Coastal communities' participation in reducing single-use plastic bags: the role of awareness of harm and responsibility for environmental protection

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Abstract

Purpose – This research aims to explore the role of awareness of harm and responsibility for environmental protection in reducing pollution from single-use plastic bags (SPBs) in coastal communities (CCs). To this end, this study develops and tests a unique model that explains residents' intention to reduce the use of SPBs in coastal regions.

Design/methodology/approach – A questionnaire was used to collect data from 721 coastal residents in Vietnam. Structural equation modeling and moderation analysis were applied to test the proposed hypotheses.

Findings – The results show that awareness of the impact of SPBs on the environment and human health and awareness of the responsibility to protect the coastal environment significantly affect attitudes and intentions to reduce the use of SPBs. Moreover, such awareness of responsibility strengthens the attitude-intention relationship.

Practical implications – The findings suggest that CCs should not receive a lower priority in campaigns and efforts to reduce SPBs. In this regard, providing residents with free environmentally friendly bags and education programs on the impact of SPBs could be implemented.

Originality/value – CCs are directly impacted by pollution from SPBs. However, little is known about how this affects their polluting behavior. This study shows that CCs are not immune to polluting behaviors and that SPBs can be significant among residents. It also demonstrates that awareness of harm and feeling responsible for the environment are essential drivers of (intended) sustainable behaviors.

Keywords Single-use plastic bags, Awareness of harm, Awareness of responsibility, Environmental protection, Attitudes, Behavioral intention, Coastal communities

Paper type Research paper

Introduction

Marine economic development is always in a close relationship with environmental protection and sustainable development (Suntikul and Dorji, 2015), especially as coastal ecosystems play an important role in forming core values and can also serve as marine tourism destinations (Spalding *et al.*, 2017). Coastal ecosystems are formed by nature,

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but maintained or destroyed by human actions (Spalding *et al.*, 2017; Hudson, 2017) and for decades, protecting coastal ecosystems has been the responsibility of local communities, including governments, businesses, local residents and tourists (Green *et al.*, 2015; Needham *et al.*, 2016). In particular, the daily activities of coastal residents have a considerable influence on coastal ecosystems (Green *et al.*, 2015; Hudson, 2017; Spalding *et al.*, 2017; Wang *et al.*, 2019), including one of the most important activities is shopping and the subsequent pollution of the environment by single-use plastic bags (SPBs) (Ayalon *et al.*, 2009; Faraca and Astrup, 2019; Gelici-Zeko *et al.*, 2013; Crowley, 2020).

Previous research has demonstrated that the usage of SPBs and their disposal depend largely on the daily consumption habits of coastal residents (Ayalon *et al.*, 2009; De Feo and De Risi, 2010). Convenience, low cost and being available free to customers are considered as the basic factors affecting plastic bag pollution behavior (Clapp and Swanston, 2009; Gelici-Zeko *et al.*, 2013) and they create a fundamental challenge in reducing the plastic bag use behavior of coastal communities (CCs) (Gelici-Zeko *et al.*, 2013). Recently, several researchers have relied on attitude-intention-behavior theory to expand and test cognitive factors, from environmental harm, health risks and environmental responsibility and demonstrate that when the public's awareness of the impact of SPBs on the environment and health increases, they will change their use and discharge behaviors (Laroche *et al.*, 2001; Martinho *et al.*, 2017; Milfont and Duckitt, 2010). However, these studies were mainly conducted in developed countries where the awareness and intellectual level of the community are high (De Feo and De Risi, 2010; Faraca and Astrup, 2019; Ferronato and Torretta, 2019; Martinho *et al.*, 2017; Crowley, 2020; Wang *et al.*, 2019). In contrast, this study was conducted in coastal cities of Vietnam, where there has been a strong development of the island economy in recent years, but which still faces the problem of pollution from community activities, including usage status and discharge of plastic bag pollution in the sea.

Using SPBs is a daily and very popular habit of Vietnamese consumers (East Asian Seas, 2018). In 2012, the World Bank reported that, on average, Vietnamese people emit approximately 1.2 kilograms of waste each day, about 16% of which is plastic waste. With a population of nearly 97 million, in 2019 Vietnam released approximately 19,000 tons of plastic waste into the environment every single day. The habit of using SPBs and disposing of them has become a major environmental problem in Vietnam (East Asian Seas, 2018). This is a fundamental challenge for the government which has been forced to formulate macro policies to control and reduce consumers' use of SPBs (East Asian Seas, 2018) as well as in developing countries (Cobbinah *et al.*, 2017; Faraca and Astrup, 2019; Jomehpour and Behzad, 2019; O'Brien and Thondhlana, 2019; Khan *et al.*, 2019; Zambrano-Monserrate and Ruano, 2020; Wang *et al.*, 2019).

Coastal marine cities in Vietnam have several potentials and advantages for developing the marine economy, particularly sea tourism (VNAT, 2019). The development of marine tourism is based on the sustainable development of the marine economy based on green growth, biodiversity conservation and marine ecosystems and is a priority future strategic orientation for Vietnam. However, the three biggest challenges facing coastal cities are: (1) an overload of visitors; (2) business activities are not strictly controlled and (3) plastic bag pollution is still very common (East Asian Seas, 2018). Vietnam is one of the top four countries with the largest amount of plastic waste and the Jenna Jamberg Foundation report shows that Vietnam's plastic waste equals about 0.3–0.8 million tons per year, which is equivalent to 6% of the total plastic waste in the sea worldwide. This report also points out that plastic is the most common marine waste (60–80%), which is predicted to rise in the near future (East Asian Seas, 2018). Therefore, controlling the habit of using SPBs and discharging the waste directly into the marine environment is a considerable challenge for local authorities who wish to establish sustainable development of the marine economy.

As a result, this study aims to examine the awareness of coastal residents about the harmful effects of plastic bag pollution on health and the environment, and the effects on their environmental attitude and behavior. Specifically, this study seeks to explore the activities of coastal residents related to reducing plastic bag use and disposal in coastal cities. It also investigates the awareness of SPBs' impact on health and the environment, the responsibility to protect the coastal environment and how these factors affect the coastal community's participation in reducing the use of SPBs. The findings of this study provide implications for policies to encourage coastal residents to reduce the use of SPBs and consciously protect the island and island tourism environment.

Literature review and hypothesis development

The theory of planned behavior (TPB) (Ajzen, 1991) proposed that behavior can be explained by the intention to perform. First, behavioral intention is viewed as a driving factor that influences behavior or the amount of effort that a person puts into performing a certain behavior (Ajzen, 1991). Second, behavioral intention is influenced by: (1) attitude (defined as a positive/negative assessment of the conduct performed); (2) social norms (defined as the social pressure that a person feels to or does not engage in the act) and (3) perceived behavioral control (defined as a person's assessment of how difficult or easy it is to perform the behavior). The validity of TPB has been confirmed through its application in various areas of research (Bamberg *et al.*, 2007; Han and Kim, 2010; Kim and Han, 2010; Lee *et al.*, 2010; Zambrano-Monserrate and Ruano, 2020). To predict the participation of CCs in reducing the use of SPBs, this study draws upon the TPB to explain the attitude-behavioral intention relationship and extends it by examining how CCs' awareness of the impact of SPBs and responsibility affects attitude and intention.

Attitude toward environmental protection and behavioral intention

Attitude is often perceived as a psychological tendency expressed by judging a particular entity with some degree of favoritism, either dislike or disregard as a learned tendency to react in a consistently beneficial or unfavorable manner (Ajzen and Fishbein, 2000). A positive attitude towards environmental protection represents people's beliefs and an appreciation of their behavior (Bohlen *et al.*, 1993). Attitude refers to the human judgment of the outcome of behavior (Ajzen, 1991) and research over the past 30 years has shown a strong relationship between attitudes and behavior intention. Attitude-behavior intention relationships have also been well-documented in different contexts of SPBs (Sharp *et al.*, 2010), energy conservation (Abrahamse *et al.*, 2005), single-use carrier bag charge (Poortinga *et al.*, 2013), recycling e-waste (Song *et al.*, 2012), green electricity programs (Clark *et al.*, 2016), municipal waste management service qualities (Jomehpour and Behzad, 2019), municipal solid waste management (Cobbinah *et al.*, 2017) and the intention to reduce plastic use (Jamir and Aruta, 2021; Cong *et al.*, 2023). Previous studies show that, if the consumer judges that using an environmentally-friendly product is helpful to them, then the intention/plan/desire of using this type of product will be stronger (Song *et al.*, 2012; Clark *et al.*, 2016). Currently, the consumption of SPBs is considered to not be environmentally-friendly (Sharp *et al.*, 2010) and individuals who have a positive attitude to environmental protection will intend to reduce their use of SPBs that cause environmental pollution. Therefore, hypothesis H1 is proposed:

H1. Attitude toward participating in protecting the coastal environment has a positive influence on the intention to reduce the use of SPBs.

The role of awareness

Awareness can be considered a perceived control factor that can influence behavior directly and indirectly via behavioral intention (Ajzen, 1991) and many studies discuss the awareness of the negative impact of waste SPBs on the coastal environment (Ayalon *et al.*, 2009; Green *et al.*, 2015; Ocean Conservancy, 2016; Cong *et al.*, 2023). Waste SPBs can enter the soil and hinder the growth of surrounding crops, which affects the growth of grass, leading to soil erosion (Green *et al.*, 2015; Martinho *et al.*, 2017) and have negative impacts on the ecosystem; for example, SPBs in the soil result in the loss of the soil's function to retain water and nutrients (Haward, 2018; Martinho *et al.*, 2017). Some soil plants cannot grow because SPB waste hinders their ability to receive water and nutrients (Green *et al.*, 2015; Martinho *et al.*, 2017). Waste SPBs can clog water pipes, increasing the flooding of cities in the rainy season (Green *et al.*, 2015; Dilkes-Hoffman *et al.*, 2018) and also destroy wildlife in lakes and seas, while some larger species are killed after swallowing waste SPBs (Green *et al.*, 2015) and many aquatic and marine animals die from eating indiscriminately discarded plastic containers (Borrelle *et al.*, 2017). CC's have had limited understanding of the environmental impact of plastic bag pollution due to consumption and treatment and this has been a real challenge for communication and education activities aimed at limiting the shopping/consumption/disposal of products that use contaminated SPBs (Dilkes-Hoffman *et al.*, 2018) despite consumers becoming increasingly aware of the impact of plastic bag pollution on the environment, which can affect their attitudes and intent to reduce plastic bag pollution. Therefore, hypotheses H2 and H3 are proposed as follows:

H2. Awareness of the harmful effects of waste SPBs has a positive influence on the attitude toward participating in protecting the coastal environment.

H3. Awareness of the harmful effects of waste SPBs has a positive influence on the intention to reduce the use of SPBs.

The perceptions and awareness of the impact of plastic bag pollution on human health have been examined in prior studies (e.g. Green *et al.*, 2015; Marsh and Bugusu, 2012; Lindh *et al.*, 2016). In particular, the most dangerous form of pollution arises when plastic packaging is burned because the exhaust gas, particularly dioxin, can cause poisoning, fainting, shortness of breath, coughing up blood affecting the endocrine glands, reducing immunity, dysfunction, carcinogenicity and birth defects (Marsh and Bugusu, 2012; Gelici-Zeko *et al.*, 2013). It is argued that when coastal residents are aware of the impact of waste SPBs on consumer health, they will develop a positive attitude towards participating in protecting the coastal environment and an intention to reduce the use of SPBs. As such, hypotheses H4 and H5 are developed as follows:

H4. Awareness of the impact of waste SPBs on consumer health has a positive influence on the attitude toward participating in protecting the coastal environment.

H5. Awareness of the impact of waste SPBs on consumer health has a positive influence on the intention to reduce the use of SPBs.

In developed countries, awareness of the responsibility to protect the environment is improved owing to social development and improved educational levels (Minton and Rose, 1997; Laroche *et al.*, 2001; Kalafatis and Pollard, 1999; Dunlap *et al.*, 2000). Many consumers are becoming aware of the importance of purchasing, using and disposing of non-eco-friendly products (Laroche *et al.*, 2001; Milfont and Duckitt, 2010) and the rate of shopping for clean and environmentally-friendly products is increasing (Kalamas and Cleveland, 2014; Campbell-Arvai *et al.*, 2014). State regulations and policies have somewhat positively influenced the behavior of purchasing, using and disposing of non-eco-friendly products (Laroche *et al.*, 2001; Milfont and Duckitt, 2010; Dunlap *et al.*, 2000; Osbaldiston and Schott, 2011) but controlling and restricting the use of non-environmentally-friendly products is a major challenge for developing countries, including Vietnam (Cong *et al.*, 2023).

Several studies have expanded from the TPB to show that customers' awareness of the responsibility to protect the environment is an important indicator explaining attitudes (Minton and Rose, 1997; Laroche *et al.*, 2001; Milfont and Duckitt, 2010; Dunlap *et al.*, 2000). Moreover, the intention to reduce the use of plastic bag pollution is also greatly influenced by customer awareness of their responsibility to protect the environment. Hence, hypotheses H6 and H7 state that:

H6. Awareness of the responsibility to protect the coastal environment has a positive influence on attitude toward participating in protecting the coastal environment.

H7. Awareness of the responsibility to protect the coastal environment has a positive influence on the intention to reduce the use of SPBs.

The positive relationship between attitude and behavioral intent is complex and controversial. The complexity of the relationship between the two research concepts has been shown by various moderating effects, such as involvement (Homburg and Giering, 2001; Seiders *et al.*, 2005), social identity (Smith and Terry, 2003; Terry and Hogg, 1996) and knowledge (Cooil *et al.*, 2007; Evanschitzky and Wunderlich, 2006). Regarding the awareness of the responsibility to protect the environment (Minton and Rose, 1997; Laroche *et al.*, 2001; Kalafatis and Pollard, 1999; Dunlap *et al.*, 2000), this study argues that such awareness can increase the impact of attitude toward participating in protecting the coastal environment on the intention to reduce the use of SPBs. High awareness of environmental responsibility will make the public's attitude more positive toward environmental protection (Laroche *et al.*, 2001). Several studies have confirmed the positive contribution of previous hypothesis about awareness of environmental responsibility to the adaptive attitude-behavior of communities.

If individuals have a low awareness of environmental responsibility, attitude towards environmental protection and the intention to participate in minimizing the use of SPBs can be nonexistent. In contrast, when the community has a high awareness of environmental protection responsibilities, attitude will be more positive towards most environmental protection activities. In this case, the intention to reduce the use of SPBs heavily depends on the awareness of environmental responsibility and the positive attitude of the community towards environmental protection.

Essentially, the moderating role of environmental responsibility awareness is consistent with previous research that shows the benefits of integrating the concept of environmental responsibility awareness in the relationship between attitudes and intentions toward environmental protection. However, the intentions to minimize plastic bag use are found only in communities with high awareness of environmental responsibility rather than in low-awareness community groups. When the role of environmental responsibility awareness is considered, along with the fact that it may affect the relationship of attitudes and intentions to reduce SPBs, the following hypothesis is proposed:

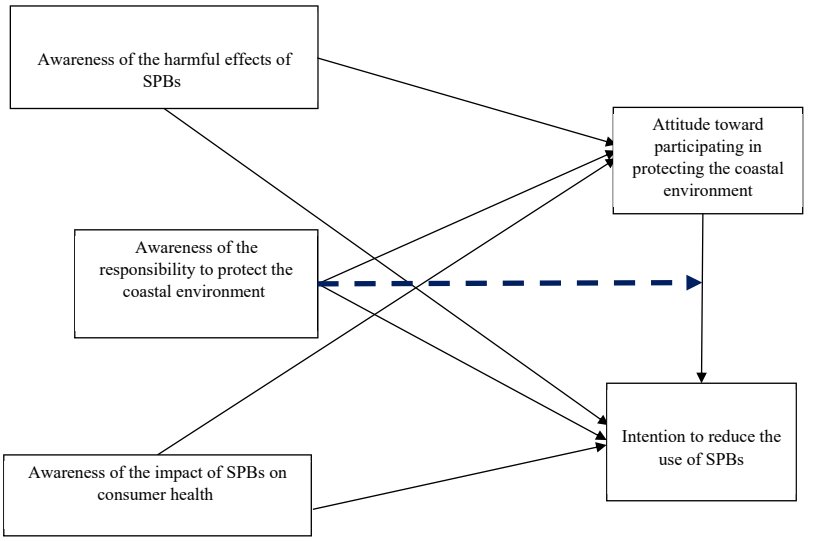
H8. Awareness of the responsibility to protect the coastal environment moderates the impact of attitude toward participating in protecting the coastal environment on the intention to reduce the use of SPBs.

The proposed research model is depicted in Figure 1.

Methods

Sample and procedure

Data was collected using structured questionnaires administered face-to-face in CCs in three cities: Nha Trang, Quy Nhon and Da Nang. In particular, the data collection was conducted locally by trained researchers in Vinh Nguyen Ward, Loc Tho Ward city of Nha Trang, Nhon



Source(s): The results of research by authors

Figure 1.
Proposal of research model

Binh, Nhon Phu Ward city of Quy Nhon and Phuoc My, An Bac Hai Ward city of Da Nang. Residents in the local communities were randomly selected within local wards. The sampling approach across 125 CCs (local wards) resulted in 721 completed questionnaires from local residents.

Measurement scales

This study uses existing scales from previous studies that were translated and adapted to the local context using market research experts (five in total) and test respondents (20 in total). A 7-point Likert scale was used to assess the measures.

This study used four items to measure the intention to reduce the use of SPBs as follows: "I plan to reduce the use of SPBs", "I look forward to minimizing the use of SPBs", "I will minimize the use of SPBs" and "I have a plan to reduce the use of SPBs". This measure is analogous with several studies that test these intentions (Ajzen, 1991; Song *et al.*, 2012; Clark *et al.*, 2016; Cong *et al.*, 2023).

Another three items were used to measure the attitude while participating in protecting the coastal environment as follows: "When participating in activities to reduce the use of plastic bags in the coastal environment, I feel (Not satisfied/Satisfied)", "When participating in activities to reduce the use of plastic bags in the coastal environment, I feel (Dislike/Like)" and "When participating in activities to reduce the use of plastic bags in the coastal environment, I feel (Useless/Useful)". This measure is analogous to several studies that test these attitudes (Ajzen, 1991).

The construct of awareness of the harmful effects of waste SPBs was measured using three statements as follows: "Plastic bag pollution gets in the soil, which hinders the growth of the plants, hinders the growth of grass leading to soil erosion", "Plastic bag pollution destroys ecosystems; when consumed and discarded outside, plastic bag pollution is in the soil, making it unable to retain water and nutrients", "Plastic bag pollution clogs water pipes, increasing the possibility of flooding cities in the rainy season", "Waste plastic bag pollution destroys organisms when drifting in lakes; in the seas, they kill microorganisms when

swallowed" and "Many aquatic and marine animals die as a result of eating indiscriminately the discarded plastic containers of visitors" (Green *et al.*, 2015; Dilkes-Hoffman *et al.*, 2018).

This study measured awareness of the impact of waste SPBs on consumer health using four measures: "Colored SPBs contaminate food", "Plastic bag pollution contain metals such as lead and cadmium, which are harmful to the brain", "Burning plastic bag pollution causes lung cancer" and "Plastic bag pollution burns exhaust gas, especially dioxin, which can cause poisoning, fainting, and shortness of breath". These items were utilized in prior studies measuring the awareness of the impact of waste SPBs on consumer health (Green *et al.*, 2015).

Awareness of the responsibility to protect the coastal environment was assessed by asking the respondents to indicate their evaluation of the following three perspectives adapted from previous studies: "I feel that I have a responsibility to make the environment of the sea and islands cleaner", "I feel that I have a responsibility to preserve coral reefs" and "I believe that my actions can improve the coastal environmental for future generations" (Laroche *et al.*, 2001; Milfont and Duckitt, 2010; Kalamas and Cleveland, 2014).

Data analysis methods

A confirmatory factor analysis (CFA) was conducted using a range of subsamples (n = 150) to verify that the measurement scales ensured reliability, convergent validity and discriminant validity. Next, structural equation modeling (SEM) analysis was used to test the structural relationship between the concepts. Following guidelines from Browne and Cudeck (1992), acceptable model fits are indicated by the goodness of fit index (GFI), Tucker-Lewis index (TLI) and comparative fit index (CFI) values greater than 0.90 and the root mean square error of approximation (RMSEA) values are below 0.08.

To assess the moderating role of the awareness of the responsibility to protect the coastal environment, this paper implemented a multi-group analysis technique. The first step was to examine the full constraint model in which all the linear structure estimates were placed in groups with high and low awareness of environmental responsibility. The author then proceeded to handle a less binding model in which there was only a structural relationship between attitude towards participating in protecting the coastal environment and intention to reduce the use of SPBs and then to compare the two groups.

Results

Sociodemographic profile of respondents

As indicated in Table 1, the sample statistic results show that the percentage of women in the sample was 51.3%, the respondents aged 36–55 account for a high rate of 62.5%, over 70% of respondents were married, the rate of respondents with a family average income below 5 million/month was 41.5%, nearly 65% of the respondents have a high school or lower-level education and 82% of the respondents lived beside the sea/mainland.

In particular, the respondents were asked about concerns regarding activities directly related to the seas and coastal areas. Approximately 39.1% answered their main occupation was fishing, 22.6% answered coastal aquaculture activities, 7.4% were tour guides, 6.7% were involved in activities related to selling tourism products and 5.8% of the respondents responded to the tour.

Respondents' participation in reducing the use of plastic bags

As shown in Figure 2, the respondents showed good behavior in relation to reducing the use and disposal of SPBs in coastal cities, such as limiting the purchase of SPBs (63%), limiting the use of SPBs (60%), limiting the discharge of SPBs into the environment (59%), propagating images of sea tourism (66%), engaging in mobilizing people to restrict their

Variable	%
Gender	
Male	48.7
Female	51.3
Married	
Single	28.8
Married	71.2
Age (in years)	
Under 18 years old	2.10
From 19 to 35 years old	26.7
From 36 to 55 years old	62.5
Over 55 years old	8.7
Income (exchange rate: 1 USD = 23,100 VND)	
Under 220 USD	41.5
From 220 to 440 USD	36.5
From 440 to 660 USD	12.7
Over 660 USD	9.3
Education	
High school	64.1
Under-graduate	24.7
Post-graduate	6.0
Other	15.2
Live place	
Island	14.40
Beside the sea	52.9
Mainland	32.0
Far from the sea	0.7
Occupation	
Fishing	39.1
Aquaculture	22.6
Tour guide	7.1
Sell souvenirs/fine crafts	6.7
Tourist transport	5.8
Others	18.7

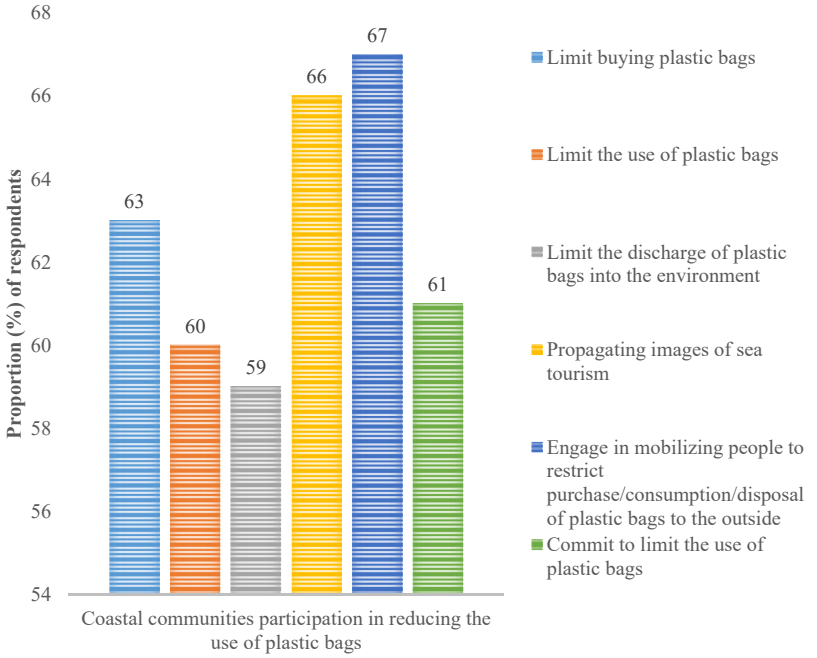
Source(s): The results of research by authors

Table 1. Research sample according to demographic characteristics (n = 721)

purchase/consumption/disposal of SPBs outside (67%) and committing to limiting the use of SPBs (61%). However, approximately 40% of the respondents have still not adopted positive behaviors related to minimizing pollution from shopping/use and the disposal of SPBs. This result creates significant challenges for managers to change the future shopping/use and disposal behavior regarding SPBs in CCs.

Reliability and validity of the measures

Before conducting the CFA, the potential issue of common method bias was eliminated by using Harman's single-factor test (MacKenzie and Podsakoff, 2012). The CFA results show that the value of the χ^2 statistic is 553.65 with 142 degrees of freedom, and the probability of 0.000 indicates that this statistic is statistically significant. The RMSEA value is 0.063 < 0.08, and the three values of GFI, TLI and CFI are 0.945, 0.954 and 0.945 > 0.9, respectively. The measurement model fits well with the data.



Source(s): The results of research by authors

Figure. 2.
CCs' participation in reducing the use of plastic bags

As shown in Table 2, the standardized factor loading of the indicator is statistically significant at 0.001 and the range is from 0.722 to 0.872. The scales have high composite reliability beyond the recommended threshold of 0.80 and the extracted variance values are greater than 0.60. These results demonstrate that the scales have high reliability and convergence validity (Browne and Cudeck, 1992).

The analysis shows that for all pairs, the two-factor CFA model is better than the one-factor CFA model, and the chi-square difference statistics are statistically significant at the level of 0.001 (Fornell and Larcker, 1981). This indicates that the measurement scales have a high level of discriminant validity. Table 3 describes the correlations between the variables.

Structural model

The SEM results show that the value of the χ^2 statistic is 554.23 with 143 degrees of freedom, and the probability of 0.000 indicates that this statistic is statistically significant. The RMSEA value is 0.062 < 0.08, and the three values of GFI, TLI and CFI are 0.943, 0.953 and 0.944 > 0.9, respectively. The structural model fits well with the data. Table 4 summarizes the hypothesis testing results.

Moderation analysis results

As mentioned above, a multigroup analysis was conducted to test the moderating effect of awareness of responsibility to protect the coastal environment. Two subgroups were identified with low awareness of responsibility (n = 379) and high awareness of responsibility (n = 342). Results of the initial scalar model show that its fit is worse than the full metric invariance model ($\chi 2$ = 112.5, df = 109, χ^2/df = 1.027; RMSEA = 0.05;

Concepts and indicators	FL	SE	t	SFL	CR	VE
Intention to reduce the use of plastic bags (INT)					0.89	0.68
INT1	1.000	–	–	0.844		
INT2	1.038	0.036	28.776	0.872		
INT3	0.993	0.036	27.851	0.853		
INT4	0.907	0.042	21.853	0.722		
Attitude toward participating in protecting the coastal environment (ATTN)					0.86	0.66
ATTN1	1.000	–	–	0.797		
ATTN2	0.993	0.043	23.278	0.859		
ATTN3	0.928	0.043	21.762	0.789		
Awareness of the harmful effects of waste plastic bags (AHW)					0.91	0.67
AHW1	1.000	–	–	0.810		
AHW2	1.065	0.042	25.149	0.832		
AHW3	1.111	0.044	25.165	0.832		
AHW4	1.184	0.046	25.952	0.851		
AHW5	1.112	0.049	22.759	0.771		
Awareness of the impact of waste plastic bags on consumer health (AWH)					0.86	0.61
AWH1	1.000	–	–	0.792		
AWH2	1.024	0.044	23.265	0.824		
AWH3	1.030	0.046	22.459	0.798		
AWH4	0.939	0.047	19.843	0.718		
Awareness of the responsibility to protect the coastal environment (ARE)					0.86	0.67
ARE1	1.000	–	–	0.817		
ARE2	1.024	0.042	24.391	0.855		
ARE3	0.929	0.041	22.648	0.791		

Table 2.
Factor weight, aggregate reliability and extracted variance

Note(s): FL: Factor loading; SE: Standard error; SFL: Standardized factor loading; CR: Composite reliability; VE: Variance extracted
Source(s): The results of research by authors

	INT	ATTN	AHW	ARE	AWH
INT	–				
ATTN	0.57***	–			
AHW	0.59***	0.55***	–		
ARE	0.60***	0.53***	0.58***	–	
AWH	0.60***	0.56***	0.69***	0.60***	–
Mean	5.68	5.77	5.62	5.47	5.61
S.D.	1.11	1.15	1.16	1.21	1.16

Table 3.
Coefficient of correlation, mean and standard deviation

Note(s): ***$p < 0.001$, S.D. Standard deviation
Source(s): The results of research by authors

Path coefficient	Hypothesis	Estimates	t-value	Support/Reject
ATTN → INT	H1	0.308	6.231***	Support
AHW → ATTN	H2	0.354	5.587***	Support
AHW → INT	H3	0.199	3.052**	Support
AWH → ATTN	H4	0.199	3.161**	Support
AWH → INT	H5	0.248	3.834***	Support
ARE → ATTN	H6	0.150	3.107**	Support
ARE → INT	H7	0.294	6.039***	Support

Table 4.
Test results of hypotheses about relationships between variables

Note(s): ***$p < 0.001$; **$p < 0.05$; *$p < 0.10$; R^2 (ATTN) = 0.349; R^2 (INT) = 0.528
Source(s): The results of research by authors

TLI = 0.95; CFI = 0.96), indicating the initial scalar invariance is not supported. This study continued with a partial scalar model by relaxing each item of intercept for each construct, showing that the partial scalar model's fit is almost equivalent to that of the full metric invariance model ($\chi 2$ = 108.5, df = 108, χ^2/df = 1.004; RMSEA = 0.05; TLI = 0.95; CFI = 0.96). Therefore, the partial scalar invariance model is confirmed, indicating the suitability for testing the moderating role of awareness of the responsibility to protect the coastal environment.

As indicated in Table 5, the findings support the relationship by indicating that the effect of awareness of the responsibility to protect the coastal environment on intention to reduce the use of SPBs in the "high awareness of the responsibility to protect the coastal environment" subgroup (β = 0.18, t = 2.67, $p < 0.005$) is significantly [$\Delta\chi^2$ (1) = 3.6, $p < 0.05$] higher than in the "low awareness of the responsibility to protect the coastal environment" subgroup (β = 0.12, t = 2.32, $p < 0.005$).

Discussion of findings

This study postulates that the CCs that have a positive attitude while participating in protecting the coastal environment will have a higher intention to reduce the use of SPBs. The results support the relationship (β = 0.308, t = 6.231, $p < 0.001$). This result supports the studies of Bohlen *et al.* (1993), Song *et al.* (2012) and Clark *et al.* (2016) in different consumer contexts. Accordingly, SPBs are considered to be unfriendly to the environment, and when the community has a more positive attitude towards participating in protecting the coastal environment, they will have a higher intention to reduce the use of SPBs.

This study also expects that communities that are aware of the harmful effects of SPBs on the marine tourism environment will have a positive attitude towards participating in protecting the coastal environment. The results support the relationship (β = 0.354, t = 5.587, $p < 0.001$) as well as previous studies, including Green *et al.* (2015), Dilkes-Hoffman *et al.* (2018) and Haward (2018). Thus, when consumers are more aware of the harmful effects of SPBs on the environment, they will have an increasingly positive attitude in participating in protecting the coastal environment.

This study expects that awareness of the impact of SPBs on the coastal environment will lead the community to intend to reduce the use of SPBs as the results support the relationship (β = 0.199, t = 3,052, $p < 0.05$) which confirms the validity of previous studies, such as Green *et al.* (2015), Dilkes-Hoffman *et al.* (2018) and Haward (2018). Thus, consumers who are more aware of the impact of SPBs on the environment will have an increased intention to reduce the use of SPBs.

This study proves that awareness of the harmful effects of SPBs on health will lead the community to have a positive attitude in participating in protecting the coastal environment. The research results support the relationship (β = 0.199, t = 3,161, $p < 0.05$) as well as previous studies, such as Green *et al.* (2015). This study also demonstrates that awareness of the harmful effects of plastic pollution on health will increase the community's intent to reduce the use of SPBs. These results support the relationship (β = 0.248, t = 3,834, and $p < 0.001$).

Paths and relationship	Low ARE (n = 379) Estimate	*t*-value	High ARE (n = 342) Estimate	*t*-value	χ^2 difference (*df* = 1)
ATTN→ INT	0.12	2.32*	0.18	2.67*	7.7***

Note(s): *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$
Source(s): The results of research by authors

Table 5. Moderating effect of awareness of the responsibility to protect the coastal environment

This study proves that when the awareness of the responsibility to protect the marine environment is increasing, the community will have a positive attitude while participating in protecting the coastal environment. These research results support the relationship ($\beta = 0.15$, $t = 3{,}157$, $p < 0.05$) and previous studies, including Laroche *et al.* (2001), Milfont and Duckitt (2010), and Kalamas and Cleveland (2014). This study also demonstrates that increasing awareness of responsibility for protecting the marine environment will increase the community's intent to reduce the use of SPBs. These research results support the relationship ($\beta = 0.294$, $t = 6.039$, $p < 0.001$).

The results also show that awareness of the responsibility to protect the coastal environment exerts a positive moderating impact on the attitude-intention association, specifically, the effect of attitudes on intention to reduce the use of SPBs is significantly higher in the "high awareness of the responsibility to protect the coastal environment" subgroup than in the "low awareness of the responsibility to protect the coastal environment" subgroup. This study addresses the call for examining possible moderators in the relationship between attitude and intention toward environmental protection attitudes (Nguyen and Johnson, 2020).

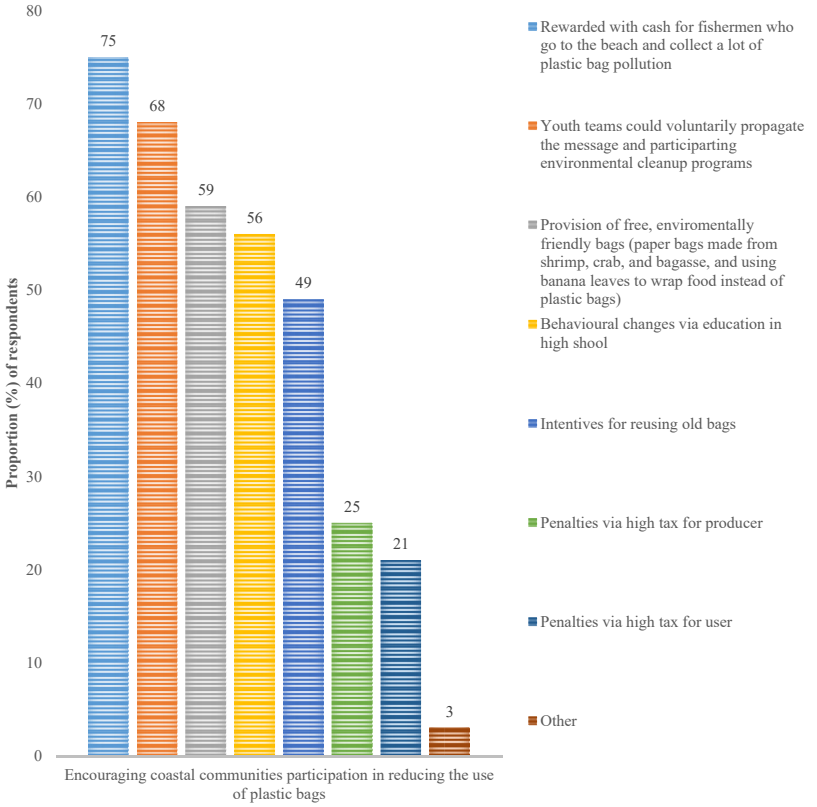
Conclusion and implications

This study explores the activities related to reducing plastic bag use and disposal in coastal cities of coastal residents. It also extends the TPB to examine the awareness of SPBs' impact on health and the environment, the responsibility to protect the coastal environment and how these factors affect the coastal community's participation in reducing the use of SPBs. These objectives have been achieved in the context of plastic waste in CCs in Vietnam.

Many respondents in the research sample showed good behavior in reducing the use and disposal of SPBs in coastal cities, such as: limiting the purchase of SPBs; limiting the use of SPBs; limiting the discharge of SPBs into the environment; propagating images of sea tourism; engaging in mobilizing people to restrict their purchase/consumption/disposal of SPBs outside; and committing to limiting the use of SPBs. However, approximately 40% of the coastal residents in the sample still have not adopted positive behaviors related to minimizing pollution from shopping and the use and disposal of SPBs. This result creates significant challenges for managers in changing the shopping/use and disposal behavior of SPBs among CCs in the near future. This study suggests that CCs should *not* receive a lower priority in campaigns and efforts to reduce SPBs because they suffer the most and "see the plastic wash up on their shore".

The study also shows that the awareness of the impact of SPBs on human health and the environment and the awareness of the responsibility to protect the coastal environment have significant effects on the behavioral intentions of the community in participating in minimizing the use of SPBs. Interestingly, an exploratory moderator analysis shows that ARE strengthens key relationships in the perceptions of harm-sustainable behavior pathways in the community.

The study provides some implications for encouraging coastal residents to reduce the use of SPBs and consciously protect their island and island tourism environment. In essence, to restrict plastic bag pollution from CCs, it would help if local governments and businesses provided more environmentally-friendly bags in the first place. In addition, classes for training, consulting and guiding CCs on the impact of plastic bag pollution on human health, public health and the living environment could play an important role in behavior change. Educational programs about the harm inflicted on long-term health by SPBs could also be organized to teach students and the population. These interventions are illustrated in Figure 3.



Source(s): The results of research by authors

Figure 3.
Encouraging CCs' participation in reducing the SPBs

The communities pay great attention to and support rewards encouraging fishermen to participate in collecting rubbish along the coast and the amount of waste collected during each trip to the sea will be worth a valuable reward from the government. This solution received a high level of agreement with 75% of the answers in the sample and these results should receive attention from local authorities in developing a plan to encourage fishermen to collect rubbish.

The respondents appreciated the option of using a young volunteer team to propagate the harmful effects of SPBs on the environment and the establishment of youth volunteer teams to collect rubbish at the end of each week was considered by the communities to be a useful solution to guide young people to protect the environment in the long term. A total of 68% of the respondents agreed with this solution.

CCs are interested in the support of the authorities and businesses by supplying bags made from environmentally-friendly natural products. This is an appropriate direction to exploit the potential of the natural products (fish, crabs and banana leaves) available in the localities. However, the high cost of producing bags of natural origin also requires manufacturers to invest in technology in the near future. Educating young people about the environment, protecting the environment and the harmful effects of SPBs on the coastal environment were also highly appreciated by the respondents with over 55% of the respondents supporting this solution. In addition, the respondents are interested in solutions to encourage CCs to use their

bags more than once to save both household budgets and environmental sanitation. Despite the communication difficulties involved in helping the communities to understand and implement the solution, this should be given high priority in the future.

It is worth noting that the regulations on penalties imposed through the taxation of manufacturing enterprises and users were not supported by the respondents (the rate of approval was between 21% and 25%). The results of this research also support several studies conducted in different research contexts, such as Western countries. Therefore, the economic measures to be applied in cases concerning the incentive to reduce plastic bag use by CCs should be considered carefully by the regulators.

Coastal residents' attitudes towards environmental protection play a fully intermediating role in the relationship between perceptions of environmental harm, awareness of harm to health, awareness of environmental responsibility and the intention to reduce the use of SPBs. Therefore, to increase communities' intention to reduce plastic bag use, it is necessary to increase the promulgation of regulations and institutions for the production, use and disposal of SPBs. Simultaneously, strict handling and punishment rules should be introduced for those who commit violations through a mobile environmental inspection board and each locality should build a control and treatment station to help inspectors report to the competent authorities on the production, sale and disposal of SPBs.

CCs, in their daily activities, often need to buy and use SPBs. To limit the disposal of SPBs in the environment, it is advisable to encourage small shops and businesses to not supply SPBs. If a customer wishes to have a SPBs, the business establishment may require the customer to pay more, in accordance with the law of multipliers. This approach will help in limiting the number of SPBs that are purchased, used and discharged into the coastal environment in Vietnam.

To restrict SPBs from these CCs, local governments and businesses should provide more environmentally-friendly bags, such as paper bags made from shrimp, crab, bagasse and banana leaves for wrapping food. Competitions could be organized for fishermen to collect and pick up SPBs to reduce coastal pollution and be rewarded with cash. Every month, fishermen collect many SPBs at sea and every year, there are programs to honor fishermen who have made achievements in reducing plastic bag pollution at sea. Through these activities, good examples of collecting SPBs at sea can spread widely among a community, encouraging more fishermen to join this movement.

Classes for training, consulting and guiding CCs on the impact of plastic bag pollution on human health, public health and the living environment could be strengthened and youth teams could voluntarily propagate the message about the impact of plastic bag pollution on the communities. Environmental clean-up programs could be organized every weekend to raise public awareness of and attitudes toward limiting the use of SPBs and contributing to environmental protection.

Environmental and environmental protection awareness for CCs could be increased, propagating the basic benefits that the bay provides to the communities. The future values the communities will receive if the environment is protected and exploited moderately should be described and community responsibility will be enhanced with greater awareness of the harmful effects of climate change, global warming and plastic waste issues for future generations.

As expected, increasing awareness about the harmful effects of SPBs on health and the environment and the awareness of environmental responsibility can have a positive impact on people's attitudes toward environmental protection and reduce their intention to use SPBs in the future. In addition, this study confirms that the integration of theories on behavioral intention and expected value will contribute to increasing the level of interpretation of the concepts in the research model. This study also incorporated variables that examine future outcomes in explaining attitudes and intentions and therefore, as a result, makes certain academic and practical contributions.

Limitations, future research directions

Although the research extended the TPB, further research should integrate other theories, such as social exchange theory, and some factors can be integrated into cost perceptions versus benefit perceptions and the cohesion of CCs. Other constructs can also be added as determinants and moderators, such as environmental knowledge (Roczen *et al.*, 2014), attention to environmental protection and consideration of future consequences (Petrocelli, 2003; Strathman *et al.*, 1994). This study collected data from residents living in three coastal marine cities (Nha Trang, Quy Nhon and Da Nang) and future research should expand the sample sites to other CCs in Vietnam. Finally, this study utilized a survey method, which is often associated with common method bias and future research could consider collecting data using other methods such as experimental techniques.

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