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Departamento de Comercialización
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Three Essays on Pro-environmental Consumer´s Behavior

Tesis Doctoral

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Programa de Doctorado en Ciencias Económicas y Empresariales
Universidad de Granada

TESIS DOCTORAL

THREE ESSAYS ON PRO-ENVIRONMENTAL CONSUMER´S BEHAVIOR:

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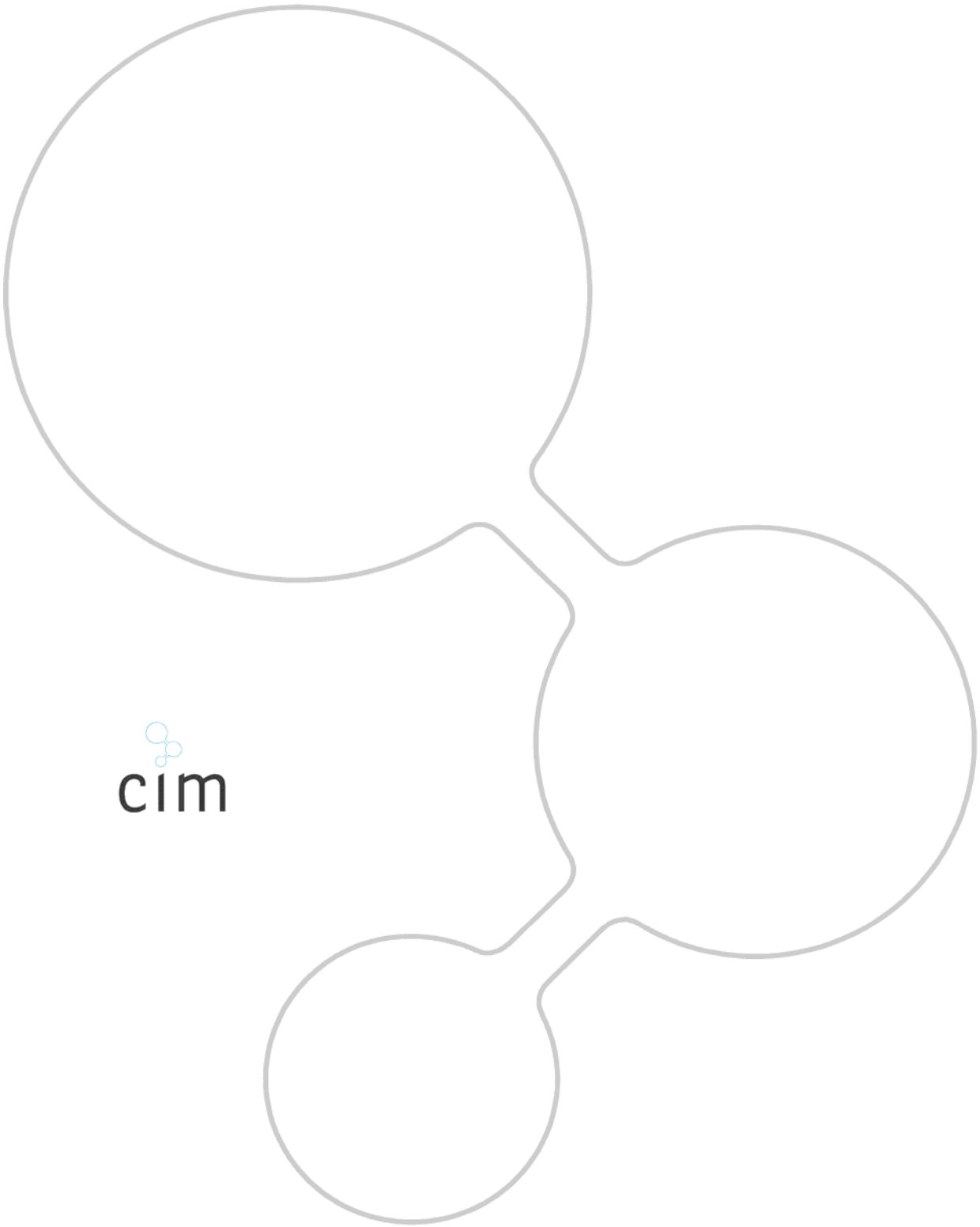
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Nuria Rodríguez Priego

Granada, Septiembre de 2012.

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"Keep your thoughts positive because your thoughts become your words.
Keep your words positive because your words become your behavior.
Keep your behavior positive because your behavior becomes your habits.
Keep your habits positive because your habits become your values.
Keep your values positive because your values become your destiny."

Mahatma Gandhi

A mis padres, a mis hermanos y a Ángel.

Tres Ensayos Sobre Comportamiento Pro-Medioambiental del Consumidor

1. **Recompensa y Castigo: Examen de los Factores Psicológicos que Influyen en la Intención de Comportamiento Pro-Medioambiental en España.**

2. **Percepción del Riesgo y Compromiso por Reducir el Cambio Climático Global en España.**

3. **Pedaleando por el medio ambiente. Análisis de los factores psicológicos que influyen en la intención de uso de los sistemas de alquiler de bicicletas como un medio sostenible de transporte: un estudio de caso.**

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o. RESUMEN

0. RESUMEN

La presente tesis está distribuida en tres ensayos cuyo principal objetivo consiste en explorar diversos aspectos relacionados con el comportamiento del consumidor hacia el medio ambiente tales como la intención, la percepción del riesgo y el compromiso con el cambio climático global.

Con esta finalidad, en el primer ensayo se aplica un enfoque interdisciplinar que incorpora aspectos psicológicos relacionados con la intención de recompensar, o penalizar, a las empresas que están adoptando, o no, medidas para reducir su impacto en el medio ambiente. Para ello se realiza una revisión de la literatura previa existente sobre comportamiento pro-medioambiental y concienciación del individuo, así como su implicación con la causa. Del mismo modo se utilizan el comportamiento pasado reportado por el propio individuo y la percepción del riesgo de cambio climático global, como variables determinantes de la intención de comportamiento futuro hacia dichas empresas. Se proponen dos modelos de ecuaciones estructurales para cada uno de los comportamientos, recompensa y castigo, y tras el análisis de datos se corroboran las hipótesis propuestas.

Con en el segundo ensayo se pretende explicar y predecir la percepción del riesgo y el apoyo por parte del consumidor al compromiso de la sociedad por reducir el cambio climático global. La Teoría de la Cognición Cultural se incluye en el modelo propuesto y los datos son analizados a través de regresión jerárquica múltiple con la finalidad de verificar si la efectividad percibida, la implicación con la causa y la pertenencia a un tipo cultural predefinido determinan la percepción del riesgo y el apoyo al compromiso de la sociedad. Finalmente se presenta un modelo de ecuaciones estructurales para testar el efecto de dichos predictores, junto con el riesgo percibido en el apoyo a un mayor compromiso por parte del gobierno hacia la búsqueda de soluciones para el cambio climático global.

Para concluir, el tercer ensayo pretende determinar algunos de los factores psicológicos que influyen en la intención de uso de un sistema de alquiler de bicicletas que está siendo implementado en diversas ciudades de Europa como medio de transporte sostenible. El público objetivo, en este caso, sería la comunidad universitaria

granadina, debido a la importancia de las pautas de consumo de dicho colectivo dentro de la ciudad de Granada. Se utiliza la Teoría del Comportamiento Planificado ampliada mediante la inclusión de la efectividad percibida por parte del consumidor, para determinar la intención hacia el uso de dicho sistema. Los resultados corroboran el modelo propuesto tras el pertinente análisis de datos.

I. INTRODUCCIÓN

I. INTRODUCCIÓN

El cambio climático global ha sido un tema muy recurrente en las investigaciones llevadas a cabo desde diversas disciplinas científicas durante las últimas décadas. Cada vez más, los gobiernos internacionales acuden a organismos expertos para solicitar evaluaciones holísticas de la situación en la que se encuentra el medio ambiente y se concretan pactos intergubernamentales para paliar los efectos del ser humano sobre el mismo, tales como: el Convenio de Viena de 1985; el Protocolo de Montreal de 1987; la Convención Marco de las Naciones Unidas sobre el Cambio Climático de 1992, donde se estableció el Protocolo de Kyoto finalmente adoptado en 1997 y cuya última cumbre tuvo lugar en Durban en 2011, etc.

Dichas evaluaciones muestra de forma sistemática que una de las principales causas del cambio climático global es la influencia antropogénica en el aumento de gases con efecto invernadero, lo que nos lleva a plantear la posibilidad de promover una transformación en cuanto a las pautas de consumo del ser humano, que permitan un desarrollo sostenible y compatible con la coexistencia entre nuestros descendientes y el resto de especies.

Desde las ciencias sociales y del comportamiento se vienen realizando diversos estudios científicos cuyo objetivo común ha sido analizar los factores que influyen en el comportamiento de consumo pro-medioambiental. En estas mismas líneas se puede enmarcar la presente tesis. Más concretamente, este trabajo pretende examinar dicho comportamiento desde distintas perspectivas.

En primer lugar, este compendio de ensayos se focaliza en comportamientos relacionados con la visión que el individuo tiene de las organizaciones con las que interactúa. La importancia que tiene la percepción del individuo sobre las empresas señaladas, radica en la influencia que dicha percepción tendrá en las futuras interacciones. Como consecuencia, nos preguntamos si existen factores concretos que nos ayuden a predecir el comportamiento futuro del consumidor en relación a aquellas organizaciones que incluyen en sus políticas acciones para reducir su impacto en el medio ambiente. Con ello pretendemos que los resultados de este estudio puedan ser considerados por las compañías, cuando tomen decisiones relacionadas con sus políticas medioambientales.

En segundo lugar, se apunta a la relevancia que tiene la opinión del consumidor sobre el compromiso que la sociedad debería tener para reducir el cambio climático global. El apoyo a los esfuerzos tanto por parte del gobierno, como por parte de las empresas e industria y de los ciudadanos en su conjunto, puede estar determinado por la pertenencia a un tipo cultural de los que han sido previamente descritos en la Teoría de la Cognición Cultural. Simultáneamente se estudia la importancia de la percepción del riesgo de cambio climático, desde el punto de vista del consumidor, así como de otros factores que pueden determinar un incremento en el apoyo a dichos compromisos con el medio ambiente, especialmente en el caso de las políticas gubernamentales, las cuales deberían tener en consideración la opinión del consumidor, así como su grado de implicación en campañas de concienciación medioambiental.

Por último, esta tesis se centra en el estudio de un comportamiento pro-medioambiental más concreto, como es el caso del uso del transporte sostenible, cuya finalidad es reducir la emisión de gases de efecto invernadero resultantes de otras formas de transporte alternativas. En un contexto en el que se buscan opciones que resulten menos agresivas hacia nuestro ecosistema, prosperan soluciones relacionadas con sistemas públicos y privados que supongan una diferencia ostensible en la reducción de emisiones de CO_2, a la vez que se reduce el uso de fuentes de energía no renovables como son los derivados del petróleo.

A continuación se presentan los tres ensayos propuestos al hilo del argumento expuesto en las líneas precedentes.

II. PRIMER ENSAYO

FIRST ESSAY

Reward and Punishment: Examining the Psychological Drivers of Pro-environmental Behavioral Intention in Spain.

Rodríguez-Priego, Nuria
Montoro Ríos, Francisco J.
Georgantzís, Nikolaos

FIRST ESSAY

"Reward and Punishment: Examining the Psychological Drivers of Pro-environmental Behavioral Intention in Spain".

Rodríguez-Priego, Nuria
Montoro Ríos, Francisco J.
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Abstract

The present research aim to examine individuals´ purchasing behavioural intention related with corporations who are environmental concerned. Two Structural Equations Models are proposed and tested independently for the behavioral intention of rewarding and punishing companies by buying or not their products. Results highlight the importance of increasing perceived consumer effectiveness of their energy saving actions, as well as involvement to enhance the risk perceived of global climate change and pro-environmental related behaviors. Furthermore, behavioral intention seems to be determined by past reported behaviour and consumers´ risk perception.

Keywords: Global Climate Change; Pro-Environmental Behavior; Behavioural Intention; Risk Perception; Perceived Consumer Effectiveness.

PRIMER ENSAYO

"Recompensa y Castigo: Examen de los Factores Psicológicos que Influyen en la Intención de Comportamiento Pro-Medioambiental en España".

Rodríguez-Priego, Nuria
Montoro Ríos, Francisco J.
Georgantzís, Nikolaos

Resumen

El objetivo de la presente investigación es examinar la intención de comportamiento relacionada con las corporaciones que están concienciadas con el medioambiente. Para ello se han propuesto y testado de forma independiente dos modelos de ecuaciones estructurales en función de la intención de premiar o castigar a las empresas mediante la compra o no de sus productos. Entre los resultados destaca la importancia de mejorar la efectividad que los consumidores perciben de sus acciones para ahorrar energía, así como la implicación de éstos para incrementar la percepción del riesgo de cambio climático global y las conductas relacionadas con el medio ambiente. Por otra parte, la intención de comportamiento pro-medioambiental parece estar determinada por el comportamiento pasado y la percepción del riesgo.

Palabras clave: Cambio Climático Global; Comportamiento Pro-Medioambiental; Intención; Percepción del Riesgo; Efectividad Percibida.

1. INTRODUCTION

Global climate change has become an unequivocal matter and one of the most significant environmental issues in recent years. According to the data identified by the Intergovernmental Panel on Climate Change (IPCC, 2007) and the United Nations Framework Convention on Climate Change (UNFCCC, 2007) global average air and ocean temperature are increasing in addition to sea level, and widespread melting of snow and ice are affecting the whole globe, influencing many natural systems which tend to disappear.

Even though this phenomenon has taken place in nature in the course of planet's life, it has also been acknowledged by scientists (IPCC, 2007; UNFCCC, 2007) that nowadays one of the main sources seems to be the increases in greenhouse gases caused by human activities, becoming more and more severe every time, resulting in what is called *climate sensitivity,* which is benchmarked against the warming expected for a doubling of carbon dioxide levels from pre-industrial situation.

Engagement in pro-environmental behavior has increased in the last decades from a consumer's perspective (Dunlap *et al*. 1993; Schultz 2002), and scientists coincide regarding the current state of the environment. However there is still a segment of the society that doesn't believe in the accuracy of the subject. In order to decrease global climate change the first step should be to recognize that it is really happening and that individuals can cooperate for its solution by reducing their impact on the environment. In this line, preceding research has shown how people differ when evaluating environmental problems as they diverge in their perceptions (Dunlap & Jones, 2002; Milfont & Gouveia, 2006). Hence, further research is needed to understand how these individuals think, what are their beliefs and concerns, which might be related to their previous cognition, but it is also needed to identify how we could change their minds, focusing on them as the target public.

In the present study we examine a survey tool that has been developed by the Yale Project on Climate Change Communication[1] and applied for the US and Spanish

[1] http://environment.yale.edu/climate/

population segmentation (Maibach *et al*., 2009; Rodríguez-Priego *et al.*, 2012). Our aim will be to explore what variables may have an influence on pro-environmental behavioral intention, focusing on *beliefs*, *global climate change*, *involvement*, and *past reported behavior.*

Our study begins with a review of the literature on *pro-environmental behavior* and *concern*; then we will address the previous literature concerning individuals´ *beliefs* and the influence that *past behavior* as well as the impact of *risk perception* related beliefs seem to have on *behavioral intentions*. The methodology used and the behavioral models proposed are subsequently exposed in the third section. Finally, the results, discussion and conclusions are presented, as well as future lines of research.

2. LITERATURE REVIEW

PRO-ENVIRONMENTAL BEHAVIOR AND CONCERN

Over the past decades, environmental concern has been a trend topic in academic research. Dunlap and Jones define it as "*the degree to which people are aware of problems regarding the environment and support efforts to solve them and/or willingness to contribute personally to their solution*" (2002: 485). Fransson and Gärling (1999) refer to both: the specific attitude that directly determines intentions and a general value orientation toward the environment. Besides, Schultz *et al.* (2004) stated that environmental concern is also the "*affect associated with beliefs about environmental problems*" and is related to the degree with which individuals see themselves as part of the natural world (Schultz, 2000).

Environmentally significant behavior has also been previously described by several authors; however, we will focus the present research on Stern´s perspective, which identifies it based on its actual impact, but also on intentions. Concerning the impact it is meant to be "*the extent to which it changes the availability of materials or energy from the environment or alters the structure and dynamics of ecosystems or the biosphere itself*" (Stern, 1997). Relating to the intention, this behavior is undertaken with the purpose to benefit the environment (Stern, 2000).

Ecologically conscious behavior has been examined along decades addressing the main characteristics that influence the commitment, concern, attitudes and other variables. Environmental issue involvement has been shown to predict individuals´ behavior since consumers who are aware toward the environment will try to take into account their concern when purchasing (Mainieri *et* al., 1997; Laroche *et al*., 2001; Ishaswini & Data, 2011). In this particular research, we will consider two different kinds of pro-environmental behaviors: as a result of the decision (1) to purchase products with the aim to reward companies for taking steps to reduce global climate change; and as a result of the decision (2) to not purchase products with the purpose to punish companies for not taking steps to reduce global climate change. Considering this, our first hypothesis is divided into two sub-hypothesis, presented as follows:

H_1: *Individuals´ issue involvement will determine their behavior toward the environment.*

> H_{1A}: *Individuals´ issue involvement will determine their behavior of rewarding companies that take actions to reduce global climate change.*
> H_{1B}: *Individuals´ issue involvement will determine their behavior of punishing companies that do not take actions to reduce global climate change.*

A review of past studies suggests the existence of different factors related to green behavior. Dietz *et al.*, (1998) distinguish two major streams: studies focused on sociodemographic factors and studies of values, beliefs and other socio-psychological constructs related to environmentalism.

In the first line, there are quite a few studies stating that demographic variables are associated with environmental commitment (Straughan & Roberts, 1999). Age has been examined by a number of researchers (e.g. Anderson & Cunningham, 1972; Aaker & Bagozzi, 1982; Samdahl & Robertson, 1989; Straughan & Roberts, 1999), although some studies reveal contradictions in their findings and are far from being conclusive, as the relationships are sometimes not significant (e.g. Gatersleben *et al*., 2002; Diamatopoulos *et al.*, 2003; Fraj and Martinez, 2006; Barr, 2007). Similar results are found if we focus on research concerning income, education and place of residence as environmental determinants, where we also found studies stating opposite relationships

between the variables (Kinnear *et al.*, 1974; Van Liere & Dunlap, 1981; Samdahl & Robertson, 1989; Zimmer *et al.*, 1994).

The second stream attempts to explain environmentalism through attitudinal variables (Stern, 2000). Specifically, in the environmental literature related to psychology, the New Environmental Paradigm (Dunlap & Van Liere, 1978) has been commonly used to explain environmental concern (Poortinga *et al.*, 2004). The link between values theory, norm-activation theory and New Environmental Paradigm is shown in the Value-Belief-Norm theory with the purpose to explain environmentalism (Stern *et al*., 1995b) which seems to be due to three main determinants: fundamental values, specific beliefs and personal moral norms that guide individuals´ actions.

Furthermore, the Theory of Planned Behavior (TPB) from Ajzen (1991) links attitude, subjective norms and perceived control with behavioral intention and has been widely implemented in the literature related with pro-environmental behavior. Besides, in the last few years, academic research has also included *past behavior* in the explanatory equation, which seems to predict not only behavioral intentions but future behavior (Brickell *et al.*, 2006; Smith *et al.*, 2008; Kim & Chung, 2011; Sommer, 2011). Thus, we propose the second hypothesis as follows:

H_2: *Past behavior toward the environment will determine behavioral intentions.*

> H_{2A}: *Past behavior of rewarding companies that take actions to reduce global climate change will determine behavioral intentions.*
>
> H_{2B}: *Past behavior of punishing companies that take actions to reduce global climate change will determine behavioral intentions.*

Although it has been shown the increasing awareness of people about environmental problems, some authors have illustrated that it is not always traduced into actual behavior (Dunlap *et al*., 2000; Kaplan, 2000; Schultz, 2000), consequently, in the present research we do not examine only environmental involvement, but also beliefs, with the purpose to analyze the relationship with behaviors and intentions toward the environment.

BELIEFS

Regardless of the scientific consensus around environmental hazard, individuals still differ in their personal *beliefs* toward the issue (Maibach *et al.*, 2009). This may be due to several factors as it has been highlighted by different authors. Furthermore, when lay public lack of accessibility to scientific knowledge; we would expect beliefs to be uncorrelated with each other. However, individuals´ values and beliefs on environmental topic that can seem disengaged have been shown to be correlated. As Cultural Theory asserts (Schwarz & Thompson, 1990: 6), individuals´ values and beliefs may be determined by group membership. Kahan *et al*. (2005) have also illustrated some cultural patterns in their Cultural Cognition theory for the US population. They state that if someone believes that global warming poses no serious environmental risk, he is very likely to believe that gun control doesn't determine gun violence, and that abortion clearly puts the health of women in danger; as well, if he believes that gun control does determine crime, he's likely to think that global warming is a serious problem, and that abortion isn't dangerous to a woman's health.

In line with those studies which aim to examine environmentalism from a psychological perspective, and as it has been previously mentioned, Schwartz´s Norm Activation Theory (1977) attempts to explain pro-social or altruistic behavior as a result of personal norms, meaning the strong moral obligation feeling that people experiences when engaging in this kind of behavior. Likewise, as mentioned before, in the TPB Ajzen (1991) asserts that behavioral intentions are determined by individual's attitudes and beliefs, which is an extension to the Theory of Reasoned Action. Moreover, as described in the previous subsection, Stern (2000) and Stern *et al.* (1999; 1995a; 1995b) developed and tested the Value-Belief-Norm theory, based on Ajzen´s TPB and Schwartz´s Norm-Activation theory, that support a causal relationship where beliefs determine behavioral intentions toward the environment, which will lastly have an effect on actual behavior.

Finally, Dunlap *et al*. (1993) have proposed that the rise of the environmental movement is linked to growing acceptance of a new ecological paradigm or worldview (NEP). The NEP scale measures broad beliefs about the biosphere and the effects of human action on it, and it prompt an individual to accept more narrowly focused awareness of consequences beliefs (Stern *et al.*, 1999).

In this study, we examine individuals´ *beliefs* with reference to two main constructs: (1) *perceived consumer effectiveness*, meaning the extent to which individuals believe that their actions will make a difference in solving a problem (Ellen *et al.*, 1991); and (2) *risk perception* of global climate change, regarding how it will affect future generations, plants and animals.

Concerning perceived consumer effectiveness (PCE), it is related to the concept of perceived behavioral control developed in the TPB, and defined as individuals´ belief that their efforts can make a difference in the solution to a problem (i.e. global climate change), or if they believe that their behavior will lead to the desired outcome (Ellen *et al*., 1991). It seems to be related to pro-environmental behavior (Kinnear *et al*., 1974; Webster, 1975) and has been tested to predict socially responsible and green purchasing behavior (Kim & Choi, 2005; Wesley *et al.*, 2012). Consequently, we hypothesize that:

H_3: *Perceived consumers effectiveness will determine their behavior toward the environment*.

H_{3A}: *Perceived consumers effectiveness will determine their behavior of rewarding companies that take actions to reduce global climate change*.

H_{3B}: *Perceived consumers effectiveness will determine their behavior of punishing companies that do not take actions to reduce global climate change*.

PCE is also related to the concept of perceived self-efficacy (PSE) from Bandura (1977), defined as people´s beliefs about their competence to have an effect in the events that affect their lives. This last concept has been shown to determine risk related behaviors (Morisset, *et al*., 2010), although in the present research, instead of PSE we have measured PCE with the aim to differentiate our research from previous approaches. Thus, we propose that PCE might be related to risk perception as stated in the subsequent hypothesis:

H_4: *Perceived consumers effectiveness is related with their risk perception of global climate change*.

In the present research, issue involvement is measured regarding the level of worry that individuals feel they are facing toward global climate change. Preceding

research has shown that level of worry among other factors is related with the level of risk perceived, when referring to health risk (Lee *et al*., 2005) and to environmental hazards (Kahan *et al.,* 2011). Thus, we want to test if this relationship is verified when considering global climate change threat:

H_5: *Individuals´ issue involvement is related with their risk perception of global climate change*.

Finally, risk perception is understood in the present paper as individuals´ beliefs regarding the harm that global climate change will cause on human being, but also on plants and animals species. Previous research has shown the relationship between risk perception and purchasing intention (Lobb *et al.*, 2007), but also with the willingness to address global climate change, meaning the intention to engage in environmentally friendly behavior (O´Connor *et al*., 1999). Hence, we postulate the following hypothesis:

H_6: *Individuals´ risk perception of global climate change will determine their behavioral intentions*.

A summary of these relations is offered in Figure 1.

3. METHODS

3.1. Procedure and Respondents

A national study was conducted in Spain in June and July 2011, with a representative sample of the online population, where participants completed a 38-item survey, with an average length of 16 minutes per participant, that included measures developed by the Yale Project on Climate Change Communication, with the aim to asses four categories of global-warming and energy-related constructs: global warming individuals´ behavior, intentions, beliefs, issue involvement, and preferred societal response.

The sample was recruited by *Toluna Networks*, an online panel community with 147,883 panelists. A total of 835 completed surveys were returned for an overall

response rate of 75%. However 233 of them were excluded from the final data base since the time of response was considerably under the average time that participants spent in the pre-test of the questionnaire (16 minutes), obtaining a final sample size of 602 individuals.

The distribution of the final sample corresponded to 52% of females. The ages were ranged between 18 and more than 75 years old, distributed as shown in Table 1.

Table 1. Sociodemographic distribution

Sample	n = 602
Cooperation rate*	75
Gender*	
Males	48
Females	52
Ages*	
18-24	13
25-34	22
35-44	20
45-54	24
55-64	17
65-74	4
75+	1
Education*	
Less than high school	3
High school	11
Some college	40
Bachelor´s degree	46

* Data are given in percentages.

3.2. Measures

In order to achieve the objectives of the present paper, several of the items were chosen to measure the latent constructs presented in the model proposed (see Figure 1). A description of these scales, as well as an evaluation of their reliability is offered in the next paragraphs.

Issue Involvement

This latent variable (INVOLV) was built by a combination of two items that presented high reliability ($\alpha = 0.766$): concern about global climate change which has

previously been proven to be related to risk perception (Kahan et al., 2011); and previous thoughts regarding the topic. Both items were measured with a four-point Likert scale (see Table 2).

Table 2. Reliability test for INVOLV

	Mean	SD	Cronbach's Alpha
INVOLV1: How worried are you about global climate change?	3.15	0.694	0.766
INVOLV2: How much had you thought about global climate change before today?	3.12	0.739	

Beliefs

Two different latent constructs were included as distinct dimensions of individuals´ beliefs: *perceived consumer effectiveness* and *risk perception*. The first one (PERC_CE) is defined as the extent to which individuals believe that their actions will make a difference in solving a problem (Ellen *et al*., 1991). It was measured using a three items scale (α = 0.792) with a four-point Likert scale (see Table 3) from "*Not at all*" to "*A lot*", related to the effectiveness of the energy-saving actions taken by the participants.

Table 3. Reliability test for PERC_CE

Think back to the energy-saving actions you're already doing and those you'd like to do over the next 12 months.	Mean	SD	Cronbach's Alpha if Item Deleted	Cronbach's Alpha
PERC_CE1: If you did most of these things, how much do you think it would reduce your personal contribution to global climate change reduction?	2.62	0.785	0.823	0.792
PERC_CE2: If most people in the Spain did these same actions, how much would it reduce global climate change?	3.10	0.749	0.565	
PERC_CE3: If most people in the modern industrialized countries around the world did these same actions, how much would it reduce global climate change?	3.52	0.696	0.741	

The second one, Risk perception (RISK_P), was measured by a combination of three single items (see Table 4) in a four-point Likert scale ranging from "Not at all" to

"A great deal" (α = 0.821). Participants were asked whether or not they perceived that global climate change would harm them personally, future generations and/or plant and animal species.

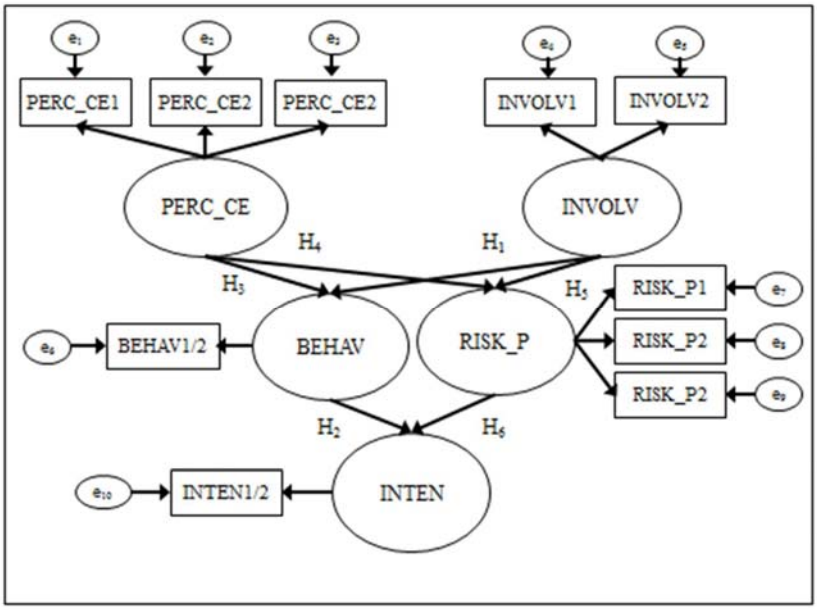
Table 4. Reliability test for RISK_P

How much do you think global climate change will harm…?	Mean	SD	Cronbach's Alpha if Item Deleted	Cronbach's Alpha
RISK_P1: [You personally]	2.90	0.775	0.886	0.821
RISK_P2: [Future generations of people]	3.62	0.623	0.665	
RISK_P3: [Plant and animal species]	3.65	0.617	0.716	

Past Reported Behavior

Participants were asked regarding their accomplishment for two kinds of reported behavior during the last twelve months, which will be considered as the behaviors of "*Reward*" and "*Punishment*": (1) the behavior of purchasing products to reward those companies that were taking steps to reduce global climate change; and (2) the behavior of not purchasing products with the purpose to punish those companies that were not taking steps to reduce global climate change. Both behaviors were measured with a five-point Likert scale [1 = *Never*; 5 = *A lot of times*].

Figure 1. Illustration of the model proposed.



Behavioral Intentions

This variable was measured by two separated items related to the previous reported behavior: (1) the intention to keep rewarding companies that were taking steps to reduce global climate change; and (2) the intention to keep punishing companies that were not taking steps to reduce global climate change. Both items were measure with a three-point Likert scale [1 = *Less frequently*; 3 = *More frequently*].

3.3. Data Analysis

In order to test the model proposed, the first step was to conduct Exploratory Factor Analysis (EFA) with SPSS 18.0 version of the software for the latent constructs that were presented in the last subsection: PERC_CE, INVOLV and RISK_P.

This methodology provides a way to investigate and find common but unobserved factors that may influence a set of variables (Cudeck, 2000). It involves the study of order and structure when facing multivariate data, and attempts to reveal those intrinsic constructs and dynamics from observed data (Tucker & MacCallum, 1997).

The sample considered is sufficient according to Luque (2012: 44), who recommends having at least 100 cases and never less than 50.

With this purpose, EFA was tested within the items that would shape the three latent constructs proposed: *perceived consumer effectiveness, involvement* and *risk perception. Kaiser-Meyer-Olkin* coefficient and *Bartlett's test of sphericity* were computed to determine the adequacy of the methodology. Principal Components Analysis with varimax rotation results are presented in section 4.

The second step was to conduct Confirmatory Factor Analysis (CFA). It was performed to assess comprehensively the measurement scales used in the proposed model, in order to determine whether the tools used in this paper were adequate. The main difference between the EFA and the CFA is that the latter allows for restrictions on the charges, setting a priori which observed variables are affected by what factors, what variables are correlated, and so on, whilst the first method didn´t impute the given

sources of information to prefixed latent constructs. Results for the evaluation of the global goodness of fit, as well as the composite reliability and the variance extracted are presented in section 4.

Finally, Structural Equation Modeling (SEM) was used to test the postulations regarding the relationship of *perceived consumer effectiveness* and *involvement* with *behavior* and *risk perception*; and the relationship between *behavior* and *risk perception* with *behavioral intention*.

SEM is a multivariate regression methodology that allows testing hypothesized effects between variables that were considered dependent in the first step, but are independent in the second step (Del Barrio & Luque, 2012: 527), as it happens with *behavior* and *risk perception* in the present research, in fact variables in SEM may influence on another reciprocally, either directly or using a third variable as intermediate or moderator. Hence, there are two latent exogenous variables: *perceived consumer effectiveness* and *involvement*; and three latent endogenous variables: two first-degree endogenous variables (*risk perception* and *behavior*); and one second-degree endogenous variable which is *behavioral intention*.

4. RESULTS

4.1. EFA

The first step to analyze the data in order to estimate the model proposed, was the preparation of the data. Missing values were estimated using multiple imputation method by expectation-maximization with the statistical program Lisrel 8.80. This method first impute predicted scores for missing values for a number of regressions in which each incomplete variable is regressed on the remaining variables for a given case; then, the entire data set is subjected to maximum likelihood estimation. Both steps are subsequently repeated until it finds a stable solution (Del Barrio & Luque, 2012: 546).

Afterwards, EFA was lead through Principal Components Analysis, so as to seek the best linear combination of the proposed variables that explains a higher percentage of data variance (Luque, 2012: 48).

Three main components were found to explain 74.88% of the variance, as indicators of the three latent constructs included in the model (see Table 5).

Table 5. Principal Components Analysis: Total Variance Explained

Component	Initial Eigenvalues		
	Total	% Variance	Cumulative %
1	3.602	45.024	45.024
2	1.462	18.277	63.301
3	0.927	11.582	74.883

The results showed that Principal Components Analysis was suitable for the latent constructs proposed since: (1) Bartlett's test of sphericity provided significant differences between the correlation matrix and the identity matrix (Chi-Square = 1834.652; df = 28; *p*-value = 0.000); (2) Kaiser-Meyer-Olkin index was higher than 0.75; and (3) the correlation coefficients of the anti-image correlation matrix presented low values. Moreover, we found: (a) factor loadings higher than the minimum required ($R^2 > 0.5$); (b) high communalities for all the variables (> 0.5); and (c) three factors were extracted as expected and according to the literature reviewed (Table 6).

Table 6. Rotated Component Matrix

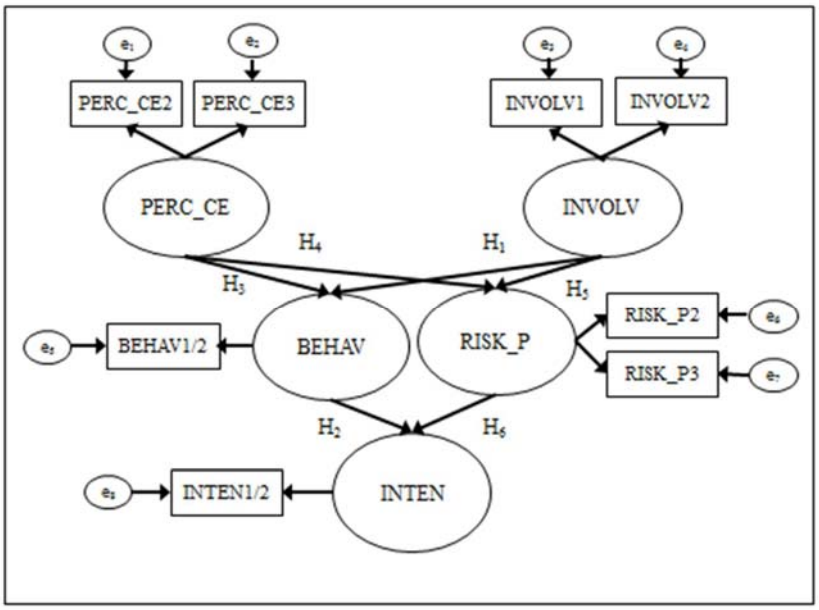
	1	2	3
RISK_PERC1	**0.627**	0.175	0.345
RISK_PERC2	**0.895**	0.117	0.202
RISK_PERC3	**0.896**	0.113	0.126
PERC_CE1	0.004	**0.743**	0.222
PERC_CE2	0.154	**0.897**	0.110
PERC_CE3	0.227	**0.799**	0.052
INVOLV1	0.320	0.229	**0.799**
INVOLV2	0.184	0.108	**0.888**

4.2. CFA

First of all, CFA and test for univariate and multivariate normality were computed providing non normality for the distribution of the variables tested. Moreover,

the CFA values given suggested to exclude two of the items from the analysis (RISK_PERC1 & PERC_CE1), restricting the model as shown in Figure 2.

Figure 2. Model proposed modified after CFA



Robust Maximum Likelihood was implemented to correct deviations from normality. Global adjustment of CFA provided appropriate levels for the measures of goodness of fit as showed in Table 7.

Table 7. Global Goodness of Fit for the CFA

	χ^2	p-value	RMSEA	AGFI	NFI	NNFI	IFI	RFI	CFI
Model	9.23	0.16130	0.030	0.98	1.00	1.00	1.00	0.99	1.00
Recommended		> 0.05	< 0.05	> 0.90	< 0.90	≈ 1	≈ 1	> 0.90	≈ 1

4.3. SEM

The last step in the methodology proposed is related to the construction of the integrative model that aims to explain the behavioral intention to (not) purchase products from companies that are (not) taking steps to reduce global climate change, what we call *reward* and *punishment*.

Once again, we decided to estimate the parameters of the model with Robust Maximum Likelihood estimation methodology, with the purpose to correct deviations from normality.

Concerning the SEM analysis, same model was tested separately for each of the behaviors and behavioral intention: (1) the first model examined the behavior and intention of rewarding companies for taking steps to reduce global climate change; and (2) the second one was related to the behavior and intention of punishing companies for not taking steps to reduce global climate change.

4.3.1 Reward Model

Global adjustment for the *Reward Model* provided appropriate levels for the RMSEA, AGFI, NFI, NNFI, IFI, RFI and CFI measures of global adjustment, as showed in Table 8.

Table 8. Reward Model - Global Goodness of Fit for Behavioral Intention 1

	χ^2	p-value	RMSEA	AGFI	NFI	NNFI	IFI	RFI	CFI
Model	68.64	0.000	0.077	0.93	0.98	0.96	0.98	0.95	0.98
Recommended		> 0.05	< 0.05	> 0.90	< 0.90	≈ 1	≈ 1	> 0.90	≈ 1

The structural model adjustment was analyzed using the estimated coefficients significance (Table 9), where all the values for the Student *t*-test were significant at a 95% level of confidence. Likewise, after examining the reliability of the standardized coefficients (R^2) it was noted that all of them were over 0.5. Besides, the structural equations indicate that the relationships within the endogenous variable explain: 40% of the variance of RISK_P; 26% for theBEHAV1; and 28% for INTEN1 as stated in Table 10. The estimated standardized model is displayed in Figure 3.

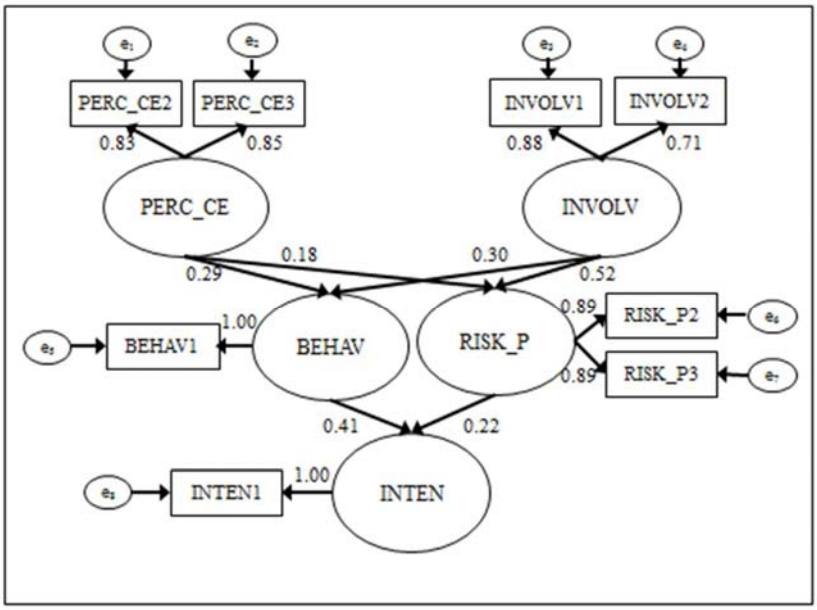
Table 9. Reward Model – Structural Model Adjustment for Behavioral Intention 1: Estimated Coefficients

Observed Variables	Estimated Coefficients	t-student	R^2
RISK_P2	0.56	-	0.80
RISK_P3	0.55	19.57	0.79
PERC_CE2	1.00	-	0.69
PERC_CE3	0.94	14.97	0.72
INVOLV1	0.61	19.50	0.77
INVOLV2	0.53	15.05	0.51

Table 10. Reward Model – Structural Model Adjustment for Behavioral Intention 1: Structural Equations

Relationships	Estimated Coefficients	t-student	R^2
PERC_CE → RISK_P	0.29	3.58	0.40
INVOLV → RISK_P	0.52	8.87	
PERC_CE → BEHAV1	0.57	6.25	0.26
INVOLV → BEHAV1	0.36	5.95	
BEHAV1 → INTEN1	0.19	10.70	0.28
RISK_P → INTEN1	0.13	4.96	

Figure 3. Reward Model - Standardized Structural Equation Model for Behavioral Intention 1



Finally, to assess the measurement model adjustment it is necessary that all the latent constructs have a high internal consistency that will be determined through the *composite reliability* and the *variance extracted*, both presented in Table 11 and computed with the following mathematical formulas (Del Barrio & Luque, 2012: 563-564).

$$\text{Composite reliability} = \frac{(\Sigma \text{ Standardized charges})^2}{(\Sigma \text{ Standardized charges})^2 + (\Sigma \text{ Errors of measurement})}$$

$$\text{Variance extracted} = \frac{\Sigma \text{ Standardized charges}^2}{\Sigma \text{ Standardized charges}^2 + \Sigma \text{ Errors of measurement}}$$

Table 11. Reward Model – Measurement Model Adjustment

Latent construct	Composite reliability	Variance extracted
PERC_CE	0.901	0.820
INVOLV	0.807	0.771
RISK_PERC	0.918	0.909

The values for composite reliability are all of them above the limit imposed (> 0.70). Variance extracted will indicate the percentage of the indicators explained by the latent variable. The scores obtained for variance extracted are over 0.50, therefore they adequately measure the latent construct (Del Barrio & Luque, 2012: 564).

4.3.2 Punishment Model

Regarding the *Punishment Model* proposed, global adjustment also provided appropriate levels for the RMSEA, AGFI, NFI, NNFI, IFI, RFI and CFI measures of global adjustment, as showed in Table 12.

Table 12. Punishment Model – Global Goodness of Fit for Behavioral Intention 2

	χ^2	p-value	RMSEA	AGFI	NFI	NNFI	IFI	RFI	CFI
Model	31.29	0.00803	0.043	0.97	0.99	0.99	0.99	0.98	0.99
Recommended		> 0.05	< 0.05	> 0.90	< 0.90	≈ 1	≈ 1	> 0.90	≈ 1

The estimated coefficients for the structural model adjustment are presented in Table 13, where all the values for the Student *t*-test were significant at a 95% level of confidence. Moreover, all the R^2 of the standardized coefficients were over 0.5, assessing sufficient reliability. Also, the structural equations indicate that the relationships within the endogenous variable explain in this particular case: 39% of the variance of RISK_P; 27% for theBEHAV2; and 13% for INTEN2 as stated in Table 14. The estimated standardized model is displayed in Figure 4.

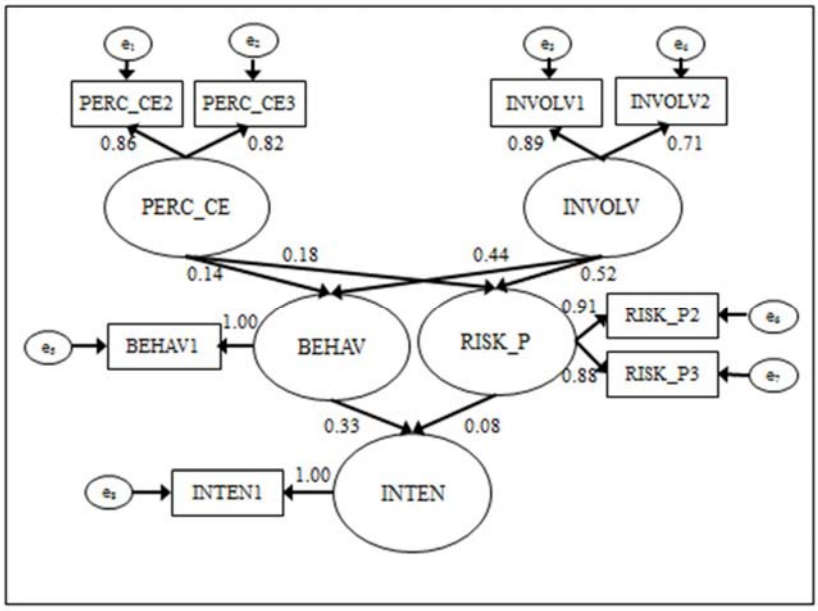
Table 13. Punishment Model – Structural Model Adjustment for Behavioral Intention 2: Estimated Coefficients

Observed Variables	Estimated Coefficients	t-student	R^2
RISK_P2	1.00	-	0.82
RISK_P3	0.96	19.58	0.77
PERC_CE2	1.00	-	0.75
PERC_CE3	0.87	13.60	0.67
INVOLV1	1.00	-	0.78
INVOLV2	0.85	12.02	0.50

Table 14. Punishment Model – Structural Model Adjustment for Behavioral Intention 2: Structural Equations

Relationships	Estimated Coefficients	t-student	R^2
PERC_CE → RISK_P	0.15	3.44	0.39
INVOLV → RISK_P	0.48	8.52	
PERC_CE → BEHAV1	0.29	2.75	0.27
INVOLV → BEHAV1	0.98	8.12	
BEHAV1 → INTEN1	0.10	1.96	0.13
RISK_P → INTEN1	0.17	7.89	

Figure 4. Punishment Model - Standardized Structural Equation Model for Behavioral Intention



Finally, in order to examine the internal consistency, we computed the *composite reliability* and the *variance extracted*, as indicated previously. Results are presented in Table 15.

Table 15. Punishment Model – Measurement Model Adjustment

Latent construct	Composite reliability	Variance extracted
PERC_CE	0.904	0.825
INVOLV	0.812	0.778
RISK_PERC	0.919	0.911

As we can realize, all the values for composite reliability and variance extracted indicate that there is high internal consistency in the model proposed (composite reliability > 0.70; variance extracted > 0.50). Consequently, they adequately measure the latent construct (Del Barrio & Luque, 2012: 564).

5. DISCUSSION

The results of the present research corroborate the hypotheses tested, finding predictors of pro-environmental behavioral intention to purchase products from companies that are taking steps to reduce global climate change, as a reward for those corporations, and to not purchase products from companies that are not taking steps to reduce global climate change, as a punishment for them.

The EFA conducted through Principal Components Analysis and varimax rotation found three latent constructs as predicted, corresponding to perceived consumer effectiveness, involvement and risk perception. However, later CFA suggested excluding two of the items that were identified as PERC_CE 1 and RISK_P1.

Furthermore, results for the CFA test of global goodness of fit gave appropriate levels for the χ^2 (9.23; *p*-value = 0.16130), RMSEA (0.03), AGFI (0.98), NFI (1.00), NNFI (1.00), IFI (1.00), RFI (0.99), and CFI (1.00) indexes.

Finally, two Structural Equations Models were proposed with the latent variables found in the previous step (see Table 16): the first one for the behavioral intention of rewarding companies; and the second one for the behavioral intention of punishing them.

Table 16. Comparison of both explanatory Models

Standardized coefficients	Model 1	Model 2
PERC_CE → RISK_P	0.18	0.18
INVOLV → RISK _P	0.52	0.52
PERC_CE → BEHAV	0.29	0.14
INVOLV → BEHAV	0.30	0.44
BEHAV → INTEN	0.41	0.33
RISK_P → INTEN	0.22	0.08

Regarding the first model, the analysis revealed satisfactory values for the absolute measure of fit, RMSEA (0.077); and the incremental adjustment measures: AGFI (0.93), NFI (0.98), NNFI (0.96), IFI (0.98), RFI (0.95) and CFI (0.98) indexes.

Likewise, the structural model adjustment gave significant values for the Student *t*-test for all the items, at a 95% level of confidence (*t*-value > 1.96), and all the standardized coefficients were sufficiently reliable ($R^2 > 0.5$).

The results for the standardized coefficients of the structural equations showed the same values for the relationship of the perceived consumer effectiveness and involvement with the risk perceived in both models, and greater for the involvement meaning that this variable has a higher impact on the risk that individuals have of climate change. Nevertheless it changes for the rest of the predictors. The standardized coefficient between the perceived consumer effectiveness and their behavior is 0.29 in the reward model, whilst it is 0.14 in the second one. Likewise, the values are higher for the involvement again, as it happened when considering the preceding relationship with the risk perceived.

Moreover, the last variable shows greater values for the both standardized coefficients in the first model (0.41 & 0.22) than in the second one (0.33 & 0.08), which supports the results related with the percentage of variance explained (28% in the reward model vs. 13% in the punishment model).

Composite reliability and variance extracted were also computed to test the adjustment of the measurement model. The first one ensures the internal consistency of the indicators as composite reliability is over 0.70 for all the latent variables; and the

second one indicates the percentage of the variance of the indicators that is explained by the latent variable, all over 0.50 as expected.

With regard to the second model, the punishing behavioral intention, it also proved an adequate adjustment for the absolute measures with a RMSEA of 0.043; as well as incremental adjustment measures: AGFI (0.97), NFI (0.99), NNFI (0.99), IFI (0.99), RFI (0.98), CFI (0.99).

Furthermore, the standardized coefficients were found to be reliable ($R^2 > 0.5$), and all the values for the Student *t*-test of the structural model adjustment were significant at a 95% level of confidence (> 1.96).

In this predictive and explanatory model we found that the variance of the final variable, INTEN2, was explained in a 13%, whilst it was a 39% for risk perception, and a 27% for the reported behavior of punishing companies for not taking steps to reduce global climate change.

Finally, internal consistency of the indicators was confirmed (composite reliability > 0.70), in addition to the values expected for the variance extracted (> 0.50).

When comparing both explanatory Models (Table 16) we can see that the final variable *behavioral intention* is better explained in the first Model, which means that the model proposed predicts a higher percentage of the behavioral intention of rewarding companies instead of the behavioral intention of punishing them (28% for the reward vs. 13% for the punishment).

6. CONCLUSIONS

The purpose of the present research was to explain and predict two different behavioral intentions related with individuals´ decisions of purchasing: the first one involves the behavioral intention of rewarding companies for taking steps to reduce global climate change, by buying their products; and the second one includes the behavioral intention of punishing companies for not taking steps to reduce global climate change, by not buying their products. Both behavioral intentions were proposed to be predicted through two latent variables: risk perception and past reported behavior.

First of all, EFA was conducted in order to find the number of latent variables that could be derived from the items included, followed by CFA to confirm the results previously found. Finally, SEM was accomplished as an adequate methodology that would predict the interdependent relationships between the variables included in the model, since risk perception and behavior were considered dependents in the first step, but independents in the next one.

Regarding the results, the SEM confirmed that the variables found in the literature would verify the hypotheses tested with a 28% of the variance of rewarding behavioral intention explained, and a 13% for punishment. Therefore, we can state that greater levels of risk perceived and past behaviors toward the corporations, should predict future behavioral intentions to keep rewarding or punishing them. Likewise, perceived consumer effectiveness and involvement seem to predict individuals´ reported behavior, as well as their risk perception of global climate change.

Besides, the outcomes obtained in the present study, could be helpful for those corporations who are thinking to change their production chain in order to include environmental care in their concerns, as consumers will consider this when facing their purchasing decisions.

In addition, they might consider the possibility to improve their communication strategies with the purpose to increase consumers´ awareness about the pro-environmental actions that the companies are taking, so they do not miss any information that could distort the image that the corporations want to give in an integrative way.

On the other hand, institutions that are planning to enhance individuals´ pro-environmental purchasing behavior, should focus on improving their perceived risk of global climate change, as it seems to positively determine behavioral intention; but they should also try to increase consumers´ involvement with global climate change, as well as to make them aware of the positive outcomes that their pro-environmental actions are having, so their perceived effectiveness could augment.

Finally, the present research has some limitations since it only considers behavioral intention as the final variable of the model proposed, instead of actual behavior. Therefore we think that future research should go a step further including how

the model could be improved by adding the effect that the variables proposed may have on individuals´ final behavior toward those companies.

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III. SEGUNDO ENSAYO

SECOND ESSAY

Risk Perception and the Commitment to Reduce Global Climate Change in Spain.

Rodríguez-Priego, Nuria
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Georgantzís, Nikolaos

SECOND ESSAY

"Risk Perception and the Commitment to Reduce Global Climate Change in Spain".

Rodríguez-Priego, Nuria
Montoro Ríos, Francisco J.
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Abstract

In the present paper, an online national representative survey of the Spanish population (n = 602) was conducted with the aim to examine factors predicting risk perception toward global climate change, and level of commitment that participants would make in order to reduce it. Multiple hierarchical regression analysis was conducted in four steps and a structural equations model was tested. A survey tool designed by the Yale Project on Climate Change Communication was applied in order to build scales for the variables introduced in the study. The results show that perceived consumer effectiveness and involvement are determinant factors for risk perception and the level of commitment to reduce global climate change. However, there are some differences in the influence that sociodemographics, view of nature and cultural cognition have on them.

Keywords: Risk Perception; Global Climate Change; Perceived Consumer Effectiveness; Cultural Cognition Theory.

SEGUNDO ENSAYO

"Percepción del Riesgo y Compromiso por Reducir el Cambio Climático Global en España".

Rodríguez-Priego, Nuria
Montoro Ríos, Francisco J.
Georgantzís, Nikolaos

Resumen

En el presente trabajo se llevó a cabo una encuesta nacional representativa de la población española (n = 602) con el objetivo de examinar los factores que predicen la percepción de riesgo frente al cambio climático global, y el nivel de compromiso para reducirlo por parte de los participantes. Se realizaron análisis de regresión jerárquica múltiple en cuatro pasos y se testó el modelo de ecuaciones estructurales propuesto basado en la revisión de la literatura existente. Se aplicó una herramienta diseñada por el Yale Project on Climate Change Communication con el fin de construir escalas de medida para las variables introducidas en el estudio. Los resultados muestran que la efectividad percibida por los consumidores de sus propios actos en defensa del medioambiente y la implicación son factores determinantes en la percepción del riesgo y el nivel de compromiso para reducir el cambio climático global. Sin embargo, se encontraron algunas diferencias en cuanto a la influencia que las variables socio-demográficas, la visión de la naturaleza y la cognición cultural parecen tener sobre la percepción del riesgo y el nivel de compromiso.

Palabras clave: Percepción del Riesgo; Cambio Climático Global; Efectividad Percibida; Teoría de la Cognición Cultural.

1. INTRODUCTION

Humans have been exposed to many threats throughout history: epidemic illnesses, world wars, terrorist attacks, and environmental catastrophes. Human survival instinct forces people to evaluate circumstances and make decisions when faced with risks. Many different factors determine the resulting choices including emotions, positive and negative feelings, past experiences and cognition (Peters and Slovic, 1996; Finucane et al., 2000a; Loewestein et al., 2001). This paper focuses on global climate change as an environmental threat, measuring the perceived risk it generates and analyzing how that risk is shaped.

Global Climate Change is a reality that has been acknowledged by scientists during several decades. Moreover, the Intergovernmental Panel on Climate Change´s (IPCC) reports present a clear scientific view on the current state of earth´s climate and its potential environmental and socio-economic impacts.

The last IPCC report (2007) stated that eleven of the twelve warmest years since 1850 occurred in the period between 1995 and 2006 resulting in widespread melting of snow and ice, and rising average global sea levels. Global atmospheric concentrations of CO_2, methane (CH_4) and nitrous oxide (N_2O) have increased markedly as a result of human activities since 1750 and are now well above pre-industrial values.

Although human action is not the sole cause of the changes that have taken place, future climate change caused by humans could trigger additional increases in greenhouse gases in the atmosphere, amplifying the warming (Stern, 2006). These reactions are potentially powerful lesser known and just beginning to be quantified.

Therefore, international governments are to starting to consider environmental threats as an actual source of danger. The European Union has developed a climate strategy related to the European Climate Change Programme (ECCP), which advocates specific control measures to limit temperature increases to 2° C above pre-industrial levels by 2020[1]. The evolution of EU environmental policy includes the progressive

[1] Commission of the European Communities (2007). Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Region. Available online at:

introduction of economic growth that is compatible with sustainability, environmental protection and social cohesion (Aguilar, 2003).

More specifically in Spain, a legislative strategic framework has been established, including the *Spanish Strategy for Climate Change and Clean Energy 2007-2012-2020*, which calls for the implementation of projects to reduce climate change and encourage the use of clean energy, while promoting social welfare, economic growth and improved environmental protection. Furthermore, global climate change is the main environmental concern of regional populations in Spain, and it is linked to concerns about specific, local problems, such as rising temperatures, drought precipitation, increased desertification and soil erosion (Moyano et al., 2009).

Political actions may be influenced by what citizens perceive as risks (Slovic, 1997), and the importance of climate change risk perception rests on how policy-makers are influenced by two different stakeholders: scientists and the lay public. Despite the evidence for climate change, both scientists and lay people may be subject to the same problems when they make judgments since cognitive limitations affect their beliefs and contribute to disagreements (Kahneman et al., 1982). Additionally, environmental consciousness can be manifested through an increased understanding of environmental policy measures (Jiménez Sánchez & Lafuente, 2010).

Differences in interpretation of environmental data present some obstacles to global climate change mitigation. First, the lack of a cognitive framework to conduct a global multidisciplinary risk evaluation reduces the effectiveness of disaster risk management and adaptation to climate change (Cardona, 2004). Furthermore, previous research has shown that people tend to perceive more risk from rare events such as natural disasters or terrorism, than from everyday risks like heart disease, or car accidents. (Slovic *et al*., 1980).

Risk perception has been previously examined from several perspectives and fields of research. Psychological, anthropological and sociological studies have identified well-known paradigms. Many past studies on risk perception have focused on climate change (Bord *et al*., 1998; Dunlap, 1998; Stedman, 2004; Leiserowitz, 2006); and natural disasters (Ho *et al*., 2008). Results show that the risk people perceive from

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0002:FIN:EN:PDF

their environment is highly influenced by the characteristics of the potential source of danger, but also by individual characteristics like gender, race, ethnicity, socioeconomic status (Flynn et al., 1994; Finucane et al., 2000b; Lerner et al., 2003) and even by culture (Dake, 1991; Sjöberg, 1996; Douglas, 1998: 98; Poortinga *et al*., 2002; Rippl, 2002).

Therefore, the aim of the present study is twofold: (1) to analyze the factors determining risk perception toward global climate change; and (2) to examine whether these factors have an influence on the support for the efforts of the Spanish government, corporations and citizens in order to reduce negative impacts on the environment.

To fulfill these objectives, several scales based on a survey tool developed by the Yale Project on Climate Change Communication designed to examine the US population's level of concern were used in the present study. Additionally, we have included items from the cultural cognition theory (Kahan, 2008) and the view of nature (Douglas & Wildavsky, 1982). Finally, we tested whether sociodemographic aspects determine both latent constructs: risk perception and support for climate change reduction efforts. All of the variables measured are described in the third section.

2. LITERATURE REVIEW

2.1. Risk Perception

The importance of risk perception is related to the influence that it has on government spending priorities, as citizens´ perception and awareness are translated into policies, much more than the actual risks identified by the experts (Slovic, 1997). This means that policy makers take action considering what ordinary citizens perceive as risks; hence this research is exploring what will increase the risk perceived by non-specialized individuals. When experts are asked to evaluate hazardous activities they contemplate technical aspects (Slovic et al., 1982a), while the lay public takes other aspects into account.

This concept is a psychological construct based on a variety of sources of information and subjective judgment about the perceived likelihood of encountering

hazards. Often in these situations, objective information is minimal and heavily influenced by internal factors that can be quite discrepant from the objective evidence of actual risk (Gierlach, et al., 2010). Furthermore, Douglas and Wildavsky (1982) state that risk perception is the result of past experiences that shape individuals´ perspectives, providing cognitive schemes for defining and understanding risk.

Risk perception has also been defined as the judgments that people make when they are asked to characterize and evaluate hazardous activities and technologies (Slovic, 1987). Therefore it is inherently subjective (Krimsky & Golding, 1992), and it depends on awareness, culture and social constructs (Slovic & Gregory, 1999). Hence, risk perception is a subjective assessment of the probability of a specific type of accident happening, and how concerned individuals are with the consequences (Sjöberg, 2004, pp: 8).

Choices made in circumstances of risk and uncertainty have been one of the most examined research topics in judgment and decision-making (Loewestein et al., 2001). Psychometric research has identified three main factors related to the perception of risk: first, the understanding of the risk implied, followed by the extent to which it evokes a feeling of dread and, finally, the number of people who are exposed to it (Slovic *et al.*, 1982). In a follow-up study, Peters and Slovic (1996) found that people´s perception of risk has two main psychological dimensions: *dread*, defined as the lack of perceived control and the catastrophic potential; and *risk of the unknown*, when a hazard is estimated to be unobservable, or has delayed impacts.

Research regarding perceived risk began with the *affect heuristic* to understand a wide range of risk-taking behaviours (Kahneman et al., 1982; Peters et al., 2006) including the use of simple gambles; and was followed by studies on the impact of *Cultural Theory (CT)* and *the culture cognition theory* (CC) where gender and race seem to be related to risk perception (Finucane et al., 2010; Kahan et al., 2010; Satterfield et al., 2010a), and past experience (Satterfield et al., 2010b); and finally *psychometric studies* assuming that risk is defined by individuals in a subjective manner, determined by psychological, social, institutional and cultural factors (Slovic, 2010: xxv).

One specific approach to the determinants of human impact on the environment, or their ecological footprint, is through the study of perceived environmental risk, with a look at the whole range of interests and methodological approaches represented within the risk research community. Increasingly, researchers are adopting risk analysis tools and techniques in their efforts to characterize the uncertain future climate (Lorenzoni *et al*., 2005). Studies related to public attitudes could be used to highlight the concerns of people at risk and anticipate their reactions to these situations as well as develop risk management solutions (Slovic et al., 1982b).

Besides cultural and sociodemographic factors affecting risk judgments, another variable that has been proven to have an effect on risk perception is the concept of perceived self-efficacy (Bandura, 1977). This is defined as people´s beliefs about their ability to influence events that affect their lives. Risk related behaviors are influenced by perceived self-efficacy (for example, driving behavior, (Morisset, et al., 2010)), although instead of this particular variable, we have measured '*perceived consumer effectiveness*' which is related to the previous concept, in order to differentiate our research from previous approaches. This construct indicates the extent to which individuals believe that their actions will make a difference in solving a problem (Ellen *et al*., 1991), and may have an influence on risk perception of global climate change.

2.1.1. Cultural Theory

There are two trends concerning the definition of culture: first, some authors refer to the mental constructs as values, beliefs and norms, or cultural bias; second, it refers to the social relations that determine individuals´ behavior and attitudes. Both ideas are integrated in the Cultural Theory (CT) and defined as *ways of life* (Thompson et al., 1990).

The anthropologist Mary Douglas (1978) established a model to explain people's behavior and beliefs, called the *grid-group cultural theory*. Later, it was further developed by Schwarz and Thompson (1990: 61) and others (Douglas and Wildavsky, 1982; Wildavsky, 1987; Douglas, 1992) and renamed the *Four Political Cultures* or *Cultural Theory (CT)*. This theory answers to two central questions about

the existence of human beings: '*Who am I*?' and '*How should I behave?*' (Wildavsky, 1987). It argues that, on the one hand, personal identity is determined by individuals´ relationships to *groups*, influenced by the incorporation of an individual in a group. On the other hand, behavior depends on the social circumstances to which an individual is subject (*grid* dimension), the degree to which an individual´s life is circumscribed by other's instructions.

The *Four Political Cultures* have been classified based on several aspects related to the individual preferences for organizing society; views of resources, scarcity and availability; learning styles, social contexts, desired system properties, ideals of fairness, and preferred form of governance (see Table 1).

Table 1. The Four Political Cultures*

	Hierarchical	Egalitarian	Individualistic	Fatalistic
Preferred way of organizing	Nested bounded group	Egalitarian bounded group	Ego-focused network	Margins of organized patterns
View of resources	Scarce	Depleting	Abundant	Lottery
Learning style	Anticipation	Trial without error	Trial and error	Luck
Social context	Positive group Positive grid	Positive group Negative grid	Negative group Negative grid	Negative group Negative grid
Desired systems properties	Controllability (inherent orderliness)	Sustainability (inherent fragility)	Exploitability (inherent fluidity)	Copability (inherent chaos)
Ideal of fairness	Equality before the law	Equality of result	Equality of opportunity	Not on this earth
Preferred form of governance	Leviathan: structured society and a legitimated government.	Jeffersonian: Self-sufficiency, self-government, and individual responsibility.	*Laissez-faire*: the government has not so much power, transactions between private parties are free	It doesn´t matter who you vote for…

(*adapted from Schwarz and Thompson, 1990: 66)

This approach claims that our knowledge, our actions, our way of justifying what we do and our judgments of people's behavior are all biased. Schwarz and Thompson postulated the existence of these Political Cultures in terms of individuals' perception of risk. Each is a package of biases that explains the view of one's surroundings. Thus, the two dimensions of sociality (*group* and *grid*) generate four

basic forms of social relationships (Schwarz and Thompson, 1990: 6): Fatalism, Hierarchy, Individualism and Egalitarianism (Table 2 and Figure 1).

However, after Douglas and Wildavsky (1982) introduced the grid-group analysis and defined only four distinct cultures, other authors introduced a fifth way of life called the *Hermit* (Figure 1) who "*escapes social control by refusing to control others or to be controlled by others"* (Thompson *et. al.* 1990: 7*). The "Impossibility Theorem" strengthens this theory, claiming that the number of distinct ways of life and their related worldviews within the group-grid structure is finite. This theorem refers to the impossibility of intermediate ways of life in the first proposed model. This last cultural type is located in the center of the grid-group framework.

Table 2. Characteristics of the Four Political Cultures*

Type	Characteristics	Group	Grid
INDIVIDUALIST	Low group incorporation and low subordination to others or role prescriptions, they negotiate their own relationships with others. The individual thinks the resources are not scarce, and they justify their behavior by the pursuit of personal rewards in a competitive environment. The latent strategy is to preserve the individual´s freedom to contract.	Low	Low
HIERARCHIST	High group boundaries and externally imposed prescriptions. They see the whole collective as something more important than the individual. Their ideal of fairness is equality before the law. The latent strategy implies secure internal structure of authority.	High	High
EGALITARIANS	Strong group boundaries and weak regulation. Their ideal of fairness means equality of result, and the latent strategy is based on the survival of the collectivity.	High	Low
FATALISTS	View of the resources as a lottery. They have low group incorporation and high social prescriptions. They think that the way they live their life is organized by external factors, therefore they handle risks by acceptance and absorption. The latent strategy is just to survive.	Low	High
HERMIT	They isolate themselves from the organization of the group and the commitment of prescriptions on themselves or others.	Center	Center

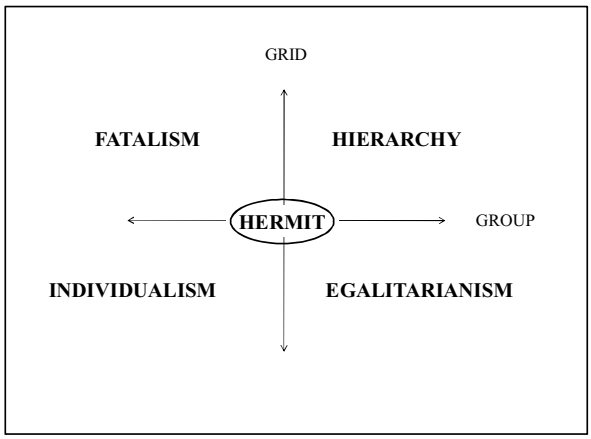
(*adapted from Schwarz and Thompson, 1990)

Consequently, three main claims and three propositions have been attributed to Cultural Theory (Mamadouth, 1999). The first claim assumes that culture matters and

everything that individuals do is culturally biased; second, there are a limited number of cultural types that can be distinguished with the grid-group dimensions; and third, the typology of viable combinations can be applied anywhere, and at anytime as they are universal. Concerning the propositions, this theory argues that (1) social relationships and cultural bias cannot be combined contrary to each other, there must be *consistency* and *coherence* and this is called the *compatibility condition*. Moreover, (2) the *impossibility theorem* states that the ways of live are exhaustive: there are five and only five (after adding a fifth typology named Autonomy or Hermit´s position). And finally, (3) the different typologies depend on each other to be viable (*requisite variety condition*).

Douglas (1998, p: 98) has taken CT a step further by applying it to the view that individuals have about nature. The task of CT is to decompose the elements of this argument and show how each derived view of nature is related to a distinct vision of society.

Figure 1. The two dimensions of sociality and the four rationalities*



(*adapted from Schwarz and Thompson, 1990: 7, and Kahan, 2008).

This paradigm states that individual perceptions of different hazards depend on cultural values (Douglas & Wildavsky, 1982). Thus, people from a particular dimension tend to assign similar reasons for events that are different from other dimensions. Risk perception is related to the dimension to which individuals belong. Cultural biases in this theory are shared values and beliefs, called “ways of life”.

Schwarz and Thompson developed four distinct views of nature which are in conflict with each other. Each view has a way of organizing and is predatory in terms of time, space and resources. These four 'views of nature' can be graphically represented by a ball in a landscape, as in Table 3 below. The fifth category is a new proposal added by Leiserowitz and Smith (2010).

Table 3. The Five Views of Nature*

View of Nature	Description	Representation
Nature Benign	It gives us global or stable equilibrium. It does not matter what happen, the ball will always return to the bottom of the basin. The *laissez-faire* attitude is hold by the managing institutions. There are abundant resources.	
Nature Capricious	Random world. They do not have any particular view concerning the environment. The situation of the resources is a lottery. Institutions with this view of nature do not really manage, nor do they learn. They just cope with erratic events.	
Nature Tolerant	The world is forgiving of most events, but is vulnerable to an occasional knocking of the ball over the rim. The resources are scarce, but they are controllable. The managing institutions must therefore regulate and control against unusual occurrences. It accepts that the small risk of disaster necessitates government regulation, but believes that, once minimum standards have been met, it should be free to make its own decisions. There are acceptable environmental risks that can be determined by experts.	
Nature Ephemeral	The world is a terribly unforgiving place and the least jolt may cause its catastrophic collapse. There is a precarious balance of the ball on the landscape. The managing institutions must treat the ecosystem with great care as the resources are depleting.	
Nature Gradual	Earth´s climate is slow to change. Global warming will gradually lead to dangerous effects. It is represented with a ball in an inclined landscape.	

(*adapted from Schwarz and Thompson, 1990; p. 5; and Leiserowitz and Smith, 2010)

2.1.2. Cultural Cognition

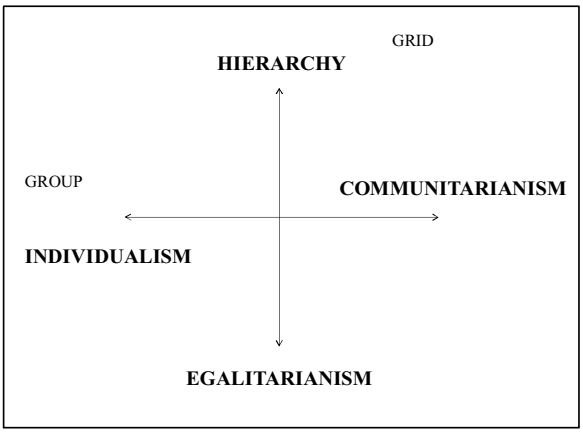
The CT of Risk (Figure 1) has been tested empirically by Kahan et al. (2010), who developed a new approach called Cultural Cognition (CC). This asserts that

individuals have different perceptions of risk, as mentioned above, and classifies them in four types of worldviews or supportive values. Dake (1990; 1992) proposed four separate scales to measure political attitudes identifying the quadrants isolated by grid and group dimensions.

However, there are two problems with this approach (Kahan, 2011). The first is that the separate scales used to measure the four worldviews fail to demonstrate internal validity in tests such as *Cronbach´s alpha*. The second problem is that a single individual can exhibit multiple, opposing worldviews, due to a low degree of coherence and internal consistency (Kahan, 2011).

Initially, CC used Dake´s scales to measure worldviews but, instead of following the work of Jenkins-Smith and others (Jenkins-Smith 2001; Silva & Jenkins-Smith 2007; Jenkins-Smith & Herron 2009) it uses two continuous attitudinal scales, instead of four. This was done in an attempt to avoid Dake's problems of multiple competing orientations in one individual, or low reliability of the measurement scales. One of the scales is for "Hierarchy-Egalitarianism" and depends on the individual´s orientation for high or low *grid*. The other is used to measure the orientation toward weak or strong *group* ways of life, and it distinguishes between "Individualism-Communitarianism" (see Figure 2). CC eliminates the *Fatalism* option, after which it has been proven to have high reliability and it also avoids the logic indeterminacy problem associated to Dake´s scales (Kahan *et al*., 2007).

Figure 2. Cultural Cognition Worldviews (Kahan, 2008)



Kahan (2008) distinguishes three main features of CC: the first is a way in which to measure cultural worldviews; the second includes socio-psychological mechanisms used to explain individuals´ beliefs about risk; and finally CC promotes the collective management of public risk perception and the effect of policies to mitigate risks.

The properties of the scale make it well suited for testing Douglas and Wildavsky's theory (Kahan, 2008). Public risk perception should be correlated with a combination of cultural worldviews and the position of an individual in the "grid-group" map, as hypothesized by Douglas (1985, p. 54). The present paper uses a "short form" version of the two scales, which consists of six "agree-disagree" items that are as reliable as the full-form counterparts (Kahan, 2011). Therefore, the scales are expected to measure two latent variables, one for each axis, resulting in the aggregation of the observable indicators determined by the twelve items.

As stated in the initial part of this paper, the objective is to analyze the factors determining both risk perception of global climate change, and support for policies directed at the reduction of human impact on the environment. According the previous theoretical review[1], some of the main determinants of both concepts are: sociodemographics (like gender, race, ethnicity, socioeconomic status), perceived consumer effectiveness, environmental involvement with the issue, as well as the view of nature and cultural values of the individuals.

The next sections outline the methodology used to test these effects, and the main results are described.

3. METHODS

Two different analytical techniques were conducted in order to reach the proposed objectives. First, separate models were developed and hierarchical multiple regression analyses were carried out. The initial model aimed to explain and predict the perceived risk of global climate change. Subsequent models tested the same

[1] The previous essay gives theoretical support to the relationship of perceived consumer effectiveness and involvement with the variables predicted.

independent variables as predictors of support for government, corporate industrial, and citizen efforts to reduce global climate change.

Afterwards, exploratory factor analysis with principal components extraction and varimax rotation was conducted and a structural equation model was developed with the remaining factors to test and incorporate some of the preceding predictors such as perceived consumer effectiveness, involvement and hierarchism (the model is described in section 5.6.).

3.1. Procedure and Respondents

The data for the present research were obtained from an online survey conducted in Spain. It was based on a survey tool designed by the Yale Project on Climate Change Communication[1] and related to individuals´ global climate change involvement, beliefs and policy preferences among others. Additionally, some questions related to cultural values based on CC by Kahan (2008) were included.

A national representative sample (n = 602) of the online population was obtained. *Toluna Networks*, an online panel community with 147,883 panelists, recruited participants in June and July 2011. The sample included 52% of females, and ages were ranged from 18 to over 75 years old.

3.2. Measures

The internal consistency of the measurement scales was examined with Cronbach´s alpha test to assess reliability. Hinton et al. (2004) suggest four cut-off points, which involve excellent reliability (0.90 and above), high reliability (0.70-0.90), moderate reliability (0.50-0.70) and low reliability (0.50 and below). Our results confirm that the measurement of the variables is internally consistent since all the constructs verified high reliability.

[1] http://environment.yale.edu/climate/ http://environment.yale.edu/climate/ Part of this research was a result of the lead author's research trip to Yale University, working with Dr. Anthony Leiserowitz, director of the Yale Project on Climate Change Communication.

3.2.1. Risk Perception

This construct was measured by a combination of three single items. Participants were asked whether or not they perceived that global climate change would harm them personally, or harm future generations and/or plant and animal species. Responses were rated in a four-point Likert scale ranging from "Not at all" to "A great deal" (α = 0.821).

Table 4. Reliability test for RISK_PERC

How much do you think global climate change will harm…?	Mean	SD	Cronbach's Alpha if Item Deleted	Cronbach's Alpha
[You personally]	2.90	0.775	0.886	0.821
[Future generations of people]	3.62	0.623	0.665	
[Plant and animal species]	3.65	0.617	0.716	

3.2.2. Support for Commitment

To determine a value for this measure, individuals were asked about their support for commitments to reduce global climate change. Latent variables were divided into three categories according to the source of these commitments: The first source was government´ commitments (GOV_COM), resulting from a combination of two items with a four-point Likert scale (α = 0.725); the second source was corporate and industrial commitments (CORP&IND_COM – *Do you think that corporations and industry should be doing more or less to address global warming?*); and finally the citizens´ commitments (CITIZENS_COM – *Do you think that citizens themselves should be doing more or less to address global warming?*). The latter two variables were measured by a single item.

Table 5. Reliability test for GOV_COM

	Mean	SD	Cronbach's Alpha
Do you think global climate change should be a low, medium, high, or very high priority for the next president and Congress?	3.07	0.799	0.725
How big of an effort should the Spain make to reduce global climate change?	3.07	0.670	

3.2.3. Perceived Consumer Effectiveness

Perceived consumer effectiveness (PERC_CE) was defined by Ellen et al. (1991) as the extent to which individuals believe that their actions will make a difference in solving a problem. Likewise, Brown (1979) and Thompson (1981) have stated that previous knowledge and experience may determine perceived consumer effectiveness, given that some people believe that their actions will have the results expected, whilst other are not so confidents in their ability to make a difference (Kim & Choi, 2005). In the present paper, this latent variable was measured using a three items scale ($\alpha = 0.792$) with a 4-point Likert scale from "*Not at all*" to ""*A lot*", related to the effectiveness of the energy-saving actions taken by the participants.

Table 6. Reliability test for PERC_CE

Think back to the energy-saving actions you're already doing and those you'd like to do over the next 12 months.	Mean	SD	Cronbach's Alpha if Item Deleted	Cronbach's Alpha
If you did most of these things, how much do you think it would reduce your personal contribution to global climate change reduction?	2.62	0.785	0.823	0.792
If most people in the Spain did these same actions, how much would it reduce global climate change?	3.10	0.749	0.565	
If most people in the modern industrialized countries around the world did these same actions, how much would it reduce global climate change?	3.52	0.696	0.741	

3.2.4. *Involvement*

Environmental Involvement (INVOLV) was measured by a combination of two items with high reliability (α = 0.766): concern about global climate change which has previously been proven to be related to risk perception (Kahan et al., 2011); and previous thoughts regarding the topic.

Table 7. Reliability test for INVOLV

	Mean	SD	Cronbach's Alpha
How worried are you about global climate change?	3.15	0.694	0.766
How much had you thought about global climate change before today?	3.12	0.739	

3.2.5. *View of Nature*

This variable was measured by a single item based on the theory developed by Schwarz and Thompson (1990), adapted by Douglas (1998:98) as described before, and after adding a fifth option (Gradual) from Leiserowitz and Smith (2010). Even though it has been defined as a categorical scale, we can see that the items have been ordered gradually, from lowest to highest severity of the environmental situation. While the first type assumes that nature is benevolent, the last situation confirms a gradual and progressive degradation of the environment, therefore we include it in the hierarchical regression analysis.

Table 8. View of Nature

People often disagree about the climate system works. The five images below illustrate five different perspectives. Each image shows the climate system is like a ball balanced on a line, however, it affects everyone differently to global warming. Which of the five images is closer to your opinion about the climate system works? [Images were displayed randomly].	1. Stable (Nature Benign) 2. Random (Nature Capricious) 3. Fragile (Nature Tolerant) 4. Treshold (Nature Ephemeral) 5. Gradual (Nature Gradual)

3.2.6. *Cultural Cognition Values*

Cultural values scales derived from CC (egalitarianism vs. hierarchism, and individualism vs. communitarianism) were used in the survey. In order to measure "hierarchism", a six item scale was combined and tested to examine internal

consistency. Cronbach Alpha gave a value of 0.722 for this index (see Table 9), indicating that the scale has high reliability. For "individualism", the combination of the six item scale failed to reach a satisfactory Cronbach Alpha value (0.552), therefore all the items were tested independently to identify whether they would correlate with Risk Perception or Support for Commitments. Ultimately, only one of them was included in the models tested as a representation of the others since none of the items for "individualism" showed a significant relationship in the pre-test with the variables predicted, but we wanted to include at least one of them in order to reach a more comprehensive and integrated model (IPRIVACY – *The government should stop telling people how to live their lives*).

Table 9. Reliability test for HIERARCHICAL

	Mean	SD	Cronbach's Alpha if Item Deleted	Cronbach's Alpha
HREVDIS: It seems like minorities don´t want equal rights, they want special rights just for them.	4.21	1.612	0.653	0.722
HWMNRTS: The women´s right movement has gone too far.	3.24	1.684	0.696	
HTRADFAM: A lot of problems in our society today come from the decline in the traditional family, where the man Works and the woman stays home.	3.07	1.759	0.689	
EWEALTH: Our society would be better off if the distribution of wealth was more equally.	-4.78	1.261	0.701	
ERADEQ: We need to dramatically reduce inequalities between the rich and the poor, inmigrants and non-inmigrants, men and women.	-4.51	1.411	0.672	
EDISCRIM: Discrimination against minorities is still a very serious problem in our society.	-4.27	1.387	0.687	

3.2.7. Sociodemographics

Finally, the following sociodemographic measures were included: gender, education level (see Table 10) and political ideology (measured using a ten-point Likert scale from "Progressive-Left" to ""Conservative-Right").

Table 10. Sociodemographical Distribution

Gender*	
Males	48
Females	52
Ages*	
18-24	13
25-34	22
35-44	20
35-54	24
55-64	17
65-74	4
75+	1
Education*	
Less than high school	3
High School	11
Some college	40
Bachelor´s degree	46
Political ideology*	
Progressive-Left [1-5]	
5	7
4	13
3	17
2	8
1	12
Conservative-Right [1-5]	
1	11
2	7
3	11
4	7
5	6
DN/NA	1

*All the values are given in percentages.

4. RESULTS

The latent constructs described in the previous section were introduced in the models proposed by hierarchical multiple regression in four steps as independent variables to explain and predict the dependent variables in each of the sections. Risk perception toward global climate change is the first dependent variable, followed by support for government, corporate, industrial, and citizens' efforts. Then, structural equation modeling was conducted with Lisrel 8.80 to test a more integrative model where risk perception is a predictor of support for government commitments.

4.1. Models of Global Climate Change Risk Perception

The first model included sociodemographic variables and found that only political ideology was a significant predictor of risk perception (p-value < 0.05) although it explained only 1% of the variance (F = 4.059, p-value < 0.01, R2adj = 0.017). This means that individuals with a more progressive ideology would have a higher perception of risk regarding global climate change.

Model 2 shows that perceived consumer effectiveness (β = 0.175, p-value < 0.001) and involvement (β = 0.453, p-value < 0.001) also have a significant and positive effect on risk perception and explain 29% of the variance (*F* = 44.869, p-value < 0.001, R^2_{adj} = 0.290). When people are more involved or have a higher perceived consumer effectiveness related to their energy-saving actions, they perceive a higher risk of global climate change.

Table 11. Hierarchical Multiple Regression for Global Climate Change Risk Perception

Independent variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
	β	β	β	β
Female	0.035	0.042	0.019	0.015
Education	- 0.057	- 0.033	- 0.034	- 0.039
Political Ideology	- 0.134*	- 0.001	0.006	0.056
PERC_CE		0.175***	0.161***	0.145***
INVOLV		0.453***	0.415***	0.398***
View of Nature			0.212***	0.206***
HIERARCHICAL				- 0.113**
IPRIVACY				0.002
F	4.059**	44.869***	45.352***	35.226***
Adjusted R Square	0.017	0.290	0.332	0.338

Dependent variable: RISK_PERC
Entries are standardized regression coefficients
* significant at 0.05;
** significant at 0.01;
*** significant at 0.001.

Model 3 includes the view of nature and found that this latent construct (β = 0.212, p-value < 0.001) together with perceived consumer effectiveness (β = 0.161, p-

value < 0.001) and involvement (β = 0.415, p-value < 0.001) are significant predictors of risk perception and the variance increased in 4.2% in the model proposed (F = 45.352, p-value < 0.001, R^2_{adj} = 0.332). These results verify that individuals who have a more catastrophic view of nature will have a stronger perception of risk.

Finally, the full model incorporate cultural values related to CC and increased the variance explained up to 33.8% (F = 35.226, p-value < 0.001, R^2_{adj} = 0.338). The latent variable Hierarchical has a significant and negative relationship to risk perception (β = -0.113, p-value < 0.01), indicating that individuals who are more hierarchical will have a weaker perception of risk toward global climate change, whilst egalitarians will perceived a stronger hazard. Perceived consumer effectiveness (β = 0.145, p-value < 0.01), involvement (β = 0.398, p-value < 0.01) and view of nature (β = 0.206, p-value < 0.01) still show significant and positive relationships to risk perception. These results are consistent with the primary postulations: perceived consumer effectiveness, involvement and view of nature determine risk perception, and partially support CC theory since hierarchism determines risk perception, but communitarianism doesn´t. Furthermore, sociodemographic variables doesn´t seem to have any impact on the risk perceived.

4.2. Models of Support for Government Commitment

Same variables were tested to examine whether they would predict support for government commitment to reduce global climate change. Model 1 shows that political ideology is a predictor of the dependent variable (β = -0.226, p-value < 0.001) and it explains 4.6% of the variance (F = 10.252, p-value < 0.001, R^2_{adj} = 0.046). Once more, individuals with a more progressive ideology will support a higher government commitment to reduce negative human impacts on the environment.

Model 2 found that perceived consumer effectiveness (β = 0.286, p-value < 0.001) and involvement (β = 0.451, p-value < 0.001) are significant predictors of support for government commitment. According to our hypothesis, both latent constructs determine the dependent variable. Besides, political ideology shows a negative and significant relationship for support of government commitment (β = -

0.088, p-value < 0.01). This model increases variance to 40.6% (F = 78.792, p-value < 0.001, R^2_{adj} = 0.406).

The inclusion of the item that measures the views of nature in Model 3 enhances the variance in 1.1% (F = 68.951, p-value < 0.001, R^2_{adj} = 0.417); view of nature (β = 0.115, p-value < 0.001), perceived efficacy (β = 0.276, p-value < 0.001), involvement (β = 0.432, p-value < 0.001) and political ideology (β = -0.085, p-value < 0.05).

Table 12. Hierarchical Multiple Regression for Support for Government Commitment

Independent variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
	β	β	β	β
Female	0.007	0.009	- 0.002	- 0.004
Education	- 0.018	0.016	0.017	0.015
Political Ideology	- 0.226***	- 0.088**	- 0.085*	- 0.021
PERC_CE		0.286***	0.276***	0.252***
INVOLV		0.451***	0.432***	0.411***
View of Nature			0.115***	0.105***
HIERARCHICAL				- 0.150***
IPRIVACY				- 0.059
F	10.252***	78.792***	68.951***	55.692***
Adjusted R Square	0.046	0.406	0.417	0.434

Dependent variable: GOV_COM
Entries are standardized regression coefficients
* significant at 0.05;
** significant at 0.01;
*** significant at 0.001.

The last model explains 43.4% of the variance, with an increase of 1.7% compared to the previous model (F = 55.692, p-value < 0.001, R^2_{adj} = 0.434). Hierarchical latent construct shows a negative and significant relationship with the predicted variable (β = -0.150, p-value < 0.001), similar to the full model for risk perception. This means that egalitarians support stronger government commitment to reduce global climate change. However, the items related to communitarianism-individualism don´t seem to have an effect on the predicted variable. In the last model, political ideology did not affect support for government commitment, although perceived consumer effectiveness (β = 0.252, p-value < 0.001), involvement (β = 0.411, p-value < 0.001) and view of nature (β = 0.105, p-value < 0.001) did. This full model verifies previous assumptions since perceived consumer effectiveness, involvement, view of nature and hierarchism seem to determine support for government commitment, but the relationship with the item that measured communitarianism is not validated

4.3. Models of Support for Corporate and Industrial Commitment

When predicting the third dependent variable, results show slight differences with the previous models. Here, sociodemographic variables appear to be predictors until the last step (see Table 13), whilst views of nature and cultural values don´t seem to predict the variance. More specifically, the first model predicts 5.4% of the variance (F = 11.799, p-value < 0.001, R2adj = 0.054) with both education (β = 0.086, p-value < 0.01) and political ideology (β = -0.217, p-value < 0.001) presenting significant relationships with the predicted variable. The values given suggest that individuals with a higher level of education and a more progressive ideology support greater corporate and industrial efforts to reduce global climate change.

Model 2 includes the effect of perceived consumer effectiveness (β = 0.215, p-value < 0.001) and involvement (β = 0.193, p-value < 0.001), education (β = 0.105, p-value < 0.01) and political ideology (β = -0.151, p-value < 0.01) with an increase of 10.6% (*F* = 22.693, p-value < 0.001, R^2_{adj} = 0.160) in the variance.

Table 13. Hierarchical Multiple Regression for Support for Corporate an Industrial Commitment

Independent variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
	β	β	β	β
Female	0.054	0.049	0.046	0.047
Education	0.086**	0.105**	0.105**	0.107**
Political Ideology	- 0.217***	- 0.151***	- 0.149***	- 0.128**
PERC_CE		0.215***	0.211***	0.202***
INVOLV		0.193***	0.186***	0.180***
View of Nature			0.039	0.032
HIERARCHICAL				- 0.055
IPRIVACY				- 0.073
F	11.799***	22.693***	19.068***	15.008***
Adjusted R Square	0.054	0.160	0.160	0.164

Dependent variable: CORP&IND_COM
Entries are standardized regression coefficients
* significant at 0.05;
** significant at 0.01;
*** significant at 0.001.

The third model incorporates the view of nature, although it doesn´t have an influence on the dependent variable. Therefore, the variance doesn´t increase (F = 19.068, p-value < 0.001, R^2_{adj} = 0.160), even though the estimated coefficients show minor changes.

The full model includes cultural values, but again the variables corresponding to view of nature, hierarchism and individualism do not affect support for effort in this particular case. The total variance corresponds to 16.4% (F = 15.008, p-value < 0.001, R^2_{adj} = 0.164), and four of the independent variables tested predicted support for corporate and industrial commitment: education (β = 0.105, p-value < 0.01), perceived efficacy (β = 0.211, p-value < 0.001) and involvement (β = 0.186, p-value < 0.001) have a significant positive effect on the dependent variable, whilst political ideology indicates a significant negative effect (β = -0.149, p-value < 0.001).

4.4. Models of Support for Citizens´ Commitment

Like the previous section, education (β = 0.116, p-value < 0.01) and political ideology (β = -0.172, p-value < 0.001) are significant predictors of support for citizens' commitment to reduce climate change and explain 4.2% of the variance (F = 9.432, p-value < 0.001, R2adj = 0.042).

Table 14. Hierarchical Multiple Regression for Support for Citizens´ Commitment

Independent variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
	β	β	β	β
Female	0.053	0.042	0.039	0.036
Education	0.116**	0.141***	0.141***	0.137***
Political Ideology	- 0.172***	- 0.090**	- 0.090**	- 0.025
PERC_CE		0.355***	0.353***	0.329***
INVOLV		0.207***	0.203***	0.181***
View of Nature			0.026	0.019
HIERARCHICAL				- 0.149***
IPRIVACY				- 0.026
F	9.432***	40.258***	33.599***	27.212***
Adjusted R Square	0.042	0.256	0.255	0.269

Dependent variable: CITIZENS_COM
Entries are standardized regression coefficients
* significant at 0.05;
** significant at 0.01;
*** significant at 0.001.

Model 2 also shows a positive and significant relationship between the two new predictors, perceived consumer effectiveness (β = 0.355, p-value < 0.001) and involvement (β = 0.207, p-value < 0.001) and the dependent variable, increasing the percentage of the variance to 25.6% (F = 40.258, p-value < 0.001, R^2_{adj} = 0.256).

The incorporation of the view of nature in the third step doesn´t improve the prediction and explanation of support for citizens' commitment to reduce climate change, but the variance decreases 0.1% (F = 35.599, p-value < 0.001, R^2_{adj} = 0.255).

Model 4 introduces the effect of the hierarchism index (β = -0.149, p-value < 0.001) and excludes the influence of political ideology from the prediction, explaining 26.9% of the variance (F = 27.212, p-value < 0.001, R^2_{adj} = 0.269). Level of education (β = 0.137, p-value < 0.001), perceived consumer effectiveness (β = 0.329, p-value < 0.001) and involvement (β = 0.181, p-value < 0.001) are still predictors of the dependent variable. These results are consistent with the premises regarding level of education, perceived consumer effectiveness, involvement and hierarchism predicting support for citizens' commitment, although view of nature and CC theory don´t seem to have an influence on the dependent variable.

4.5. Exploratory Factor Analysis

Further analysis was conducted in order to build a more integrative model that would explain the relationship between risk perception of global climate change and support for government efforts to reduce it. The first step was to examine the correlations matrix between the items that shape both latent constructs (see Table 15).

Table 15. Pearson correlations between the variables explained

	RISK_PERC2	RISK_PERC3	GOV_COM1	GOV_COM2
RISK_PERC1	0.570**	0.509**	0.436**	0.401**
RISK_PERC2		0.794**	0.460**	0.346**
RISK_PERC3			0.451**	0.324**
GOV_COM1				0.577**

**Correlation is significant at 0.01 level.

Principal component analysis doesn´t require any particular hypothesis about the structure underlying the variables. This method seeks the best linear combination of the proposed variables which explains a higher percentage of data variance (Luque, 2012: 48).

Table 16. Principal Components Analysis: Total Variance Explained

Component	Initial Eigenvalues		
	Total	% Variance	Cumulative %
1	4.013	40.128	40.128
2	1.451	14.509	54.638
3	1.196	11.964	66.602
4	0.999	9.995	76.596
5	0.690	6.899	83.495

The items that were introduced in the exploratory factor analysis were chosen with two criteria: first, we focused on the items that seemed to determine both risk perception and support for government commitment; then, we reduced them to those that were measured in a continuous scale in order to facilitate the subsequent structural equation analysis. Consequently, we had five variables which measurement scales satisfied both conditions: perceived consumer effectiveness, involvement, hierarchism, risk perception and support for government commitment.

Exploratory factor analysis was conducted with SPSS 18 and we found that the items that would fit model should be reduced to two items for each construct since the rotated component matrix gave better values when removing some of them. The results showed that principal component analysis was suitable for the remaining items since: (1) Bartlett's test of sphericity provided significant differences between the correlation matrix and the identity matrix (Chi-Square = 2234.738; df = 45; *p*-value = 0.000); (2) Kaiser-Meyer-Olkin index was higher than 0.75; and (3) the correlation coefficients of the anti-image correlation matrix presented low values. Moreover, we found: (a) factor loadings were also higher than the minimum required ($R^2 > 0.5$); (b) high communalities for all the variables (> 0.5); (c) five factors were extracted as expected and according to the literature reviewed, explaining 83.50% of the variance of the data (Table 16).

Table 17. Rotated Component Matrix

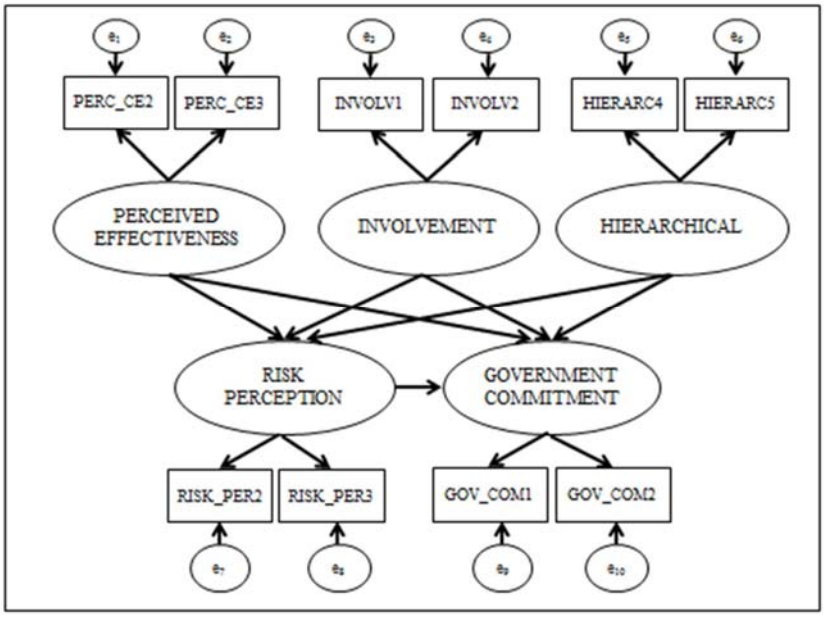
	1	2	3	4	5
RISK_PERC1	**0.909**	0.128	0.157	-0.082	0.129
RISK_PERC2	**0.889**	0.118	0.215	-0.076	0.160
PERC_CE1	0.086	**0.887**	0.133	-0.058	0.162
PERC_CE2	0.152	**0.881**	0.111	-0.131	0.115
INVOLV1	0.148	0.091	**0.908**	-0.086	0.118
INVOLV2	0.253	0.180	**0.762**	-0.063	0.314
EGALIT1	-0.104	-0.086	-0.045	**0.892**	-0.049
EGALIT2	-0.036	-0.088	-0.088	**0.890**	-0.093
GOV_COM1	0.123	0.139	0.165	-0.091	**0.910**
GOV_COM2	0.276	0.246	0.404	-0.101	**0.627**

4.6. Structural Equation Modeling

Structural equation modeling (SEM) was used to test the postulations regarding the relationship of perceived consumer effectiveness, involvement and hierarchism in determining risk perception and support for government commitment, and the relationship between perceived risk of global climate change and support for government commitment to reduce it. Hierarchical multiple regression supported some of our first assumptions by assessing the effect that each explanatory variable had on the dependent variable after considering the aggregate effect of the remaining variables. On the other hand, SEM allows testing hypothesized effects between variables that were considered dependent in the first step, but are independent in the second step (for example, risk perception).

Thus, there are three exogenous variables: perceived consumer effectiveness, involvement and hierarchical (measuring egalitarianism vs. hierarchism); and two endogenous variables: one first-degree endogenous variable which is risk perception; and one second-degree endogenous variable which is support for government commitment (see Figure 3).

Figure 3. Structural Equation Model Proposed



The first step to estimate the model was the preparation of the data. Missing values were estimated using multiple imputation method by expectation-maximization. This method first imputed predicted scores for missing values for a number of regressions in which each incomplete variable is regressed on the remaining variables for a given case; then, the entire data set is subjected to maximum likelihood estimation (Del Barrio & Luque, 2012: 546).

Table 18. Test of Univariate Normality

	Skewness		Kurtosis		Skewness and Kurtosis	
Variable	Z-Score	*p*-value	Z-score	*p*-value	χ^2	*p*-value
PERC_CE2	-3.428	0.001	-3.236	0.001	22.228	0.000
PERC_CE3	-9.744	0.000	2.726	0.006	102.385	0.000
INVOLV1	-5.102	0.000	1.477	0.140	28.209	0.000
INVOLV2	-4.888	0.000	-0.240	0.811	23.954	0.000
HIERARC4	8.184	0.000	1.565	0.118	69.422	0.000
HIERARC5	6.461	0.000	-1.943	0.052	45.517	0.000
RISK_P2	-11.447	0.000	5.374	0.000	159.916	0.000
RISK_P3	-12.174	0.000	6.091	0.000	185.291	0.000
GOV_COM1	-5.201	0.000	-1.203	0.229	28.500	0.000
GOV_COM2	-4.091	0.000	1.738	0.082	19.761	0.000

The test for univariate and multivariate normality gave the following values (Table 18 and 19), which suggests that the parameters should be estimated by Robust Maximum Likelihood.

Table 19. Test of Multivariate Normality

Skewness			Kurtosis			Skewness and Kurtosis		Relative Multivariate Kurtosis
Value	Z-score	*p*-value	Value	Z-Score	*p*-value	χ^2	*p*-value	
11.892	23.848	0.000	147.741	13.586	0.000	753.310	0.000	1.231

To estimate the parameters of the model, robust maximum likelihood was conducted to correct deviations from normality. Global adjustment provided appropriate levels for the measures of goodness of fit as showed in Table 20.

Table 20. Global Goodness of Fit

	χ^2	p-value	RMSEA	AGFI	NFI	NNFI	IFI	RFI	CFI
Model	33.85	0.11115	0.024	0.97	0.99	1.00	1.00	0.98	1.00
Recommended		> 0.05	< 0.05	> 0.90	< 0.90	≈ 1	≈ 1	> 0.90	≈ 1

The structural model adjustment was analyzed using the estimated coefficients significance (Table 21), where almost all the values for the Student *t*-test were significant at a 95% level of confidence, except the relationships between hierarchism and risk perception, and risk perception and support for government commitment, which were significant at a 90% level of confidence. Moreover, when examining the reliability of the standardized coefficients (R^2) it was noted that almost all of them were over 0.5.

Table 21. Structural Model Adjustment: Estimated Coefficients

Observed Variables	Estimated Coefficients	t-student	R^2
PERC_CE2	0.61	20.80	0.66
PERC_CE3	0.59	19.72	0.74
INVOLV1	0.62	21.58	0.80
INVOLV2	0.51	15.69	0.49
HIERARC4	0.96	14.16	0.58
HIERARC5	1.17	14.30	0.69
RISK_PERC2	0.56	15.23	0.83
RISK_PERC3	0.54	21.30	0.78
GOV_COM1	0.67	14.32	0.71
GOV_COM2	0.46	14.45	0.47

Likewise, the structural equations indicate that the predictors proposed explain 70% of the variance for support for government commitment (GOV_COM) and 39% for the perceived risk of global climate change (RISK_PERC), as stated in Table 22.

The estimated coefficients for the proposed model are also displayed in Figure 4, showing the highest values for the relationship of involvement with risk perception (0.49) and government commitment (0.58), and the lowest for hierarchism which is negatively related with risk perception (-0.09 & 95% level of confidence) and government commitment (-0.09 & 90% level of confidence).

Figure 4. Estimated Structural Equation Model

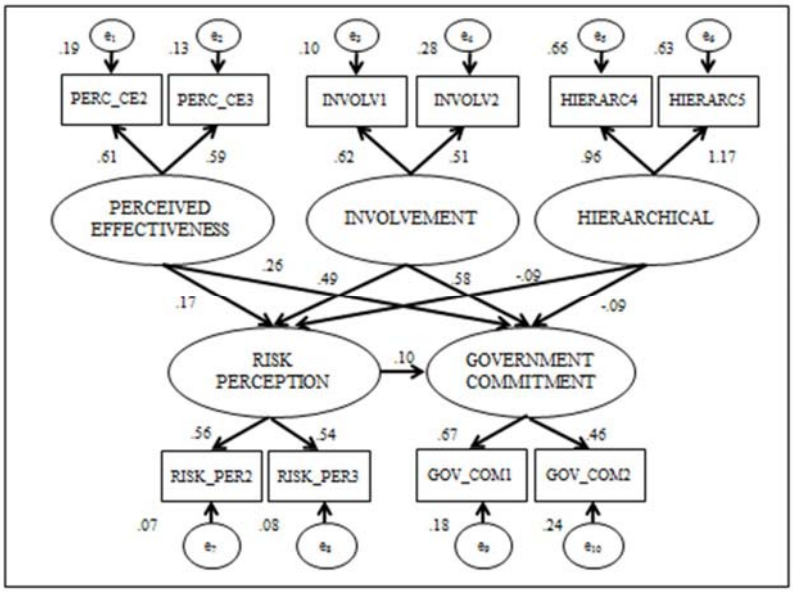


Table 22. Structural Model Adjustment: Structural Equations

Relationships	Estimated Coefficients	t-student	R^2
PERC_CE → RISK_PERC	0.17	3.35	
INVOLV → RISK_PERC	0.49	8.62	0.39
HIERARC → RISK_PERC	-0.09	-1.86	
PERC_CE → GOV_COM	0.26	4.78	
INVOLV → GOV_COM	0.58	8.97	0.70
HIERARC → GOV_COM	-0.09	-2.03	
RISK_PERC → GOV_COM	0.10	1.93	

Finally, to assess the measurement model adjustment, we computed the composite reliability for each of the latent constructs and the variance extracted, presented in Table 23. The values for composite reliability are almost all above the limit imposed (> 0.70), except those related to the first latent construct (PERC_CE).

Variance extracted will indicate the percentage of the indicators explained by the latent variable. The scores obtained for variance extracted are over 0.50, therefore they adequately measure the latent construct (Del Barrio & Luque, 2012: 564).

Table 23. Measurement Model Adjustment

Latent construct	Composite reliability	Variance extracted
PERC_CE	0.510	0.692
INVOLV	0.771	0.630
HIERARC	0.779	0.640
RISK_PERC	0.888	0.799
GOV_COM	0.752	0.611

5. DISCUSSION

The results of this study reveal some predictors and explain individuals´ risk perception toward global climate change and their support for commitments to reduce it.

In the third section, the high reliability ($\alpha = 0.821$) for the first latent construct, risk perception, was explained and predicted with the models proposed in the hierarchical multiple regression. After introducing all the variables (section 4), perceived consumer effectiveness, involvement and view of nature were revealed to be significant and positive predictors of risk perception at a 99.99% level of confidence, whilst hierarchism had a negative and significant relationship with risk perception at a 99% level of confidence, and this full model explains 33.8% of the variance of the latent variable (RISK_PERC).

Further analyses were conducted with SEM, and perceived consumer effectiveness and involvement were proven to positively explain risk perception at a 95% level of confidence (*t*- test > 1.96), and hierarchism was a negative predictor at a 90% level of confidence (*t*-test > 1.64). This means that individuals with higher

perceived consumer effectiveness, greater levels of involvement with global climate change, and egalitarian beliefs will have a higher perception of risk.

Hierarchical multiple regression models were tested for the latent construct related to support for government commitment to reduce global climate change (GOV_COM). In this case, the same variables (PERC_CE, INVOLV and View of Nature) were found to be significant and positive predictors of GOV_COM at a 99.99% level of confidence. Likewise, hierarchism was a significant but negative predictor at a 99.99% level of confidence. Finally, the fourth construct explains 43.4% of the variance of support for government efforts.

SEM analyses corroborated that GOV_COM was significant and positively related to the latent variables perceived consumer effectiveness and involvement, negatively related to hierarchism at a 95% level of confidence (t-test > 1.96), and positively related with risk perception at a 90% level of confidence (t-test > 1.64). The full SEM explains 70% of the variance of support for government commitment to reduce global climate change. These results mean that when individuals have higher levels of perceived effectiveness of their actions to reduce global climate change, and they are more involved with the environment, they will support increased government commitments toward the cause. In addition, these commitments receive even greater support when higher levels of risk of global climate change are perceived.

Finally, the same latent variables were also tested as predictors of support for corporate and citizens' commitment to help the environment. The first full model explains 16.4% of the variance of the dependent variable (CORP&IND_COM), where perceived consumer effectiveness and involvement again have a positive and significant relationship to CORP&IND_COM at a 99.99% level of confidence, whilst education is positively related and political ideology is negatively related at a 99% level of confidence. Therefore, we can infer that individuals who are more educated, more progressive, and have greater levels of perceived effectiveness and involvement will support greater corporate and industrial commitments to reduce global climate change.

The 26.9% of the variance of the last dependent variable (CITIZENS_COM) was explained and predicted by perceived consumer effectiveness, involvement, education (relationship at a 99.99% level of confidence) and hierarchism (negative

relationship at a 99.99% level of confidence). Subsequently, we can assume that increased levels of support for citizens´ commitments to reduce global climate change are related to greater values for perceived consumer effectiveness, involvement, education, and egalitarianism. Table 24 compares the 4 hierarchical multiple regressions considered.

Table 24. Comparison of the coefficients and Adj. R Square for all the hierarchical multiple regressions

	RISK_PERC	GOV_COM	CORP&IND_COM	CITIZENS_COM
Adjusted R Square	0.338	0.434	0.164	0.269
(Full model)	35.226***	55.692***	15.008***	27.212***
Independent variables	β	β	β	β
Female	0.015	-0.004	0.047	0.036
Education	-0.039	0.015	0.107*	0.137***
Political ideology	0.056	-0.021	-0.128	-0.025
PERC_CE	0.145***	0.252***	0.202***	0.328***
INVOLV	0.398	0.411***	0.180***	0.181***
View of Nature	0.206	0.105***	0.032	0.019
HIERARCHICAL	-0.113	-0.150***	-0.055	-0.149***
IPRIVACY	0.002	-0.059	-0.073	-0.026

6. CONCLUSIONS

The present research aimed to explain and predict two latent constructs, risk perception of global climate change and individuals' support for commitments to reduce it, and the relationship between them. Therefore, we conducted hierarchical multiple regression analysis in four steps in order to test the proposed models and examine whether the underlying independent variables found in the literature would predict them. We also tested a SEM model to explain the intrinsic relationship between risk perceived and support for government commitment to reduce global climate change.

The analytical process was divided into six sections: the first one generated the results related to the hierarchical regression for risk perception; the regression model for support for government commitment was developed in the subsequent section. In the third step, we analyzed support for corporate and industrial commitment; then we explored support for citizens´ commitment; and finally in the fifth and sixth sections we developed an exploratory factor analysis followed by SEM to test the integrative model.

Some of the postulations tested were verified indicating that risk perception of global climate change is predicted by perceived consumer effectiveness, involvement, view of nature and hierarchism. It suggests that the higher the effectiveness of energy-saving actions, and the higher the involvement, the greater the perception of the risk of global climate change. Moreover, the more hazardous the view of nature that individuals have, and the more egalitarian they are, the greater the risk perception. However, in this particular full model, sociodemographic variables don´t seem to influence the dependent variable.

Greater levels of perceived consumer effectiveness and involvement lead to increased support for government commitment. Views of nature and hierarchism, as well as risk perception, have positive effects on support for government commitment.

Likewise, there is more support for corporate and industrial commitment when the values for perceived consumer effectiveness and involvement are higher. On the other hand, the view of nature and cultural values do not have any effect in this case, but sociodemographic variables do: the higher the level of education and the more progressive the individuals are, the greater the support for corporate and industrial efforts to reduce global climate change.

Moreover, citizens´ efforts show greater values of support when level of education, but also perceived consumer effectiveness and involvement are higher. In addition, individuals who are considered hierarchical are less likely to support commitments toward the cause.

SEM results provide further support for the previous relationships discovered, and also for the association between perceived risk and support to increase government commitment.

Overall, our results are consistent with CT regarding the influence of views of nature (Schwarz and Thompson, 1990; p. 5) on the variables tested. Individuals with a more drastic view of nature will perceive higher levels of environmental risk, and will also support greater government commitment to reduce global climate change. Furthermore, CC statements (Kahan et al., 2011) have been also proven but only with reference to egalitarian vs. hierarchical individuals. Therefore, cultural values will also

affect both the risk perceived and the support for government commitment, which should be considered by policy makers in the process of decision-making.

Previous research has explained the relationship between risk perception and policy preferences (Leiserowitz and Smith (2010), Kahan et al. (2011). Consequently, the results of present research can be extrapolated to the relationship between risk perception and support for government commitment, which should have effects on policy makers' decisions when developing strategies related to the reduction of global climate change.

The importance of risk perception in today´s societies means the importance of cultural group membership should be considered in public and private campaigns on risk communication related to the environment based on the perceived consumer effectiveness and the involvement of the target audience.

Although these results show a consistent effect of some factors on the perception of risk regarding global climate change, as well as on the support for the of social agents´ commitments (government, companies and individuals) to reduce it, there are some limitations: these results were obtained from a national sample, using an on-line panel. This circumstance should be considered when making generalizations based on the main conclusions.

Thus, the preceding methodology could be used in future research with a sample that includes the whole Spanish population, and also by conducting the survey in other countries in order to compare cross-national results.

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IV. TERCER ENSAYO

THIRD ESSAY

Cycling toward the environment. An analysis of psychological factors influencing the intention to use bike hire schemes as a sustainable way of transportation: a case study.

Rodríguez-Priego, Nuria
Porcu, Lucía
Montoro Ríos, Francisco J.

THIRD ESSAY

"Cycling toward the environment. An analysis of psychological factors influencing the intention to use bike hire schemes as a sustainable way of transportation: a case study".

Rodríguez-Priego, Nuria
Porcu, Lucía
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Abstract

Bike hire schemes have being developed in many cities in the last years as a healthier and more sustainable way of transportation. At the same time, research related with attitudes, perceptions and bicyclist characteristics have evolved progressively. In the present paper, we aim to examine the impact of the main psychological factors influencing individuals´ behavioural intention to use a bike sharing scheme as a more sustainable way of transportation. In the attempt to achieve this objective, Theory of Planned Behavior (TPB) has been extended by including the variable 'perceived consumer effectiveness', meaning the perceived capability to reduce environmental impact when using the hire scheme mentioned. Hierarchical multiple regression was conducted in two steps in order to observe the difference between TPB and the model proposed. The results corroborate the positive influence of attitude, subjective norms, perceived behavioral control and perceived consumer effectiveness on behavioral intention, improving the percentage of variance explained when adding the last variable.

Keywords: Theory of Planned Behavior (TPB); Perceived Consumer Effectiveness; Sustainable Transport; Bike Hiring.

TERCER ENSAYO

"Pedaleando por el medio ambiente. Análisis de los factores psicológicos que influyen en la intención de uso de los sistemas de alquiler de bicicletas como un medio sostenible de transporte: un estudio de caso".

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Montoro Ríos, Francisco J.

Resumen

Los sistemas de alquiler de bicicletas han sido desarrollados en diversas ciudades en los últimos años como una forma más saludable y sostenible de transporte. Al mismo tiempo, la investigación relacionada con las actitudes, las percepciones y las características de los ciclistas han evolucionado de forma progresiva. En el presente trabajo, nuestro objetivo es examinar el impacto de los principales factores psicológicos que influyen en la intención de comportamiento de los individuos en relación al uso de un sistema de alquiler de bicicletas como medio sostenible de transporte. En el intento de lograr este objetivo, la Teoría del Comportamiento Planificado (TPB) se ha ampliado mediante la inclusión de la variable "efectividad percibida por el consumidor", es decir, la capacidad percibida de reducir el impacto ambiental al utilizar el sistema de alquiler mencionado. Para ello se llevo a cabo un análisis de regresión múltiple jerárquica en dos etapas con el fin de observar la diferencia entre la TPB y el modelo propuesto. Los resultados corroboran la influencia positiva de la actitud, normas subjetivas, control percibido y la efectividad percibida por el consumidor, sobre la intención de comportamiento, mejorando el porcentaje de varianza explicada cuando se añade esta última variable.

Palabras clave: Teoría del Comportamiento Planificado (TPB); Efectividad Percibida; Transporte Sostenible; Alquiler de Bicicletas.

1. INTRODUCTION

Bike sharing programs have evolved throughout last decades, becoming nowadays widely used in cities that are concerned about ecological footprints and committed to environmental sustainability, but also as a healthier mode of transportation. The main objective of those schemes is to reduce CO_2 emissions and thus environmental impact that citizens may cause by using different means of transport. Awareness about global climate change and increasingly higher fuel prices have shed even further light on the need of sustainable strategies that support more energy-efficient mobility (Shaheen *et al.*, 2010) and several cities around the world are funding transportation projects that may contribute to maintaining air quality (i.e. Thakuriah *et al.*, 2012).

ENbici bike hire scheme has been developed by the Andalusian Energy Agency, under the Department of Innovation, Science and Enterprise (*Consejería de Innovación, Ciencia y Empresa*), and the Institute for Diversification and Energy Saving (IDAE), and implemented in several Andalusian towns with the aim to promote bicycling as a mean of sustainable transport[1].

In Granada this system has been available since October 2009 for all the university community, which is constituted by more than 85.000 individuals among students, academic staff and support staff[2]. Since only one hundred people are engaged with the *ENbici* bikes´ hiring, the results have so far been fairly disappointing. In order to understand this behavior, our research addresses the main factors that are likely to lead individuals to use the hire scheme and the main barriers that would dissuade them.

The role of attitudes on travel behaviour has been previously examined (Eriksson & Forward, 2011). Furthermore, there are a few studies analysing the influence of psychological variables related with the Theory of Planned Behavior on bicycling behaviour (Xing *et al.*, 2009; Gatersleben & Hadded, 2010; Heinen *et al.*, 2011). But, the academic literature lacks empirical research on the use of bike hire

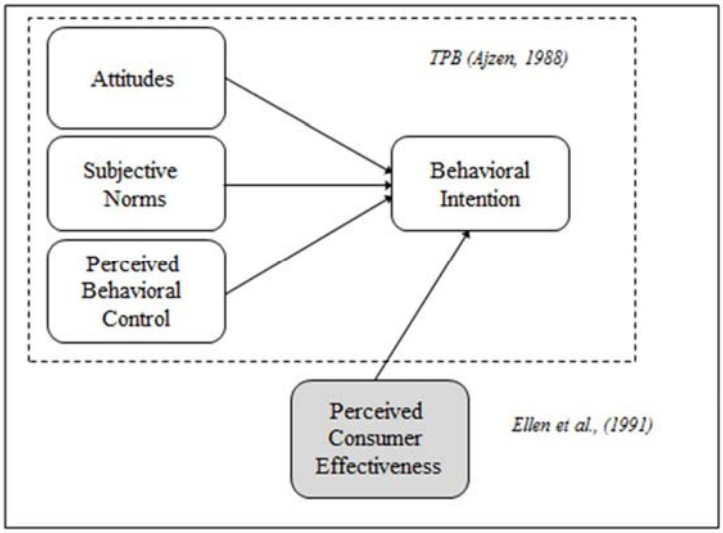
[1] http://ugr.onroll.info/ Last accessed March 16, 2012
[2] http://www.ugr.es/ Last accessed February 25, 2012

schemes as a more sustainable mode of transportation that makes bicycling accessible without the need of owning a bicycle and without prior knowledge about the maintenance that it requires. Thus, this paper aims to fill this research gap.

The present study represents an attempt to model the antecedents of bike hiring behavioral intention, and the research purpose is to explore the psychological factors that determine it. In order to achieve the research objectives and following the statements of the Theory of Planned Behavior, TPB (Azjen *et al.*, 1988), attitudes, subjective norms and perceived behavioral control, have been considered as predictors of consumer's behavioural intention. In addition, we posit that '*perceived consumer effectiveness*' (Ellen *et al.*, 1991) may enhance percentage of variance predicted.

In the model proposed, we focus on *Behavioural Intention* to use the bike hire scheme as a result of *attitudes*, *subjective norms* and *perceived behavioural control*, where *perceived consumer effectiveness* is tested as an added independent variable to the Theory of Planned Behavior (see Figure 1).

Figure 1. Modeling Behavioral Bicycling Intention



2. LITERATURE REVIEW

The Theory of Planned Behavior, TPB (Ajzen & Madden, 1986), has been widely implemented and tested in the academic literature in the last decades (Armitage & Conner, 2001) becoming a *hot* theory as it has been applied in many different fields. This approach is an extension of the Theory of Reasoned Action, TRA (Fishbein & Ajzen, 1975), which only takes into account two variables, attitudes and social norms, as independent variables when explaining the intentions. In this case, TPB increases the number of predictors by including the *perceived behavioral control* together with *attitudes* and *subjective norms*, with the aim of predicting deliberate behaviors.

As well as in TRA, the *behavioral intention* is still the key factor in this theory, although the added variable, *perceived behavioral control*, enhance the model, as it reflects past experience and the obstacles and impediments that the individual believes that may arise, and is defined as the subjective belief that the consumer has regarding the impediments to perform a behavior (Phostuma and Dworkin, 2000).

In summary, TPB is based on three types of beliefs: behavioral, normative and controlled. The firs type refers to the likely consequences of individuals´ behavior; the normative beliefs are related to the expectations that others individuals have concerning our behavior; and finally, control beliefs are connected with the presence of factors that may facilitate or impede the performance of a particular behavior. Besides, it is expected that the more positive than the attitude and subjective norms are toward the behavior, and the more control the individual perceives, the greater the intention will be.

TPB has been examined to predict the use of public transportation (Heath & Gifford, 2002), but it also seem to explain pro-environmental behaviors (Cheung & Chan, 1999; Tonglet *et al.*, 2004; Han *et al.*, 2010). Subsequently, in this study we will consider the use of the bike hire scheme *ENbici* as a pro-environmental behavior since it reduces the utilization of private cars, and will test whether TPB may have an influence on individuals´ intention toward it.

Furthermore, we want to test whether '*perceived consumer effectiveness*' also exerts a positive and direct influence on consumers' behavioral intention. This concept is related to the notion of *perceived self-efficacy* from Bandura (1977), who introduced

and defined it as people's beliefs about their own competence and capabilities to produce designated levels of performance, and it is expected to determine all behavioral change. Likewise, this construct has been implemented in previous studies in order to extend and test the validity of the Theory of Planned Behavior (Armitage & Conner, 1999; Povey *et al.*, 2005). Likewise, we will examine how *perceived consumer effectiveness* referred to the extent to which individuals believe that their actions will make a difference in solving a problem (Ellen *et al*., 1991), may have an influence on behavioral intention to use the bike hire scheme mentioned.

Ellen *et al*. (1991) have distinguished the concept of perceived consumer effectiveness regarding environmental issues from those related with environmental attitudes and concerns. They state that individuals with a high environmental concern will not always translate it into purchasing behaviors; meanwhile, individuals with a strong belief about the results that their actions will have, are more likely to engage in such environment supporting behaviors. Therefore, perceived consumer effectiveness is expected and has been previously assessed to be related with green consumption (Kim & Choi, 2005).

Moreover, previous knowledge and experience seem to determine perceived consumer effectiveness (Brown 1979; Thompson 1981), since some people may think that their actions will have the results expected, whilst others are not so confidents in their ability to make a difference (Kim & Choi, 2005).

3. DATA AND METHODS

Granada is a medium size city located in the Southern Spain region of *Andalusia* that counts around 235.000 inhabitants (INE, 2012[1]). The four campuses and other administrative university buildings are scattered throughout the city. The university community is constituted by more than 85.000 people, including students and staff, making them a crucial and extremely relevant target audience for public and private campaigns, thus a significant target group for researching on consumption patterns and consumer's behavior.

[1] http://www.ine.es/nomen2/index.do?accion=busquedaDesdeHome&nombrePoblacion=Granada&x=0&y=0 Last accessed April 5, 2012

A survey was conducted from May through August 2011 regarding *ENbici*, a bike hire scheme with four hiring hubs located in the main campuses that has been recently implemented. We used a convenience sample composed by students, faculties and support staff who studied/worked in the University of Granada and who had a corporate e-mail during the data collection period.

The online questionnaire was available through a web link hosted at *surveymonkey.com* which was sent by corporate e-mail to the whole university community. Overall, 436 questionnaires were completed from May through August 2011, with female participation making up 53% of the results. This sample size should be enough from a statistical perspective since it is more than ten times higher than the number of variables introduced in the regression model (Stevens 2002).

Table 1. Sociodemographic distribution of the sample*

Group	
Academic staff	14
Support staff	3
Students	83
Gender	
Male	47
Female	53
Level of education	
Less than high school	1
High school	36
University degree	64
Residence	
Center of a large city.	43
Suburb of a large city.	28
State near a large city.	4
Town near a large city.	17
Median population away from a large city. Small	3
population away from a large city. Rural	1
population away from a large city.	3
DN/NA	1

*distribution is given in percentages.

The final composition of the sample was similar to the population's structure with 17% of academic and support staff and 83% of students. Regarding their biking habits, only a 36% of the individuals taking the questionnaire reported to have used the hire scheme in other cities before, and a 37% reported to were used to ride a bicycle to move around the city when the survey was accomplished. Table 1 gives further

information about the sociodemographic distribution of the sample.

All the items were assessed on a 6-point Likert type scales (where 1 means totally disagree and 6 totally agree). The internal consistency of those measurement scales was assessed using Cronbach´s alpha coefficients. Following Hinton *et al.* (2004) suggestions we could conclude that two of the constructs verified high reliability (ATT; SN), and the two remaining scales [PSB; BI] confirmed excellent reliability (see Table 2), therefore we can state that the measures of the instruments are internally consistent.

Table 2. Resume for reliability of measurements (N = 436)

Constructs	*Number of items*	*Cronbach´s alpha*	*Type*
Attitudes (ATT)	5	0.855	High reliability
Subjective Norms (SN)	3	0.752	High reliability
Perceived Consumer Effectiveness (PCE)	3	0.907	Excellent reliability
Behavioural Intentions (BI)	3	0.938	Excellent reliability

Descriptive statistics were carried out to assess the mean and standard deviation of the scores of the latent variables included in the model proposed. *Attitudes* [ATT] regarding the use of the bike hire scheme were measured with a five items scale (see Table 3). The respondents had to rate *ENbici´*s use according to their beliefs between bad/good idea, harmful/beneficial, unpleasant/pleasant, something they like/do not like, and useful/useless.

Table 3. Reliability of measurements for Attitudes [ATT]

Using the Enbici system to move around the city is a…	**Mean**	**SD**	**Cronbach's Alpha if Item Deleted**	**Cronbach's Alpha**
[Bad idea / Good idea]	5.42	0.950	0.819	0.855
[Harmful / Benefitial]	5.63	0.712	0.839	
[Unpleasant / Pleasant]	5.00	1.227	0.814	
[Something I do NOT like / Something I like]	5.16	1.078	0.805	
[Useless / Useful]	5.35	0.994	0.840	

A three items scale was used to measure *Subjective Norms* [SN] as displayed in Table 4 ("*Most people who are important to me think I should use the ENbici system to move around the city and so help the environment*" [SN1], "*People whose opinions I value would approve my defense of the environment using the ENbici system to mover around the city*"[SN2], "*I´m expected to take care of the environment using the ENbici*

system to move around the city instead of my own car" [SN3]), whereas *Perceived Behavioural Control* [PBC] was directly measured with a single item ("*If I want I can take care of the environment using the ENbici scheme every day to move around the city*").

Table 4. Reliability of measurements for Subjective Norms [SN]

	Mean	SD	Cronbach's Alpha if Item Deleted	Cronbach's Alpha
SN1	2.55	1.589	0.682	0.752
SN2	4.38	1.569	0.703	
SN3	3.22	1.776	0.610	

Perceived Consumer Effectiveness [PCE] was measured using a three items scale (see Table 5), assuming that most of the citizens in Granada would use the hire programme ("*If most people in Granada would use the ENbici system, how much do you think this could help to reduce global warming*" [PCE1]), that most of the people in the country would do it ("*If most people in this country would use the ENbici system, how much do you think this could help to reduce global warming*" [PCE2]), and that most people in industrialized countries would handle *ENbici* ("*If most people in industrialized countries would use the ENbici system, how much do you think it could help to reduce global warming*" [PCE3]).

Table 5. Reliability of measurements for Perceived Consumer Effectiveness [PCE]

	Mean	SD	Cronbach's Alpha if Item Deleted	Cronbach's Alpha
[PCE1]	4.79	1.277	0.888	0.907
[PCE2]	5.19	1.142	0.790	
[PCE3]	5.48	0.993	0.912	

Finally, and regarding the *Behavioral Intentions* [BI], it was used a three items scale (see Table 6) asking participants whether they agreed or disagreed with the statements that considered the use of the hire scheme as a pro-environmental behaviour ("*I will try to care for the environment using the ENbici system to move around the city* [BI1]*; I want to help the environment using the ENbici system to move around the city*

[BI2]*; I hope to help the environment using the ENbici system to move around the city*" [BI3]).

Table 6. Reliability of measurements for Behavioral Intentions [BI]

	Mean	SD	Cronbach's Alpha if Item Deleted	Cronbach's Alpha
[BI1]	4.04	1.575	0.911	0.938
[BI2]	4.32	1.511	0.919	
[BI3]	4.34	1.531	0.898	

Pearson bivariate correlations were also computed and presented in the next section, with the aim of examining the relationships between the independent variables (*attitudes, subjective norms, perceived behavioral control and perceived consumer effectiveness*) and the *behavioural intention* to use the bike hire scheme *ENbici.*

Finally, the model proposed was tested by hierarchical multiple regression analysis in two steps. The first step included the variables mentioned in the TPB and in the second step the variable *perceived consumer effectiveness* was added with the objective to examine whether it could improve the percentage of variance explained. The analyses were performed using SPSS software version 18.

4. RESULTS AND DISCUSSION

In Table 7, Pearson bivariate correlations were calculated (Table 6) with the purpose to examine the relationships between attitude, subjective norms, perceived behavioral control, perceived consumer effectiveness and behavioral intention to use the bike hire scheme *ENbici*. The strongest correlation is given between attitudes and behavioural intention (r = 0.604**), whilst the weakest is between perceived behavioural control and perceived consumer effectiveness (r = 0.221**). When attending to behavioural intention as the focal point of our model, we observe that the perceived consumer effectiveness has the weakest Pearson correlation (r = 0.387**); this outcome may give us a hint regarding the consequences of the introduction of the variable perceived consumer effectiveness in the second step of the model proposed.

Table 7. Pearson correlations between Attitude (*ATT*), Subjective Norms (*SN*), Perceived Behavioral Control (*PBC*), Perceived Consumer Effectiveness (*PCE*), and Behavioral Intention (*BI*) to use the bike hire scheme.

	ATT	*SN*	*PBC*	*PCE*
SN	.349**			
PBC	.384**	.307**		
PCE	.363**	.269**	.221**	
BI	.604**	.451**	.435**	.387**

**Correlation is significant at 0.01 level.

Afterwards, results for hierarchical regression analysis in two steps are given in Table 8. The first step included the variables mentioned in the TPB: *attitude, subjective norms and perceived behavioural control*; in the second step the variable *perceived consumer effectiveness* was added with the objective to examine whether it could improve the percentage of variance explained.

Table 8. Hierarchical regression in two steps: Attitude (*ATT*), Subjective Norms (*SN*), Perceived Behavioral Control (*PBC*), Perceived Consumer Effectiveness (*PCE*) as predictors of Behavioral Intention (*BI*) to use the bike hire scheme.

		Staff	Students	Total
		β	*β*	*β*
Step 1				
ATT		.422***	.457***	.455***
SN		.153	.249***	.232***
PBC		.317**	.164***	.189***
	Adj. R^2	.528***	.439***	.459***
	F	25.651***	80.419***	106.137***
Step 2				
ATT		.393***	.419***	.415***
SN		.146	.223***	.212***
PBC		.315**	.155***	.180***
PCE		.068	.156***	.137***
	Δ R^2	-.004***	.019***	.014***
	Adj. R^2	.524***	.458***	.473***
	F	10.091***	65.472***	84.553***

*p < .05
**p < 0.01
***p < 0.001

The sample has been divided into the two different groups that make up the university community: students and staff. When examining the differences among the groups, we observe that, for academic and support staff, the first model explains a higher percentage of variance of behavioral intention (Adj. R^2 = 52.8%; F = 25.651; p-value = 0.001), although the full model doesn´t improve when perceived consumer effectiveness is included (Adj. R^2 = 52.4%; F = 10.091; p-value = 0.001). In this subsample set, subjective norms and perceived consumer effectiveness do not appear to be related with the dependent variable, and only attitudes (β = 0.422, p-value = 0.001)

and perceived behavioral control (β = 0.317, p-value = 0.01) seem to be significant predictors of behavioral intention to use the hire scheme.

The subsample set composed by the students shows similar relations between the variables in the explanation of behavioural intention. TPB measures are positively associated with intention at a 99% level of confidence: attitudes (β = 0.457, p-value = 0.001), subjective norms (β = 0.249, p-value = 0.001) and perceived behavioral control (β = 0.164, p-value = 0.001) are significant and positive predictors of behavioral intention; and even perceived consumer effectiveness (β = 0.156, p-value = 0.001) is significant at a 99.99% level of confidence, although it only improves the variance explained in the model in a 1.9% (F = 65.472; p-value = 0.001)

When observing the whole sample, we can notice that TPB variables by themselves explain 45.9% of the variance of behavioral intention (F = 106.137; p-value = 0.001), and when perceived consumer effectiveness is included, the percentage increases to 47.3% (F = 84.553; p-value = 0.001). The full model will be therefore explained by attitudes (β = 0.415, p-value = 0.001), subjective norms (β = 0.212, p-value = 0.001), perceived behavioral control (β = 0.180, p-value = 0.001) and perceived consumer effectiveness (β = 0.137, p-value = 0.001) as hypothesized.

5. CONCLUSIONS

The present study provides a relevant contribution to the academic literature by proposing an empirical effort to underline the variables that exert a positive influence on the intention to use bike hire schemes. Furthermore, this research provides useful insights into individuals´ bicycling behavior as an alternative and more sustainable mode of transportation.

More specifically, this paper sheds light on the crucial role of TPB variables in predicting the behavioural intention and, in addition, it empirically demonstrates that perceived consumer effectiveness exerts a significant influence, resulting in the assessment of an extended TPB model that is likely to predict bike hiring behavior.

Significant differences have been found regarding the independent variables that seem to predict individuals´ behavior in the group proposed. Despite the fact that the students have shown positive and significant relations between attitudes, subjective norms, perceived behavioral control, perceived consumer effectiveness and behavioral intention, we can observe that the increase in the variance explained in the second step is less than a 2%, so we could describe it as a small increment. Moreover, the other group which is composed by academic and support staff, hasn´t revealed significant relationships between subjective norms and behavioral intention. Attending to that fact, we may believe that one of the reasons that lead to this particular result is due to the average age of the focus group, which is undoubtedly higher than the referred to the students, and could make them less sensitive to others expectations about their personal actions (subjective norms).

Likewise, staff doesn´t seem to be affected by perceived consumer effectiveness in the second step of the model. This result doesn´t necessarily mean that they are not aware about the effectiveness of their actions, but it could be due to a lack of association between the use of the bike and environmental protection. Also, one of the reasons that could make subjective norms not significant, in the case of staff, might be explained on the basis of personal characteristics of this particular group, as it could happen regarding the effect that age might have on individuals choices. Those who are younger may be more influenced by subjective social pressures when facing their decisions, whilst older individuals will consider other factors.

These elements play a crucial role in planning effective marketing communications campaigns to promote transport alternatives, like *ENbici* scheme, as it is essential to realize the differences and similarities when focusing on the target population. Relevant implications can be derived from these results in terms of marketing communications strategies in promoting the most suitable, ecological and socially desirable mean of transportation.

Nevertheless, some limitations led us to assume that the results must be interpreted cautiously (i.e. the sample is composed only by university members which have a certain level of education), thus more efforts are needed to further test and validate the theoretical model in different contexts and with a larger sample. Future research may aim to test the model proposed and enrich it with stronger results.

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V. CONCLUSIONES

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Esta recopilación de ensayos ha sido elaborada con el objetivo general de examinar el comportamiento pro-medioambiental del consumidor. Concretamente, se analizaron los factores determinantes de dos tipos de comportamiento a través de la intención de los individuos participantes en sendos estudios: la compra de productos procedentes de empresas que han tomado acciones para reducir su impacto en el medio ambiente y el uso de medios de transporte sostenibles, en particular el uso de sistemas de alquiler de bicicletas.

Por otra parte, se pretendía explorar la posible influencia de la Teoría de la Cognición Cultural y otros factores predictivos sobre la percepción de riesgo de cambio climático global, así como el apoyo al compromiso por parte de la sociedad para reducir el impacto sobre el medio ambiente.

Teniendo en consideración dicha finalidad y, en base a los resultados obtenidos, podemos establecer las conclusiones que se enumeran a continuación.

En primer lugar, el ensayo inicial muestra la relevancia que debe tener la opinión del consumidor en cuanto a la imagen de la empresa. Tal y como se ha indicado, aquellas empresas que manifiestamente toman acciones para reducir su impacto sobre el medio ambiente, serán recompensadas por el consumidor mediante la compra de sus productos, siempre que éstos consumidores estén implicados con la causa y perciban que sus acciones puedan suponer un cambio hacia la mejora del entorno. Del mismo modo serán penalizadas por el consumidor, a través de la "no compra" de sus productos, aquellas empresas que no estén tomando acciones para reducir su impacto en el medio ambiente, a tenor de los factores considerados.

En este caso, la intención del consumidor viene determinada por la percepción del riesgo de cambio climático global, obteniéndose una mayor intención de penalizar o recompensar cuanto mayor es el nivel de riesgo percibido. Al mismo tiempo, el comportamiento pasado parece reforzar positivamente dicha intención.

En el tercer ensayo, la intención de comportamiento sostenible es medida a través del uso del sistema de alquiler de bicicletas implementado en la Universidad de Granada, como hemos indicado anteriormente. La Teoría del Comportamiento

Planificado es complementada mediante la introducción de una nueva variable, la efectividad percibida, demostrándose una relativa mejora en cuanto a capacidad explicativa y predictiva del modelo en el colectivo estudiantil, aunque no se corrobore para el personal académico y administrativo. Pensamos que ésta última conclusión parcial pudiera deberse a la falta de asociación, por parte del colectivo de personal académico y administrativo, entre el uso de este medio de transporte y la protección del medioambiente. Además, en este mismo subgrupo, las normas subjetivas no parecen tener un efecto significativo en la predicción de la intención de comportamiento, lo que pudiera estar relacionado con la importancia que el colectivo de estudiantes puede conceder a las presiones sociales percibidas, mientras que el personal académico y administrativo no se vería afectado por esta variable lo que probablemente esté ocasionado por las características intrínsecas de dichos individuos.

Consecutivamente, la introducción del factor cultural en el segundo ensayo corrobora la tesis propuesta por la Teoría de la Cognición Cultural, según la cual los individuos pueden ser clasificados en cuanto a las creencias que comparten, que determinarán su percepción del riesgo relacionado con diversos eventos futuros, dentro de los cuales se ha seleccionado el cambio climático global.

En cuanto al compromiso por reducir el impacto sobre el medio ambiente, se confirma la relevancia de las variables examinadas: la efectividad percibida y la implicación con la causa, influyen positivamente en el apoyo al compromiso por parte de los tres entes de la sociedad que se han analizado (gobierno, empresas y ciudadanos), mientras que la cultura parece influir solamente en el compromiso por parte del gobierno y de los ciudadanos, pero no de las empresas. No obstante lo anterior, se observa una discrepancia en cuanto a la influencia de algunas de las variables sociodemográficas incluidas en el estudio, ya que parecen ser relevantes en cuanto al apoyo por parte de las empresas y los ciudadanos, pero no por parte del gobierno. Por este motivo, en el modelo propuesto para medir el apoyo al compromiso gubernamental, únicamente se incluyeron los factores culturales, la implicación y la efectividad percibida, diferenciándose del análisis previo en cuanto a la introducción de la percepción del riesgo.

Por todo lo expuesto, el presente trabajo incide en la importancia que tanto para las empresas como para el gobierno debería concederse a la percepción que los

individuos tienen de la situación medioambiental, ya que por una parte dicha percepción predeterminará la posición del consumidor hacia ambas instituciones, apoyando por un lado a las empresas que muestran su preocupación por esta causa y, por otro, a los gobiernos que se comprometen a reducir su impacto en nuestro ecosistema y, por otra parte, tanto el sector empresarial como el gobierno podrían utilizar las conclusiones extraídas en estos ensayos en campañas de concienciación ambiental, incidiendo el riesgo percibido por el consumidor, así como sobre su implicación con el medioambiente, a la vez que se hace visible la efectividad de las acciones que de forma individual pueden tomar los ciudadanos para mejorar la situación de degradación en la que nos encontramos.

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