowledge, level of commitment, and attitude. They found that visitors with high sustainable intelligence are more concerned about their actions and behaviour towards sustainable tourism development. Furthermore, they tend to visit sustainable tourism destinations than the two other segments, namely, reflective and unconcerned visitors.

2.3. Hypotheses development

In this section based on above arguments and VBN theory and nudge theory, four hypotheses are proposed that explained as follows. Martin and Czellar (2017) established a conceptual link between biosphere values and theories on environmental behaviour by proposing that feelings associated with nature are related to the formation of biosphere values, which may be conducive to sustainable behaviour. Lobo & Greenland (2015) underscored the concern of how personal values, including biospheric value, affect pro-environmental behaviour, requiring further investigation (De Groot & Steg, 2008). Drawing on VBN theory, the impact of biospheric value on pro-environmental behaviour should be considered because consumers with strong biospheric value are generally concerned about the environment, driving them effectively towards pro-environmental behaviour (De Groot & Steg, 2007). Thus, this study posits the following hypothesis:

H1. Biospheric value is positively associated with pro-environmental behaviour.

According to nudge theory, DSR practices can nudge visitors to behave through feedback actions such as support for tourism development and environmentally responsible actions (Su et al., 2018b). In other words, DSR can influence positive behaviours such as environmentally friendly behaviour. Su et al. (2018b) suggested that the effect of DSR on environmentally responsible actions is important and positive. Thus, this study posits the following hypothesis:

H2. DSR is positively associated with pro-environmental behaviour.

López-Sánchez and Pulido-Fernández (2016) found that visitors with a high level of sustainable intelligence are more interested in action on sustainable tourism development. In line with notion of VBN theory, Silvestre and Fonseca (2020) found that visitors with a high level of sustainable intelligence are participating in sustainable tourism development initiatives in tourist destinations. Thus, this study posits the following hypothesis:

H3. Sustainable intelligence is positively associated with pro-environmental behaviour.

Alcock, White, Pahl, Duarte-Davidson, and Fleming (2020) found that the number of nature visits is positively related to nature appreciation and eco-friendly behaviour. They asserted that the more people visit nature for recreation and appreciate the natural world, the more they demonstrate environmental behaviour. Thus, this study posits the following hypothesis:

H4. Visit experience at environmentally friendly tourist sites is positively associated with pro-environmental behaviour.

3. Methods

3.1. Study site

Upo Wetland is located in the southern part of Korea (Appendix Fig. A), which is a natural inland wetland covering 2,479,338 m^2 and is 140 million years old. Upo Wetland, where primitive low-rise swamps are retained, is inhabited by rare flora and fauna. In addition, the wetland is the home of 480 species of plants, birds, fish, aquatic insects, mammals, reptiles, amphibians, and shellfish (Changnyeong-gun, 2021a). Upo Wetland was designated as a preserved wetland in 1998 by Ramsar Convention on Wetland, a Wetland Protected Area in 1999 by Korea's Ministry of Environment, a Natural Reserve (No.524), a UNESCO World Natural Heritage in 2011, and a wetland rehabilitation zone in 2012 (Korean Tourism Organization, 2019). The wetland was certified as the Ramsar Wetland City in 2018 as a system by the General Assembly. The number of visitors to Upo Wetland was over 800,000 in 2020 (Changnyeong-gun, 2021b).

3.2. Analysis procedure

This section explains four steps of the data analysis procedures (Fig. 2). Firstly, for the validity of the measurement model, this study implemented confirmatory factor analysis (CFA). Secondly, the segmentation of visitors based on DSR was performed using cluster analysis. Thirdly, ANCOVA was conducted to test differences in pro-environmental behaviour between DSR clusters after controlling variables. Lastly, GLM was implemented to examine the effects of DSR clusters, biospheric value, sustainable intelligence, and visit experience at ecotourism sites on pro-environmental behaviour. This study analyzed the collected data using Amos 23.0 SPSS 23.0.

3.3. Measures

This study generated a list of measurement items from the related literature. Specifically, four items each were used to measure three dimensions of DSR (i.e., environment, socio-cultural, and economic), which were adapted from previous research (Fatma et al., 2016; Kang & Moscardo, 2006; Su et al., 2018b). Moreover, biospheric value was assessed using four items adapted from previous research (Ruepert et al., 2016; Van der Werff et al., 2014). Then, sustainable intelligence was assessed using four items adapted from López-Sánchez and Pulido--Fernández (2016). Furthermore, pro-environmental behaviour was assessed using four items, which were adapted from previous research (Su et al., 2018b). A five-point Likert scale (1 = strongly disagree and 5 = strongly agree) was used to assess these measurement items.

Two tourism faculty members were asked to review the measurement items to check content validity, that is, whether these items were appropriate in the wetland context. A pre-test was conducted for 10 people, including four graduate students, four destination managers, and two visitors. Through these procedures, ambiguous items were modified for clarity. For example, a question about visitors' past experience with pro-environmental behaviour was modified, and demographic questions (e.g., income) were specified to reflect the accurate information of visitors.

3.4. Data collection

An onsite survey was conducted with the visitors of Upo Wetland. Two field researchers contacted potential respondents at the wetland ecological centre and the remaining areas and described the research purpose. Upon their agreement on the survey participation, respondents received a self-administered questionnaire, which was distributed using convenient sampling method. The survey questionnaire was distributed to 500 visitors, and 470 survey responses were collected, representing a response rate of 94.0%. 55 samples were removed because of incomplete and missing responses, having 415 samples for analysis. Thus, the true response rate was 83.0%, and the 95% confidence interval for the true response rate was found to be between 79.4% and 86.6%.

4. Results

4.1. Characteristics of respondents

Table 1 shows that the respondents comprised more females (58.1%) than males (41.9%). Of the respondents, 43.8% were within the age

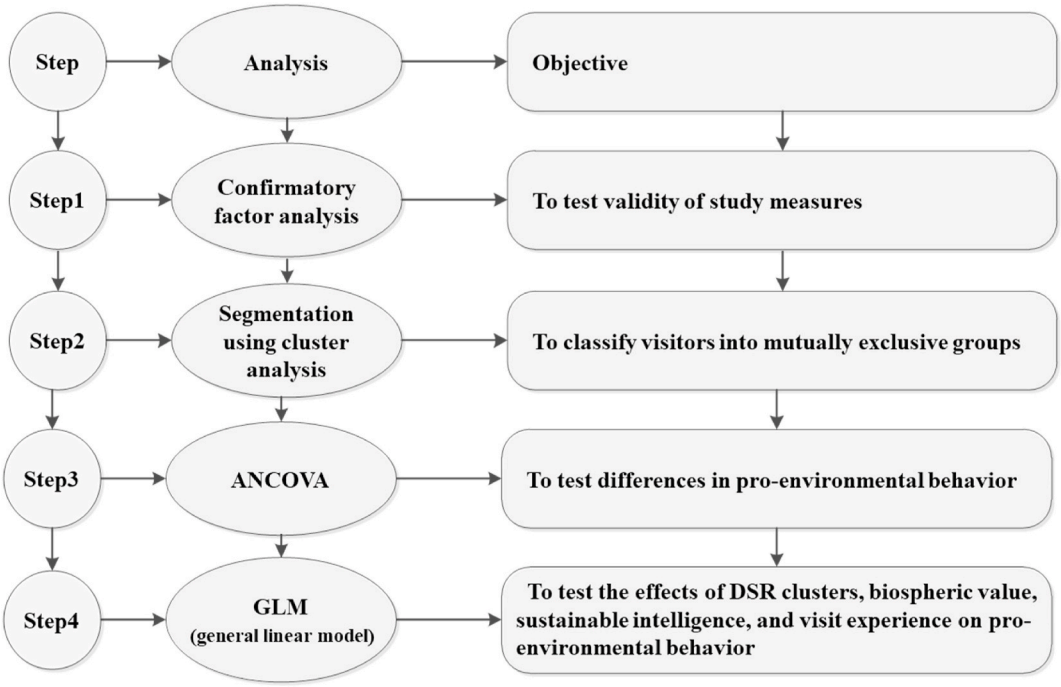

Fig. 2. Analytical approach.

Table 1
Profile of respondents.

Factor		*N* (%)	Factor		*N* (%)
Gender	Male	174 (41.9)	Marital	Single	84 (20.2)
	Female	241 (58.1)	status	Married	331 (79.8)
Age	20–39	182 (43.8)	Companion	Family/relatives	275 (66.3)
	40–49	129 (31.1)		Others	140 (33.7)
	50 and above	104 (25.1)	Information	Word of mouth	142 (34.2)
Education	High school or less	96 (23.1)	sources	Internet/SNS	127 (30.6)
	College/university	276 (66.5)		TV/radio/newspaper/magazine	96 (23.1)
	Graduate school	43 (10.4)		Others	50 (12.1)
Monthly household income	Less than 3 million KRW	112 (27.0)	Visit experience at environmentally friendly tourist sites	Yes	321 (77.3)
	3–5 million KRW	177 (42.7)		No	94 (22.7)
	Over 5 million KRW	126 (30.3)			
Total = 415 (100.0%)					

Note: 1 USD = 1113 KRW (Korean won, 13.11.2020).

group of 20–39 years, followed by that of 40–49 years (31.1%) and over 50 years (25.1%). The majority of the respondents had college and university education (66.5%). Then, the monthly household income with 3–5 million KRW (Korean Won) was dominant (42.7%), followed by over 5 million KRW (30.3%). Married respondents (79.8%) were predominant, as compared with singles (20.2%), and more than two-thirds of the respondents were accompanied by family and relatives (66.3%). The major sources of information on Upo Wetland were from word of mouth (34.2%) and Internet/Social Network Services (SNS) (30.6%). 77.3% of the respondents visited environmentally friendly tourist sites in the past.

4.2. Measurement model

Table 2 presents a good fit to the data: χ^2 (234) = 454.798 (p < .001); χ^2/df = 1.944; GFI = .913; NFI = .927; TLI = .956; CFI = .963; RMSEA = .048 (Hair, Black, Babin, & Anderson, 2010). Convergent validity was confirmed as the factor loadings ranged from .567 to .901 with significance at p < .001 (Hair et al., 2010) and values of average variance extracted (AVE) were larger than .5 (Fornell & Larcker, 1981). Also, values of composite reliability (CR) and Cronbach's α exceeded the cut-off value of .7, respectively (Hair et al., 2010; Nunnally, 1978).

Table 3 indicates that four correlation coefficients were higher than the square root of AVE. Thus, we assessed the confidence interval of the inter-factor correlation (Fornell & Larcker, 1981). Discriminant validity is confirmed when 1 is not contained at the 95% confidence interval of correlation between two constructs (Anderson & Gerbing, 1992). For example, the highest correlation between environmental responsibility and socio-cultural responsibility (r = .845) is .751–.939 of the 95% confidence interval, which confirmed discriminant validity.

Table 2
Results of CFA.

Scale items	Factor loadings	t-value	AVE	CR	Cronbach's α
Pro-environmental behaviour (Su et al., 2018b)			.534	.818	.832
1. I comply with relevant instructions not to destroy Upo Wetland's environment.	.733	14.524***			
2. When I see garbage in Upo Wetland, I put it in the trash can.	.567	13.382***			
3. I try to convince partners to protect the natural environment on Upo Wetland	.774	–			
4 I try not to disrupt the fauna and flora of Upo Wetland during my visit.	.824	16.181***			
Sustainable intelligence (López-Sánchez & Pulido-).			.515	.808	.800
1. I think that activity for the sustainability of Upo Wetland ecotourism destination is important	.718	14.415***			
2. I want to take action for sustainability while sightseeing in Upo Wetland.	.793	–			
3. I am willing to pay for Upo Wetland to become a sustainable tourist destination.	.604	11.950***			
4. I try to understand Upo Wetland as a sustainable tourist destination.	.743	14.955***			
Biospheric value (Ruepert et al., 2016; Van der Werff et al., 2014)			.684	.896	.904
1. Respecting the earth: harmonize with other species in the earth.	.824	21.154***			
2. Unity with nature: fit into nature.	.901	–			
3. Protecting the environment: preserve nature.	.817	20.653***			
4. Preventing pollution: protect natural resources from pollution.	.759	18.234***			
Economic responsibility (Fatma et al., 2016; Su et al., 2018b)			.656	.883	.871
1. I think the tourism organization of Upo Wetland keeps strict control over its cost.	.689	15.281***			
2.I think the tourism organization of Upo Wetland tries to ensure its survival and long-term success.	.840	–			
3.I think the tourism organization of Upo Wetland tries to improve its economic performance.	.860	21.627***			
4. I think the tourism organization of Upo Wetland gives back to the local community.	.840	20.465***			
Socio-cultural responsibility (Fatma et al., 2016; Kang & Moscardo, 2006; Su et al., 2018b)			.623	.868	.868
1. I think the tourism organization of Upo Wetland is concerned with improving the general well-being of society.	.803	17.844***			
2. I think the tourism organization of Upo Wetland treats their stakeholders well.	.766	16.822***			
3. I think the tourism organization of Upo Wetland provides experience for tourists through meaningful connections with local people and understanding of local culture.	.803	–			
4. I think the tourism organization of Upo Wetland helps to solve socio-cultural problems.	.784	17.333***			
Environmental responsibility (Fatma et al., 2016; Su et al., 2018b)			.569	.841	.839
1. I think the tourism organization of Upo Wetland includes environmental concerns in its operations.	.719	14.605***			
2. I think the tourism organization of Upo Wetland reduces its consumption of natural resources.	.746	15.191***			
3. I think the tourism organization of Upo Wetland communicates to its audiences about its environmental practices.	.768	–			
4. I think the tourism organization of Upo Wetland is concerned with respecting and protecting the natural environment.	.782	16.012***			

Note: t-values of one indicator in each construct were not obtained for those fixed at 1 for identification purposes; $\chi^2_{(234)}$ = 454.798 (p < .001), χ^2/df = 1.944, GFI = .913, NFI = .927, TLI = .956, CFI = .963, and RMSEA = .048. ***p < .001.

Table 3
Correlations, square root of AVE, and confidence intervals of correlations.

Variables	EnR	SCR	EcR	BV	SI	PEB
Environmental responsibility (EnR)	***.754***[a]	(.751−.939)[b]	(.681−.857)	(.341−.465)	(.494−.630)	(.496−.644)
Socio-cultural responsibility (SCR)	.845***	***.789***	(.732−.904)	(.323−.439)	(.448−.572)	(.447−.583)
Economic responsibility (EcR)	.769***	.818***	***.810***	(.370−.486)	(.522−.650)	(.479−.615)
Biospheric value (BV)	.403***	.381***	.428***	***.827***	(.548−.660)	(.550−.670)
Sustainable intelligence (SI)	.562***	.510***	.586***	.604***	***.718***	(.696−.832)
Pro-environmental behaviour(PEB)	.570***	.515***	.547***	.610***	.764***	***.731***

Note: [a] = Values in the bold italic are square root of AVE, [b] = Values in the parenthesis are 95% confidence intervals of correlation, and values below the square root of AVE are correlations.
***p < .001.

4.3. Segmenting visitors by using DSR

This study performed a cluster analysis to classify samples into mutually exclusive segments using the Ward method with the K-means procedure. The results of the cluster analysis revealed two appropriate cluster solutions (Table 4). The two clusters were classified by employing the non-hierarchical cluster analysis using the K-means technique: low DSR group (N = 187, 45.1%) and high DSR group (N = 228, 54.9%) out of 415 respondents. Multivariate ANOVA also indicates that two DSR clusters were differentiated from DSR factors with significant difference (p < .001), thus confirming that distinct clusters were identified.

Discriminant analysis was performed with two clusters and DSR factors to further validate the DSR clusters. A random sampling procedure was employed to divide the sample into two parts (Hair et al., 2010). Table 5 shows that the discriminant function that correctly classified the divided half samples: 97.1% of the holdout sample (N = 207) and 99.5% of the analysis sample (N = 208). This study also correctly classified 99.0% of respondents and 99.0% of cross-validated groups for the entire sample.

Table 4
Results of cluster analysis for DSR.

Variable	Cluster I (*N* = 187, 45.1%) Low DSR group	Cluster II (N = 228, 54.9%) High DSR group	F-value
Environmental responsibility	3.14 (.53)	4.22 (.49)	462.154***
Socio-cultural responsibility	3.07 (.53)	4.14 (.50)	442.319***
Economic responsibility	3.14(.53)	4.20 (.53)	406.262***
Multivariate tests	Pillai's trace = .639***, Wilks' Lambda = .361***, Hotelling–Lawley trace = 1.770***, Roy's greatest root = 1.770***		

***p < .001.

4.4. Results of ANCOVA

ANCOVA was performed to test the differences in pro-environmental behaviour between the two DSR clusters (low and high DSR) after controlling biospheric value, sustainable intelligence, and demographic and general characteristic variables. The results of ANCOVA indicate that the dependent variable of pro-environmental behaviour was statistically significant between the low and high DSR clusters at p < .001 even when controlling for biospheric value, sustainable intelligence, and demographic and general characteristics (Table 6). Biospheric value and sustainable intelligence were statistically significant at p < .001, and visit experience at environmentally friendly tourist sites was significant at p < .05. This finding indicates that those with biospheric value, sustainable intelligence, and visit experience are likely to have strong pro-environmental behaviour.

4.5. Results of GLM

GLM was employed to incorporate ANCOVA, where we controlled biospheric value, sustainable intelligence, and visit experience at ecotourism sites. GLM enables researchers to examine the effects of DSR, biospheric value, sustainable intelligence, and visit experience on pro-environmental behaviour. Exp(B) for all variables was also computed to show the degree of impact.

The GLM results indicate that biospheric value positively influenced pro-environmental behaviour (Table 7), thus supporting H1. Also, the impact of the high DSR group on pro-environmental behaviour was 1.283 times higher than its counterpart. DSR clusters positively affected pro-environmental behaviour, thus supporting H2. Also, the impact of the high DSR group on pro-environmental behaviour was 1.253 times higher than that of the low DSR group. Sustainable intelligence positively affected pro-environmental behaviour, thus supporting H3. Also, the impact of the high DSR group on pro-environmental behaviour was 1.512 times higher than its counterpart. Visit experience at environmentally friendly tourist sites positively affected pro-environmental behaviour, thus supporting H4. Also, the impact of the high DSR group on pro-environmental behaviour was 1.167 times higher than its

Table 5
Results of discriminant analysis and classification for DSR.

Sample	Function	Eigenvalue	% of variance	Canonical correlation	Wilks' lambda	χ^2	df
Analysis sample	1	1.905	100.0	.810	.344	218.065***	3
Holdout sample	1	1.695	100.0	.793	.371	201.731***	3
Whole sample	1	1.770	100.0	.799	.361	419.206***	3
Sample	Clusters	Predicted group membership				Total	
		Low DSR	High DSR				
Analysis sample (*N* = 208, 50.1%)	Low DSR	93 (100.0%)	0 (.0%)			93 (100.0%)	
	High DSR	1 (.9%)	114 (99.1%)			115 (100.0%)	
Holdout sample (*N* = 207, 49.1%)	Low DSR	94 (100.0%)	0 (.0%)			94 (100.0%)	
	High DSR	6 (5.3%)	107 (94.7%)			113 (100.0%)	
Whole sample (*N* = 415, 100.0%)	Low DSR	187 (100.0%)	0 (.0%)			187 (100.0%)	
	High DSR	4 (1.8%)	224 (98.2%)			228 (100.0%)	

Note: Analysis sample (hit ratio = 99.5%, cross-validated ratio = 99.0%), holdout sample (hit ratio = 97.1%, cross-validated ratio = 96.1%), whole sample (hit ratio = 99.0%, and cross-validated ratio = 99.0%). ***p < .001.

Table 6
Comparison of pro-environmental behaviour between DSR clusters using ANCOVA.

Model/*predictor*		Sum of square	df	Mean square	F-value	p-value
Corrected Model		83.596	16	5.225	21.028	.000***
Error		98.891	398	.248		
Total		7475.813	415			
Covariates						
Biospheric value		7.921	1	7.921	31.878	.000***
Sustainable intelligence		15.280	1	15.280	61.494	.000***
Visit experience at environmentally friendly tourist sites (no[a])	Yes	1.339	1	1.339	5.390	.021*
Gender (male[a])	Female	.204	1	.204	.819	.366
Age (20–39 years old[a])	40–49	.350	1	.350	1.408	.236
	Older than 50	.565	1	.565	2.273	.132
Education (high school or less[a])	College/university	.730	1	.730	2.938	.087
	Graduate school	.616	1	.616	2.478	.116
Monthly income (less than 3 million KRW[a])	3–5 million KRW	.522	1	.522	2.101	.148
	Over 5 million KRW	.297	1	.297	1.196	.275
Marital status (single[a])	Married	.007	1	.007	.027	.869
Companion (others[a])	Family/relative	.001	1	.001	.004	.952
Information sources (others[a])	Word of mouth	.000	1	.000	.001	.981
	Internet/SNS	.022	1	.022	.090	.765
	TV/radio/newspaper/magazine	.039	1	.039	.157	.692
Main effect						
DSR clusters[b]		3.805	1	3.805	15.314	.000***

Note: Dependent variable = pro-environmental behaviour, $R^2 = .458$, adjusted $R^2 = .436$, [a] reference variable, [b] DSR clusters (low DSR group = 0, high DSR group = 1), low DSR group mean = 3.88 (S.D = .70), and high DSR group mean = 4.45 (S.D = .50).*p < .05, ***p < .001.

Table 7
Results of GLM.

Dependent variable: pro-environmental behaviour	B	S.E.	Parameter estimates			
			Wald's χ^2	p-value	Exp(B)	95% CI
(Intercept)	1.086	.210	26.631	.000***	2.962	1.961–4.475
High DSR group[a]	.225	.055	16.543	.000***	1.253	1.124–1.396
Biospheric value	.249	.045	30.494	.000***	1.283	1.174–1.401
Sustainable intelligence	.413	.049	71.039	.000***	1.512	1.373–1.664
Visit experience atenvironmentally friendly tourist sites[b]	.154	.059	6.776	.009**	1.167	1.039–1.310
Goodness of fit	Likelihood ratio $\chi^2_{(4)} = 237.698$***, Pearson's $\chi^2_{(410)} = 102.916$ (χ^2/df = .251)					
	Log likelihood = −299.529, Akaike's information criterion (AIC) = 611.058					

Note: [a] = DSR clusters (low DSR group = 0, high DSR group = 1),[b] = visit experience (No = 0, Yes = 1), and CI = Confidence interval.**p < .01, ***p < .001.

counterpart. In summary, the impact of biospheric value, sustainable intelligence, and visit experience on pro-environmental behaviour was stronger for the high DSR group than the low DSR group. Sustainable intelligence had the largest impact on pro-environmental behaviour among the other variables.

5. Discussions and implications

This study applied nudge theory in the combination with VBN theory to develop a research framework for assessing the impact of DSR, biospheric value, sustainable intelligence, and visit experience on pro-environmental behaviour at Upo Wetland as an ecotourism destination. Although VBN theory has been used to support individuals' perceptions and attitudes towards their pro-environmental behaviours (Han, Olya, Cho, & Kim, 2018; Han, Olya, Kim et al., 2018; Park, Lee, Lee, Kim, & Kim, 2018), they could not fully capture the effects of environmental factors, such as DSR, that are triggered by other stakeholders (e.g., ecotourism destination organizations, managers). Thus, this study filled the research gap by employing nudge theory to support linkages of nudging factors with visitor's pro-environmental behaviour. In accordance with Olya (2020), all key actor groups including visitors and destination managers need to play their roles in the sustainable management of eco-tourism destination. Nudge theory can explain why and how responsible behaviours (DSR) of tourism organizations and eco-tourism site managers can affect visitors' pro-environmental behaviours.

DSR is an important concept that enables stakeholders to not only minimize negative environmental impact but also provide economic and social benefits for the local community in ecotourism destinations (Su et al., 2018b; Su & Swanson, 2017). Thus, ecotourism destinations greatly depend on stakeholders' DSR behaviours, which influence the destination environment and their pro-environmental behaviour (Su et al., 2018b). Sustainable management in ecotourism destinations is highly dependent upon support from visitors (Han, McCabe et al., 2018; Kim & Stepchenkova, 2020), whether they are willing to engage in pro-environmental behaviour. However, DSR groups may make different decisions depending on their perception of whether their expected benefits exceed the cost according to social exchange theory (Su et al., 2018). Kim and Weiler (2013) asserted that significant differences exist in attitudes and behavioural intention between high and low environmental groups based on market segmentation. Some research employed the market segmentation approach in ecotourism sites to select specific groups for better preservation on ecotourism sites (Choi et al., 2020; Fernández-Hernández et al., 2016). Destination managers are concerned about which DSR groups better demonstrate pro-environmental behaviour to preserve their ecotourism destinations. However, research focusing on market segmentation in the DSR context is limited. Thus, this study attempted to fill this gap by segmenting DSR groups and examining their difference in pro-environmental behaviour. The results of market segmentation delineated DSR by high and low groups. Then, this study investigated differences in pro-environmental behaviour between the two groups using ANCOVA, which enables researchers to control other possible influencing variables on the differences. The results of ANCOVA revealed that a significant difference exists in pro-environmental behaviour between the high and low DSR groups after controlling for biospheric value, sustainable intelligence,

and demographic and general characteristic variables. Furthermore, the high DSR group has a higher mean value (M = 3.88) than its counterpart (M = 4.45). These results support those of Kim and Weiler (2013), in that the high environmental attitude group was significantly higher in attitude and behavioural intention than its counterpart. The finding of the current study provides the destination managers with practical implications to efficiently promote the positive economic, social, and environmental impacts to a specific segment.

The concept of biospheric value is related to nature and environment (Steg et al., 2013), which is improved by pro-environmental behaviour. Visitors' biospheric value influences their self-identity and behavioural intention to engage in pro-environmental activities (Van der Werff et al., 2014). The concept of sustainable intelligence refers to an individual ability to apply his/her knowledge and experience in demonstrating proactive behaviour towards sustainable tourism (López-Sánchez & Pulido-). Thus, biospheric value is associated with pro-environmental behaviour of ecotourists. Although several studies have been conducted on DSR and pro-environmental behaviour (Su et al., 2018b; Su & Swanson, 2017), how DSR, biospheric value, and sustainable intelligence contribute to pro-environmental behaviour for sustainable management was not fully understood. Therefore, this study filled this gap by examining the relationship of these variables with pro-environmental behaviour. The results of GLM revealed that the pro-environmental behaviour is significantly affected by DSR clusters, biospheric value, sustainable intelligence, and visit experience, where the high DSR group on pro-environmental behaviour is higher than the low DSR group. The findings suggest that destination managers should incorporate these variables when developing stainable strategies of ecotourism destinations. Notably, sustainable intelligence had the strongest impact on pro-environmental behaviour among other variables. This finding further provides the academia and practitioners with implications about how sustainable intelligence should be taken into consideration for better sustainable management of ecotourism sites.

5.1. Theoretical implications

This study contributes to the current knowledge of tourism by applying nudge theory and VBN theory to predict pro-environmental behaviour of eco-tourism visitors. In particular, nudge theory supports the results of this study as DSR along with sustainable intelligence, biospheric value, and visit experience affected pro-environmental behaviours of eco-tourism site visitors. According to VBN theory, visitors with high biospheric value and sustainable intelligence would most likely engage in pro-environmental activities. In addition to the perception of visitors on their role, the responsibility of tourism organizations and site managers can also act as a nudge that boosts pro-environmental behaviours of visitors. Specifically, visitors with visit experience reported a higher level of interest in pro-environmental behaviour. These findings highlight how personal and environmental nudges are important in forming pro-environmental behaviours of visitors to ecotourism destinations.

Su and Swanson (2017) highlighted that DSR is a source of competitive advantage and innovation for tourism agencies. In addition, DSR protects the social and environmental interests of tourism destinations. To date, research conducted on DSR associated with pro-environmental behaviour is limited. In this respect, the present research contributes to the ecotourism literature by exploring how pro-environmental behaviour is differently affected depending on DSR groups at ecotourism destinations. The results of this study revealed that pro-environmental behaviour is statistically different between the low and high DSR clusters after biospheric value, sustainable intelligence, and demographic variables are controlled. This finding suggests that the highly perceived DSR groups are more likely to demonstrate strong pro-environmental behaviour as compared with their counterpart. This result signifies that visitors' pro-environmental behaviour can be predicted by DSR in terms of environmental, socio-cultural, and economic perspectives.

This study also contributes to the ecotourism literature by investigating the impact of biospheric value on pro-environmental behaviour at ecotourism destinations. The results of this study revealed that pro-environmental behaviour is significantly affected by biospheric value. The results are consistent with the study of Van der Werff et al. (2013), who found a positive relationship between biospheric value and environmental self-identity and stated that biospheric value assists visitors' engagement in pro-environmental behaviour. Moreover, De Groot and Steg (2008) highlighted that biospheric value impacts consumer attitude towards pro-environmental behaviour. The finding of the current study suggests that biospheric value is an important antecedent of predicting pro-environmental behaviour at ecotourism sites.

The findings of this study signify that visitors' involvement in sustainable intelligence and biospheric value is desirable in predicting their future concerns in relation to their pro-environmental behaviour. Biospheric value translates visitors' attitude to engage in pro-environmental behaviour when they have high DSR at ecotourism sites. Similarly, Soyez (2012) argued that values influence self-identity, which in turn shapes pro-environmental behaviour. De Groot and Steg (2007) emphasized the importance of behavioural intention in explicating pro-environmental behaviour. To date, research examining sustainable intelligence associated with pro-environmental behaviour is limited. Thus, this research contributes to the ecotourism literature by investigating the impact of sustainable intelligence on pro-environmental behaviour at ecotourism destinations. The results of this study revealed that sustainable intelligence significantly influences pro-environmental behaviour. Notably, sustainable intelligence was found to have the highest impact on pro-environmental behaviour among DSR, biospheric value, and visit experience. This finding contributes to the ecotourism literature in that sustainable intelligence should play a significant role in predicting pro-environmental behaviour at ecotourism sites.

Finally, visit experience at eco-tourism sites influences visitors' pro-environmental behaviour (Ardoin, Wheaton, Bowers, Hunt, & Durham, 2015). Ramkissoon, Weiler, and Smith (2012) stated that fostering visit experiences at environmentally friendly sites may further help preserve national heritage sites. Moreover, they asserted that visitors' destination-specific pro-environmental behaviour may influence general pro-environmental behaviour. This research contributes to the ecotourism literature by exploring whether the visit experience of ecotourism sites influences pro-environmental behaviour. The results of this study indicated that pro-environmental behaviour is significantly affected by the visit experience. This finding suggests that visit experience is also an important antecedent of predicting pro-environmental behaviour at ecotourism sites. In summary, visitors in the high DSR group with more sustainable intelligence, biospheric value, and visit experience at environmentally friendly tourist sites are more likely to have strong pro-environmental behaviour than their counterpart.

5.2. Practical implications

The findings of this study provide destination managers with several practical implications. Firstly, the findings of market segmentation indicated that the high DSR group is more likely to demonstrate pro-environmental behaviour than the low DSR group. Therefore, destination managers should utilize this market segmentation when promoting the preservation of ecotourism destinations. Destination managers should also select the high DSR group as the target market and then focus on their promotion efforts to exert an environmentally friendly behaviour from visitors. Destination managers may appoint them as PR agent so that they can promote pro-environmental behaviour to potential visitors.

Secondly, destination managers should develop promotion strategies that can improve the awareness of DSR among stakeholders including ecotourists. For instance, the awareness or perception of DSR will be

better promoted by demonstrating such economic responsibility as an improvement of the economic performance of ecotourism and giving back to the local community. Socio-cultural responsibility can also contribute to enhancing the awareness of DSR by improving the well-being of the society, interacting with other stakeholders, and making ecotourists understand the local culture. The awareness of DSR can be enhanced by environmental responsibility, such as demonstrating environmental concern and protection of their operation, reducing consumption of natural resources, and sharing environmental practices with stakeholders including ecotourists. Destination organizations are recommended to install a video theater that introduces the DRS activities that Upo Wetland has implemented and why this wetland should be economically, socially, and environmentally responsible. This video service will help visitors to not only demonstrate pro-environmental behaviour but also become part of the high DSR group in the long run Fig. 1.

Thirdly, the finding of this study showed that sustainable intelligence strongly influences pro-environmental behaviour. Sustainable intelligence is the strongest contributing factor to influence pro-environmental behaviour among other antecedents. Therefore, destination managers should design alternative or tailored information based on sustainable intelligence so that they can contribute positively to preserving ecotourism destinations. Destination managers should also promote sustainable intelligence to ecotourists by developing virtual reality (VR), which enables them to learn about the sustainability of ecotourism destinations. The VR program could be promoted through YouTube and Facebook so that multiple ecotourists could enhance their sustainable intelligence in ecotourism destinations.

Fourthly, given that biospheric value is significantly related to pro-environmental behaviour, tourism practitioners should focus on protecting natural resources and the environment in ecotourism development. In addition, destination managers should promote for ecotourists to fully understand and sympathize with the conservation value of ecotourism sites using social networking messengers to instil a positive perception of living in harmony with nature.

Lastly, this study demonstrated that visit experience at ecotourism sites has a positive impact on pro-environmental behaviour. This result implies that experience and understanding of ecotourism by tourists are important. Those who have experience atecotourism sites are more likely to prefer storytelling programmes by local guides (residents) so that visitors can better understand why pro-environmental behaviour is important to keep the ecotourism destination sustainable for a long time. Informing and communicating news of the specific ecotourism destination's environmentally friendly activities through social networking messenger would be also effective to maintain interest and emotional intimacy with the destinations.

5.3. Limitations

This research has limitation which also provides avenues for future research directions. Although this study addresses the impact of DSR, sustainable intelligence, biospheric value, and visit experience on pro-environmental behaviour, the study is limited to one ecotourism site; that is, Upo Wetland, Korea. Future research on this subject is recommended to conduct cross-cultural studies at regional and national levels, which will contribute to generalizing the current research results. This study found that sustainable intelligence plays a critical role in predicting pro-environmental behaviour. Future research may need to further extract measurements through in-depth interviews that will contribute to increasing the predicting power of pro-environmental behaviour for specific ecotourism destinations.

Appendix

Fig. A. Upo Wetland.

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