Moderating Effects of Trust on Environmentally Significant Behavior in Korea

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Abstract: To treat environmental problems and to seek sustainable development, voluntary and cooperative efforts, which is really against the traditional mentality with the emphasis on the individual competitive optimization, became the key to maintain the sustainability of complex social and ecological systems. To understand the cooperative and voluntary individual's environmentally significant behavior (ESB), this paper focuses on the role of trust, and assesses the effect of trust on the relationship between existing factors and ESB. A structural equation model (SEM) is constructed to estimate the moderating effects of trust on ESB in Korea. We found that people with a negative view on strict environmental regulations do not exhibit ESB and thus nudge policies could be much more effective than the forceful measure. It is noteworthy that public private partnership, as a kind of optimal trust, should be more promoted in the environmental protection policies.

Keywords: environmentally significant behavior (ESB); public private partnership (PPP); trust; structural equation model (SEM); Korea

1. Introduction

The core characteristics of the modern society manifested in science, technology, industrial capitalism, market economy, and bureaucratic society are indebted to the "enlightenment mentality". The mentality linked with our modern values and consciousness makes us believe that we can handle social problems through scientific and technological methods advanced with economic development [1]. Unfortunately, this instrumental mentality has been equally applied to the method of dealing with environmental problems that threaten our future survival. However, technological advancement itself is not sufficient to solve modern environmental problems such as natural resource depletions and global climate change [2]. These problems, which are embedded in a combination of complex social-ecological systems with multiple subsystems and internal variables within these subsystems, demand collaborative governance where resource users participate in developing rules and norms for managing the resources [2,3]. Policy solutions with one-size-fit-all recommendations are likely to fail to achieve environmental sustainability without voluntary and cooperative participation from the public.

The importance of the involvement of citizens in environmental policy is related to the growing challenge faced by government in terms of handling environmental problems. Environmental problems characterized by multiple stakeholders and scientific uncertainty make it harder for government to determine levels and methods of regulations [4]. As a response, scholars turn their attention to citizens' involvement in promoting environmental conditions. They argue that the promotion

of environmentally significant and responsible behavior can draw on collaborative environmental governance, which is an alternative to the failures of top-down methods of government regulations [5].

As such, there is a growing interest in individuals' environmentally significant behavior (ESB) ranging from reduced consumption to the purchase of energy-efficient products [6,7]. ESB involves changes in environmental practices and lifestyles that lead to positive consequences of the environment. However, despite the positive implications of ESB, one that hinders further facilitating the behavior is related to the public nature of ESB. That is, rational and self-interested individuals are less willing to endure inconvenience from reducing consumption and paying more for environmentally friendly goods for the sake of promoting such common goods as the environment. Rather, individuals want to merely enjoy benefits from ESBs without paying their own costs [8–10]. So this challenge raises the following questions: how can ESB be facilitated? Why some individuals engage in this environmentally responsible behavior and others do not? This study pays special attention to trust and its moderating effects on ESB. Researchers from diverse academic fields have examined the factors affecting on ESB. Most of these studies focused on environmental values and psychology and socio-demographic factors. Recently, several scholars pay attention to trust as a means to understanding environmental behavior [11–14]. However, these studies are mainly conducted in western contexts and thus their results and implications may not be applicable to Asian contexts.

Thus, this study focus on the moderating effects of trust on the relationships between existing factors and ESB using the National Survey of Environmental Behavior conducted in South Korea (hereafter Korea). It constructed a structural equation model to estimate the moderating effects.

2. Theoretical Review and Hypotheses

2.1. The Concept of ESB

Environmentally significant behavior (ESB) involves individuals' voluntary and proactive behavior toward allocating and managing environmental resources in a socially sustainable manner and goes beyond present regulatory requirements, thereby playing an important role in promoting environmental sustainability. Recently, ESB has received increasing attention from scholars as a feasible and practical complement to regulatory regimes in dealing with nontraditional environmental issues such as climate change; that is, those issues characterized by weak regulatory regimes and environmental leadership based mainly on some disagreement over methods for addressing them and the level of responses [4].

ESB is defined by its impact and intention [6]. The former describes the extent to which the individual's environmental behavior is altered to address environmental change either directly or indirectly. Direct environmental impacts of individuals are introduced by practicing sustainability in their everyday lives, including reductions in material consumption and pollution-causing activities. In addition, environmental enhancement can be achieved indirectly by shaping the context in which decisions that affect the environment are made [6,15]. Individuals can influence public policies that are directly or indirectly associated with the environment by participating in the policymaking process. For example, policies concerning the local transport and waste management infrastructure can affect patterns of behaviors such as personal travel and waste disposal [16]. Similarly, diverse market provision systems may influence individuals' attitude on environmental-friendly consumption.

In addition, individuals can engage in ESB with the intention to affect the environment. This environmental intention can trigger an individual to take environmental action, but it does not necessarily lead to actions with environmental impacts [6]. For example, individuals may report their willingness to make "green" purchases and engage in other pro-environmental behaviors, but such intentions often fail to translate into actual behaviors. The discrepancy between environmental intentions and behaviors has been widely discussed [6,17].

With the definition of ESB, it can be classified into four coherent subtypes based on a two-by-two table as shown in Table 1. The vertical dimension distinguishes between inactive behaviors describing

environmental intentions and active ones that lead to some action producing an environmental impact. The horizontal dimension focuses on domains in which individuals' environmental behaviors, ranging from private to public, occur. First, behaviors in the private sphere involve actions that directly cause environmental impacts by shifts in personal lifestyles that practice "voluntary simplicity" either dramatically or incrementally. Such behaviors entail the personal curtailment of consumption (e.g., water and meat) and the use/purchase of environmentally friendly products [6,18]. Second, behaviors in the public sphere involve actions that cause environmental impacts indirectly through the public domain, including participation in the public policymaking process through various means such as environmental protests, environmental petitions, and donations to environmental organizations [6]. Combining these two dimensions, the present study classifies four types of ESBs: no active ESBs in the private sphere, no active ESBs in the public sphere, active ESBs in the private sphere, and active ESBs in the public sphere. The study pays special attention to active ESBs in the private sphere, including personal constraints on consumption (PCC) and personal green consumerism (PGC). Recently, both policymakers and scholars have recognized these two types of ESBs as important for environmental sustainability. Without drawing on individuals' voluntary efforts to change their unsustainable level of consumption, any initiatives involving policies and technologies are likely to fail.

Table 1. Types of ESB.

	Private Sphere	Public Sphere
No Action (Intention)	Provide support for using green products (e.g., willingness to pay higher prices for "green" products)	Provide support for environmental policies (e.g., willingness to pay higher environmental taxes and the acceptance of environmental regulations)
Action	1. Personal constraints on consumption (PCC; e.g., less meat, less water, and less driving)	1. Environmental citizenship (e.g., environmental petition and donated to environmental organizations)
	2. "Green" consumerism (e.g., using/purchasing energy-efficient products)	2. Environmental activism (e.g., active participation in environmental organizations and demonstrations)

Note: This table is adjusted based on Stern (2000) [6]. ESB: Environmentally significant behavior.

In response to the recent popularity of environmentalism, majorities of Koreans agree the need for ESB and are willing to practice it. However, there is a considerable gap between environmental willingness and actual environmental actions [19]. According to the report of the Korea Environmental Industry and Technology Institute (2010) [20], about 88.4% of the people agree on the necessity of environment-friendly living, while 64.5% think that environment-friendly products are too expensive and only 37.9% are living with an environmentally friendly lifestyle. Recently, as a means to promote ESB by individuals, Korean government has been introducing voluntary environmental programs, including "carbon point system", "green mileage system", and "carbon cashback system." These programs provide financial incentives (redeemable points or gift certificate) to people who save electricity, water, and gas as well as purchase eco-friendly products.

2.2. Theoretical Perspectives of ESB and Hypotheses

In an attempt to understand pro-environmental behavior, psychological perspectives have focused primarily on internal and psychological factors, including environmental values, beliefs and attitudes and related them to environmental behavior [21–25]. These studies were fundamentally based on a linear model suggesting that environmental knowledge leads to environmental attitudes (environmental awareness and concern), which in turn gives rise to pro-environmental behavior [26]. Although a variety of studies have been conducted to analyze ESB based on this early model, they have lacked explaining mechanisms of how environmental attitude shape behavior. To fill this gap, Ajzen and Fishbein [27] introduced a theory of planned behavior in which environmental behavior

is predicted by a complex structure of individual behavior involving behavioral intention, attitudes, social pressures, and behavioral beliefs and normative beliefs. Furthermore, building upon Ajzen and Fishbein's model, Hines, Hungerford and Tomera [28] did a meta-analysis of 128 research studies on pro-environmental behavior and suggested factors linked with environmental behavior, including knowledge of issues, knowledge of action strategies, locus of control, attitudes, verbal commitment, individual sense of responsibility, and situational factor.

From economic perspectives, economists understood environmental behaviors as a private provision of public good [25]. The general assumption of this perspective is that individuals will maximize his/her own utility and benefits and thus are more likely to be free riders than participate in provision of public goods. However, this economic perspective cannot explain individuals' voluntary effort to provide public goods [29]. This gap is filled by another perspective that goes beyond the economic perspective, suggesting that voluntary environmental behavior is driven by "warm glow" altruism [30] and morality [31]. According to Andreoni [30], people who have warm glow altruism will contribute to the private provision of public goods because they feel rewarded by the act of giving, such as donation or pro-environmental behavior [25,30]. Similarly, Brekke et al. [31] argue that individuals' utility from charitable activity is motivated by moral reason rather than self-interest [29,31]. In their moral-based model, people have their own moral ideal and would make voluntary contribution to their ideal.

Despite the divergent understanding about environmental behavior, literature generally converges on factors that influence ESB. They include (1) New Environmental Paradigm (NEP) [32–34]; (2) Environment-Economy Trade-off (EET) as a perception of relationship between economic growth and environmental conservation [35,36]; (3) Environmental Knowledge (EKN) [21,37,38]; (4) Pro-social Behavior (PSB) [6,39–41].

2.3. The New Environmental Paradigm

Fundamental issues of environmental behavior research are about individual's value and/or concern for the environment [41–44]. Values are generally conceptualized as important life goals or standards that function as guiding principles in life [44,45]. Especially, in relation to environmental problems, values may play an important role in solving these problems [43]. Several studies revealed that the stronger individuals have new environmental values, the more likely they are to engage in environmental responsible behavior [44,46]. As a value-based approach, Stern et al. (1995) [47] proposed a causal model of environmental concern to examine the relationship between values and environmental behavior, and they used the New Environmental Paradigm (NEP) scale suggested by Dunlap & Van Liere (1978) [32] as measures of environmental concern. The New Environmental Paradigm (NEP) is focusing on measurement of people's views on the relationship between human and environment, so it has been used as a tool to measure general environmental concern [33,48]. And these studies using NEP revealed that person with a higher environmental concern is more likely to act in a pro-environmentally manner [44,49]. Therefore, we hypothesize that:

H1: *Individuals with a stronger level of NEP are more likely to show ESB.*

2.4. Environment-Economy Trade-Off

The relationship between environmental protection and economic growth has been an ongoing debate [50–52]. This environment-economy dichotomy indicates the level of perception toward the impact of environmental protection and economic development. On one hand, individuals with a stronger perception toward an economy-environment trade-off are less likely to undertake ESB. This is largely due to the perceived costs involved in environmental behavior and their subsequent influence on economic well-being [53,54]. On the other hand, individuals who perceive the positive relationships between environmental protection and economic development are more likely to support environmental policies and thus voluntarily undertake environmental behavior. Similarly, those

with environmental value putting environmental conservation over economic growth have a greater tendency to adopt ESB. Therefore, we develop the following hypotheses:

H2: *Individuals with a stronger level of perception toward a positive relationship between environmental protection and economic development are more likely to show ESB.*

2.5. Environmental Knowledge

Researchers insist that an individual's environmental behavior is highly dependent on his/her environmental knowledge [21,55]. According to Fryxell & Lo (2003, p. 45) [56], environmental knowledge can be defined as "a general knowledge of facts, concepts, and relationships concerning the natural environment and its major ecosystems." Similarly, Laroche et al. (2001) [57] approached a concept of environmental knowledge as individual's ability to identify or define a number of symbols, concepts, and patterns of behavior associated with environment. In other words, environmental knowledge involves what people know about the environment, key relationships leading to environmental aspects or impacts, an appreciation of "whole systems", and collective responsibilities necessary for sustainable development [41]. In general, therefore, it is considered that environmental knowledge has a positive impact on pro-environmental behavior. Kaiser & Fuhrer (2003) [58], Mobley et al. (2010) [59], and Oğuz et al. (2010) [60] revealed that people who have sufficient knowledge about environmental issues and problems are more likely to behave in an eco-friendly manner. Thus, we developed the following hypothesis:

H3: *Individuals with a greater level of environmental knowledge are more likely to show ESB.*

2.6. Prosocial Behavior

Another approach to analyzing factors affecting ESB is based on the models of altruism, empathy, and prosocial behavior [26]. Prosocial behavior is defined as any voluntary behavior that results in benefits for other persons [61,62] and explained well by norm-activation theory of altruism [6,63,64]. This theory considers environmental behavior as a function of social norms, personal norms, and awareness of consequences. In the same vein, Stern, Dietz & Kalof (1993) [65] and Mostafa (2009) [66] found that prosocial behavior (or altruism) has a positive influence on pro-environmental behavior. Oppositely, individuals with a stronger level of selfish and competitive orientation are less likely to act ecologically [67]. Therefore, we hypothesize that:

H4: *Individuals with a strong level of prosocial propensity are more likely to show ESB.*

2.7. Trust as a Moderating Factor

Trust is generally built upon the accumulation of social and institutional relations [68–71]. It can help lubricate social friction and promote cooperation, particularly in the areas where collective actions are needed, including economic development, democratic [68,71,72] and environmental governance [73,74]. The focus of scholars in this field has focused two primary dimensions, including social trust and institutional trust [71,72,75–77]. First, social trust primarily results from continued social interaction between and among individuals and has a social property for facilitating cooperation. Individuals with a greater level of social trust are more likely to pursue the common good than their counterparts. This behavioral tendency is related to the fact that these individuals tend to believe that the members of the community will cooperate and work towards the protection of the common good. Second, institutional trust describes trust towards public institutions, including government and nonprofit organizations [78]. Individuals with a higher level of institutional trust are more likely to behave more responsibly with the environment than their counterparts. This is largely because these individuals tend to believe that public institutions are credible and executes environmental policies in a reliable manner handling the environmental problems [77,79,80]. Also, trust promotes citizens' participation in social networks involving organized social groups function as channels

to facilitate the flow of information and knowledge and thus increase the level of awareness on environmental issues [77]. This aspect is well documented in local urban development contexts. Therefore, we hypothesize that:

H5: *The effects of NEP, EEP, EKN, and PSB on ESB will be different between the group with high level of trust and the group with low level of trust.*

3. Research Methodology and Model Description

3.1. Data

We used data from the National Survey of Public Environmental Behavior conducted in South Korea in the spring of 2012. The survey considered a random sample of 5000 residents drawn from a national panel developed by a survey firm, and the panel proportionally represented the population of major cities. The questionnaire was circulated by e-mail and by a covering letter addressed to the name of each head of household listed in the panel directory. A total of 5000 individuals were originally targeted, and a total of 1085 responses were obtained after excluding 60 for incomplete data (a 21.7% response rate).

3.2. Variables Measures

Private-sphere ESB was measured in two ways. First, it was measured by separate measures in two dimensions: (1) PCC (less meat, less water, and less driving) and (2) PGC (the use of energy-efficient bulbs, the use of energy-efficient electronic devices, and recycling). Each measure was evaluated based on a five-point Likert-type scale ranging from "strongly disagree" (1) to "strongly agree" (5). Pfeffer and Stycos used similar measures to estimate ESB [7].

For the independent Variables, the new environmental paradigm (NEP) is the underlying worldview and mind-set that people have toward the environment and emphasizes harmonious interactions between humans and nature [32]. This perspective emphasizes that earth can support only a limited number of people with its limited resources. It reflects a shift in people's environmental perspective from the "dominant social paradigm", which suggests the power of humans over the environment and natural resources and thus seeks unlimited economic growth [33] (p. 178). The items for measuring the NEP were adapted from Dunlap and Van Liere [32], and Dunlap et al. [33]: (1) "The balance of nature is very delicate and easily upset by human activities", (2) "The earth is like a spaceship with only limited room and resources", and (3) "We are approaching the limit of the number of people the earth can endure."

The environment-economy trade-off (EET) focuses on the negative perception toward a relationship between environmental protection and economic prosperity. EET was measured by asking the extent to which the respondent agreed with the following three statements [81]: (1) "Environmental regulations have a negative impact on the economy", (2) "Environmental regulations have a negative impact on employment", and (3) "Individuals are worse off by environmental regulations."

Environmental knowledge (EKN) indicates the level of knowledge that people have of causes of major environmental issues such as global warming. It was measured by five items to assess the respondent's knowledge of primary causes of global warming, including (1) pollution from firms, (3) the use of fossil fuels, and (5) the destruction of tropical forests. Previous studies have generally verified the significant positive effect of EKN on the progressive environmental behavior of individuals [82], which suggests that cognitive factors such as EKN can be an important prerequisite for the development of environmental behaviors [83].

Pro-social behavior (PSB) was measured by asking the respondents to indicate the extent to which he or she agreed with the following statements: (1) "Sometimes I give change to beggars", (2) "From time to time I contribute money to charities", and (3) "From time to time I volunteer for community service." The items of all independent variables were measured based on a five-point Likert-type scale ranging from "strongly disagree" (1) to "strongly agree" (5).

For the moderating variables, first, trust could be measured by an additive index of multiple modes of trust: generalized trust, trust in government institutions/programs, and trust in civil society organizations. Generalized trust was measured by asking the respondent to indicate the extent to which he or she thought that most people can be trusted. Similarly, trust in government institutions was measured by the response to the statement "Generally speaking, I would say that government institutions, including government agencies, the National Assembly, and courts, can be trusted." Finally, trust in civic society organizations was measured in a similar way.

Gender was a nominal variable. The respondent was coded as 1 if male and 0 otherwise. Household income was an ordinal variable and measured using gross household income before taxes. Those respondents indicating an income less than 12 million won (Korean) were coded as 1, those with an income between 12 and 24 million won as 2, those with an income between 24 and 36 million won as 3, an income between 36 and 60 million won were coded as 4, and those an income above 60 million won as 5.

For other descriptive characteristics of the variables, age could be the first ordinal variable. This variable was not designed as a continuous variable because asking to indicate age can be culturally sensitive and even inappropriate for some people, particularly for females and older individuals. Therefore, a direct question may induce no response. For the coding scheme, those respondents indicating their age to be less than 18 were coded as 1; those between 19 and 24, as 2; those between 25 and 34, as 3; those between 35 and 44, as 4; those between 45 and 54, as 5; and those above 55, as 6. Home ownership was a nominal variable. The respondent was coded as 1 if he or she was a homeowner and 0 otherwise. Marital status was a nominal variable. The respondent was coded as 1 if he or she was married and 0 otherwise. Educational attainment was an ordinal variable. The respondents were asked to indicate the highest level of education completed in 2009. Those respondents with a middle school degree were coded as 1; high school graduates, as 2; college graduates, as 3; and those with a graduate degree or higher, as 4. Religiosity was an ordinal variable measured by the frequency of attending religious services. Those respondents attending religious services more than once a week were coded as 4; those attending approximately once a week, as 3; those attending approximately once a month, as 2; those attending only on major religious holidays, as 1; and those who did not attend religious services, as 0. Based on these variables, our research framework for empirical analysis is as shown in Figure 1.
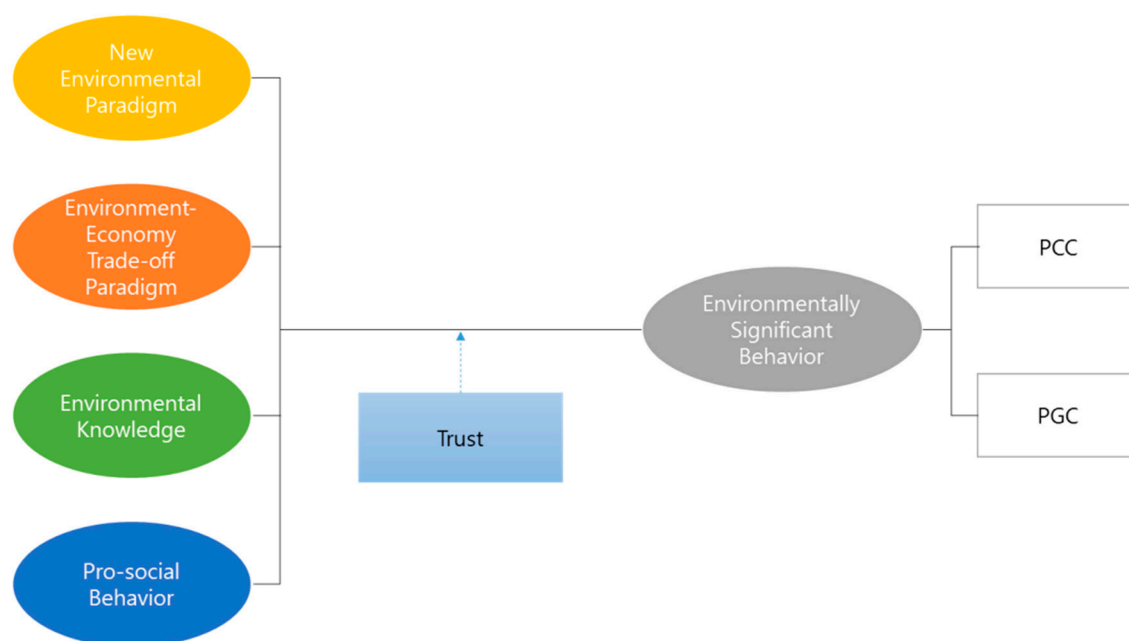

Figure 1. Research framework.

3.3. Research Methodology

In this study, to examine the factors affecting ESB, and to assess the moderating effects of trust, gender, and income, we utilize a multi group analysis of SEM. All the questions based on the arguments of the hypotheses on the variables, a five-point Likert-type scale is used for evaluation ranging from "strongly disagree" (1) to "strongly agree" (5). Prior to our assessment, we conducted reliability analysis and confirmatory factor analysis (CFA) about the total survey items using the maximum likelihood estimation procedure, and reconstructed items based on the results of CFA. Reliability analysis is a method for estimating the consistency of measured items by utilizing the value of Cronbach's α. And through CFA, which is used to test whether measured items of model are consistent with latent variables using covariance, we could understand the construct validity and appropriateness of the measurement model.

A general regression model has limitations in that it cannot reflect functional relations between each variable, because all dependent variables are treated as one group and trapped into one linear regression equation. In addition, in the presence of multi-collinearity or endogeneity problems, it is not possible to make accurate prediction so that regression analysis is conducted by cutting off correlations between variables through various assumptions and constraints. However, SEM can be used to analyze the validity of the research model and the causal relationship between variables empirically, which cannot be estimated by regression analysis. In other words, this method has the characteristics of general regression analysis, and is possible to conduct simultaneous estimation about correlations between variables. The method also has the advantage of reflecting measurement errors into the analysis of model validity.

The main study purpose is to identify the moderating effects of trust, for which it is appropriate to use multiple group analysis to estimate different effects of moderating variable by using the characteristics of SEM. First of all, therefore, this study estimates the validity and causal relation of measurement model. And then, to examine the moderating effects of trust, gender, and the level of income, we divide all samples into two groups; trust is divided by the average point (3 point) of measured items, gender is classified as male and female group, and income level is categorized into higher and lower groups with a cut-off of 36 million won. Based on these, we employ an unconstrained (or free) model which does not impose restrictions that relations between latent variables are differ from the effects of moderating variable and equality constrained model which assume that the sizes of relations between variables are equal to each other. We then analyze the moderating effects of three variables by conducting χ2 difference test between the two models. Data analysis is carried out by SPSS 18.0 (IBM, Armonk, NY, USA) for windows and AMOS 18.0 software (IBM, Armonk, NY, USA).

4. Empirical Results and Implications

4.1. Demographic Characteristics of Participants

The demographic characteristics of the full sample are shown in Table 2. The table presents the distribution of respondents by gender, age, income level, marital status, home ownership, educational attainment, religion, and occupation.

Table 2. Descriptive statistics.

Variables	Items	Frequency	Ratio	Variables	Items	Frequency	Ratio
Gender	Male	510	47.0%	Religion	None	502	46.3%
	Female	575	53.0%		Protestantism	252	23.2%
Age	From 19 to 24	193	17.8%		Catholic	110	10.1%
	From 25 to 34	204	18.8%		Buddhism	209	19.3%
	From 35 to 44	270	24.9%		Others	12	1.1%
	From 45 to 54	260	24.0%	Participation in religion activity	None	600	55.3%
	over 55	158	14.6%		Only at religious feast	138	12.7%
Income Level	Less than 12 million won	129	11.9%		Once a month	76	7.0%
	12–24 million won	189	17.4%		Once a week	167	15.4%
	24–36 million won	228	21.0%		Twice a week (or more)	104	9.6%
	36–60 million won	354	32.6%	Occupation	Unemployed	50	4.6%
	over 60 million won	185	17.1%		Housewife	193	17.8%
Home Ownership	Yes	605	55.8%		Student	154	14.2%
	No	480	44.2%		Self-employed	110	10.1%
Marital Status	Yes	691	63.7%		Public official	51	4.7%
	No	394	36.3%		Business worker	450	41.5%
Educational Attainment	Middle school	24	2.2%		Profession	54	5.0%
	High school	342	31.5%		Man of religion	3	0.3%
	University	635	58.5%		Retired	20	1.8%
	Graduate school (or more)	84	7.7%		Total/Response Rate	1085	100%

4.2. Reliability and Validity Analysis

Prior to testing the moderating effects of trust, gender, and income level on ESB, CFA was performed to assess the reliability and validity of the measurement model. In this study, the proposed measurement model consists of four latent constructs, i.e., NEP, EET, EKN, and PSB. These factors are measured by their respective multiple indicator variables, and are allowed to inter-correlated. The results of CFA indicate that the measured model fits the observed data well enough (Results of CFA on standard model: GFI = 0.927, AGFI = 0.904, CFI = 0.905, IFI = 0.906, RMR = 0.048, RMSEA = 0.064.), but there were items for which the standardized regression weights are less than 0.5. Thus, we removed these items, and performed CFA on the modified model. According to the results of CFA on the modified model, all factor loadings are significant and all standardized regression weights are more than 0.5 (see Table 3).

Table 3. Standardized factor loading of modified model items.

Items	Estimate	Factor Loading	*t*-Value	Items	Estimate	Factor Loading	*t*-Value
NEP3←NEP	1.000	0.519	fixed	EKN2←EKN	0.970	0.758	23.264 ***
NEP2←NEP	1.193	0.734	14.193 ***	EKN1←EKN	0.970	0.738	22.706 ***
NEP1←NEP	1.184	0.728	14.169 ***	EKN4←EKN	0.828	0.591	18.199 ***
EEP3←EEP	1.000	0.793	fixed	EKN5←EKN	0.938	0.684	21.082 ***
EEP2←EEP	1.081	0.877	26.913 ***	PSB3←PSB	1.000	0.671	fixed
EEP1←EEP	0.976	0.761	25.224 ***	PSB2←PSB	1.345	0.909	12.831 ***
EKN3←EKN	1.000	0.751	Fixed	PSB1←PSB	0.726	0.506	13.514 ***

*** Statistically significant at 99%.

In addition, the goodness-of-fit index (GFI = 0.974), the adjusted goodness-of-fit index (AGFI = 0.961), the normed fit index (NFI = 0.960), the incremental fit index (IFI = 0.974), and the root-mean-square residual (RMR = 0.019) of the modified model met the recommended threshold

levels, so we could argue that this modified model is better than the standard model. On the basis of CFA, we named the selected items as NEP, EEP, EKN, and PSB. We also performed reliability analysis on each item, and found no problems with the reliability of the scales because the values of Cronbach's α are more than 0.7 in all items except for NEP (Cronbach's α of NEP = 0.681, see Table 4).

Table 4. Survey items and Cronbach α after Confirmatory Factor Analysis (CFA).

Variables	Items	Cronbach α
New Environmental Paradigm (NEP)	The environment can be easily destroyed by human activities.	0.681
	The earth has limited physical space and resources.	
	The world's population has reached a critical point which the earth can sustain.	
Environment-Economy Trade-Off Paradigm (EET)	Strict environmental regulation has a negative effect on the economy.	0.850
	Environmental regulation has a negative effect on personal employment.	
	Strict environmental regulation damages individuals.	
Environmental Knowledge (EKN)	Air pollution of a manufacturing business or another industry	0.829
	Driving a car	
	Use of fossil fuel (coal or oil) by an electric power company	
	Use of home appliances (electric heater, laundry machine, refrigerator)	
	Destruction of tropical forest	
Pro-Social Behavior (PSB)	I give money to beggars.	0.706
	I contribute money to charity.	
	I volunteer at voluntary organizations or local communities.	
Trust	Generally speaking, I would say that most people can be trusted.	0.731
	Generally speaking, I would say that government institutions, including government agencies, the National Assembly, and court can be trusted.	
	Generally speaking, I would say that government programs can be trusted.	
	Generally speaking, I would say that civil society organization can be trusted.	
Environmentally Significant Behavior (ESB)	I normally try to cut down on eating meat for environmental reasons.	0.712
	I normally try to use less water when showering or bathing.	
	I normally try to use energy-efficient light bulbs.	
	I normally try to purchase energy-efficient appliance such as hot water heaters, refrigerators, and dish washers.	
	I normally try to drive less.	
	I normally try to recycle.	

4.3. Results of the Standard Structural Model

The basic SEM of this study is the relationship between NEP, EET, EKN, PSB, and ESB. We conducted covariance structure analysis by constructing the paths of each factor, targeting a total of 1085 respondents, and we used the maximum likelihood method, which is known to be consistent and asymptotically efficient when estimating the parameters of large samples [84]. Before analyzing the basic model, we tested the skewness and kurtosis of each variable, and the results satisfy the conditions for a normal distribution (skewness was less than 2, and kurtosis was less than 4). Table 5 shows the goodness-of-fit of the basic measurement model, but we draw the modified model by reducing the relations between non-significant variables to secure the appropriateness of the research. The model was modified by using a modification index (MI), but some parts were revised based on the theoretical basis. The goodness-of-fit index (GFI = 0.938), adjusted goodness-of-fit index (AGFI = 0.919), and the root-mean-square residual (RMR = 0.036) of the basic model met the recommended level, but all indices of the modified model were much better.

Table 5. Goodness-of-fit of the measurement model.

Goodness-of-Fit	Absolute Fit Index					
	d.f.	χ^2	χ^2/d.f.	GFI	RMR	RMSEA
Standard	-	-	5	0.9	0.05	0.05
Basic	160	658.35	4.115	0.938	0.036	0.054
Modified	155	410.05	2.645	0.963	0.029	0.039
	Incremental Fit Index					
	TLI	NFI	IFI	CFI		
Standard	0.9	0.9	0.9	0.9		
Basic	0.914	0.907	0.928	0.928		
Modified	0.955	0.942	0.963	0.963		
	Parsimonious Fit Index					
	AGFI	PNFI	PGFI			
Standard	0.9	Model comparison	Model comparison			
Basic	0.919	0.764	0.715			
Modified	0.95	0.769	0.711			

The χ^2 statistic is the basic estimator for evaluating goodness-of-fit, and we can make the conclusion that the model is suitable when the χ^2 statistic is low and the p-value of χ^2 is high. However, the χ^2 statistic varies with the size of the sample so that other alternative indices should be considered with it [85]. In general, a RMSEA (root-mean-square error of approximation) value less than 0.10 is considered a good fit, and a value less than 0.05 is considered a very good fit. The GFI (goodness-of-fit index), adjusted goodness-of-fit index (AGFI), and NFI (normed fit index) better than 0.90 are considered as a good fit [86]. Therefore, we adopted the modified model for the final analysis.

The results of the analysis about the effects of NEP, EET, EKN, and PSB on ESB are shown in Table 6. First, the effect of NEP on ESB was not significant, although the sign was positive (β_NEP = 0.028). Therefore, Hypothesis 1, "the higher the individual level of NEP is", the more he or she acts in an environmentally friendly manner, was rejected. This result corresponds with Wiidegren's findings that personal norms have a greater impact on ESB than NEP [87]. Through the years, Korean citizens have experienced major events including the four-river project, green growth policy, or Japan's disaster of the Fukushima nuclear accident, and their concerns and awareness about the environment have highly increased. In accordance with this trend, the respondents reacted positively to the questionnaires related to NEP, but, in reality, this value or paradigm cannot be converted into ESB yet. Second, Hypothesis 2, "an individual with a negative view on strict environmental regulations will not exhibit ESB", predicts a negative path from EET to ESB. The results showed that the path from EEP to ESB was significant (β_EEP = −0.114, $p < 0.01$), supporting Hypothesis 2. Although citizen's values about the environment have been heightened recently, when the two values, economic growth and environmental conservation, oppose each other, they might still place more weight to economic aspects. Likewise, the person who is more concerned about economic benefits rather than the regulation for environmental protection may not control their consumption activity, or may not use energy efficient or eco-friendly products.

Table 6. Results of the Standard Model.

H	Path	Estimate	β	S.E.	*t*-Value	Result
H1(+)	NEP→ESB	0.032	0.028	0.070	0.457	Reject
H2(−)	EEP→ESB	−0.076 ***	−0.114	0.026	−2.899	Accept
H3(+)	EKN→ESB	0.157 ***	0.157	0.057	2.728	Accept
H4(+)	PSB→ESB	0.337 ***	0.498	0.037	9.180	Accept
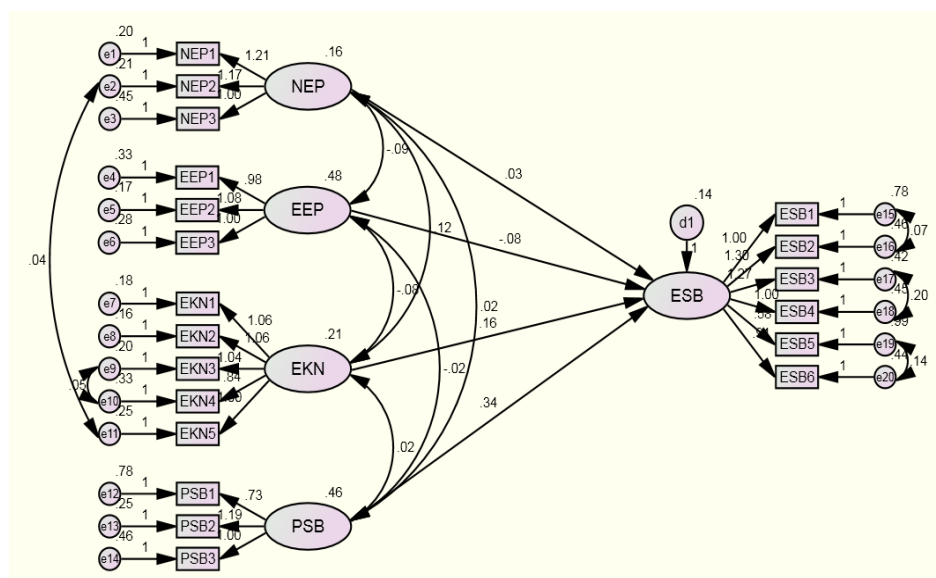
Note: *** indicate significance at the 1% levels.

Third, in this study, the level of EKN is measured by questions about the main reasons for environmental pollution and global warming. According to the result, EKN had a positive effect on ESB, and the path coefficient was significant (β_EKN = 0.157). In other words, the higher the individual level of EKN, the more he or she will save environmental resources and use eco-friendly products. This result coincides with the argument of Burgess et al. [88] (p. 1447), that knowledge about the environment may affect the consciousness about environmental problems, and further that this consciousness may draw pro-environmental behavior. Thus, Hypothesis 3 was accepted. Fourth, among the four latent variables in this study, PSB had the most significant effect on ESB and the sign was positive (β_PSB = 0.498). Generally, the person who seeks self-interest and acts based on selfishness tends to emphasize his or her own outcomes, and has lower concerns about the environment. In addition, the studies dealing with the value-basis of environmental beliefs and behavior revealed that the individuals who strongly subscribe to values beyond their self-interests, such as self-transcendent, pro-social, altruistic, or biospheric values, are more likely to engage in pro-environmental behavior [46,89,90]. The present study result agrees with all of these studies, and Hypothesis 4, "the person who has pro-social propensity will exhibit ESB", was accepted.

4.4. Results of the Moderating Effects of Trust

We performed a multiple group analysis to estimate the moderating effects of trust on ESB. Multiple group analysis is a method to test the difference of path coefficients between two groups [85] (p. 467). In this study, respondents were split into two groups based on their trust. Respondents with a high level of trust were placed in the high trust group (*n* = 478), whereas respondents with a low level were classified into the low trust group (*n* = 607). We estimated the significance of the difference between the two groups by comparing the χ^2 statistics of the cross-group equality constraint model and the unconstrained model. If there are meaningful differences between them, we could argue for

the moderating effects of trust on the relations between NEP, EET, EKN, PSB, and ESB. The significance of the difference between the two models can be identified by the χ^2 variation. When a change of the degree of freedom is 1, we could judge that the result is statistically significant at the 0.05% significance level if the variation of χ^2 is larger than 3.841 [85] (p. 472). In addition, standardized path coefficients can be used for deciding the relative importance of the coefficient, but it is impossible to compare coefficients of each sample when the samples are separated. Thus, unstandardized path coefficients are used for comparing each group in multiple group analysis [85] (p. 274).

Table 7 presents the results of the moderating effect of trust. On the whole, the goodness-of-fit indices met the recommended level (GFI = 0.951, NFI = 0.922, IFI = 0.963, CFI = 0.963, RMSEA = 0.027). First, moderating effect of trust was identified in the causal relations between NEP and ESB (the variation of χ^2 = 4.072). But when separating the moderating effect of trust between a higher trust group and a lower trust group, the effect was significant only for the lower trust group ($p < 0.1$, $coef_{NEP} = 0.180$), not for the higher trust group. In higher trust group, trust is embedded in the values and norms of the group members; it is natural for them to expect cooperation and compliance with rules. Basically, trust is not rare and found relatively easy and can used as it needs for promoting cooperation. In this situation, the moderating effect of trust is not likely to draw on environmentally responsible behavior. On the contrary, for the lower trust group, trust is rare and essential commodity to bring back cooperation among a member of people. So trust is an essential ingredient for people to act in a manner pursuing common goals. Thus, it is more likely to observe the moderating effect of trust on the relations between NEP and ESB.

Table 7. Moderating effects of trust on ESB.

Independent Variable	Dependent Variable	Trust		Unconstrained Model χ^2(d.f. = 310)	Constrained Model χ^2(d.f. = 311)	$\Delta\chi^2$(d.f. = 1)
		Low (N ='607)	High (N = 478)			
All Variables (Constrained)				563.692	574.772 (d.f. = 314)	11.08 ** (d.f. = 4)
NEP		0.180 *	0.097	563.692	567.764	4.072 **
EEP	ESB	−0.079 **	−0.067 *	563.692	563.746	0.054
EKN		0.019	0.293 ***	563.692	569.538	5.846 **
PSB		0.387 ***	0.247 ***	563.692	566.996	3.304

Regression weights of this table are non-standardized estimates. GFI = 0.951, NFI = 0.922, IFI = 0.963, CFI = 0.963, RMSEA = 0.027. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. According to the result of the multi-group analysis, χ^2 of the unconstrained model is 563.692, and χ^2 of the equally constrained model for all variables is 574.772, so the difference between the two models is 11.08. A standard value of χ^2 at the 0.05 significance level (d.f. = 4) is 9.488, implying that there is a significant difference.

Second, the moderating effect of trust also existed in the relationship between the level of EKN and ESB (the variation of χ^2 = 5.846). For the low trust group, the path coefficient of EKN on ESB was not significant, but, for the high trust group, the path coefficient had a strongly positive effect at the 0.01 significance level ($coef_{EKN} = 0.293$). Combining these results, person with low trust may act in an eco-friendly manner according to their subjective value rather than EKN which is acquired from other experiences. On the other hand, those with a high level of trust may behave in an environmental friendly manner based on the knowledge about environment rather than their own value. Meanwhile, there were no moderating effects on the paths from EET and PSB to ESB because the χ^2 variations were lower than 3.841, but the effects of each variable were the same in the high- and low trust groups. That is, those with a negative view about rigorous environmental regulation do not seem to exhibit ESB, and those who acted pro-socially also behave in an environmental friendly manner regardless of the level of trust.

In addition to the analysis of the moderating effect of trust, we tested the effects of gender and income level. The items for ESB are composed of how much do they control their private consumption, and how often do they use eco-friendly products. Therefore, we established hypotheses to investigate

whether the characteristics of ESB vary with gender and income level by H6, "the effects of NEP, EEP, EKN, and PSB on ESB will differ depending on the gender", and H7, "the effects of NEP, EEP, EKN, and PSB on ESB will differ depending on the level of income". According to the results, however, the moderating effect of gender on ESB was not significant. Only the path of EET had a significant difference between males and females (χ^2 variation = 4.564), and the EEP of women had a more negative effect on ESB than men's (see Table 8).

Table 8. Moderating effects of gender on ESB.

Independent Variable	Dependent Variable	Gender		Unconstrained Model χ^2(d.f. = 310)	Constrained Model χ^2(d.f. = 311)	$\Delta\chi^2$(d.f. = 1)
		Male (*N* = 510)	Female (*N* = 575)			
All Variables (Constrained)				610.566	616.353 (d.f. = 314)	5.787 (d.f. = 4)
NEP	ESB	0.008	0.047	610.566	610.642	0.076
EEP		−0.017	−0.129 ***	610.566	615.130	4.564 **
EKN		0.203 **	0.101	610.566	611.351	0.785
PSB		0.341 ***	0.322 ***	610.566	610.626	0.060

Regression weights of this table are non-standardized estimates. GFI = 0.946, NFI = 0.917, IFI = 0.957, CFI = 0.957, RMSEA = 0.030. **, *** indicate significance at the 5%, and 1% levels, respectively.

In the next analysis, the level of income had no moderating effect on the relations between all latent variables and ESB. In other words, the χ^2 variations between the cross-group equality constraint model and the unconstrained model of all latent variables were lower than 3.841. Hence, we conclude that the moderating effect of income level was not significant for the relationships between NEP, EET, EKN, PSB, and ESB. Thus, Hypothesis 7 was rejected (see Table 9).

Table 9. Moderating effects of income on ESB.

Independent Variable	Dependent Variable	Income Level		Unconstrained Model χ^2(d.f. = 310)	Constrained Model χ^2(d.f. = 311)	$\Delta\chi^2$(d.f. = 1)
		Male (*N* = 510)	Female (*N* = 575)			
All Variables (Constrained)				576.113	581.075 (d.f. = 314)	4.962 (d.f. = 4)
NEP	ESB	0.166	−0.047	576.113	578.240	2.127
EEP		−0.092 **	−0.055 *	576.113	576.607	0.494
EKN		0.033	0.238 ***	576.113	579.101	2.988
PSB		0.376 ***	0.300 ***	576.113	576.954	0.841

Regression weights of this table are non-standardized estimates. GFI = 0.948, NFI = 0.920, IFI = 0.961, CFI = 0.961, RMSEA = 0.028. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

5. Conclusions

It is generally recognized that government cannot handle environmental problems effectively without assistance from the public. The involvement of citizen in environmental policies through reduced or green consumption is necessary to maintain and promote sustainability. In this research, we focus on the moderating effect of trust on the relationship between existing factors and ESB. In addition, we tested the effects of gender and income level as moderator variables on ESB.

The main findings could be summarized as follows. First, the effect of NEP on ESB was not significant, and this result agrees with previous arguments that personal norms have a greater impact on ESB than on NEP. This might reflect the situation that agreement with the NEP items becomes the rule rather than the exception, but this agreement may not be changed into ESB. Second, the result indicates people with a negative view on strict environmental regulations do not exhibit ESB.

This means that those who are concerned more about economic benefits than about the regulation for environmental protection may not control their consumption activity, or may not use eco-friendly products. Third, EKN had a positive effect on ESB, and this result agrees with the previous discussion that knowledge about environment may affect the consciousness about environmental problems, and further that this consciousness may draw pro-environmental behavior. Fourth, those who participate in voluntary organizations and contribute to charities are more likely to exhibit ESB. This result coincides with arguments that the individuals who strongly subscribe to values beyond their self-interests, that is, self-transcendent, pro-social, altruistic or biospheric values, are more likely to engage in pro-environmental behavior.

We also estimated the moderating effects of trust, gender, and income level on the relations between NEP, EEP, EKN, PSB and ESB. According to the results, the moderating effects of trust were identified in the causal relations between NEP, EKN and ESB. First, trust functioned as moderator only for a lower trust group, not a higher trust group. For a higher trust group, trust is a highly embedded value and practiced among and between the group members and thus does not occupy any special place for the role as a moderator for ESB. On the contrary, trust for a lower trust group can play a special role in moderating ESB because of its rarity as an essential ingredient for fostering ESB. Therefore, people in a lower trust group are more likely to behavior in an environmentally responsible manner. In addition, there were no moderating effects on the paths from EET and PSB to ESB across two groups. Finally, we tested the moderating effects of gender and income level and the results showed that these factors had no moderating effects in general. Especially, income level did not have a significant effect as a moderator for ESB. The possible reason may be related to voluntary programs, including "carbon point", "green mileage", and "carbon cashback", that Korean governments have initiated. These programs have provided financial incentives to individuals who provide environmentally responsible behavior through saving energy and water. This financial incentive may weaken the effect of income for ESB. There was a significant difference between the genders on the path of EET to ESB, and EEP of women had more negative effect on ESB than men's.

These results have some implications. First, the empirical results suggesting the moderating effects of trust on ESB is particularly relevant to low-trust societies like Korea and raise the questions about the methods of promoting trust. We suggest separate but complementary processes of fostering trust in the society. First, social trust can be developed by increasing social interactions and communications. Civic society organizations can play an important and active role into this area. They encourage citizens to engage in civic discussions and volunteering activities. Second, institutional trust underlying trust in public institutions and legal frameworks can be strengthened by providing formal and equitable arrangements for facilitating cooperation between government institutions and various segments of society. The role of government would particularly be important in this area.

As for the limitations of this study, it is related to variable measurements. Variables, including environmental values, EKN, and trust are highly abstract concepts that require multiple dimensions and the measurements we used in this research may not the best to represent the concepts. Thus, there may be possible measurement errors. In addition, the study is limited to evaluating private environmental behavior addressing personal consumption and purchase. Future study may want to investigate public environmental behavior describing citizens' participation in environmental policy processes through environmental petition and donation.

Author Contributions: All authors made equal contributions to the work in this editorial paper.

Conflicts of Interest: The authors declare no conflict of interest.

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