



# Determinants of consumers' response to eco-labelled seafoods: The interaction between altruism, awareness and information demand

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## ABSTRACT

Eco-labels are one of the most effective tools of environmental information policy. Several studies have been carried out in order to explore the determinants of consumers' seafood eco-labels choice emphasizing that awareness, altruism and information demand play a key role. However, it is unclear whether these three aspects are independent of each other or have important interrelationships that deserve to be studied. To fill this gap, this study aims to explore the interaction between altruism, awareness, information demand and seafoods eco-label choice in three Mediterranean countries (Greece, Italy and Spain). Partial Least Squares Structural Equation Modelling has been used in order to identify the key determinants and the relationship between selected variable, while we used PLS multigroup analysis (PLS-MGA) to perform a cross-country analysis. The results, based on 781 respondents, found that altruism is the key factor that leads consumers to choose eco-labelled seafood acts as a significant mediator between awareness and information demand and the choice of eco-labelled seafood products. This conclusion highlights the need to spread altruistic values among consumers by encouraging pro-social and pro-environmental behaviours, reducing inhibiting factors such as pluralistic ignorance, and then increasing consumer knowledge, skills and confidence.

## 1. Introduction

### 1.1. Research background

For the past several years, sustainability has become a priority for many economic sectors, including the fishing industry—probably the most complex of the agro-food sectors because of its inherent interplay between human and natural resources (Charles, 1994, p. 201). In this sector, the increasing attention towards sustainability since the beginning of the 1990s has grown in relation to the methods of capture and the level of exploitation of fish stocks (Giacomarra et al., 2021; FAO, 2020; Froese et al., 2018). It is now known that industrial fishing has negatively impacted fish stocks, reducing fish populations and degrading marine ecosystems. As a consequence, several measures have been adopted, including the introduction of fishing quotas, limitation of fishing zones and periods, development of aquaculture, and increase of checks and penalties (Galati and Crescimanno, 2012). Another approach

that can help reverse this progressive deterioration of marine ecosystems is the promotion of sustainable consumption. In this respect, eco-labels can be seen as a tool for consumers to engage in sustainable consumption by changing their consumption habits (Gardiner and Viswanathan, 2004; Horne, 2009; Tlusty and Thorsen, 2016). More generally, the role of eco-labels is twofold: on the one hand, it requires fishing companies to follow specific standards to reduce environmental pressures, such as regulating methods of capture, monitoring fish stocks, and promoting sustainable management (Kaiser and Edwards-Jones, 2005). On the other hand, they have an important informative function: providing simple and accessible information on the environmental and sustainability attributes of production processes that consumers desire but cannot easily detect (Yokessa and Marette, 2019; Leire and Thidell, 2005; Piotrowski and Kratz, 2017; Roheim, 2003). The essential function of eco-labels is indeed to create greater environmental awareness among consumers about the role that ecologically-conscious companies can have in the achievement of environmental objectives (D'Souza et al.,

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2021; Brécard et al., 2012; D'Amico et al., 2016; Zhou et al., 2017), in this way promoting more responsible behaviours. People who are well-informed about the attributes of green products might be more inclined to choose them (Daugbjerg et al., 2014).

Eco-labelling has traditionally concerned agricultural and aquaculture products, but wild-caught seafood has been gaining popularity in recent years (Taufique et al., 2019; Davidson et al., 2012; Thrane et al., 2009). According to Eco-label Index, approximately 456 eco-labels have been issued for different products globally—in 199 countries and 25 sectors, including the fishery industry with nearly 50 different eco-label schemes. Some of the most well-known third-party certifications in fisheries include the Marine Stewardship Council (MSC), Friends of the Sea (FOS), Dolphin-Safe and Salmon-Safe, to name a few. These voluntary standards cover a range of environmental aspects, including 'single attribute' labels, such as dolphin-safe tuna labels, while 'multi attribute' labels address environmental factors at multiple stages of a product's life cycle from sea to table.

### 1.2. Research gap, aim of the study and contribution

Several studies have been carried out in order to explore the influence of seafood eco-labels on consumers' purchasing habits and on the main factors affecting the decision to buy and pay a premium price for eco-labelled seafood products (Brécard et al., 2012; D'Amico et al., 2016; Verbeke, 2008). However, this is not a simple matter. There are demographic and socio-cultural aspects that have been emphasised (i.e. age, gender, education and income levels), although there are other subjective aspects that are not so easy to determine, but which nevertheless produce very interesting results. Specifically, here we will focus on three of the most cited in the existing literature: levels of awareness, altruism and information demand. Results have shown a positive consumer interest in eco-labelled fishery products especially after receiving information on the meaning of these standards (Bronnmann and Hoffmann, 2018; Blomquist et al., 2015; Galati et al., 2021). Indeed, as several authors assert, the greater consumers' awareness of fish resources overexploitation, the greater the interest and willingness to pay for sustainable seafood products (Jonell et al., 2016; Uchida et al., 2014; Onozaka et al., 2010). In other words, the environmental cultural background contributes to reinforcing consumers' awareness of the sustainability aspects of the fishery industry. The lack of consumer understanding of eco-labels is often caused by poor attitudes or a lack of interest in getting informed, which suggests the need for further consumer information campaigns (García-Herrero et al., 2019). Few studies, on the other hand, have investigated the influence that altruistic values have in explaining the pro-environmental attitude and behaviour of consumers of seafood products revealing mixed results depending on the studied product, ecolabel scheme and demographics features (Fuller et al., 2022; Yadav, 2016). Empirical evidence shows that individuals guided by altruistic values are more concerned about environmental issues and more likely to adopt responsible behaviours (Aruga and Wakamatsu, 2018; Vicente-Molina et al., 2013). Altruistic values reflect individuals' concerns about social and environmental issues and their decision to support, even though their purchase decisions, environmental and social initiatives without expecting any personal benefit (Fuller et al., 2022). Some studies attempted to identify the influence of altruistic values on the choice of certified products, as organic products (Fuller et al., 2022; Nguyen et al., 2017; Yadav, 2016; Lusk et al., 2007) while few studies explored their role on the choice of seafood eco labelled selection. A recent study by Galati et al. (2021) showed that Spanish and Italian consumers with stronger altruistic attitudes appeared more likely to prefer eco-labelled seafood products. The third aspect to consider is the demand for information. Although in most markets progress has been made on the mandatory information that labels must carry, there is a growing number of consumers who demand additional information on the environmental, social and ethical implications of their purchases (Del Giudice et al., 2018; Peiró-Signes et al.,

2022). These three aspects (information demand, awareness and altruism) seem to play a key role in consumers' intention to choose eco-labelled seafoods that have been studied separately in several papers. However, little is known and it is unclear whether these three sources are independent of each other or have important interrelationships that deserve to be studied.

In light of the above discussion, the aim of this study is to explore the interaction between altruism, awareness, information demand and eco-label choice and their effect on the choice of fish products with sustainability certifications. In the following section, a total of six hypotheses based on the literature have been established and subsequently studied using Partial Least Squares Structural Equation Modelling (PLS-SEM). Additionally, we used PLS multigroup analysis (PLS-MGA) to perform a cross-country analysis on our sample from three different EU Mediterranean countries: Spain, Italy and Greece. These three Mediterranean countries were selected due to their representativeness in terms of catches, accounting for 61% of the total catches in the Mediterranean and Black Sea by EU countries (Eurostat, 2022). Similarly, we also studied the moderating effect of sex, age, and educational and income levels on the model relationships and on the actual values of the variables of interest.

Taking into account the international recognition of certification schemes in the fishing sector, it is highly important to acquire information on the main determinants affecting consumer preferences for certified fish products in different countries. This knowledge will improve the quality of information that should appear on products and communicated to consumers and define effective communication strategies capable of making consumers increasingly aware of sustainable fishery approaches and guide them towards responsible consumption choices.

## 2. Literature review

Modern consumers are increasingly interested in finding out how to identify sustainable products. In this respect, eco-labels are one of the most effective tools of environmental information policy (Taufique et al., 2017). The growing interest of consumers in eco-labels—as tools able to offer greater guarantees in terms of quality and sustainability of products and processes—has fuelled the interest of academics who have tried to explain the relationship between seafood eco-labels and consumer habits. In light of this, a number of theoretical frameworks have been developed to identify internal (such as awareness and attitudes) and external (such as price) drivers affecting the choice and consumption of eco-labelled seafood products (Jonell et al., 2016).

### 2.1. Consumers' environmental consciousness

Several studies have emphasised that eco-labels play a significant role in raising awareness of sustainable fisheries (Giacomarra et al., 2021). For instance, Mulazzani et al. (2021) investigated fish consumers' attitudes towards shark protection and their willingness to pay more for certified small pelagic fishes, and showed that a 'shark-free' label increased consumers' environmental consciousness. Consistent with this, Jonell and co-authors (2016) and Onozaka and colleagues (2010) found that consumers' awareness of incorrect fishing catching practices and overexploitation played a crucial role in influencing sustainable buying decisions. Specifically, the effect of consumers' awareness on the fish eco-label choice was to reduce their likelihood of purchasing wild freshwater fish in order to protect the environment and fishery resources (Chen and Wang, 2021). Therefore, consumers that are aware and accept eco-labels, understand the underlying environmental issues behind these labels, choose and are willing to pay a premium price for eco-labelled seafoods (Winson et al., 2021; Vitale et al., 2017; Uchida et al., 2013).

In light of the above framework, the first hypothesis is established:

**H1.** Awareness positively impacts eco-label choice.

## 2.2. Consumers' awareness as antecedent of altruistic values

Environmental concern is an important driver of sustainable behaviour and can be distinguished from altruistic motivations (De Dominicis et al., 2017). A Steg et al. (2014) study found that relevant values were crucial to activating the personal norms and feelings associated with environmental responsibility. A person with altruistic tendencies acts on behalf of others without expecting anything in return. Altruistic consumers are more concerned about the ecological benefits of their behaviour than they are about the consequences for their own well-being (Steg et al., 2014). When consumers are aware of problems, altruistic values can also influence their personal opinions about environmental protection (Gifford and Nilsson, 2014). Panda et al. (2020) developed a model that incorporates environmental sustainability awareness into measuring consumer altruism, buying intention, loyalty and evangelism. Their findings indicate that consumer altruism is positively influenced by sustainability awareness. In the case of seafood eco-labels, altruism is also correlated with physical proximity to marine environments, making people more conscious of maritime environmental degradation (Tulone et al., 2020). Consumers with higher personal standards and awareness have a higher likelihood of developing altruistic behaviour intentions and reducing wild fish purchase intentions or buying certified products (Aruga, 2020; Chen and Chang, 2012; Chen and Wang, 2021). In addition, consumers' awareness of the impact of their consumption choices on the sustainability of fish resources drives a greater need for knowledge: awareness of the meaning of eco-labels for the protection of marine environments led consumers to find credible information about labels or logos (Kumar et al., 2021). In line with this, Uchida et al. (2014) revealed that consumers, after hearing about declining stock levels and more sensationalised information about the environmental impact of the fishing industry, increased their awareness of fish stock levels and were more interested in choosing eco-labelled products.

In the economic literature, little attention has been given to the role of altruism as a factor affecting consumers' attention and information demand regarding seafood eco-labels. Empirical evidence has shown that altruism can change consumer behaviour, such as recycling decisions, contributing significantly to the definition of sustainability-conscious choices (Panda et al., 2020; Czudec, 2022; Gueguen and Stefan, 2016). The success of eco-labelling depends on the number of consumers with altruistic social behaviour (Birch et al., 2018). Previous studies have investigated the influence that consumers' altruistic values have on the adoption of responsible purchasing choices. For example, Fuller et al. (2022) find that consumers are willing to pay a premium price for Fair Trade and organic certified coffee, while Lusk et al. (2007) point out that higher level of altruism in consumers enhance perceived utility for environmental and animal welfare certification programs. However, as Sarti et al. (2018) find, altruism guides both the choice of products that offer public and private benefits, highlighting that altruism does not exist on its own in explaining consumers' intention to buy sustainable products. In the fishery industry, a recent study by Galati et al. (2021) showed a positive relationship between altruism, information demand and preference for eco-labelled fishes. In other words, an altruistic consumer who cares more about sustainable seafood products pays more attention to the eco-labelling information when making a purchase decision and is more likely to accept the eco-labelled product. In other words, altruistic values affect the WTP for eco-labelled products only when it is supported with information (Fuller et al., 2022). In light of this, as Hoque (2021) mentioned, consumers with altruistic values seek out more information about the consumption of farmed fish and fish farming. On the other side, it is also important to note that the consumers' altruism is affected by the information provided by the brand and whether it does deliver on what it promises (Chen and Chang, 2013). Therefore, along with the knowledge of eco-labels, the

motivation of altruistic people to find information about sustainable fish consumption could play an influential role in consumer decision-making (Lawley et al., 2019; Jonell et al., 2016). Although some previous research argued that altruistic values influence the consumer pro-environmental behavior there is little research regarding the influence of altruistic values on consumers' choice of ecolabeled fishery products and on the dependence and relationship between altruism, environmental consciousness and the information demand. Based on the above, this study explores the following hypotheses:

**H2.** Awareness positively impacts altruism;

**H3.** Awareness positively impacts information demand;

**H4.** Altruism positively impacts information demand;

**H5.** Altruism positively impacts eco-label choice.

## 2.3. Environmental information and demand of sustainable products

Several studies on seafood eco-labels have emphasised the importance of information diffusion and absorption (Sigurdsson et al., 2022; Brécard et al., 2009). Signs, symbols, and information on labels are some of the sources of information consumers use to make decisions about sustainable seafood products (Jonell et al., 2016; Gelcich et al., 2014; D'Souza, 2004). Eco-labels are used by governments and businesses to provide information about different quality and sustainability characteristics of fish products and raise awareness among consumers about a given product's higher ecological quality over unlabelled products (Minkov et al., 2018). Indeed, through eco-labels, consumers have the possibility to collect information on the environmental consequences of production and consumption of products that are generally unobservable without a specific signal (Brécard et al., 2009). In light of this, previous studies emphasised that consumers' unfamiliarity with eco-labels entail a low willingness to pay for certified products (Yadav, 2016). Empirical evidences have shown that responsible information behind seafood certification programs about sustainable fishing practices and management would lead to a growing demand for sustainable seafood, especially when this information comes from official sources like government agencies (Masi et al., 2022; Travaille et al., 2019). Consistent with this, Teisl et al. (2008a) showed that dolphin-safe labels affect consumer behaviour and that the market share of canned tuna increased because of dolphin-safe labels. In their research, Natali et al. (2022) showed that consumers tend to favour the most commercialised species, but interest in discarded species increases when consumers receive information about eco-labels and discarding. In other words, products that include eco-labels are a crucial source of knowledge for enhancing consumers' awareness regarding environmental concerns (Hossain et al., 2022; Song et al., 2019).

In light of this, this last hypothesis has been raised:

**H6.** Information Demand positively impacts eco-label choice

## 2.4. Socio-demographic features effect on seafood eco-labelled choice

Even though altruism and awareness explain some aspects of the culture and of consumers' habits, the latter also make decisions based on social, and economic factors. Some studies emphasise that educational level is one of the socio-demographic characteristics most affecting the choice of eco-labelled seafood products. Consumers who are highly educated are more altruistic and inclined to trust eco-labels and buy green items, because they have greater cognitive abilities (Galati et al., 2021; Teisl et al., 2008a,b; Westlake et al., 2019). Age also plays a crucial role in eco-label demand (Chou, 1998), albeit with mixed results. On the one hand, Salladarre et al. (2010) showed that the age of consumers is negatively correlated with demand for certified fishery products, emphasizing that eco-labels have a more positive impact on young consumers, as they are more aware of environmental issues (Mulazzani

et al., 2021; Galati et al., 2021; Lu et al., 2013). In contrast, Xuan (2021) found that older people prefer fish products regardless of certification. Other studies have revealed that gender is a factor affecting consumers' interest in eco-labels. In particular, it has often emerged that women who live alone are well-informed about environmental concerns, have a strong internal need for eco-label choice and are more altruistic relative to men (Vitale et al., 2020; Piper and Schnepf, 2008; Braaas-Garza et al., 2018). Finally, the existence of children influences altruism levels, because parents would like to ensure the welfare of their children (Vyrastekova et al., 2014), in particular among people with European or North American backgrounds (Winson et al., 2021). In light of this, this study explores the moderating effect of sex, age, and educational and income level in the relationships of the model.

Based on the above discussion a theoretical research model is proposed and it is provided in Fig. 1.

### 3. Methodological approach

#### 3.1. Data source

To fulfil the research aim, a questionnaire was developed to collect data for further analysis. All items included in the questionnaire were adapted from mature scales of previous empirical research and modified according to the topic of the study. In detail: altruism items were developed based on Panda et al. (2020); awareness about the wild fish product life cycle related to fish was reformulated according to Kikuchi-Uehara et al. (2016); information demand was measured using the scale adapted from Kikuchi-Uehara et al. (2016). Responses to the questions were recorded by using a five-point Likert scale ranging from 1 ('strongly disagree') to 5 ('strongly agree'). Furthermore, the questionnaire included some questions aimed at understanding consumers' opinions about information displayed on the label and related to health and environmental sustainability, to name a few, adapted from Grunert (2011) and Huang et al. (2015). Finally, socio-demographic characteristics were recorded. A preliminary version of the questionnaire was reviewed and tested by economists and psychologist, to verify the measurement items, and by a small sample of respondents, to verify the understandability, logical consistency and unambiguity of the questions. Some adjustments were made in line with emerging suggestions.

The survey was carried out in three Mediterranean countries (Italy, Spain and Greece) and implemented online via Google Forms, one of the most common online survey platforms used in research, from January 2020 to May 2022. The link to the questionnaire was shared on social networks and different online platforms as well as through personal contacts in academic networks, and was accompanied by a message inviting people to participate in the online survey. The decision to administer the online questionnaire was linked, on the one hand, to the need to respect—in particular in the first period—the social distancing dictated by the COVID-19 pandemic, and, on the other hand, to achieve

a higher number of respondents. In fact, as evidenced by other authors, snowball non-discriminative sampling is widely used in internet searches as it allows researchers to obtain a high number of responses from people who are genuinely interested in the topic and who are often hard to reach (Alaimo et al., 2021; Baltar and Brunet, 2012; Sadler et al., 2010; Waters, 2015), avoiding any bias in the selection of the individuals. Additionally, the sample collection allows a tightly controlled comparisons drawn over a variety of relevant settings, which enhances the scientific goal of this study and makes for a proper generalisation (Rothman, et al., 2013).

In total, 781 respondents filled out the survey, of which 354 lived in Italy, 358 in Spain and 95 in Greece.

Socio-demographic characteristics of the samples are summarised in Table 1.

#### 3.2. Data analysis

We tested the research model by applying Partial Least Squares Path Modelling (PLS-PM) with SmartPLS Software (Ringle et al., 2015). PLS-PM is a variance-based structural equation modelling technique (Henseler et al., 2015; Hair et al., 2014) that is able to evaluate complex models with multiple constructs and multiple causal relations (Hair et al., 2011) and does not require the assumption of normality for the variables.

PLS evaluation of the model consists first of the assessment of the measurement model—that is, the relationships between the items and the constructs (also called dimensions or latent variables). In a second step, once the measurement model is deemed reliable and valid, the structural model—that is, the relations between the constructs—is evaluated.

#### 3.3. Measurement model

Evaluating a reflective measure involves examining its reliability and validity (Henseler et al., 2015). An item's reliability is achieved if its factor loading is greater than 0.7 for its construct. A construct is reliable if its rhoA (Cronbach's alpha or Composite Reliability are alternative measures) is higher than the suggested 0.7 threshold (Dijkstra and Henseler, 2015).

Validity of the measurement model is evaluated in terms of convergent and discriminant validity. Values of average variance extracted (AVE) for a construct over the 0.5 level (Fornell and Larcker, 1981) denote sufficient convergent validity. Finally, for the discriminant validity assessment, we used the heterotrait–monotrait ratio of correlations (HTMT) (Henseler et al., 2015). Values of HTMT below 0.85 (see Table 3) provide evidence that each construct relates more strongly to its own measures than to the rest of the constructs.

#### 3.4. Structural model

Once the measurement model is assessed we can test the hypothesised relationships between the latent variables. The Path coefficients (standardised  $\beta$ ) show the strength of the causal relationships between the constructs that are connected. To assess the structural model, we used a bootstrapping procedure with 5000 resamples (Henseler et al., 2015). The bootstrapping procedure generates standard errors, t-statistics and 95% confidence intervals for the path coefficients (see Table 4) that allow us to evaluate the statistical significance of the hypothesised relationships. Additionally, Table 4 gives information about the  $R^2$  and the  $Q^2$  values obtained from a blindfolding procedure. The coefficient of determination ( $R^2$ ) indicates the variance explained by the model, and indicates the explanatory quality of the model (Chin, 1998), while the  $Q^2$  value indicates the ability of the model to predict the indicators of the endogenous latent variables.

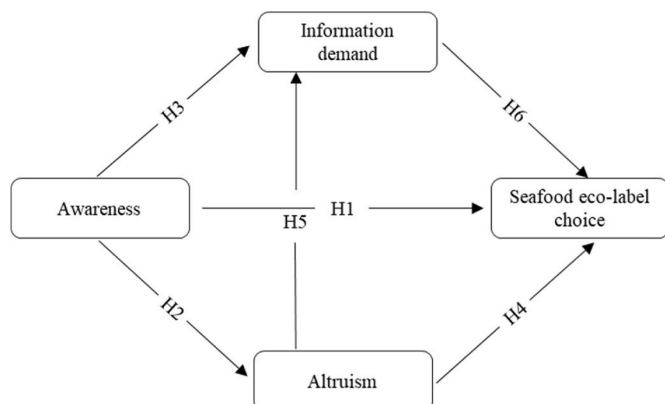


Fig. 1. Theoretical research model.

**Table 1**  
Sociodemographic characteristics.

	Sex		Age			Education level			Income level		
	F	M	<40	40–55	>55	Secondary or less	Post-university diploma	Tertiary education	High	Medium	Low
ES											
N	218	114	89	187	56	86	92	154	93	161	78
%	65.7	34.3	26.8	56.3	16.9	25.9	27.7	46.4	28.0	48.5	23.5
GR											
N	52	43	37	41	17	26	37	32	8	36	51
%	54.7	45.3	38.9	43.2	17.9	27.4	38.9	33.7	8.4	37.9	53.7
IT											
N	183	171	170	148	36	65	126	163	84	158	112
%	51.7	48.3	48.0	41.8	10.2	18.4	35.6	46.0	23.7	44.6	31.6

3.5. Multi-group analysis

In the study, we controlled for possible confounding effects by including relevant socio-economic variables. In other words, we evaluated the moderating effects of these variables in the study. To evaluate the moderation, we tested the differences in the model relationships for the different groups (country, age, sex, income level and educational level) using PLS Multigroup Analysis (PLS-MGA) with a nonparametric confidence set approach (Sarstedt et al., 2011) that overcomes prior methods' deficiencies and allows sample size differences. To avoid Type-II error inflation, 95% bias-corrected and accelerated (Bca) confidence intervals were obtained by means of a bootstrapping procedure. Path coefficients' confidence intervals are compared between groups (pair-wise comparison). We can state that there is a significant difference between the path coefficients if the confidence intervals for the two groups in comparison don't overlap. Table 5 (appendix) summarises the results of the moderating effects of the socio-economic variables.

Note that differences between the path coefficients of each group in Table 5 represent the differences in the size of the impact of the corresponding relationships. Therefore, to evaluate the actual differences in the level of a construct from one group to another we need to conduct a complementary analysis. We used an ANOVA on ranks or Kruskal–Wallis test for each construct in the model to evaluate the differences in the construct values across groups. For interpretation purposes we used the average values of the items in each construct as the dependent variable, because they can be interpreted directly as in the scale in the study.

**Table 2**  
Measurement model indicators.

	Outer loadings	Cronbach's alpha/rho_A/ Composite reliability	Average variance extracted (AVE)
<b>ALTRUISM (Reformulated according to Panda et al., 2020)</b>		0,92/0,921/0,935	0641
I1) I am aware of environmental problems and always try to buy the products for my family's consumption which are not harmful for the environment	0,766		
I2) I am aware of environmental problems and always try to buy the products which is not harmful for the society	0,813		
I3) I believe eco-friendly food help to protect environment and social workers conditions	0,829		
I4) I am conscious about society's problems and changing behavior	0,802		
I5) If needed, I am ready to show my willingness to help others	0,794		
I6) Pollution and overexploitation are always a concern for me	0,830		
I7) I believe in green consumption - save future generations	0,821		
I8) When I consume sustainable products I feel proud	0,749		
<b>AWARENESS ABOUT WILD FISH PRODUCT LIFE CYCLE – related to fish (Reformulated according to Kikuchi-Uehara et al., 2016)</b>		0,776/0,782/0,871	0693
L1) I myself can do efforts to reduce the worldwide overexploitation of fish stocks	0,839		
L2) My buying decision when I purchase a fish has an impact on: the overall marine conservation status, the respect of social standards towards fish employees and the environment protection from pollution	0,884		
L3) The damages on fish stocks caused by the bycatch are related to daily fish demand	0,770		
<b>INFORMATION' DEMAND (Reformulated according to Kikuchi-Uehara et al., 2016)</b>		0,899/0,899/0,937	0832
M1) I would like to know more about the impacts on fish stocks associated with the fish I more frequently eat	0,889		
M2) Information about sustainable seafood should be promoted more actively to consumers	0,937		
M3) More information is needed to take appropriate actions for reducing unsustainable fishing practices	0,911		

Latent variable scores from the PLS analysis, instead, are a normalised measure that has to be interpreted in terms of standard deviations from the average, which complicates the interpretability of the results. We used the Kruskal–Wallis test, which compares medians instead of means, because a pretest indicated some significant nonnormality in the data, which violated the assumption that the data were normally distributed. Additionally, Levene's test indicated that in some cases the standard deviations of the variables within each of the levels of segmentation variables were not the same, as there were statistically significant differences amongst the standard deviations at the 95.0% confidence level. This violated one of the important assumptions underlying analysis of variance (regular ANOVA on the means) and would have invalidated most of the standard statistical tests. The Kruskal–Wallis test tests the null hypothesis that the medians of the construct within each of the levels of the segmentation variable are the same (e.g. to test if the medians of altruism in men and women are the same or significantly differ from each other). The data from all the levels of the segmentation variable (i.e. sex) are first combined and ranked from smallest to largest. That is, the smallest observation is assigned a rank of 1, the second smallest observation a rank of 2, and so on; the average rank is then computed for the data at each level. Additionally, we used pairwise comparisons and Bonferroni procedure to test differences between the average ranks for segmentation variables with more than two groups. Table 6 summarises the results of these tests (appendix).

**Table 3**  
HTMT ratio assessment.

	Altruism	Awareness	Ecolabel's choice	Information demand
Altruism	0,000	0000	0,000	0000
Awareness	0,764	0000	0,000	0000
Ecolabel's choice	0,542	0435	0,000	0000
Information demand	0,696	0590	0,409	0000

**4. Results**

**4.1. Evaluation of measurement model**

The evaluation of the measurement model assesses the relationships between the indicators and constructs. Table 2 shows that all item outer loadings were above 0.7, construct reliability measures were above the suggested threshold of 0.7, AVE values were over 0.5 and HTMT ratios were below 0.85. Thus, all the indicators and constructs satisfied the proposed indicators and the model could be assessed with sufficient confidence.

**4.2. Evaluation of structural model**

Fig. 2 shows the results of the structural model proposed for the total sample. The path coefficients are indicated next to the arrows and, inside the endogenous latent variables, the R<sup>2</sup> for the corresponding regression.

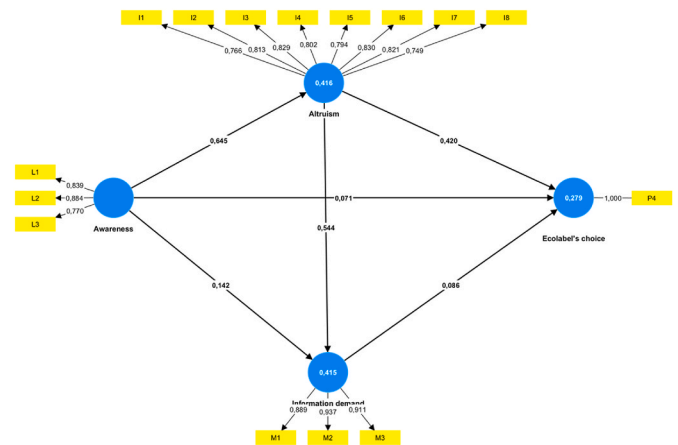
Table 4 includes the results from the bootstrapping procedure, including evaluation of the statistical significance of the path coefficients based on the t-statistic and the 95% Bca confidence interval. In addition, Table 4 includes the variance of each endogenous variable in the model explained by each exogenous variable and the predictive relevance evaluation. The R<sup>2</sup> values exceeded the minimum threshold suggested by Falk and Miller (1992) and indicated a moderate capability of the model to explain the corresponding latent variables. Finally, the Q<sup>2</sup> values above zero confirmed that the structural model has satisfactory predictive relevance.

According to the results, all the direct effects are significant except for the relationship between Awareness and Eco-label Choice. The lack

**Table 4**  
Direct effects, explained variances and Q<sup>2</sup> test for endogenous variables.

Effects on endogenous variables	Path (significance)	t-value	Explained Variance (%)	Q2	Bca Confidence intervals
<i>Effects on Altruism</i>					
Awareness	0,645***	25,017	41,6	0,424	[0,59, 0,692]
<i>Effects on Information demand</i>					
Altruism	0,544***	13,738	34,5	0,251	[0,464, 0,618]
Awareness	0,142**	3453	7		[0,06, 0,221]
<i>Effects on Ecolabel's choice</i>					
Altruism	0,42***	8753	21,9	0,153	[0,327, 0,512]
Awareness	0,071 n.s.	1,59	2,7		[-0,019, 0,157]
Information Demand	0,086*	2032	3,3		[0,004, 0,168]

\*\*\* Significant at p < 0.001, \*\* Significant at p < 0.01, \*Significant at p < 0.5. Sig. stands for significant at p < 0.05.



**Fig. 2.** Structural model.

of statistical significance of the path coefficient between Awareness and Eco-label Choice (H1) and the significant value (0.271, significant at p < 0.001) of the indirect effect *axb*, being a: Awareness → Altruism and b: Altruism → Eco-label Choice, uncovers a full mediation (Nitzl et al., 2016). This finding shows that even when a consumer is aware about the problems of overexploitation of fish that may influence the consumer's choice of eco-labelled fish products, the consumer will not select eco-labelled products if he/she is not altruistic. Awareness, indeed, has a significant direct effect on Altruism (H2: β = 0.645, sig. at p < 0.001), confirming the hypothesis H2, and explaining a large portion of Altruism (41.6%). Awareness also has a significant direct effect on Information Demand (H3: β = 0.142, sig. at p < 0.01). However, Altruism's (H4: β = 0.544, sig. at p < 0.001) impact on Information Demand is higher than Awareness, and it is able to explain 34.5% of its variance compared to the direct effect of Awareness, which only explains 7%. Then, in this case, Altruism is partially mediating the relation between Awareness and Information Demand. The total effect of Awareness on Information Demand (β = 0.492, sig. at p < 0.001) corresponds to the sum of the direct effect (H3: β = 0.142, sig. at p < 0.01) and the indirect effect through Altruism (β = 0.351, sig. at p < 0.001). This finding corroborates the idea that consumers' Altruism is key to their willingness to obtain information about the impact and sustainability of fish practices and, ultimately, affects the Eco-label Choice of consumers.

Eco-label Choice is mainly driven by consumer Altruism (H5: β = 0.492, sig. at p < 0.001), as it explains 21.9% of the total variance (27.9%) explained by the model. On the other hand, the other factor that some authors have identified as an important determinant of Eco-label Choice, the Information Demand of the impact and sustainability of the fish practices, has a smaller (explains 3.3% of the variance on Eco-label Choice) but significant impact (H6: β = 0.086, sig. at p < 0.05).

**4.3. Multi-group analysis**

Table 5 displays the PLS-PM results for the different groups. Overall, the model showed no significant differences in the model relationship according to sex, age, income and educational level. That is, the hypothesised relationships do not show significant differences between groups (e.g. men vs women); the strength and direction of the impact of the relationships is not moderated by these variables. The analysis showed that only country paths showed significant differences. In particular, differences emerged between Greek and Spanish consumers. The relations between Awareness and Altruism (Diff: 0.234), Awareness and Information Demand (Diff: 0.370) and Altruism and Eco-label Choice (Diff: 0.393) between Greek and Spanish consumers show significant differences, being higher for Greek consumers. This indicates that the relationships between these variables are significantly stronger in the case of Greek consumers. Therefore, a smaller increase/decrease

on the input variable will have a greater increase/decrease in the outcome variable for Greek than for Spanish consumers. Note that, as will be shown later (in Table 6), the average rank for the values of Altruism and Eco-label Choice are higher in Spanish than in Greek consumers. Therefore, for the same level of Altruism in a Spanish and Greek consumer, the Greek consumer is more likely to choose an eco-labelled fish product, although Spanish consumers show an overall higher tendency to choose eco-labelled fish products than Greek consumers. Additionally, the country group comparison showed a similar value for the relation between Altruism and Eco-label Choice for Italian and Spanish consumers, and significant differences when compared to the Greek consumers (Diff: 0.421). Similarly to the Spanish–Greek case, Italians showed higher values of Eco-label Choice (e.g. 3.99 vs 2.98 on EC average, 441.95 vs 263.37 on EC average rank). In summary, the results showed that Altruism is a significant mediator and key in the relationship between Awareness and Information Demand and between Awareness and Eco-label Choice. Additionally, country acts as mediator in some of the relations in the model while sex, age, income or educational level have no impact in the model relationships.

Overall, we observed no significant differences in the values attending to age and income level. For instance, results showed Italian consumers' average rank values were higher in all the variables. In particular, Italian and Spanish consumers had significantly higher values of Information Demand, Altruism and Eco-label Choice than Greeks, and Italians also showed significantly higher values of Awareness than the Spanish and Greeks. Regarding sex, women showed significant higher values of Altruism and Information Demand than men, while for educational level, respondents who completed only secondary studies or lower showed significantly lower values of Altruism and Eco-label Choice.

## 5. Discussion

Several studies have been carried out in recent years to explain the willingness of consumers to choose eco-labelled seafood products and the reasons underlying these consumption habits, highlighting the role of two key factors: consumer awareness of the environmental issues, and the environmental cultural background (Bronnmann and Hoffmann, 2018; Galati et al., 2021). This study contributes to enriching previous empirical evidence by exploring the interaction between altruism, awareness, information demand, as well as socio-demographic factors, and their effect on the pro-environmental attitudes and behaviour of fish consumers towards eco-labelled products in three different countries.

The results highlight that altruism is an important factor that leads consumers to choose fish products with eco-labels. This result confirms what has been found in some previous studies, according to which consumers with a high level of orientation towards altruistic values are more concerned about environmental issues and are more likely to make more responsible and aware choices (Panda et al., 2020; Czudec, 2022; Vicente-Molina et al., 2013). In detail, our study shows how altruism is a mediator between awareness and eco-labelled product choice—that is, awareness affects altruistic behaviours, which in turn lead to greater interest in fish products certified as sustainable. In other words, consumers who are aware of the potential impact of their choices on the marine ecosystem and the overexploitation of fish resources, but are not altruistic, are less likely to choose the eco-label. Consumers' awareness of the state of health of marine ecosystems, of overexploitation of fish resources and the consequent depletion of fish stocks, in fact affects their altruistic values and creates a sense of concern about the negative consequences that their choices may have on the environment, surroundings, and on others (Steg et al., 2014). This confirms what Panda et al. (2020) found, wherein consumers' altruism was significantly influenced by their environmental sustainability awareness. However, as previously emphasised, and in contrast to previous empirical evidence, the effect of awareness on the choice of eco-labelled seafood products is mediated by altruism. Numerous studies have highlighted

how consumer awareness of illegal fishing practices and over-exploitation of fish resources plays a key role in influencing consumer choices (Winson et al., 2021; Jonell et al., 2016; Onozaka et al., 2010). In other words, as highlighted by Winson et al. (2021) and Vitale et al. (2017), consumers who are aware and who recognize the seafood eco-label as an important tool for protecting fish resources and marine ecosystems are more willing to pay a price premium for certified fish products.

An interesting result that emerged from our study is the influence that both consumer awareness and altruism values have in influencing the need for information that can be satisfied by the meaning of the label. Empirical evidence has shown that consumers' knowledge of the state of fish resources increases their awareness and increasingly leads to the search for credible information on sustainable fish products, and to a growing interest in the choice of certified products (Kumar et al., 2021; Uchida et al., 2014). In fact, third-party certifications, also in the fishing industry, give consumers the opportunity to obtain information on the environmental and sustainability attributes of production processes, including in the specific case of catches and capture methods that are not observable in the absence of this information tool (Brécard et al., 2009). Therefore, seafood eco-labels, as pointed out by Song and co-authors (2019), become a fundamental tool that supports the choices of consumers and a crucial source of knowledge to increase their awareness of the sustainable dimension of the fishing sector, transforming credence attributes into search attributes (Leire and Thidell, 2005). However, what emerged from our study was the more marked influence of altruism, confirming also in this case that altruism is a significant mediator and key in the relationship between awareness and information demand, and between awareness and eco-label choice. Some studies that analysed the influence of altruistic values on consumer choices highlighted how consumers driven by altruism values seek information on fishing companies' conduct and on the adoption of actions and strategies aimed to protect marine ecosystems (Hoque, 2021). A recent study by Galati et al. (2021) comparing the influence of altruism on the attention of Spanish and Italian consumers to eco-labelled seafood products highlighted that altruistic consumers who care more about sustainable fish products pay more attention to the eco-labelling information. This result confirms that altruism can change consumer behaviour by orienting consumers towards more responsible behavioural models (Czudec, 2022; Panda et al., 2020).

The comparison among Greek, Italian and Spanish consumers highlights that Italian consumers' average rank values were higher for most of the variables. In particular, Italian and Spanish consumers had significantly higher values of information demand, altruism and eco-label choice than Greeks, and Italians also showed significantly higher values of awareness than the Spanish and Greeks. However, the relative impact tended to be higher among Greeks. For example, Greeks showed a significantly greater impact of altruism on eco-label choice than Italian and Spanish consumers. This result emphasises that, although Italian and Spanish consumers show overall higher levels of altruism, for the same levels of altruism, Greek consumers are more likely to choose eco-labelled seafood products than Italian and Spanish consumers. In other words, country acted as a moderator in some of the relations in the model while sex, age, income and educational level had no impact on the model relationships. This result confirms what emerged from a *European Eurobarometer* (2020) survey which shows a greater sensitivity of Greek consumers towards environmental issues and greater attention to the wholesomeness and sustainability of the products they buy, compared to Spanish and Italian ones. In detail, 55% of Greek consumers prefer to buy food products that protect the planet, compared to 34% of Spanish and 41% of Italian consumers. But above all they recognize the importance of the information contained in the labels which should be mandatory for 63% of Greek consumers, a percentage that drops to 56% for Spanish and 48% for Italian consumers. Of particular interest is the case of age, which in our model has no significant impact. This is consistent with previous works where contradictory results can be

found: for Salladarré et al. (2010) young people have more tendency to purchase certified fish products, while for Xuan (2021) the opposite was true, older people have more predilection for certified products. However, regarding sex, women showed significantly higher values of altruism and information demand than men, confirming what has been found in previous studies according to which women were generally more knowledgeable about environmental issues and were guided by altruistic values in their choice of certified fish (Vitale et al., 2020; Piper and Schnepf, 2008). Our results also highlight that respondents who only completed their secondary studies or lower showed significantly lower values of altruism and eco-label choice. This is consistent with Galati et al. (2021) and Westlake et al. (2019), according to which people with a higher level of education are more altruistic and inclined to trust eco-labelled seafood products.

## 6. Conclusions and implications

This work connects with an important academic discussion that has been taking place in recent years about the factors that influence the decision to choose eco-labelled products, both in seafood and in many other sectors. Much research has focused on the socio-cultural and economic profiles of buyers, and although some conclusions can be drawn (for example, the relevant role of educational levels in purchasing decisions), the results do not seem very conclusive and are sometimes even contradictory with regard to other objective characteristics. However, increasing interest is being paid to the subjective qualities of the buyer. In this sense, the results of this work recommend focusing this analysis on the levels of altruism. The results presented and discussed above point to altruism as the key factor that leads consumers to choose eco-labelled seafood. Awareness or information demand have been pointed out in previous works, but here it was found that altruism plays a more influential role and in fact acts as a significant mediator between these variables and the choice of eco-labelled sea products. Another significant conclusion is that mediating factors such as gender, age, or income and educational levels were not found to have a significant impact on the model relationships. However, some significant differences were detected depending on the countries analysed.

Our findings yield theoretical, managerial and political implications. Firstly, the study contributes to enriching the literature on the main drivers affecting the choice of eco-labelled seafood products by exploring the interaction between psychographic and socio-cultural variables. In particular, this study advances the knowledge concerning the role of altruistic values in affecting the pro-environmental behaviours and attitudes of consumers, finding that altruism is an important factor that leads consumers to choose fish products with eco-labels, playing the role of mediator between awareness and choice of the eco-labelled products. This conclusion highlights the need to spread altruistic values among consumers by encouraging pro-social and pro-environmental behaviours, reducing inhibiting factors such as pluralistic ignorance, and then increasing consumer knowledge, skills and confidence. From this point of view education and communication seem to be the key aspects of public policies that seek to promote responsible consumption. With regard to this issue, government can deliberately drive new policy and communication actions to increase altruism, especially in those aspects related to sustainability of the oceans, as this reinforces the demand for information about the impacts and sustainable practices, and increases eco-labelled product choice among consumers. Some appropriate strategies to increase consumers' altruism include informing them about environmental and social problems caused by non-eco-friendly food or promoting feel-good policies. The aim of these political strategies should be to develop consumers' empathy, because it is probable that consumers are more likely to engage in altruistic behaviour when they are aware of environmental issues, including the negative consequences of human actions on marine ecosystems for present and future generations. Encouraging people to value the future more than the present and to behave in a more altruistic

way will make consumer choice for sustainable products an educated and self-controlled decision, where future well-being will dominate other impulses for pleasure in the moment (e.g. buying at a lower price) (DeSteno, 2018).

Likewise, private companies seeking to position their eco-labelled products must know that their potential audience is one with higher levels of altruism. The communication of the values implicit in the purchase is a key way to reach this consumer. Education and the transmission of values can be key to reaching new market segments, especially in a sector as sensitive to environmental problems as the seafood industry. In any case, the fact that the level of altruism of consumers appears as the key factor leads us to point out that other ethical aspects beyond environmental problems (such as social or labor aspects) can also play an important role and should be part of the communication and differentiation strategy.

Finally, this study has certain limitations. The sampling procedure doesn't allow the use of the sample for descriptive purposes of the population or to generalise how the associations observed in the study work for other countries. Another limitation of the study can be traced back to its hypothetical nature based on the declared preferences of the respondents which tend to exaggerate the declared opinions and which often do not translate into real purchasing decisions. From this point of view, other studies are needed using non-hypothetical methods, such as experimental auctions, in order to corroborate or not our results. Adding to these limitations is Greece's low response rate. Despite this, one of the conclusions reached was the difference detected between countries. This question may be important; however, most consumer analysis has been carried out on a single market. It is important to focus on analyses that involve several countries; accordingly, this work has focused on three European and Mediterranean countries with which it could be assumed that there are more similarities than differences. It would be very interesting to extend the analysis to other countries that are more culturally different. Likewise, it would be interesting to carry out temporal analyses that allow us to analyse the evolution of consumer preferences and attitudes.

## Credit author statement

Angel Peiro-Signes: Methodology, Data curation, Formal analysis, Validation, Visualization, Writing – original draft preparation, Writing – review & editing. Lluís Miret-Pastor: Methodology, Data curation, Validation, Visualization, Writing – original draft preparation, Writing – review & editing. Maria Tsiouni: data collection, Writing – original draft preparation; Dario Siggia: data collection, Writing – original draft preparation; Antonino Galati: Conceptualization, Methodology, Data curation, Validation, Supervision, Writing – original draft preparation, Writing – review & editing.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Data availability

Data will be made available on request.

## Appendix



**Table 5**  
PLS-MGA results

Effects on endogenous variables	Country			Sex		Age			Educational level			Income level		
	ES	GR	IT	F	M	<40	40–55	>55	Secondary or less	Post-university diploma	Tertiary education	High	Medium	Low
<b>Effects on Altruism</b>														
Awareness	0.575*** [0.489, 0.648] (GR)	0.808*** [0.691, 0.884] (ES)	0.674*** [0.594, 0.737]	0.628*** [0.55, 0.692]	0.678*** [0.601, 0.738]	0.631*** [0.538, 0.706]	0.646*** [0.565, 0.709]	0.687*** [0.532, 0.785]	0.664*** [0.553, 0.747]	0.692*** [0.594, 0.759]	0.603*** [0.518, 0.675]	0.638*** [0.517, 0.725]	0.609*** [0.517, 0.678]	0.706*** [0.619, 0.774]
<b>Effects on Information demand</b>														
Altruism	0.598*** [0.484, 0.703]	0.387** [0.167, 0.606]	0.406*** [0.267, 0.529]	0.479*** [0.374, 0.585]	0.61*** [0.483, 0.71]	0.536*** [0.413, 0.649]	0.57*** [0.454, 0.671]	0.487*** [0.235, 0.734]	0.581*** [0.399, 0.737]	0.492*** [0.343, 0.618]	0.532*** [0.415, 0.648]	0.639*** [0.491, 0.772]	0.539*** [0.428, 0.644]	0.466*** [0.312, 0.61]
Awareness	0.077 n.s. [−0.052, 0.199] (GR)	0.447*** [0.219, 0.632] (ES)	0.245*** [0.13, 0.369]	0.22*** [0.111, 0.32]	0.051 n.s. [−0.064, 0.173]	0.169* [0.045, 0.301]	0.102* [0.003, 0.199]	0.19 n.s. [−0.102, 0.445]	0.146 n.s. [−0.025, 0.32]	0.203** [0.068, 0.333]	0.108 n.s. [−0.016, 0.227]	0.016 n.s. [−0.143, 0.17]	0.152** [0.044, 0.263]	0.237* [0.086, 0.381]
<b>Effects on Ecolabel's choice</b>														
Altruism	0.389*** [0.249, 0.523] (GR)	0.782*** [0.546, 0.969] (ES, IT)	0.361*** [0.222, 0.501] (GR)	0.441*** [0.325, 0.558]	0.341*** [0.191, 0.487]	0.506** [0.355, 0.643]	0.297*** [0.165, 0.442]	0.619*** [0.343, 0.883]	0.56*** [0.344, 0.757]	0.42*** [0.238, 0.591]	0.33*** [0.199, 0.459]	0.304** [0.104, 0.505]	0.384*** [0.257, 0.506]	0.541*** [0.352, 0.712]
Awareness	0.127 n.s. [−0.004, 0.254]	−0.153 n.s. [−0.403, 0.088]	−0.076 n.s. [−0.216, 0.06]	−0.01 n.s. [−0.124, 0.107]	0.2** [0.06, 0.332]	0.046 n.s. [−0.078, 0.179]	0.123 n.s. [−0.019, 0.256]	−0.048 n.s. [−0.316, 0.21]	−0.035 n.s. [−0.23, 0.157]	0.045 n.s. [−0.139, 0.22]	0.157** [0.031, 0.269]	0.124 n.s. [−0.063, 0.288]	0.084 n.s. [−0.051, 0.215]	0.01 n.s. [−0.156, 0.169]
Information Demand	0.032 n.s. [−0.096, 0.176]	0.135 n.s. [−0.049, 0.328]	0.169** [0.054, 0.28]	0.084 n.s. [−0.023, 0.193]	0.101 n.s. [−0.02, 0.22]	0.02 n.s. [−0.107, 0.153]	0.16* [0.036, 0.29]	0.031 n.s. [−0.147, 0.226]	0.011 n.s. [−0.144, 0.174]	0.099 n.s. [−0.052, 0.247]	0.11 n.s. [−0.017, 0.24]	0.042 n.s. [−0.136, 0.239]	0.131* [−0.002, 0.256]	0.072 n.s. [−0.053, 0.216]

\*\*\* Significant at  $p < 0.001$ , \*\* Significant at  $p < 0.01$ , \*Significant at  $p < 0.5$ . stands for significant at  $p < 0.05$ . n.s. = not significant according to a bootstrapping procedure with 5000 resamples. Characters in parentheses indicate the group members from which this group was significantly different using 95% confidence Bias Corrected and accelerated confidence intervals.

**Table 6**  
summarises mean, standard deviation, median and the values for the

		Country			Sex		Age			Educational level			Income level			
		Total	ES	GR	IT	F	M	<40	40–55	>55	Secondary or (less S)	Post-univ. Diploma (pUD)	Tertiary Eduaction (TE)	high	med	low
<b>Awareness</b>	<b>N</b>	781	332	95	354	453	328	296	376	106	177	255	349	185	355	241
	<b>Mean std. dev.</b>	3.5 0.9	3.3 0.83	3.25	3.74	3.5 0.87	3.49	3.47	3.48	3.61	3.4	3.59	3.47	3.49 0.9	3.5 0.88	3.49
	<b>Average Rank</b>		338.82 (IT)	343.52 (IT)	452.68 (ES, GR)	391.26	390.63	387.27	386.26	417.46	368.36	416.03	384.19	387.14	393.03	390.97
<b>Information Demand</b>	<b>Mean std. dev.</b>	4.18 0.88	4.28 0.85	3.81 0.98	4.18 0.87	4.26 0.86	4.07 0.91	4.14 0.89	4.21 0.87	4.19 0.94	4	4.24 0.86	4.23 0.84	4.19 0.89	4.24 0.86	4.09 0.91
	<b>Average Rank</b>		418.69 (GR)	302.32 (ES, IT)	388.83 (GR)	414.56 (M)	358.46 (F)	378.69	397.4	402.36	354.21	404.82	399.56	396.83	405.4	365.3
	<b>Mean std. dev.</b>	3.97 0.78	4.02 0.71	3.54 1.01	4.05 0.74	4.07 0.74	3.84 0.82	3.91 0.79	4.00 0.74	4.06 0.86	3.78 0.86	4.04 0.73	4.02 0.76	4.02 0.74	4.02 0.74	3.87 0.87
<b>Altruism</b>	<b>Average Rank</b>		397.68 (GR)	293.77 (ES, IT)	410.82 (GR)	417.73 (M)	354.07 (F)	371.56 (>55)	393.95	433.59 (<40)	338.94 (pUD, TE)	408.3 (S)	404.76 (S)	402.05	400.24	368.9
<b>Ecolabel's choice</b>	<b>Mean std. dev.</b>	3.72 1.15	3.64 1.11	2.98 1.27	3.99 1.06	3.84 1.1	3.55 1.2	3.76 1.14	3.65 1.64	3.82 1.13	3.41 1.24	3.81 1.13	3.81 1.09	3.77 1.14	3.73 1.12	3.66 1.2
	<b>Average Rank</b>		373.19 (GR, IT)	263.37 (ES, IT)	441.95 (ES, GR)			397.93	379.43	412.07	335.24 (pUD, TE)	408.31 (S)	406.63 (S)	400.86	391.82	382.22

Characters in parentheses indicate the group members from which this group was significantly different at p-0.05 level according to the Bonferroni's pairwise comparison procedure.

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