Applying the Theory of Planned Behavior in Predicting Pro-environmental Behaviour: The Case of Energy Conservation

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Abstract: This paper aims to propose and validate a model based on the Theory of Planned Behavior in order to explain consumers' pro-environmental behaviour regarding energy conservation. The model was constructed using the five variables from Ajzen's Theory of Planned Behavior (TPB) (behaviour, intention, perceived behavioural control, subjective norms and attitude) to which a variable adapted from Schwartz's Norm Activation Theory (NAT) was added ("awareness of the consequences and the need") in order to create a unique model adapted for the special case of energy conservation behaviour. Further, a survey was conducted and the data collected were analysed using structural equation modelling. The first step of data analysis confirmed that all the constructs have good reliability, internal consistency and validity. The results of the structural equation analysis validated the proposed model, with all the model fit and quality indices having very good values. In the analysis of consumers' pro-environmental behaviour regarding energy conservation and their intention to behave in a pro-environmental manner, this model proved to have a strong predictive power. Five of seven hypotheses were validated, the newly introduced variable proving to be a success. The proposed model is unique and will offer companies and organizations a valuable green marketing tool which can be used in the fight for environment protection and energy conservation.

Keywords: awareness of environmental problems; global warming; climate changes; structural equation modelling

JEL Classification: C52; M31; Q57

1. Introduction

Environmental problems like climate changes, pollution and global warming are primarily caused by society and human behaviour (Lehman and Geller, 2004). In order to solve these environmental problems a series of actions must be taken by society and individuals, because it affects each of us, directly or indirectly. However, solving environmental problems proved to be very difficult because the changes induced by a pro-environmental behaviour cannot be seen immediately by individuals and very often don't affect them directly (Leary, Toner & Gan, 2011).

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For example, some people may believe that the negative consequences of global warming are uncertain and they will not be immediately seen, but rather in a distant future (Clement, Henning & Osbaldiston, 2014, Gifford, 2011) and, in their opinion, environmental changes will not affect them personally more than other persons. Due to this particular opinion that many people adopted, individuals may think that environmental problems such as energy conservation belong to the entire society, and it is not their personal concern. This is why inducing individuals a pro-environmental behaviour (PEB) is often a challenge and a priority, being the only path to sustainability (Brewer & Stern, 2005; Turaga, Howarth & Borsuk, 2010).

The consequences of global warming and climate changes can be seen everywhere, as for example quick transitions from excessive rainfalls and flooding to drought and fires that lead even to famine. People continue to produce massive quantities of greenhouse gases and consume resources in excess if they have enough funds. Wasting unnecessary water when washing, gas when driving and electricity are just some examples. For these environmental problems, energy conservation is the key to stop the global warming and climate changes. But convincing individuals to act pro-environmentally by saving and conserving energy is the real challenge which needs to take into consideration several of factors. For example, low income could act as a barrier for consuming unnecessary resources, but will also act as a barrier for adopting ecological substitutes to conventional sources, like solar panels which may be more expensive than conventional sources of energy. Also, individuals with high incomes will not be constrained by financial resources and will not adopt a pro-environmental behaviour consisting in energy conservation unless they realize the consequences of this type of behaviour and the problems which could occur in the future.

Energy conservation is a pro-environmental behaviour (PEB). A pro-environmental behaviour is that behaviour addopted by an individual that is considered by the society protective for the environment (Krajhanzl, 2010, p. 252) and implies performing a series of actions that diminishes as much as possible the harm done to the environment (Steg & Vlek, 2009). Like other pro-environmental behaviours, in order determine why some individuals adopt an energy conservation behaviour while others don't, it is necessary to study the predictors of this actual behaviour. The socio-psychological Theory of Planned Behavior – TPB (Ajzen, 1991), that is a good framework used very often to predict pro-environmental behaviours (PEB), will be employed in this study, in order to establish the determinants of energy conservation behaviour. Besides the specific variables of this theory, a variable using two dimensions of Schwartz's Norm Activation Theory (1977), "awareness of the consequences and the need", will also be used to enhance the predictability power of the structural equations model.

2. Theoretical Background

2.1. Theory of Reasoned Action (TRA)

The Theory or Planned Behavior - TPB was first introduced in 1985 by Icek Ajzen and is a development of the Theory or Reasoned Action – TRA developed in 1975 by Fishbein and Ajzen. The purpose of the Theory or Reasoned Action – TRA is to explain human behaviour on the basis of his intention to adopt a certain behaviour.

The Theory or Reasoned Action assumes that individuals behave in a rational manner in order to achieve favorable results, and to avoid disappointing others by confounding their expectations. According to this theory people's intention to behave in a certain manner is a predecessor variable of their actual behaviour. Moreover, the intention of the individual to behave in a certain way is determined by the attitude toward that behaviour and by the subjective norms. (Hale et al., 2003).

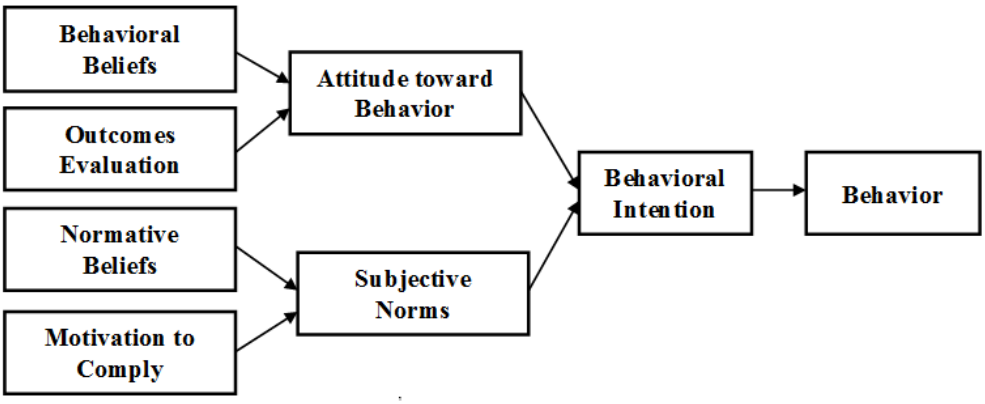

Figure 1. Theory of Reasoned Action – TRA (Fishbein & Ajzen, 1975)

The "attitude" component is represented by individual's beliefs which refer to behaviour's probability to generate the desired outcomes which can be evaluated as favorable or unfavorable (Hale et al., 2003). Subjective norms represent individual's perception about the correlation between a certain type of behaviour and what reference groups are thinking about this behaviour (Fishbein and Ajzen, 1975).

Behavioral intention is a function of attitude and subjective norms:

BI = AB(W1) + SN(W2) (Hale et al., 2003, p. 260).

The Theory or Reasoned Action lies behind the development of the Theory of Planned Behavior (Ajzen, 1991).

2.2. Theory of Planned Behavior (TPB)

Theory of Planned Behavior (TPB) was introduced by Icek Ajzen in 1985 and it further develops the Theory of Reasoned Action by adding a new variable called

"perceived behavioral control". The new theory can better explain human's behaviour in specific contexts where the individual has no control over his behaviour (Ajzen, 1985; Ajzen, 1991). Perceived behavioral control refers to either the ease or the difficulty to adopt a certain behaviour, and it is determined both by past experience and anticipated impediments or obstacles (Ajzen, 1991, p. 183). The "*perceived behavioural control"* variable consists of the situational factors and the availability of opportunities and resources such as time, money and knowledge, which reflect the real degree of control over behaviour. If the other variables remain unchanged, the intention to behave in a certain way is the central variable that determine the actual behaviour.

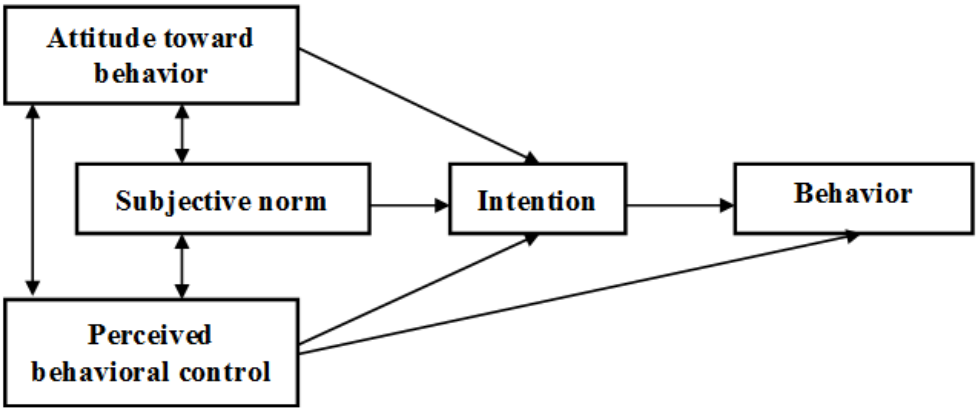

Figure 2. Theory of Planned Behavior – TPB

(Ajzen, 1991)

The Theory of Planned Behavior is used in many fields and has demonstrated its effectiveness over time in predicting actual behaviour in fields like care and health and care practices, educational behaviour, sexual behaviour, pro-environmental behaviour, the use of the Internet or in tourism (Macovei, 2015; Synodinos and Bevan-Dye, 2014).

The Theory of Planned Behavior is very used in the field of pro-environmental behaviour, serving throughout time as a solid framework for many empirical researches conducted by authors like Clement, Henning & Osbaldiston, in 2014 on energy conservation behaviour, Synodinos and Behan-Dye in 2014 on green purchasing behaviour, Chan and Bishop in 2013 on recycling behaviour, Kim, Njite, and Hancer in 2013, on eco-friendly restaurants, Greaves, Stride and Zibarras in 2013, on behavioural intentions in the workplace, Han, Hsu and Sheu in 2010 on green hotel choice, Fielding, McDonald and Louis in 2008, on environmental activism.

Because of the good results shown in many studies on pro-environmental behaviour, and the great prediction power of individuals' intention to behave in a pro-environmental manner and actual pro-environmental behaviour, the Theory of Planned behaviour will be further used as the main framework for this study regarding the energy conservation behaviour.

3. Research Model and Hypotheses

Ajzen's Theory of Planned Behavior (1991) is the main framework which will be employed in this study to predict consumers' actual pro-environmental behaviour of conserving energy. The main predictor of a pro-environmental behaviour is consumers' intention to behave in a pro-environmental manner, this relationship being studied by many researchers (Clement, Henning & Osbaldiston, 2014; Synodinos & Bevan-Dye, 2014; Macovei, 2015). The intention to adopt a certain behaviour or to act in a certain way, remains, like in the Theory of Reasoned Action (Ajzen, 1975), a central factor in determining individuals' current behaviour (Ajzen, 1985; Ajzen, 1991). The intention construct consists of motivational factors that influence a particular behaviour having a strong direct and positive influence on the actual behaviour (Ajzen, 1991).

Hypothesis 1: Consumers' intention to behave in a pro-environmental manner (energy conservation) has a positive influence on consumers' pro-environmental behaviour.

Individual behaviour often depends on the existence of resources: time, money, knowledge or wisdom (Ajzen, 1991). These resources act as constraints in individuals' intention and adoption of a certain behaviour, representing the actual degree of control over one's behaviour (Macovei, 2015). Although individuals with a high perceived behavioural control in term of the above mentioned resources are more likely to adopt a pro-environmental behaviour, if the effort associated with performing that behaviour is high, it will act as an impediment to action (Schultz & Oskamp, 1996).

Hypothesis 2: Consumers' perceived behavioural control has a positive influence on consumers' intention to behave in a pro-environmental manner.

Hypothesis 3: Consumers' perceived behavioural control has a positive influence on consumers' pro-environmental behaviour.

Subjective norms are perceived as a social pressure to engage or not to engage in certain behaviour (Ajzen and Fishbein, 2005). Subjective norms are determined by a set of normative beliefs which consist in the expectations of individuals' reference group formed by their immediate social network, such as family, friends, colleagues or neighbours. In Ajzen's Theory of Planned Behavior, the subjective norms have a

positive influence on individuals' intention to behave in a pro-environmental manner. Practically, the approval or disapproval of individuals' immediate social network has an amount of pressure on their intention, like in the particular case of energy conservation where family could have an influence on individuals' energy saving and conservation behaviour, like turning off the lights when leaving the room.

Hypothesis 4: Consumers' subjective norms have a positive influence on their intention to behave in a pro-environmental manner.

Attitude toward a behaviour represents the degree to which an individual values a behaviour as being positive or negative, good or bad. Attitude toward a behaviour is determined in the Theory of Planned Behavior by the total set of accessible behavioural beliefs (Ajzen, 1991). In the case of pro-environmental behaviour, consumers' intention to adopt a pro-environmental behaviour will be analyzed through respondents' stated behavioural intention. Attitude towards a certain behaviour has a strong direct and positive influence on behavioural intention, as shown by previous studies (Clement, Henning & Osbaldiston, 2014; Synodinos & Bevan-Dye, 2014; Ajzen & Fishbein, 2005; Fishbein & Ajzen, 1975):

Hypothesis 5: Consumers' attitude towards behaving in a pro-environment manner (Energy conservation) has a positive influence on their intention to behave in a pro-environmental manner.

Environmental awareness means "knowing the impact of human behavior on the environment" (Kollmuss & Agyeman, 2002). Environmental awareness is conceptualized in this study as awareness of the consequences and the need of a pro-environmental behaviour and has two dimensions according to the Norm Activation Theory – NAT (Schwartz, 1977, Harland et al., 1997): a personality dimension based on the knowledge and awareness of the consequences of environmental behaviour, and a situational and affective factor, based on the awareness of the need of pro-environmental behaviours. By being aware of the need to adopt pro-environmental behaviours like energy conservation, individuals should be more receptive to behave in a pro-environmental manner and should have a stronger intention to adopt a pro-environmental behaviour.

Hypothesis 6: Consumers' awareness of the consequences and the need of a pro-environmental behaviour has a positive influence on their intention to behave in a pro-environmental manner.

Hypothesis 7: Consumers' awareness of the consequences and the need of a pro-environmental behaviour has a positive influence on consumers' pro-environmental behaviour.

The proposed research model based on Ajzen's Theory of Planned Behavior enhanced with a variable construct which has two dimensions of Schwartz's Norm Activation Theory – NAT (1977). The model is presented in Figure 3 and will serve

as a framework for explaining consumers' intention to behave in a pro-environmental manner and their actual pro-environmental behaviour consisting in energy conservation.

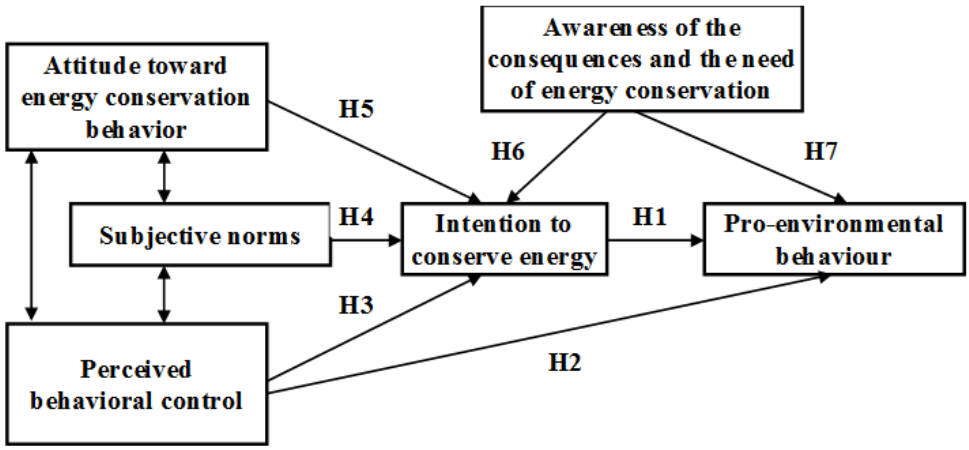

Figure 3. Proposed Research Framework of Pro-environmental Energy Conservation Behaviour

4. Measurements

The proposed research framework in this study has six latent variables or constructs. The constructs are "verbal surrogates for the phenomena named by the construct" (Freeze & Rascheke, 2007), measured using items.

Five variables are measured on a 5 point Likert Scale: 1 – Strongly Disagree, 2 – Disagree, 3 – Neither agree nor disagree, 4 – Agree to 5 – Strongly Agree. One variable, *pro-environmental behaviour* is measured on a 5 point frequency scale: never (1), sometimes (2), often (3), very often (4) and always (5). Each variable will be further defined at a conceptual and operational level.

Consumers' attitude toward a pro-environmental behaviour (energy conservation) represents "the degree to which performance of the behaviour is positively or negatively valued" (Fishbein & Ajzen, 1975; Ajzen, 1991). In this study it is measured as a latent reflective construct with four items which were adapted from Van den Berg's (2007) list of affective and cognitive attitude items: like, adequate, wise and useful.

Table 1. „Pro-environmental Attitude" measurements

Items	Adapted after
I believe it is adequate to conserve energy.	Van den Berg (2007)
I believe it is wise to conserve energy.	Van den Berg (2007)
I believe it is useful to conserve energy.	Van den Berg (2007)
I like to think that people should conserve energy.	Van den Berg (2007)

Subjective norms represent the social pressure coming from consumers' immediate social network consisting of reference groups: family, friends, neighbours or colleagues). In this study, subjective norms are a formative construct consisting of three items adapted from Clement, Henning & Osbaldiston, (2014) measuring the extent to which people who are important to an individual approve, support and have a pro-environmental behaviour.

Table 2. „Subjective norms" measurements

Items	Adapted after
Most people who are important to me support my effort to conserve energy for environmental reasons	Clement, Henning & Osbaldiston, (2014)
Most people who are important to me think I should conserve energy for environmental reasons	Clement, Henning & Osbaldiston, (2014)
Most people who are important to me take steps to conserve energy for environmental reasons	Clement, Henning & Osbaldiston, (2014)

Perceived behavioural control reflects individuals' perceptions of their ability to perform a behaviour (Ajzen, 1991). Perceived behavioural control is determined by a set of control beliefs (Ajzen, 1991) and consists of situational factors and resources like time, money and knowledge that facilitate the conditions that determine individuals to behave pro-environmental. The perceived behavioural control is a formative construct with four items, of which two are adapted after Ajzen (1991) and two are were developed for the context of this study.

Table 3. „Perceived behavioural control" measurements

Items	Adapted after
I have enough environmental knowledge for discerning between responsible and harmful behaviour.	Ajzen (1991)
I have the necessary will and wisdom to reduce energy consumption for environmental reasons.	Developed for this study
I have enough time and resources to use alternative means of ecological transport.	Developed for this study
I believe I am responsible for the environment we're living in.	Ajzen (1991)

Consumers' intention to behave in a pro-environmental manner, which is materialized by conserving energy in this study, consists in a series of expectations, wants and certainties, which are rational choices for environmental problems.

Intention variable is measured as a formative construct with four items of which two items are adapted from Soderlund and Ohman's (2006) approach for measuring intentions as expectations, plans and wants, one item is adapted from Mancha & Yoder (2015) and another one is developed for this study.

Table 4. „Consumers' intention to behave in a pro-environmental manner" measurements

Items	Adapted after
I want to conserve energy for environmental reasons.	Soderlund and Ohman (2006)
I intend to conserve energy for environmental reasons.	Soderlund and Ohman (2006)
I intend to use natural resources in a responsible manner (e.g. water, electricity, gas).	Developed for this study
I will try to reduce my carbon footprint in the forthcoming month.	Mancha & Yoder (2015)

Consumers' awareness of the consequences and the need of a pro-environmental behaviour is a construct which has two dimensions adapted from Schwartz's Norm Activation Theory – NAT (1977). The first dimension is a situational factor or activator, awareness of the need of pro-environmental behaviours, and it contains two items, one adapted from Harland et al. (2007) and another one is developed for this study and represents individuals' awareness of the need to take certain actions to conserve energy for environmental reasons. The second dimension is a personality trait, awareness of the consequences of environmental behaviour, and consists of two items adapted from Harland et al. (2007) which represents individuals' knowledge about environmental problems and potential consequences.

Table 5. „Awareness of the consequences and the need of a pro-environmental behaviour" measurements

Items	Adapted after
I am aware of the importance of energy conservation toward the future of environment	Harland et al. (2007)
I am aware of the need to reduce energy consumption for environmental reasons	Developed for this study
I am concerned about climate changes and its consequences	Harland et al. (2007)
I am concerned about global warming and its consequences	Harland et al. (2007)

A behaviour is a manifest, an observable response in a given context regarding a given target (Ajzen, 1991). A pro-environmental behaviour reflects the extent to which consumers perform activities which are environmentally-friendly.

Pro-environmental behaviour consisting of energy conservation is a formative latent variable with five items representing actions that individual should take in

order to conserve energy and protect the environment. Four items are adapted from Markowitz's et al. (2012) Student Environmental Behavior Scale (SEBS) and another one is developed for this study. All the five items are measured using a five point frequency scale: never (1), sometimes (2), often (3), very often (4) and always (5) and three of them are reverse coded.

Table 6. „Pro-environmental behaviour" measurements

Items	Adapted after
I leave the lights on when I leave a room*	Markowitz et al. (2012)
I leave the water running while brushing my teeth*	Markowitz et al. (2012)
I leave my computer on or asleep at night (not fully turned off)*	Markowitz et al. (2012)
I replace incandescent light bulbs with energy efficient alternatives	Markowitz et al. (2012)
I don't drive unless it's necessary and I try to use public transportation or the bicycle.	Developed for this study

*reverse coded items

5 Methodology, Data Analysis and Results

The survey instrument was pretested on a sample of 30 individuals that took part in pro-environmental actions regarding energy conservation.

The final survey was administered to a large sample of individuals in Romania, consisting of faculty, master and PhD students from Lumina – The University of South-East Europe, from the Bucharest University of Economic Studies, high school students and employees from a series of companies from IT&C and economic fields.

A total of 152 questionnaires were collected, 84 in classic paper and 68 in electronic format, from which 133 have been validated and subjected for further analysis. Electronic questionnaires have been sent via e-mail, accompanied by a cover letter expressing the objective of this research. A total of 312 e-mails were sent, but only 68 were received back, meaning a response rate of 21.8%.

The 133 valid questionnaires have been centralized in a database and further analyzed using IBM SPSS Statistics. The proposed research model was analyzed using the structural equations modelling technique with IBM SPSS Statistics v. 20 and Warp PLS 5.0 (Kock, 2015).

5.1 Data Analysis

Data analysis consists in measuring latent variables or constructs' reliability, internal consistency, convergent and discriminant validity, the PLS-based SEM analysis and model fit.

The reliability and internal consistency analysis followed Bagozzi and Yi (1988) approach according to which the items corresponding to each construct should be tested for internal consistency by computing Cronbach's Alpha coefficients, composite reliability coefficients and average extracted variance (AVE). Table 7 shows that Cronbach's Alpha values are over 0.7 (Nunally, 1978) and composite reliability values are over 0.7 (Fornell and Larcker, 1981), for all the constructs, thus demonstrating reliability and internal consistency. This means that the measuring instrument is reliable and all the items associated to each latent variable are understood in the same way by different respondent and each item describes accurately the underlying latent factor (Cătoiu et al., 2013).

Table 7. Reliability and validity statistics

	Cronbach Alpha	**Composite Reliability**	**AVE**	**VIF**	**1**	**2**	**3**	**4**	**5**	**6**
1. BEHAVIOUR	0.869	0.910	0.718	3.411	(0.847)	0.789	0.475	0.618	0.524	-0.576
2. INTENTION	0.858	0.904	0.703	2.841	0.789	(0.838)	0.417	0.542	0.531	-0.515
3. SUB_NORMS	0.786	0.876	0.702	1.499	0.475	0.417	(0.838)	0.330	0.411	-0.491
4. AWARENESS	0.819	0.881	0.651	1.700	0.618	0.542	0.330	(0.807)	0.413	-0.459
5. PBC	0.770	0.853	0.593	1.550	0.524	0.531	0.411	0.413	(0.770)	-0.304
6. ATTITUDE	0.757	0.847	0.584	1.719	-0.576	-0.515	-0.491	-0.459	-0.304	(0.764)

Note: Square roots of AVE's shown on diagonal

The validity of the measures were tested with both convergent and discriminant validity.

The square roots of AVE are higher than any other correlation among latent variables (Table 7) resulting a good discriminant validity (Fornell and Larcker, 1981).

The convergent validity of the constructs was assessed through the analysis of average variance extracted (AVE) and combined loadings and cross-loadings. AVE values from Table 7 are all over 0.5, showing constructs' good convergent validity (Fornell and Larcker, 1981).

Table 8. Combined loadings and cross-loadings*

	BEHAVIO	INTENTI	SUB_NOR	AWARENE	PBC	ATTITUD	Type (a	SE	P value
BEH1	0.830	-0.089	-0.083	0.004	0.146	-0.173	Formati	0.075	<0.001
BEH2	0.849	0.134	0.024	0.003	-0.073	0.024	Formati	0.075	<0.001
BEH3	0.882	-0.150	0.011	-0.024	-0.061	-0.003	Formati	0.074	<0.001
BEH4	0.827	0.112	0.047	0.019	-0.006	0.152	Formati	0.075	<0.001
INT1	0.008	0.798	0.106	0.016	0.162	0.058	Formati	0.076	<0.001
INT2	-0.172	0.878	-0.087	0.102	0.069	-0.116	Formati	0.074	<0.001
INT3	-0.015	0.862	-0.151	-0.004	-0.056	-0.039	Formati	0.074	<0.001
INT4	0.194	0.813	0.149	-0.121	-0.174	0.110	Formati	0.075	<0.001
SN1	-0.049	0.034	0.836	-0.086	0.087	-0.111	Reflect	0.075	<0.001
SN2	0.119	-0.049	0.895	0.007	0.013	-0.025	Reflect	0.074	<0.001
SN3	-0.084	0.020	0.777	0.084	-0.108	0.147	Reflect	0.076	<0.001
AWR1	0.164	-0.066	0.003	0.730	0.073	0.081	Formati	0.077	<0.001
AWR2	-0.002	0.147	0.099	0.875	-0.128	0.109	Formati	0.074	<0.001
AWR3	-0.033	0.052	-0.058	0.796	-0.050	-0.104	Formati	0.076	<0.001
AWR4	-0.112	-0.149	-0.052	0.819	0.120	-0.088	Formati	0.075	<0.001
PBC1	0.032	-0.137	0.212	0.016	0.747	0.071	Formati	0.077	<0.001
PBC2	0.134	-0.149	0.008	-0.083	0.826	-0.078	Formati	0.075	<0.001
PBC3	0.160	-0.015	-0.175	0.087	0.786	0.074	Formati	0.076	<0.001
PBC4	-0.364	0.331	-0.038	-0.017	0.716	-0.065	Formati	0.077	<0.001
AT1	-0.005	0.015	0.011	-0.122	0.081	0.836	Reflect	0.075	<0.001
AT2	-0.058	0.202	-0.029	-0.039	-0.013	0.825	Reflect	0.075	<0.001
AT3	0.320	-0.131	-0.061	0.014	-0.304	0.619	Reflect	0.079	<0.001
AT4	-0.193	-0.129	0.069	0.165	0.174	0.758	Reflect	0.076	<0.001

*Notes: Loadings are unrotated and cross-loadings are oblique-rotated. SEs and P values are for loadings. P values < 0.05 are desirable for reflective indicators.

Loadings are the Pearson correlations between latent variables and indicators. The cross-loadings from the matrix (Table 8) were obtained through an oblique rotation, which is recommended in the case of PLS-based structural equations modeling analysis (Kock, 2015).

The combined loadings and cross-loadings (Table 8) analyzed following Jewell's approach which states that indicators among constructs should have high and similar loadings (Jewell, 2011) also confirm a good convergent validity. The correlation among the indicators of model's latent variables are shown in Table 9.

Table 9. Correlations among indicators

	BEH 1	BEH 2	BEH 3	BEH 4	INT1	INT2	INT3	INT4	SN1	SN2	SN3	AWR 1	AWR 2	AWR 3	AWR 4	PBC 1	PBC 2	PBC 3	PBC 4	AT1	AT2	AT3	AT4
BEH1	1.000																						
BEH2	0.668	1.000																					
BEH3	0.618	0.647	1.000																				
BEH4	0.534	0.562	0.712	1.000																			
INT1	0.573	0.597	0.515	0.508	1.000																		
INT2	0.558	0.581	0.568	0.593	0.628	1.000																	
INT3	0.560	0.574	0.552	0.549	0.539	0.712	1.000																
INT4	0.492	0.593	0.551	0.604	0.529	0.584	0.623	1.000															
SN1	0.345	0.375	0.317	0.308	0.386	0.256	0.245	0.360	1.000														
SN2	0.425	0.399	0.460	0.379	0.443	0.356	0.267	0.345	0.662	1.000													
SN3	0.212	0.242	0.257	0.281	0.204	0.228	0.121	0.291	0.427	0.561	1.000												
AWR 1	0.472	0.422	0.399	0.388	0.441	0.360	0.378	0.243	0.193	0.281	0.162	1.000											
AWR 2	0.449	0.496	0.469	0.513	0.398	0.506	0.449	0.366	0.237	0.326	0.264	0.586	1.000										
AWR 3	0.392	0.395	0.465	0.436	0.326	0.456	0.381	0.329	0.214	0.245	0.155	0.380	0.597	1.000									
AWR 4	0.403	0.378	0.370	0.310	0.319	0.362	0.253	0.275	0.176	0.254	0.128	0.434	0.609	0.581	1.000								
PBC1	0.354	0.270	0.295	0.363	0.364	0.310	0.282	0.236	0.370	0.383	0.257	0.231	0.235	0.211	0.301	1.000							
PBC2	0.400	0.364	0.406	0.300	0.451	0.359	0.295	0.305	0.347	0.328	0.220	0.331	0.220	0.216	0.261	0.538	1.000						
PBC3	0.451	0.369	0.355	0.408	0.417	0.417	0.362	0.328	0.269	0.225	0.093	0.317	0.299	0.331	0.324	0.393	0.553	1.000					
PBC4	0.308	0.281	0.205	0.322	0.369	0.445	0.300	0.241	0.198	0.285	0.178	0.206	0.261	0.167	0.195	0.377	0.412	0.457	1.000				
AT1	-0.487	-0.450	-0.408	-0.322	-0.307	-0.422	-0.359	-0.345	-0.386	-0.360	-0.258	-0.266	-0.372	-0.371	-0.402	-0.114	-0.220	-0.167	-0.191	1.000			
AT2	-0.438	-0.348	-0.387	-0.310	-0.284	-0.364	-0.257	-0.272	-0.338	-0.419	-0.261	-0.278	-0.287	-0.344	-0.282	-0.161	-0.221	-0.158	-0.144	0.591	1.000		
AT3	-0.333	-0.225	-0.306	-0.325	-0.327	-0.344	-0.304	-0.237	-0.320	-0.317	-0.281	-0.216	-0.231	-0.250	-0.228	-0.282	-0.270	-0.262	-0.266	0.329	0.422	1.000	
AT4	-0.401	-0.428	-0.441	-0.323	-0.323	-0.388	-0.393	-0.356	-0.337	-0.354	-0.115	-0.210	-0.274	-0.278	-0.183	-0.136	-0.193	-0.062	-0.090	0.561	0.457	0.270	1.000

5.2 Hypotheses Testing

The structural research model was analyzed with WarpPLS 5.0 using bootstrap resampling method. WarlPLS 5.0 is able to analyze nonlinear relationships between latent variables (Kock, 2015), like U-curve or S-curve relationships, using the variance-based or PLS-based method. Moreover, WarpPLS software is able to estimate parameters of both formative and reflective constructs (Kock, 2015).

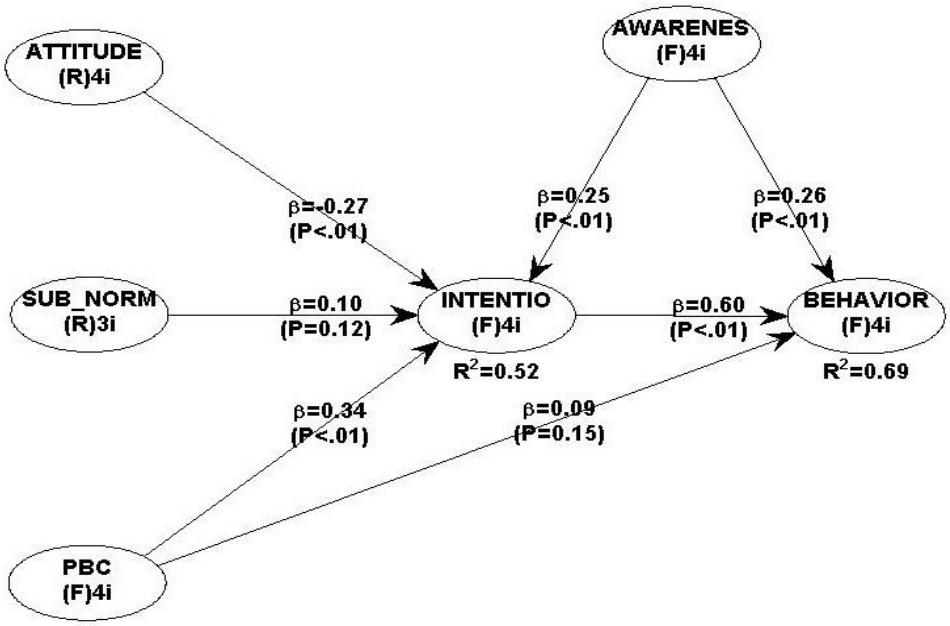

Figure 4. Pro-environmental Energy Conservation Behaviour Model
(analyzed using WarpPLS 5.0)

Figure 4 shows model's estimates consisting of β path coefficients with their probability values and the R^2 determination coefficients.

First, model's hypotheses will be tested using the β path coefficients and their probability values.

Intention has the strongest influence on *Behaviour*, with a β path coefficient of 0.60, thus validating H1.

Perceived behavioural control has a weak influence on *Behaviour* with β of 0.09 which is statistically insignificant for a $p > 0.05$ ($p=0.15$), thus rejecting H2. *Perceived behavioural control* also positively influence *Intention*, β being 0.34 for a $p < 0.01$, validating H3. *Subjective norms* have an insignificant effect of 0.10 on *Intention* for a $p>0.05$ ($p=0.12$), rejecting H4, and *Attitude* has an effect of 0.27 on *Intention* for a $p<0.01$, validating H5.

The new variable developed especially for this study, *Awareness of the consequences and the need*, significantly influences *Intention* with a β of 0.25 and *Behaviour* with a β of 0.26, thus validating H6 and H7.

The cumulative effects of the three predictors: *intention, perceived behavioural control and awareness* explain in a proportion of 69% the variance of *consumers' pro-environmental behaviour* (R^2=0.69).

The *Intention to behave in a pro-environmental manner* variable is explained in a proportion of 52% by its four predictors: *attitude, subjective norms, perceived behavioural control and awareness* ((R^2=0.52).

In conclusion, five research hypotheses are validated (H1, H3, H5, H6 and H7) and two are rejected, H2 and H4.

5.3 Model Fit Indices

The proposed research model analysed with WarpPLS 5.0 using structural equation modelling method based on PLS technique will be validated by analysing its model fit and quality indices shown in Table 10. These ten model fit and quality indices are another great advantage of WarpPLS 5.0, because in variance based SEM analysis methods usually these can't be provided.

Table 10. Model fit and quality indices

Indices	Criterion
Average path coefficient (APC)=0.274,	P<0.001
Average R-squared (ARS)=0.603,	P<0.001
Average adjusted R-squared (AARS)=0.591,	P<0.001
Average block VIF (AVIF)=1.466,	acceptable if <= 5, ideally <= 3.3
Average full collinearity VIF (AFVIF)=2.120,	acceptable if <= 5, ideally <= 3.3
Tenenhaus GoF (GoF)=0.630,	small >= 0.1, medium >= 0.25, large >= 0.36
Sympson's paradox ratio (SPR)=1.000,	acceptable if >= 0.7, ideally = 1
R-squared contribution ratio (RSCR)=1.000,	acceptable if >= 0.9, ideally = 1
Statistical suppression ratio (SSR)=1.000,	acceptable if >= 0.7
Nonlinear bivariate causality direction ratio (NLBCDR)=1.000,	acceptable if >= 0.7

*Computed with WarpPLS 5.0

All the ten model fit and quality indices are in the recommended range or have probability values less than 0.001. Moreover, the ARS index is 0.603 for a p<0.001 and AVIF, the most important measure of model fit, is 1.466, under the ideal limit of 3.3 (Kock, 2015). Also the APC is 0.227 for a p<0.001.

In conclusion, the **proposed model of pro-environmental energy conservation behaviour is validated**, having very good model fit and quality indices.

6. Conclusions, Limitations and Future Research

Ajzen's Theory of Planned Behavior – TPB (1991) is a rational choice theory from social psychology, which is very often used in the study of individuals' pro-environmental behaviour (Macovei, 2015). Ajzen's Theory of Planned Behavior – TPB enhanced with a variable adapted from Schwartz's NAT – Norm-activation Theory (1977) was once again successfully applied in the case of energy consumption behaviour, explaining in a proportion of 69% *consumers' pro-environmental behaviour* and in a proportion of 52% their *intention to behave in a pro-environmental manner*, the proposed model being validated with very good model fit and quality indices.

The newly introduced variable, *consumers' awareness of the consequences and the need of a pro-environmental behaviour*, has proved to be a strong determinant of *intention to behave in a pro-environmental manner* and *actual pro-environmental behaviour* consisting in energy conservation, and may serve as a predictor for future research in the field of pro-environmental behaviour.

Regarding two important relationships among the TPB's variables, in this study, the influence of *Perceived behavioural control* on *Behaviour* and the influence of *Subjective norms* on *Intention* variable, weren't validated because of the weak β coefficients which had probabilities values over 0.05. One of the reasons why this happened is the sample of only 133 respondents which is relatively small because in structural equation modelling (SEM) it is recommended to have 10 answers for each item involved in the research model, and in this study there are 23 items in the proposed model. Also, the collected answers weren't tested for multivariate outliers using de Mahalanobis D-Squared distance test in order to identify the unusual answers and deeper analyse it. *Subjective norms* and *Perceived behavioural control*, although have a good reliability, internal consistency and validity, may require a different formulation of their items for the case of energy conservation, which could be a subject for future research.

The model proposed and validated in this study will offer companies and organizations a valuable tool which can be used in their social and green marketing campaigns (Serban et al., 2012), organization green events (Moise & Macovei, 2014) and to better understand the consumers that don't have a pro-environmental behaviour in order to find out new ways to convince them to protect the environment and conserve the energy in order to combat global warming, pollution and climate changes.

The proposed model in this study can be used as a solid base for future research in the field of pro-environmental behaviour and energy conservation. More variables can be added to this model from other theories and fields according to the research context, like economic or demographic variables which could better explain consumers' pro-environmental behaviour in certain situations.

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