

Scuba divers' household behavior to reduce plastic and food waste

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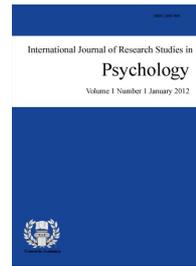
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Abstract

The attempt to study if scuba produces positive pro-environmental behaviour, used the theory of planned behaviour to build a new model to observe variables capable to explain possible reduction of plastic and food waste in the household. Previous studies have recognised subjective norms as giving little contribution to recycling process and waste prevention control; as a consequence the proposed model excludes such variable, but introduces scuba diving, awareness and demographic variables to register different behaviours adopted by divers and non-divers. A questionnaire was developed to assess 181 US divers regarding their household practices for plastic and food waste production, and two-step cluster analysis was used to observe how variables can relate to each other. Although clusters containing values for environmental awareness, attitude toward the behaviour and perceived behaviour control can be used as important combination to predict for pro-environmental behaviour, the fact of being a certified scuba diver is not significant for environmental behavioural. However, it definitely plays an important role in raising awareness of and observing the impacts on the reef. Thus, scuba diving is only characterized as a good vehicle for promoting good environmental practices, motivating people to rethink their attitudes toward their behaviour in the household.

Keywords: sustainability; food discard; municipal waste; pro-environment; scuba diving

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1. Introduction

After the Second World War people started traveling more often and further afield, making a contribution to tourism growth and at the beginning of the 21st century tourists started seeking out low-impact sports tourism 'adventures' in water environments, with these adventures eventually becoming niche tourism. Engaging in such niche tourism activities sometimes requires expensive equipment for comfort, enjoyment and easy use. "Gender, ability, ethnicity, socio-economic, and cultural background were substantive limiting actors along with social, religious, and political influences" (Jennings, 2007, p. 1).

Scuba diving became more popular and more widely available at the destinations suitable for the activity. Tourism Queensland (2003) estimated there were 5 to 7 million active divers in the world, with 2.5 million in the U.S., approximately 100,000 in the UK contributes, and 34,600 in Australia. Depondt and Green (2006) conducted a study in South-East Asia and Francophone countries of the Indian and Pacific Oceans, calculating annual totals of 107,320 and 69,150 divers, respectively. Tourism Queensland (as cited in Jennings, 2007) stated that diving tourism takes place when individuals travel to a destination where at least one scuba dive is included.

Global tourism takes divers to coastal areas of the United States, Australia, Japan, the Red Sea, the Maldives, the Seychelles and the Philippines (Davis, Harriot, & MacNamara, 1995). The Caribbean Sea, Pacific coast of South Africa, Pacific Islands, Papua New Guinea, Palau (Vianna, Meekan, & Pannell, 2010), and other destinations in Asia are also areas of biodiversity and therefore diving grounds (Musa, 2003). According to Graham (2004), whale shark watching (*Rinchorodon typus*) was estimated to have generated 47.5 million USD worldwide. In South Africa, Hara, Maharaj, and Pithers (2003) estimated the annual revenue from cage diving with great white sharks (*Carcharodon carcharias*) to be around 4.1 million USD and with tiger sharks (*Galeocerdo cuvier*) around 1.8 million USD in 2007 (Dicken & Hosking, 2009). According to studies carried out by DEMA (2012) for the Caribbean coral reefs including Florida, recreational scuba diving has generated around 2.1 billion USD, from of 4.56 million visitor-days per year. Diving is also responsible for 26,000 full-time jobs related to the activity, and in 2009 Florida took in around 20 million USD from locals taking diving courses, purchasing equipment and utilizing services related to scuba diving.

Divers were studied for their behaviors while attending a conservation education program to develop 'ownership and stewardship' towards the marine protected area held at the Flower Garden Banks National Marine Sanctuary in the USA. Divers were aged 18 to 65 years old, of which 70% were male and 30% female (Belknap, 2008), and as new tourism destinations opened up, offering more adventurous and exotic activities, greater numbers of women started to go scuba diving and according to Musa, Kadir, and Lee (2006) were 'balancing the scale' as already 53.1% of divers in Layang Layang, Malaysia were women.

Zhong, Deng, and Song (2011) described direct relations between tourism activity, local society and the use of natural resources, pointing out both positive and negative aspects of progress. Since 1978, when China opened its borders for tourism development, tourism has grown substantially but has caused considerable environmental problems. Considerable impacts occurred in the biophysical environment, affecting the water quality grade by increasing the volume of wastewater and garbage produced.

Authors like Lee and Moscardo (2005), Tisdell and Wilson (2005), Ballantyne, Packer, and Hughes (2007), Ballantyne and Packer (2009) confirmed both positive short and long-term impacts on visitors' environmental learning tourism experience. Furthermore, it can also have positive impacts on the environment itself; however, there is also the potential for a negative effect on the species and ecosystems. Borrie and Roggenbuck (2001) found that prolonged interaction with wildness tend to attach people to the environment; Vaske and Kobrin (2001) studied the relationship between place attachment and place identity with general environmental behaviors. Place

identity mediates relations between place dependence and general self-reported pro-environment behavior. Moreover, Fishbein and Ajzen (1975) and Kraus (1995) stated that behavioral intentions were proven to be indicators of future behavior. To target environmental behavior (Stern, Dietz, & Abel, 1999; Vaske & Donnelly, 1999; Vaske & Kobrin, 2001), there are programs for environmental education for adults, which are largely under-researched and under-theorized (Dillon, as cited in Walter, 2009). "Learning grounds such museums, science centers, zoos, botanical gardens, visitor centers and nature activities are the most usual sites outside school" (Falk, 2005, p. 2).

This paper aims to study behaviors noted for scuba divers in regards to environmental practices in the household by targeting plastic and food discards. The fact of spending time submersed in water exploring the beauty of the subaquatic world and observing how fragile the environment is, raises some questions about divers' commitment to reducing their ecological impact. People go scuba diving to benefit from close encounters with marine life, but are there any differences between certified and non-certified divers regarding plastic and food waste disposal?

The approach used by Bortoleto, Kurisu, and Hanaki (2012) to study waste prevention behavior to understand and assist "more-effective policies for reducing the amount of waste that is generated" (p.2195) explains the second objective of this paper which is focused on the need to be aware of which of the variables used in the proposed model are important to predict pro-environmental behavior for reducing the use of plastic and food waste.

2. Modeling divers' pro-environmental behavior based on Ajzen's theory of planned behaviour (TPB)

Schwab, Harton, and Cullum (2014) used the theory of reasoned action (TRA) from Ajzen and Fishbein (1980) to study attitudes and perceptions for recycling in four residence halls at the University of Northern Iowa during different periods of a semester. Attitudes and fellow group member behavior are best predictors for recycling, and subjective norms, predicted behavior, and contestant do not contribute for similar fellow friends' attitudes and behavior over time, moreover, subjective norms did not show to be relevant for his study. When compared average American and African households, Diamond (2005) pointed differences in Africa as 32 times smaller regarding consumption of goods and waste disposal. Patterns are directly related to long-term impacts on the environment and as per Mckinney, Schoch, and Yoanvjak (2007), recycling practices could reduce Americans' impact, having 'attitude' as good predictive variable when targeting recycling behavior (Schwab et al., 2014).

The use of technology for waste management benefits civilization and is aimed at providing healthier conditions in the local living geographic area; however, the capacity to respond to such impact sometimes is not achieved by the natural surroundings. Daily waste production demands a convenient mode of regulation and active participation from the population (Bortoleto, Kurisu, & Hanaki, 2012), and studying the reasons why citizens participate (or not) in such practices for waste management (for example, waste prevention, garbage separation, recycling, littering, etc.) has led scientists to use theoretical models for understanding such behavior. Waste management requires regular disposal practices which can be affected by external factors like outside temperature (Olsen, 1981) and residence characteristics (Oskamp, Harrington, & Edwards, 1991) besides can be also conditioned by environmental policies to facilitate reducing waste by imposing a fee for waste disposal (Kaiser, Wolfing, & Fuhrer, 1999).

From the social point of view, Fishbein and Ajzen (1975, 1980) proposed the TRA, which measures the relationship between behavioral intention and attitude regarding certain behavior and subjective norms to which people are conditioned. To the original TRA is added the variable perceived behavior control (PBC) as a reflection of "two factors: a) the individual conditions can affect an individual to adopt certain behavior, and b) the individual's perceived ability to adopt a particular behavior" (Bortoleto et al., 2012, p. 2195). The new and updated theory is called the theory of planned behavior (TPB).

Fishbein and Ajzen (1975) found a great number of definitions for attitude, for example, they mentioned Campbell (1963) and Greenwald (1968), who picked up the particular measurement of most interest for their research, having to try new definitions for attitude. Judgments for attitude were recorded and measured with scales; such an approach was included in statements asking people to measure attitude and behaviors. La Pierre (as cited in Fishbein & Ajzen, 1975) used letters when asking restaurant managers about their behavior regarding accepting Chinese customers in their restaurant. A different approach was taken by Ostrom (as cited in Fishbein & Ajzen, 1975) who used a 9-point scale to measure three aspects of attitude on religious feelings and beliefs. Festinger and Carlsmith (as cited in Fishbein & Ajzen, 1975) used an 11-point scale, ranging from 'extremely interesting and enjoyable to extremely dull and boring', to rate boring tasks. Fishbein and Ajzen (1975) observed differing attitudes when different measures of 'attitude' were employed.

Not all predictors of the TPB are actually important to provide significant statistics (Carrus, Passafaro, & Bonnes, 2008), and the attempt to improve prediction makes researchers associate contextual variables to understand environmental behavior, recognizing for example that convenient location for recycling curbs is important for prediction of good environmental practices. Schwab, Harton, and Cullum (2014) has pointed social norms related with pro-environmental behavior, although more research should be conducted to support understanding the ability to influence on waste prevention behavior (Bortoleto et al., 2012). Hence, the Figure 1 gives the proposed model to study pro-environmental behavior in the divers' household, with 'subjective norms' excluded from the Fishbein's TPB original model, but with scuba diving as variable to distinguish from divers and non-divers, demographic inputs and environmental awareness associated to this form of tourism based activity.

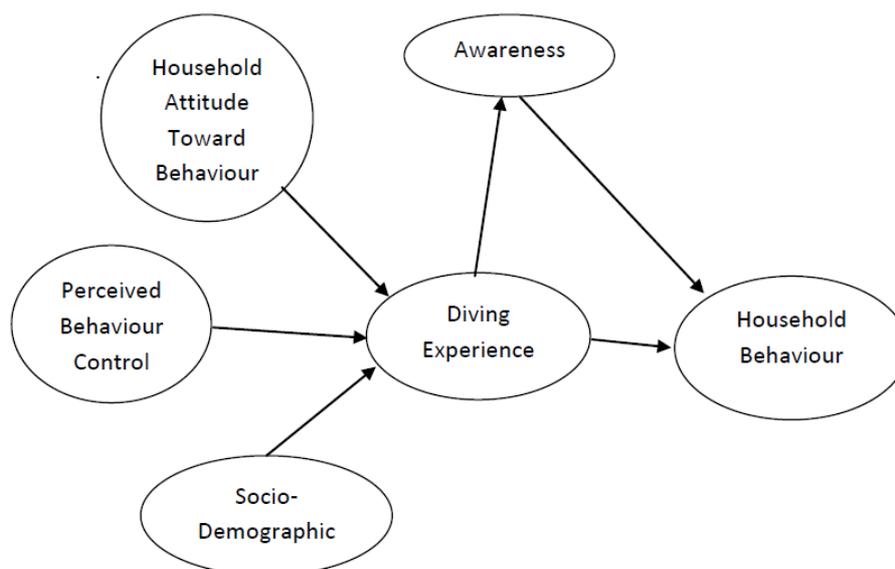


Figure 1. Model to study environmental behavior change in the diver's household

2.1 Diver's awareness (AWARE)

The variable represents quite a lot of predictions, taking into account that the majority of divers can be well educated, ranging from school diploma to university studies (Belknap, 2008; Ong & Musa, 2011), and having the possibility of being familiar with geography and courses related to general environment. The model includes 'awareness for all' as a required condition to reinforce education, and also because every diving instructor delivers training in different ways to focus pollution and impacts to the ecosystem. Having knowledge about the environment can produce social interactions, although the precondition is not constant and results in a multi-stage relationship between environmental attitude and ecological behavior (Kaiser, Wolfing, & Fuhrer, 1999).

2.2 Diver's household attitude towards the behavior (HATB)

Attitude is commonly accepted as a variable to explain or influence behavior; however, it cannot be measured directly. For example, Sarnoff (1960) defined attitude as “a disposition to react favorably or unfavorably to a class of objects. In addition, Chave (1928) provided a detailed description of the factors that influence a person's predisposition: A attitude is a complex of feeling, desires, fears, convictions, prejudices, or other tendencies that have given a set or readiness to act to a person because of varied experiences” (Fishbein & Ajzen, 1975, p. 9).

Whereas attitude reflex divers opinion, either favorable or unfavorable about plastic and food discards, beliefs will represent specific information about the same plastic and food discards. Beliefs link objects to attributes (Kaiser et al., 1999), imagine, the belief of 'using a shopping list' (the object) to 'reduce food waste' (the attribute) or 'not consuming plastic' (the object) to reduce plastic in the household (the attribute). Beliefs about an object sustain specific attitudes toward the same object; adopting good practices for household waste management might be triggered by the belief that doing so makes a positive contribution to the environment. Such an attitude carries the intention to carry out good practices in the household in regard to the environment (Schwab et al., 2014); in this manner environment-related behavior is noted and also leads to new beliefs about the environment.

The variable HATB measures the degree of commitment to which performance of good practices (Mohammad Ali & Samane, 2014) for waste management in the household is positively or negatively valued (López-Mosquera & Sánchez, 2012). The attitude toward behavior is ruled by the person's evaluation of the consequence of his behavior and how using 'the object' influences his decision to behave.

2.3 Diver's perceived behavior control (PBC)

People perceiving the ability to perform a given behavior and are in control and respond to the new variable perceived behavior control, individuals must be free to decide whether or when to perform a certain behavior. Ajzen's (1991) new theory adds the novelty of achieving behavior through motivation and ability to perform (intention + behavior control), PBC defines confidence and intention to perform a task, the aim of achieving success. A person can sense the difficulty level of the task and when they are committed to completing it, success is achieved through gaining control of the various factors.

Bortoleto et al. (2012) merged the Schwartz's altruistic behavior model and the theory of planned behavior for waste prevention, indicating that “personal norms and perceived behavior control are the main predictors and that, unlike the case of recycling, subjective norms have a weak influence on waste prevention behavior; waste prevention behavior is likely to be influenced by concern for the environment and the community, as well by perception of moral obligation and inconvenience” (Bortoleto et al., 2012, p. 2195). The results from Bortoleto's research demonstrated the effectiveness and good reliability of the TPB for modelling participation in waste prevention. Five questions were included in the model from Bortoleto's model, which describe attitude towards behavior, and one for perceived behavior control.

2.4 Diver's socio-demographic (DEMO)

Socio-demographic descriptions are required for profiling and represent the sample in the field (López-Mosquera & Sánchez, 2012). Differences between divers and non-divers required a registry of gender, age, education level, and if divers tend to live in coastal or inland areas, all in respect to rural area, urban area, city or highly populated city. Also motivation (Sauer & Fischer, 2010) for their trip to the tourist location and annual household income in USD provide differences for analysis of the socio-demographic profile required for the study (Spash, 2006).

2.5 Diver's household behaviour (BEH)

The behavior of using good practices is a function of suitable and consistent intentions, and also personal perception and ability to perform such practices (Ajzen, 1991). Strong and favorable intentions produce behavior only when perceived behavior control is also strong. Real behavior carries details obtained from variables such as verbal responses or questionnaires, providing observations of the subject. Positive responses will lead to positive behaviors in the household, variable to predict environmental behavior (Kaiser et al., 1999).

3. Materials and Methods

The representative study was based on the Organization for Economic Co-operation and Development's (OECD) last available report. In 2010 the US was cited as the country creating the most municipal solid waste with an annual average of 720 kg per capita (OECD, 2013), and in 2011 the most discarded materials after recycling were food waste and plastic (EPA, 2011). Therefore, the measurement was directed to the U.S. divers visiting a popular diving destination, and observations are related with the use of plastic and food discards in the household. The country was chosen to be Mexico which through the cross-border movement in Mexico, in 2012 could be counted 5,941,914 US citizens visited the country, representing the first nation to visit Mexico (SIOM, 2013), and fieldwork took place on Cozumel Island.

The study compared student divers who have not been exposed to scuba diving before, and also certified divers with particular attention to those taking a course of further education on diving. With student divers, there is the chance they will exhibit similar attributes to certified divers, but will always lack the diving experience and water as stimulus for behavioral change.

3.1 Instrument

A questionnaire was developed to study behaviors regarding plastic and food discards in the divers' household using a set of questions for providing input for each variable in the study taken from several scientific documents (see: Kaiser et al., 2003, pp. 15, 16; Bortoleto et al., 2012, pp. 2198, 2199; Rodríguez-Barreiro et al., 2012, p. 8; Gunders, 2012; Miao & Wei, 2013, p. 106), and which reported studies on ecological behaviours, waste prevention, environmental impacts and pro-environmental behavior (See Table 1). For food-discard-related questions, Gunders's (2012) report proved to be a great reference for searching relevant items, and was used previously by scientists. Kaiser et al. (2003) referred to the vital need for studying pollution levels, and the need to save energy and resources, despite the fact that environmental psychologists had conducted little research on it. This paper contributed with important questions to add to the measurement tool, describing household attitude toward behavior and environmental awareness. Bortoleto et al. (2012) developed a model for household waste prevention, which is suitable for use as a tool for governance and assists in understanding how to reduce waste.

The statements measuring AWARE, HATB, and PBC, are directly related with plastic use and food waste production in the household, being DIVE and DEMO used for correlations with diving experience and potential influence for behavioral change, and socio-demographic aspects. Variables to measure AWARE, DIVE, PBC and DEMO used closed-end and dichotomous questions, but HATB statements use a Likert-type scale (0 – *I don't know*; 1 – *I never do it*; 2 – *I do it sometimes*; 3- *I do it often*; 4 – *I do it always*), arranged from the less favorable to the more favorable answer within a certain rank, and unfavorable answers always tend to occupy the lower rank (Gliem & Gliem, 2003). The developed tool was designed for reaching distinct groups of divers:

- Certified divers looking for a diving holiday;
- Divers with previous certification, but engaging in further diving education;
- Participants taking a scuba diving course;

- Non-certified divers participating in a 'one-day experience' with a diving instructor, which could be a try dive, discover scuba dive or resort dive.

Table 1

List of statements used to predict divers' household pro-environmental behaviour.

Input - Measurement statement	Variable
I am a member of an environmental organization.	AWARE
I talk with friends about problems related to the environment.	AWARE
Did you ever try scuba diving, before?	DIVE
What diving courses are you taking?	DIVE
What is your certification level?	DIVE
In total, how many dives do you have?	DIVE
Since you have started diving, did you change your behavior towards the environment, in your house?	DIVE
I buy things that are produced with as little packaging as possible.	HATB
I use my own bag when going shopping, rather than one provided by the shop.	HATB
I buy fruit and vegetables without package.	HATB
I compost my kitchen waste.	HATB
When shopping, I assess the type of packaging and choose one that is recyclable.	HATB
I purchase organic food.	HATB
I purchase bio-degradable products.	HATB
I look for ways to reuse things.	HATB
I recycle recyclable materials like newspapers, cans or bottles.	HATB
For shopping, I prefer paper bags to plastic ones.	HATB
I buy seasonal produce.	HATB
Control question	
Looking for recyclable products has become part of my routine.	PBC
In which part of the country do you live?	DEMO
How would you describe where you live?	DEMO
What is the motivation of your trip?	DEMO
Please write your age:	DEMO
Gender:	DEMO
Please indicate your education level:	DEMO
What is your annual household income, in USD:	DEMO

Source: Adapted from Kaiser et al., 2003; Bortoleto et al., 2012; Rodríguez-Barreiro et al., 2012; Miao & Wei, 2013

The type of variables selected for cluster analysis has a direct influence on the segment target when identified by means, and specific inferred variables tend to form a more homogeneous cluster (Wedel & Kamakura, 2000), although variables that are easy to measure need to be assisted with segments to make divers' behavior easy to measure. Having certain socio-demographic profile does not necessarily match with divers behaving more, or less, in favor of reducing debris. Combining different variables (demographic with attitude toward the behavior; diver certification with attitude toward the behavior; or number of dives with divers' household attitude toward the behavior) gives strength to the model.

3.2 Procedure

Prior to the survey, a pilot test was conducted with 16 certified divers and 8 students to make sure the survey was easy to understand highlight arising problems and eventually modify questions. The measurement tool uses numeric variables for registering typical information from quantitative variables, which measure quantitative values, and also, there can be categorical variables describing certain characteristics like 'What is your certification level?' or 'In which part of the country do you live?' representing a non-numeric number, but a characteristic of a data unit.

From a list of 56 diving schools, data collection took place during 66 days with divers using the services of only 9 professional training schools on the island of Cozumel, Mexico. All schools were invited to participate in the study, but and in many cases, diving operators were not interested in participating in the study, or by company rules, private data such Email addresses, name, or postcode could not be recorded for the study. From the 5th of February until the 7th of April, 2013, the total of 181 surveys were administered to U.S. divers with the minimum of 18 years old as target group, the sample guarantees a statistic with 95% confidence, with 10% sampling error associated from an unknown population size (Bhattacharjee, 2012). Valledor and Carreira (2000) accept such error, fitting the distribution of the population sampled for certified divers and students (non-divers participating in try dives or taking most of the certification courses); both were assessed regarding the variables of the model illustrated in Figure 1.

The set of variables representing AWARE, DIVE, HATB, PBC, and DEMO were entered into IBM SPSS statistic 20 and performed the two-step cluster analysis using the variable statements listed in Table 1, for observing clusters and how they can be related to each other for better prediction of pro-environmental behavior in the divers' household. To quantify the standardized distance between a participant's data points and the parameter 'mean' (Baraldi & Enders, 2010), the log-likelihood method was used as a distance measure, and the Schwarz's Bayesian Criterion (BIC) was selected for forming clusters. Furthermore, setting the algorithm to handle 25% noise reduced possible outliers.

The number of clusters to be determined automatically was set at a maximum of 4, aside from the combination chosen for field evaluation using the variables '*What diving courses are you taking*' and '*What is your certification level*'. These variables were not used to form clusters, but the software rated the clusters regarding the evaluation fields.

Being a combination of hierarchical and non-hierarchical methods, the two-step cluster method (Chiu, Fang, & Chen, 2001) allows the use of different types of variables introduced for clustering, as continuous and discrete variables do not require to be represented on a specific type of scale. Scales were analyzed with their original value without conversion for fitting in the model.

4. Results

The study of the variable HATB used a Likert-type scale, which was tested for Cronbach's alpha and its internal consistency. In the sample measured for all U.S. divers (n=181) the reliability for the 11 statements representing variable HATB listed in Table 1 was 0.783, suggesting that the statements and respective Likert-type scale are acceptable for measuring the divers' household attitudes toward behavior.

Sampling U.S divers on Cozumel Island was done by the researcher and the use of 6 drop-boxes placed in the diving schools. From 236 questionnaires, 181 were selected based on the target nationality for the study registering 61.33% of male and 38.67% female divers, all aged 18 to more than 50 years old and with 47.51% motivated to scuba dive. 67.96% of divers have recorded their annual household income of more than 45.000 USD and more than 78% have university studies. Apart from the 5.52% of divers living in highly populated cities, the population in study was well almost evenly distributed among rural, urban and city, but 77.90% living on inland areas.

The set of variables representing AWARE, DIVE, HATB, PBC, and DEMO were modelled and created the group A; AWARE, DIVE, and HATB created group B; and AWARE, HATB, and DEMO created group C. Table 2 illustrates the model summary for suitable clusters formed by using the combination of 3 different variables, reaching goodness-of-fit of 0.60-0.90 for group A. The only suitable goodness-of-fit for group B was 0.60, and with 2 sets of variables group C reached 0.40 as fair value. Overall, the smallest cluster has 31 members and the largest 77, with ratio sizes varying between 1.03 and 1.48.

The criterion for finding dissimilarities between variables which form clusters was provided by Mooi and

Sarstedt (2011), who recommended using correlations below 0.90 for predicting the importance of the cluster. Furthermore, the rule of thumb set the cluster size to at least 30 members, with a ratio between clusters smaller than 3.0. Thus, the set of variables used to define group A created 2 to 4 clusters, as it was pre-set the maximum number of clusters to be formed. Such arrangement required the minimum of 2 and the maximum of 3 clustering variables, with the exception for the set combining the variable AWARE (1.2 - I talk with friends about problems related to the environment) with HATB (4.3 - I buy fruit and vegetables without package), and PBC (5.2 - Looking for recyclable products has become part of my routine). PBC has high predictor importance and makes part of clusters created in the group, thus, also for predicting household behavior. The variable AWARE makes part of 80% of the clusters formed, and HATB 50%.

The study revealed divers as being associated with environmental organizations, identifying the divers' beliefs, and also conferring some awareness. Such memberships are quite variable and not necessarily related to scuba diving organizations, but with activities or preferences relating to the diver's lifestyle. Supporting activities promoted by environmental organizations was expected to be a determinant for forming clusters, but results demonstrated the opposite (see arrangement 1.1+4.5+5.2 in Table 2), with divers clustered in the same group as participants who do not have memberships with environmental organizations.

Table 2

List of clusters formed to predict divers' household pro-environmental behaviour.

Inputs	Group	Clusters #	Clusters Smaller	Ratio	Fitness	Clustering variables	χ^2 / Fisher	
1.1 + 4.5 + 5.2		4	31	1.23	0.9	Good HATB, PBC	0.000	
1.2 + 4.1 + 5.2		4	68	1.10	0.6	Good PBC, AWARE, HATB	0.000	
1.2 + 4.2 + 5.2		2	69	1.14	0.6	Good PBC, AWARE, HATB	0.000	
1.2 + 4.3 + 5.2		2	61	1.16	0.7	Good PBC	0.000	
1.2 + 4.4 + 5.2	A	2	75	1.09	0.6	Good PBC, AWARE	0.000	
1.2 + 4.5 + 5.2		2	64	1.19	0.6	Good PBC, HATB, AWARE	0.000	
1.2 + 4.6 + 5.2		2	73	1.04	0.6	Good PBC, AWARE, HATB	0.000	
1.2 + 4.8 + 5.2		2	77	1.03	0.6	Good PBC, AWARE	0.000	
1.2 + 4.10 + 5.2		2	69	1.06	0.6	Good PBC, AWARE	0.000	
1.2 + 4.11 + 5.2		2	72	1.14	0.6	Good PBC, AWARE	0.000	
1.2 + 3.1 + 4.1		B	2	36	1.03	0.6	Good HATB	0.000
1.2 + 4.2 + 6.1		C	2	58	1.48	0.4	Fair HATB, AWARE	0.000
1.2 + 4.2 + 6.7	D	2	51	1.27	0.4	Fair HATB, AWARE	0.000	

Source: The author.

Group B combines variables for measuring AWARE, DIVE, and HATB, and the only proper arrangement is given by AWARE (1.2 - I talk with friends about problems related to the environment), with DIVE (3.1 – What is your certification level), and HATB (4.1 – I buy things that are produced with as little packaging as possible). Excluding the set listed in Table 2, arrangements involving the variable DIVE have good goodness-of-fit levels but never reaching the minimum of 30 members per cluster, a mandatory requirement for accepting the analysis (Mooi & Sarstedt, 2011). Nevertheless for group B, only HATB has important prediction value for forming clusters.

Based on cluster member size, a similar analysis was obtained for group C in which only 2 arrangements fit the requirements. AWARE, HATB, and DEMO are combined where divers were asked to describe where they live, and to rank their annual household income. For DEMO, the two-step cluster analysis has given low prediction importance, however to HATB and AWARE high importance for forming clusters which can be an indication to prediction for household behavior.

4.1 Validating and interpreting the clusters' solution

Categorical variables required cross-tabulation for validating the solution. Designed for every set of variables, the cluster membership number was created to perform the testing; the Pearson's Chi-square test verified the independence of the variables and dissimilarity of the clusters formed. For executing the test, there was the assumption that:

- (H_0) variables and the clusters formed are not related, where values of the dependent variable (cluster membership number) are not affected at all by the independent variables (AWARE, DIVE, HATB, PBC, and DEMO).

When verifying the independence of the variables with expected frequencies less than 5, the Pearson's Chi-square test (χ^2) is no longer suitable, hence, used the Fisher's Exact Test (F) with the Monte Carlo exact test selected for providing an estimate of the exact p value, and using the random sample of 181 participants with a confidence level of 95%. From the 181 US divers, participating in the study, and despite some variables not being important for forming clusters (see Table 2), both Chi-square and Fisher's exact test reveals statistical significant evidence that the formed clusters are depend on the variables used in the model ($p < 0.05$). By rejecting the null hypothesis, the tests confirm the dependency of the formed clusters where values of the dependent variable (cluster membership number) are affected at all by the independent variables (AWARE, HATB, and PBC).

The stability of the formed clusters was tested by re-testing the same sample, using a different method for measuring the distances between the closest members to form clusters, based on Akaike's Information Criterion (AIC) estimating the optimal number of clusters (Schiopu, 2010; Mooi & Sarstedt, 2011). Equal values were displayed for the number of clusters formed and respective sizes; the ratio between the largest and the smallest cluster is also equal, and when changing the order of the clusters formed, no differences were displayed. The new cluster membership variable was used in the same process, verifying the same solutions for the test of independence of the clusters and variables used.

5. Discussion

Regarding the fact that questionnaires were delivered to divers with minimum of 18 years old, U.S. divers' profile on Cozumel Island match previous studies from Belknap (2008) and other authors, although scuba can be taken by people under 18 years of age and therefore age can be also represented with younger generations. Having a big percentage of divers motivated to scuba dive, associated with wealthy annual household income and university studies, it can be an indicator for expenditure on scuba diving or sustaining jobs related to dive tourism (DEMA, 2012). Divers are curious to visit different diving grounds (Davis et al., 1995; Musa, 2003) and are willing to experience encounters with other species of fish found in specific geographic locations (Vianna et al., 2010; Graham, 2004).

The set of variables presented in the model has generated important clusters; featuring distinctions among the groups with different arrangements useful to relate to reducing plastic use and food waste (see Table 2). The goodness-of-fit of the clusters was always good, but when using demographic variables, it decreased to a fair level, which was still acceptable. Environmental awareness was demonstrated to be very important by always registering a high value for prediction importance (see Borrie & Roggenbuck, 2001; Vaske & Kobrin, 2001; Lee & Moscardo, 2005; Tisdell & Wilson, 2005; Ballantyne et al., 2007; Ballantyne & Packer, 2009), and therefore

sustaining the theory that education can contribute to environmental awareness and reduction of plastic and food discards in the household. Talking to friends about problems related to the environment has revealed good value to be included in reliable clusters with good level of fitness, although the expected relevance given from a membership of an environmental organization has created only one reliable cluster. The association has good fit when clustered with HATB and PCB, but not with DIVE, an indication of similar behavior (BEH) between divers and non-divers. The variable AWARE was combined with all the different variables in the model, and formed clusters with good level of fitness, except when combined with variables for DIVE.

Scuba diving has taken a central position for mediating important variables such as HATB, DEMO and PBC for environmental awareness and possible behavioral change, although it led to small cluster sizes with fewer than 30 members, which is not suitable for forming solid clusters. The level of fitness was always good, but probably due to the type of inputs only one arrangement of variables was revealed. Moreover, dissimilarity between clusters is statistically significant, with clusters depending on the variable set, but not sufficiently to affirm that DIVE itself, represents a very important level for environmental behavior. The use of socio-demographic variables (López-Mosquera & Sánchez, 2012) listed in Table 1, such as country location where divers are living (DEMA, 2012), and annual household income were also revealed to be an important predictor to form clusters, in particular when combined with attitudes and awareness.

5.1 Implications

This research was an attempt to interpret a possible relationship between diving activity and the behavior performed in the household, has demonstrated as relevant for profiling the diving community. Furthermore, it can offer a different approach for understanding how divers tend to act when living in their comfort zone (Schwab et al., 2014), and if being exposed with certain frequency to the natural environment actually makes them reduce their waste production in regards plastic and food discards. Divers and non-divers were profiled to test differences between groups regarding environmental practices to minimize plastic and food discards in the household.

By introducing a new variable (Carrus et al., 2008) such DIVE where divers were registered sometimes with a large amount of dives and different levels in scuba, does not provide enough significance to create clusters capable to be used to sustain of good pro-environmental behavior. Thus, in responding to the first objective of this paper, there are no significant differences between both groups behavior, the deviation between divers and non-divers is minimal. However, DIVE has demonstrated its potential for being an important nature-based activity fostering environmental education and awareness which can lead to important clusters always related with perception of relevant behavior. Prolonged interaction with wildness tend to attach people to the environment (Borrie & Roggenbuck, 2001), in which divers increase their awareness by being exposed to the open water environment, thus, making them prone to develop positive behaviors towards good environmental practices.

Scuba diving activity is a constant learning process providing knowledge about underwater world and potential human impacts on the environment, but makes no difference in between the groups studied, although is a facilitator directly related with variables for good prediction for waste management practices in the household. Comparable impacts were already confirmed by Lee and Moscardo (2005), Ballantyne et al. (2007), Ballantyne and Packer (2009) when studying visitors' environmental learning process noticed on short- and long-term after nature based tourism activities.

The TPB (Ajzen 1991) forms the base for the proposed model, studying behaviors in the household where attitudes toward the behavior, perceived behavior control (Kaiser et al., 2003, Bortoleto e al., 2012, Miao & Wei, 2013, Rodríguez-Barreiro et al., 2013), and environmental awareness can be considered as important for environmental practices. In the same way Bortoleto et al. (2012) pointed attitudinal aspects related with waste prevention, and AWARE, HATB and PBC respond the second objective, being predominantly present in the

clusters formed and formed arrangements with high importance for household waste reduction, in particular regarding the use of plastic and food waste production. The more an attitude toward behavior scores a higher rating on a positive scale, the more likely it can be used as predictor (Kaiser et al., 1999) for reducing plastic and food waste.

5.2 Limitations and further research

The tool was designed to be short and effective, but a longer set of questions could be used for giving more power to the instrument, registering behavior and attitudes in other situations related to plastic and food discards. Increasing the set of questions for each variable automatically increases the time needed for registering observations, thus it is recommended to review the sampling procedure for reducing the number of surveys with missing information. The use of the minimal number of participants can be associated with the size of the clusters, and as a consequence in some cases it was decisive for rejection; thus it is recommended to use a bigger sample with more than 600 participants, combining procedures for more effective data handling of smaller sample sizes, and playing different types of variables (Zhang, Ramakrishnon, & Livny, 1996). Also the use of different methods for cluster analysis can be used for comparison and commenting on possible differences between them.

5.3 Contributions

The present conclusion is a contribute to studies focus on social behavior (Ajzen & Fishbein, 1980; Kaiser et al., 2003; Bortoleto et al., 2012; Rodríguez-Barreiro et al., 2012; Miao & Wei, 2013) to understand what variables have greater importance for solid waste prevention (Bortoleto et al., 2012), in particular plastic and food discards (EPA, 2011; OECD, 2013). Environmental awareness has revealed to be strongly related to divers' attitude when targeting environmental behavior for plastic consumption, which is also an evidence that divers' psychological aspects and personal decisions (Mohammad Ali & Samane, 2014) characterize their perceive behaviour control and the ability to contribute to reduce plastic waste and food discards. The group-focus are scuba divers, avid nature-based tourism activities consumers, therefore the study gives additional indication of divers preferences regarding consumption of 'plastic'. Even not being statistical significant, divers have shown higher positive behavior towards the environment in comparison to non-divers, thus tourism destination management can take in consideration the cluster variables presented for better decision- and policy-making process in regards environmental impacts from the activity.

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