Asia Pacific Journal of Information Systems
Vol. 26 No. 1 (MARCH 2016), 189-210

ISSN 2288-5404 (Print) / ISSN 2288-6818 (Online)
http://dx.doi.org/10.14329/apjis.2016.26.1.189

# The Media Influence on Consumers' Energy-Saving Technology Adoption in Korea: An Empirical Study

Chulmo Koo[a], Namho Chung[b*]

[a] *Associate Professor, College of Hotel & Tourism Management, Kyung Hee University, Korea*
[b] *Professor, College of Hotel & Tourism Management, Kyung Hee University, Korea*

**ABSTRACT**

The current study attempts to expand our understanding of the determinants of energy-saving technology (EST) use by focusing on the individual aspects of environmental behaviors. This study integrates the hedonic, normative, and gain goals to explain the causal relationship between users and EST use. By adopting Goal-Framing Theory, this study proposed three individual goal frames in the environmental context: hedonic (perceived pleasurability), normative (social norms), and gain goals (legislative pressure and economic factor). Partial Least Square (PLS) was used to analyze the data from 104 respondents. Eight of the ten hypotheses were strongly supported. We found that social norms, perceived pleasurability, economic factor, and legislative pressure had positive and significant effects on attitude to EST use. Interestingly, we found that media influence did not have a severe effect on perceived pleasurability, and that the economic factor enforces mainly positive attitude to EST. Important theoretical and practical implications of these findings are discussed.

*Keywords:* Energy-Saving Technology (EST), Media Influence, Goal Framing Theory, Environmental Behavior

## Ⅰ. Introduction

As the causes and consequences of environmental degradation are increasingly discussed by the international community, the environmental related research has been a particular topic interest to numerous scholars from various academic backgrounds (H'Mida, 2009). Research has identified a variety of factors or predictors and proposed many different models to investigate the motivations of individuals who engage in pro-environmental behavior (Clark et al., 2003). While economists tend to focus on the influence of external conditions such as socio-economic characteristics on behaviors, psychologists on the other hand, tend to concentrate on linking internal, or psychological variables (e.g., value, belief, and attitude) (Clark et al., 2003), personal commitment and the perceived personal cost and benefits

*Corresponding Author. E-mail: nhchung@khu.ac.kr Tel: 8229612353

of particular actions to behaviors (Stern, 2000). Among them, altruistic behavior (e.g., Schwartz, 1977) and planned behaviors (Ajzen, 1991) dominate the motivation environmental behavior study. Despite the dominant role of psychologist attribute to internal factors for motivation environmental behavior, some researchers argued that it is necessary to integrate both cognitive variables and contextual determinants that underlie environmental concern.

Kollmus and Agyeman (2002) argued that more than 80% of the motives for pro-environmental or non-environmental behavior seem to be situational factors and other internal factors. Stern (2000) stated that "the field now needs synthetic theories or models that incorporate variables from more than one of the above broad classes, postulate relationships among them, and use them to explain one or more types of environmentally significant behavior." (p. 418). Responding to this issue, several studies point out that environmental behavior results from multiple motivations (e.g., Brandon and Lewis, 1999; Lindenberg, 2001; Lindenberg and Steg, 2007; Stern et al., 1999). Those existing studies, however, tend to discuss the environmental behaviors in general context (e.g., car-use behaviors, recycling behaviors, policy acceptance, water use, and meat consumption). Previous study that proposed the conceptual model and empirical study of environmental awareness in technology usage area is very limited. Remaining that different type of environmental behavior has different determinant behaviors (Stern, 2000), information systems research can make an important contribution by developing knowledge about a particular relationship between individuals' motivational factors and behavior intention to use energy-saving technology (EST) (Lee et al., 2013).

The current study attempts to further our understanding of the determinants of behavior intention to use EST by focusing on the individual aspects of environmental behaviors. This study integrates hedonic goal, normative goal, and gain goal to explain the causal relationship between media influence and EST behaviors. Among the existing theories of psychological behaviors, the theory of goal framing and norm-activation theory provide a good theoretical foundation to study environmental behaviors (Lindenberg and Steg, 2007). Goal-framing theory explains the framing of attitudinal, personal, and contextual aspects of behaviors (Lindenberg, 2001). This theory proposes three different individual goals in environmental context: *hedonic goal, gain goal, and normative goal*. Norm-activation theory was originally developed to explain altruistic behavior and has been successfully applied to study environmental behavior (Lindenberg and Steg, 2007). It emphasizes the importance of moral norms dimension in influencing environmental behavior (Stern, 2000). In other words, both theories suggest that environmental behaviors are affected by multiple motivations, whilst placing norms as the strongest motivation factors. Thus, we adopted these theories to support our proposed model.

Building upon these theories, three research questions are addressed. In general, this study would like to know how come general consumers tend to have pro-environmental intention to use EST? Specifically, first, how does the attitude toward EST influence on the use of EST? Second, how do perceived pleasureability, social norms, legislative pressure, and economic factor influence the attitude toward EST? Finally, how does media influence perceived pleasureability (*hedonic goal frame*), social norms (*normative goal frame*), and legislative pressure, economic factor (*gain goal frame*)?

The remainder of this paper proceeds as follows. The next section discusses goal-framing theory and

norm-activation theory. We then present the research model and hypotheses development. The research method section describes our data collection and statistical techniques. A further discussion of main research findings are provided followed by the limitations and the research implications.

## Ⅱ. Theoretical Background

### 2.1. Media Influence

News media tell people what to think by providing the public with an agenda of attributes (Wanta et al., 2004). Individuals seem to mentally link to persuasive communication media. Media influence so powerfully impact people in various industries as well as social systems. Media play a crucial role in intervene world politics enormously and shape government policy-making (Robinson, 2001). Media can make agenda by the intentional fame setting. For example, US media framed two air incident cases happened by military mistake. One is the Korean Airline, another is the Iran Air shoot down which occurred during the 1980s, which resulted in large loss of life. However, US news media framed the Iran Air shoot down due to the responsible of a technical failure by US, whereas the Korean Airline shoot down by USSR due to the responsible for a moral outrage. Media influence is underestimated in environmental issues, especially energy matter. Media message can form motivational frames for using energy type and also influence motivational desire to obtain information from others in order to make a decision (Henningsen et al., 2003). Therefore, people tend to look for guidance from experts, experienced people through main media such like CNN news. And people may enhance their values and standards for their behaviour by referring to media information (informational influence, Hsu and Lu, 2004).

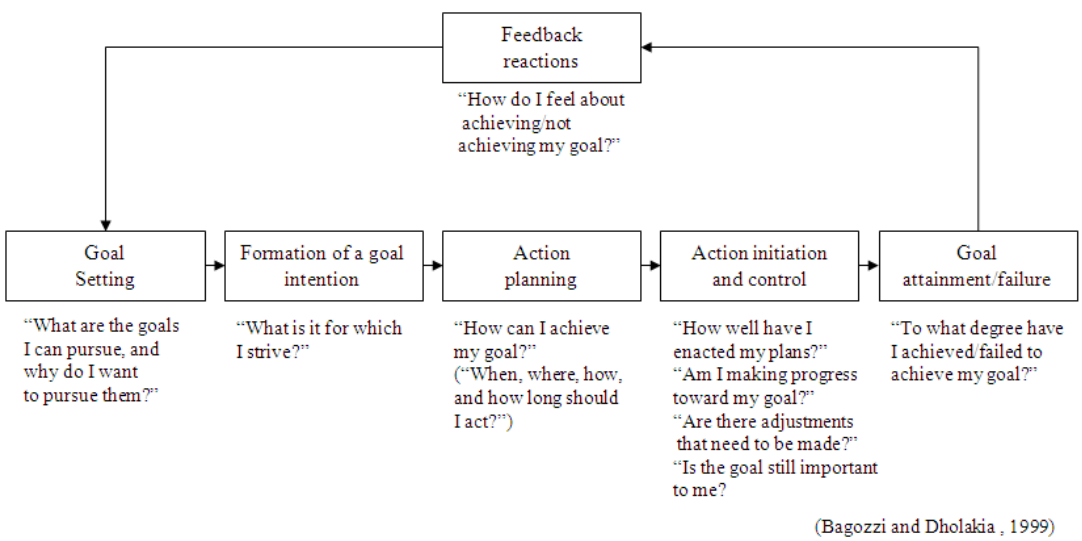
information system (IS) researchers have tried to seek information comply with referring to the value of others via communication or observation of decisions (Bearden and Etzel, 1982). Searching information is closely related to some form of communication, which would be informational influence that consumers gain information from others. Informational influence is an internalization process, which occurs once consumer or users perceived information as developing their knowledge regarding products from that of reference groups. This approach can account for the association with media influence, which explains how consumers may be affected to use the type of product, for example, eco-products via media exposure. General consumers expect IT product to be efficient (i.e., ease of use) or effectiveness (i.e., usefulness) rather than friendly and protective environment, so that consumer can have a less preference for a particular EST or product such as eco-friendly and sustainable goods including concept of green brand. Only some particular consumers have a little interested in eco-friend products such as energy saving car, electricity, or solar energy. Therefore, it is really necessary time to persuade energy consumers to engage more people in choosing a specific EST or product by intervention such like energy efficiency campaigns that perceive more awareness of climate change problem through media (Schuldt et al., 2011). For example, in other areas, Chia (2006) elaborated the perceived media effect on others and examined how media influence on peers would constitute real and essential influence on the sexual attitudes or behaviour or sexual activities for a teenager. We introduce media influence theory as a way of determinant variable for developing consumers' goal frame for EST choose and use.

## 2.2. Goal-Framing Theory

Consuming goals are limited to goal states but rather include experiences, sequences of interconnect happenings, and ongoing process (Bagozzi and Dholakia, 1999). Goals play an important role in the purposive of consumers through motivation for goals. Goal-directed consumer behavior begins with goal setting and continues to pursue next stages. <Figure 1> depicts the goal setting and goal pursuit in consumer behavior in the form of structural diagram.

Although goal-directed consumer behavior is performed through the goal schema, various decision and activities are occurred through goal-framing. Goals can be forced by coercion, reward power or, more subtly, by position in organization, family, or other social unit. A goal-framing theory perspective, goals govern and frame what people attend to, what knowledge and attitudes become cognitively most accessible, how people evaluate various aspects of the situation, and what alternatives are being considered (Lindenberg, 2001). Goal framing theory is defined as "*goal framing* where the information which is framed is the goal of an action or behavior". The decision made by goal frame is influenced by positive vs. negative information, which results in accept/reject. A frame is "the way in which people process information and act on it" (Lindenberg, 2001, p. 118). Therefore, when people change their goals, they behave differently in line with the new goals. A goal frame considers a specific goal in terms of how its framing effects (i.e., selective attention) are affected by cognitive processes. Therefore, the goal determines which frame people consider, which attitudes are most cognitively accessible, how people evaluate various aspects of the situation, and what alternatives are considered (Lindenberg, 2001).In this context, certain goals are so inclusive that they control the whole parts of sub-goals, knowledge and attitudes. There are three goals that have been identified in environmental context: *hedonic goal* (i.e., to feel better right now); *gain goal* (i.e., to guard and improve one resource); and *normative goal* (i.e., to act appropriately) (Lindenberg and Steg, 2007).

When those goals are activated, they will influence




<Figure 1> Goal Setting and Goal Pursuit in Consumer Behavior

people's attitude, feelings, and actions (Lindenberg, 2001). A hedonic goal frame activates one or more subgoals that involve the way one feels in a particular situation (e.g., avoiding negative thoughts and events, seeking direct pleasure). People who have hedonic goals are generally sensitive to what increases and what decreases their pleasure. A gain goal frame will make people very sensitive to changes in their personal resources. For example, if a particular spray that is environmentally harmful is cheaper than the environmentally sound spray, a person in a gain goal frame will simply chose the former because it is cheaper. Subgoals related to resources (e.g., saving money) will be easily activated; however, subgoals related to normative frame will involve the cognitive background. A normative goal frame activates all subgoals related to appropriateness. It will make people relatively sensitive to what they think one ought to do. Therefore, the important aspects of a situation in question are normative, according to the self-expectation or others' expectation and sensitive to what one observes other people doing.

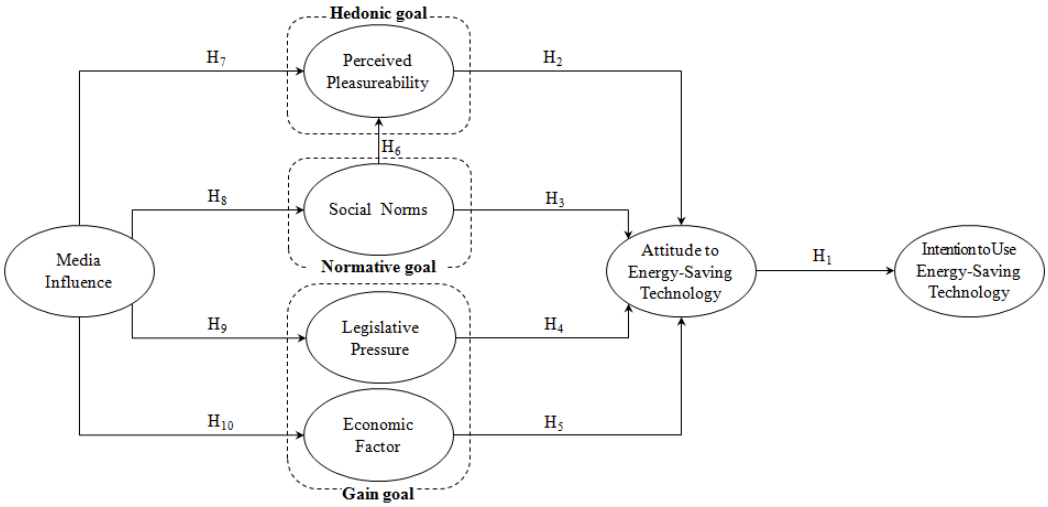
For example, Technology Acceptance Model (TAM)-based studies are related to work and focus on utilitarian use (i.e., gain goal) and task-oriented perspectives. Utilitarian value is closely related to the effectiveness and efficiency that result from the use of IT (Davis, 1989). In contrast, hedonic use (i.e., hedonic goal) is a function of the degree to which the user experiences fun and playfulness when using technology. To have a pleasurable experience, users usually have interested in multiple tasks employing hedonic contents, sounds, appealing visual layout and so on (Van der Heijden, 2004). However, the subgoal related to a normative frame involve a cognitive background, which is related to appropriateness and makes people sensitive to what they think they should do. That is dependent on the nature of product. In this research, we has focused on the EST which affect environment issue. Findings of existing TAM studies are conducted by focusing on subgoals of gain and hedonic nature of systems or technologies.

In terms of EST, social norms (i.e., normative goal) is an expectation held by an individual about how he or she ought to act in a particular social situation (Schwartz, 1977) and such norm needs to be enforced by the threat of punishment or promise of reward, while personal norm does not need to be enforced in this way (Fransson and Garling, 1999). Moral norms or social norms derive from moral concepts in an society such as another's opinion, another's thoughts, and behaviors or relative justice considerations while social conventional in social customs, appeals to authorities, and one's need for social appreciation (Kaiser et al., 1999). If ecological behavior at least partially falls into the social domain and is determined by conventional thinking, the theory of reasoned action theory should be applied in this study.

## Ⅲ. Research Model and Hypotheses Development

The research model is illustrated in <Figure 2> below. We proposed eleven hypotheses to explore the possible relationships among media influence, hedonic goal, normative goal, gain goal and intention to use of EST.

For the purpose of this research, we also categorized the goal framing variables based on its self-determination characteristics as follows. From a self-determination perspective, the goal frames can also be divided into two categories: intrinsic motivation and extrinsic motivation. Extrinsic motivation refers to the performance of an activity in order to attain




<Figure 2> Proposed Research Model

some separable outcome while intrinsic variable refers to doing an activity for the inherent satisfaction of the activity itself (Ryan and Deci, 2000). In this study, the intrinsic motivations were divided into two categories: enjoyment based (in *hedonic goal frame*) and obligation based (in *normative goal frame*). The external factors include economic and legislative pressure (in *gain goal frame*). The hypotheses development is presented in the next section.

Original Technology Acceptance Model (TAM) explained the causal links between users' attitude, intention to use ("actual computer adoption behavior"). The TAM theory suggested that intention to accept technology is mainly influenced by the person's attitude toward the IS, and the attitudes are formulated by beliefs a person capture about the IS (Bang et al., 2013; Cha, 2012; Han et al., 2013; Szajna, 1996). Many studies indicated that environmental behavior has been influenced by environmental attitude as well (Poortinga et al., 2004). Poortinga et al. (2004) stated that environmental attitudes and environmental behavior are closely related to people's value. Possibly, people with environmental concern showed the responsibility for protecting environmental problems by reflecting pro-environmental attitudes (Poortinga et al., 2004). A few studies investigated household energy use and energy saving via technical innovations, behavior change, or a combination of both (Gatersleben, 2000; Poortinga et al., 2002; Poortinga et al., 2003). We suggest that environmental behavior is assumed to be an undifferentiated class of technology adoption model. By doing so, it is explicitly assumed that intention to use of EST would be affected by the attitude of pro-environmental technologies (e.g., EST). Hence, we posited that:

*H1: Attitude to EST has a positive effect on intention to use EST.*

Watson et al. (2010) argued that consumers are likely to be green because it is good to do so (self-interest). Study by Pelletier et al. (1998) suggested that self-determined forms of motivation (both intrinsic and extrinsic motivation) were generally and significantly related to environmental behaviors. This

study also revealed that people are behaving in an environmentally conscious way for different reasons. For example, some people indicated that they engage in environmentally behavior activities for the pleasure and enjoyment they derive from doing so, while others expressed that they do so because of another reasons such as obtain recognition from others, or to avoid self-imposed punishments. To the same extent, De Young (2000) also indicates that people are likely to act environmentally because such behaviors are worth engaging in because of perceived pleasureability resulted from engaging in these behavior. Hence, we posit that:

*H2: Perceived pleasureability has a positive effect on attitude to EST.*

According to theory of planned behavior (Ajzen, 1991), subjective norms have a positive effect on behavior intention. The subjective norms construct is adopted in the context of information systems by Taylor and Todd (1995) and Venkatesh and Davis (2000). Goal framing theory explains that a normative goal frame is related to appropriateness, which a person relatively ought to do what other people think. Thus, social context influences to form perceptions and process in desirable directions. Most of studies in environmental context also found a positive relationship between subjective norms (social norms) and behavior intentions (e.g., Bamberg, 2003; Gardner and Abraham, 2010; Mostafa, 2007). In the technology setting, individuals may be motivated to use a certain system because of the intrinsic rewards derived, because of the external rewards, or because of social influence (Igbaria et al., 1996). Social processing theory posits that perceptions of media communication characteristics, the communication task requirements, and attitudes communication media are influenced by social norms (Karahanna and Straub, 1999). In other words, the primary reason people initially perceive pro-environmental attitude or favorable attitude toward EST is because the attitude is influenced by significant others to whom they feel attach or related (Ryan and Deci, 2000). Therefore, we hypothesized that social norms have positive effects on positive attitude toward EST.

*H3: Social norms have positive effects on attitude to EST.*

The important of legislation in inducing corporate ecological responsiveness has been widely recognized (Vredenburg and Westley, 1993) in organization level. Local, state, and national policies have been directed toward individual and household behavior in environmental context (Cohen, 2005) in order to change the individual behaviors toward environment (Lindenberg and Steg, 2007). For instance, laws are written and enforced requiring consumers to undertake certain environmentally friendly practices such as recycling of household waste and reducing energy usage. The most obvious of all motivations that influence the adoption of environmental practices is legislation or regulation (Paulraj, 2008). Government policy and campaign change individual behaviors, attitudes, values, or knowledge. By the legislation pressure, we argued that it will lead to favorable attitude toward EST. Consequently, it has been expected that information campaign and legal sanction actually affect individual attitude in any meaning way (Cohen, 2005). Following this argument, we hypothesized that:

*H4: Legislative pressure has a positive effect on attitude to EST.*

From economic model perspective, individuals are argued to be financially motivated to commit to envi-

ronmental behavior (Nyborg et al., 2006). Cited by Kollmus and Agyeman (2002), some economic research indicates that people make purchasing decision using a 50% or higher interest rate. In other words, if the person decides between two possible items, one energy-efficient and the other not, he or she will only chose the only energy efficient item if the payback time for the energy saved is very short. TPB also assumes that people are motivated by self-interest. In other words, they choose alternatives with highest benefits against lowest cost. Hence, in goal framing context, economic factor is a *gain goal frame* (Lindenberg, 2001). People will have to learn to use less electricity in just save money. As energy prices continue to increase, people must start to think energy saving for self-interested or electronic cost, and not just for environmental and ethical reasons. Similarly, according to individual utility models of the diffusion of innovations, people are willing to form favorable attitude new technologies when the benefits from adoption and use exceed the costs (Kraut et al., 1998). Following these theories, we posit that:

*H5: Economic factor has a positive effect on attitude to EST.*

Because extrinsically motivated behaviors are not typically interesting, the primary reason people initially perform such actions is because the behaviors are prompted, modeled, or valued by significant others to whom they feel attached or related (Deci and Ryan, 1985). This fact indicates that relatedness, the need to feel belongingness and connectedness with others, is centrally important for internalization. Thus, the internalization is more likely to be in evidence when there are ambient supports for feelings of relatedness (Ryan and Deci, 2000). In other words, significant others under an intimacy relationship may affect the level of perceived pleasureability of individual. Thus, we proposed the fifth hypothesis:

*H6: Social norms have positive effects on perceived pleasureability*

In environmental marketing research, media is crucial to delivering the proper information to consumers in order to strengthen individual and collective environmental consciousness (Rios et al., 2006). Media influence attributes consumers to acquire issues, relevance, creditability, cost of environment and help them understand as an opportunity or reinforce for consumers to use more green product ethically and economically. After people have seen media campaign concerning environmental issues, they are tendency to pledge to reduce their energy consumption somehow. Some studies have suggested that one of the powerful resources to induce the environmental concern is media (Rios et al., 2006). Media is not only helps to develop environmental awareness, but it also allows consumers to act in accordance to their newfound, or heightened, sense of concern for the natural environment (H'Mida, 2009). The interaction between media and self plays an important part in shaping the individual's own behavior and self concept. Individuals learn from media what the social environment is and respond to the knowledge what they acquire (McQuail, 1977). Reference group theory posits that in order for the behavior to be performed, informed knowledge is needed to induce a sense of responsibility to perform a behavior, which in turn activates a personal norm or a moral obligation to perform the behavior (Fujii, 2006). Consumers usually improve their ethical perception for the purchase or use of green product when they are exposed themselves consistently in media advertising or campaign such as words of 'organic', 'sustainable', 'pro-

tection', 'green', 'eco' etc. On the other hand, in terms of the relationship between media influence and pleasuability is expected to be correlated. Enjoyment is derived from a pleasurable response to media use and contents (Tamborini et al., 2010). Similarly, playfulness in psychological states has usually implied a belief that interacting would result in enjoyment or cognitive absorption (i.e., concentration, and curiosity), therefore, playfulness play an important role in enhancing user attitude and behavioral intention to use an online retailing site (Ahn et al., 2007). In our study, hedonic goal processing would occur through media information and contents how energy can actually be reduced by way of adopting environmental behavior or product use. As a result, relying information by media toward EST, we posit that media influence will have a positive effect on the goal framing motivations. Therefore, we posited that:

*H7: Media influence has a positive effect on perceived pleasureability.*

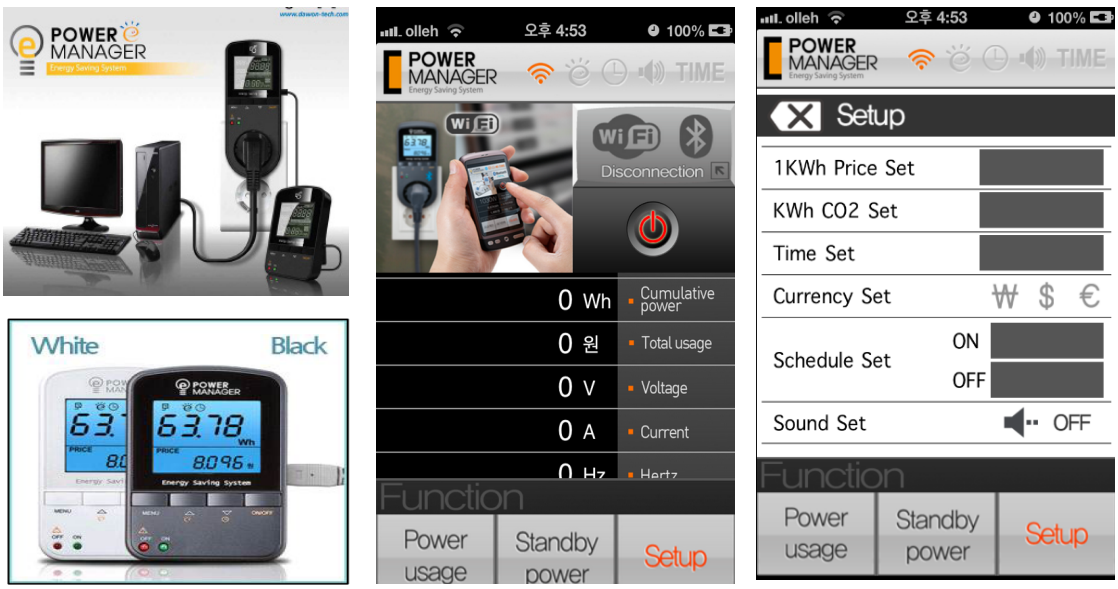
*H8: Media influence has a positive effect on social norms.*

*H9: Media influence has a positive effect on legislative pressure.*

*H10: Media influence has a positive effect on economic factor.*

## 3.1. Method

Test of the model was conducted based on usage of EST manufactured by D manufacturing company based in Gwangju, South Korea. The primary use of these power meter technology is to measure the amount of energy the users' appliances use. By making sure that users' electronic EST do not use stand-by electricity and are switched off, users can reduce their carbon emissions. The devices allow users to see how much electricity individual appliances are using now and how much it costs and helps users to eliminate power waste from standby power. Use of the EST by users is the target behavior of interest for this study (See <Figure 3>).




<Figure 3> Snapshot of Energy-Saving Technology (EST)

### 3.2. Data Collection

We obtained 360 contact numbers of subjects providing from the manufacturing company. Prior to the web-based survey, subjects were asked to consent to participation in the study via a phone call invitation. If the subject consented, he or she would receive a questionnaire link in his or her email. The respondents were informed that the survey was anonymous. We collected the data in two stages. In the first stage, we offered a US$5 cash reward for each participant. We followed up the survey via phone, short message, and email. We received 70 usable responses in the first stage. In the second stage, we raised money to a US$10 cash reward for each participant who could eagerly joined to the survey. The same follow up methods were applied. This effort was initiated to maximize the response rate. We collected 34 usable responses in the second stage. In sum, we received 104 usable responses of 360 customers (29% response rate). We collected demographic variables including age, gender, occupation, and education level. Of 104 respondents, 99 are male. Among 104 respondents, 51 are around 35-44 years old, 24 are around 25-34, and 16 are around 45-54. Furthermore, most respondents were highly educated (53.8% completed university; 13.5% had graduate degrees). Technical job constituted the largest proportion of the sample (30, 28.8%), followed by IT/IS professional (20, 19.2%). The highest yearly income per household is 24 - 48 million won (42.3%). The highest frequency of use of energy saving device is everyday (27.9%), followed by several times a week (23.1%).

### 2.3. Measures

Measurement items from prior studies were used to measure constructs in this study. All items were measured on a seven-point Likert scale (1 = strongly disagree, 7 = strongly agree). Media influence scales were adapted from Venkatraman and Venkatesh (2006); perceived pleasureability scales and legislative scales were adapted from Pelletier et al. (1998); attitude to EST were adapted from Venkatesh et al. (2002); and EST use scales were adapted Venkatesh et al. (2002). Two items to measure economic factor were developed for this study.

This procedure yielded 18 measurement items. A questionnaire was developed in English and then translated into Korean by individuals who were proficient in both languages. Then, researchers with academic specializations in the area under study compared the translated version with the original version and did not identify any discrepancies. The pretest showed that all those items were valid and reliable. Thus, 18 items in seven constructs were used, as shown in <Table 1>. Thus, a final list of 18 items was obtained: media influence (2 items), perceived pleasureability (4 items), social norms (2 items), legislative pressure (2 items), economic factor (2 items), attitude to EST (4 items) and intention to use EST (2 items).

## Ⅳ. Analysis and Results

To analyze our data, we adopted a confirmatory approach using PLS (Partial Least Square) as our analysis method. PLS has been widely used in theory testing and confirmation. It is also an appropriate approach for examining whether relationships might or might not exist and thus is useful in suggesting propositions for later testing (Fornell and Larcker, 1981). Additionally, PLS relies on a smaller sample size for validating a model than do other structural equation modeling techniques (Chin, 1998). PLS-

<Table 1> Demographic Characteristics of Respondents

| Characteristics | | Frequency | % |
|---|---|---|---|
| Gender | Male | 99 | 95.2 |
| | Female | 5 | 4.8 |
| Age | Under 18 | 1 | 1.0 |
| | 18~24 | 5 | 4.8 |
| | 25~34 | 24 | 23.1 |
| | 35~44 | 51 | 49.0 |
| | 45~54 | 16 | 15.4 |
| | Over 55 | 7 | 6.7 |
| Education | Middle school / High school | 14 | 13.5 |
| | 2-year college | 20 | 19.2 |
| | University | 56 | 53.8 |
| | Graduate school | 14 | 13.5 |
| Occupation | Blue-collar jobs | 4 | 3.8 |
| | Sales / Office worker | 12 | 11.5 |
| | Technical jobs | 30 | 28.8 |
| | IT/IS professional | 20 | 19.2 |
| | IT/IS non-professional | 4 | 3.8 |
| | Management position | 12 | 11.5 |
| | Teaching job | 4 | 3.8 |
| | Other | 18 | 17.3 |
| Yearly income per household | Less than 24 million won* | 10 | 9.6 |
| | 24 - 48 million won | 44 | 42.3 |
| | 48 - 72 million won | 32 | 30.8 |
| | 72 - 96 million won | 6 | 5.8 |
| | 96 - 120 million won | 4 | 3.8 |
| | More than 120 million won | 8 | 7.7 |
| Energy saving device usage time (weekly average) | Less than 1 hours | 15 | 14.4 |
| | 1 hours – less than 5 hours | 32 | 30.8 |
| | 6 hours – less than 10 hours | 17 | 16.3 |
| | 11 hours – less than 15 hours | 12 | 11.5 |
| | 16 hours – less than 20 hours | 6 | 5.8 |
| | 21 hours – less than 25 hours | 5 | 4.8 |
| | More than 25 hours | 17 | 16.3 |
| Energy saving device usage frequency | Once a month | 13 | 12.5 |
| | Several times a month | 18 | 17.3 |
| | Once a week | 13 | 12.5 |
| | Several times a week | 24 | 23.1 |
| | Everyday | 29 | 27.9 |
| | Many times a day | 7 | 6.7 |
| Total | | 104 | 100 |

Graph version 3.0 was used to analyze the measurement and structural models.

### 4.1. Measurement Model

To validate our measurement model, we undertook validity assessments of content, discriminant, and convergent validity. The content validity of our survey was established from the existing literature, and our measures were constructed by adopting constructs validated by other researchers. According to Campbell and Fiske (1959) and Nunnally (1967), all constructs in the model satisfied reliability requirements (with composite reliability greater than 0.70) and discriminant validity requirements (with average variance extracted greater than 0.50), the square root of average variance extracted (AVE) "greater than each correlation coefficient" (Bhattacherjee and Sanford, 2006, p. 815), and Cronbach's α greater than 0.6 (Robinson et al., 1991). We also examined the discriminant and convergent validity of each indicator (Chin, 1998). To be discriminant and convergent, each indicator should load more highly on the construct of interest than on any other latent variable. The results presented in <Tables 2> and <Table 3> demonstrate adequate discriminant and convergent validity.

### 4.2. Structural Model

To evaluate the structural models' predictive power, we calculated the $R^2$s for perceived pleasureability, social norms, legislative pressure, economic factor, attitude energy saving device and energy saving device adoption. Interpreted as multiple regression results, $R^2$ indicates the amount of variance explained by the exogenous variables (Barclay et al., 1995). Using a bootstrapping technique, the path estimates and t-statistics were calculated for the hypothesized relationships. The size of the bootstrapping sample that was used in the PLS analyses was 1,000. The result using PLS are shown in <Figure 4>.

As illustrated in <Figure 4>, eight of ten hypotheses were significant. As hypothesized, the relationship between attitude to EST and intention to use EST was significant, supporting H1 ($\beta$ = 0.625, $t$-value = 7.615, $p < 0.001$). H2, H3, H4 and H5 show that attitude to EST is significantly influenced by perceived pleasureability ($\beta$ = 0.397, $t$-value = 3.768, $p < 0.001$), social norms ($\beta$ = 0.164, $t$-value = 1.898, $p < 0.1$), legislative pressure ($\beta$ = 0.293, $t$-value = 3.329, $p < 0.001$), and economic factor ($\beta$ = 0.176, $t$-value = 2.127, $p < 0.05$). Hence, H2, H3, H4 and H5 were accepted. Moreover, the path from social norms to perceived pleasureability (H6) was significant ($\beta$ = 0.504, $t$-value = 4.672, $p < 0.001$).

H7, H8, H9 and H10 show that media influence has a significantly effects on perceived pleasureability ($\beta$ = 0.025, $t$-value = 0.243), social norms ($\beta$ = 0.547, $t$-value = 7.338, $p < 0.001$), legislative pressure ($\beta$ = 0.222, $t$-value = 2.004, $p < 0.05$), and economic factor ($\beta$ = 0.037, $t$-value = 0.377). Therefore, H8 and H9 were accepted whilst H7 and H10 were rejected. In <Table 4>, we present the resulting standardized parameter estimates and verdicts for hypotheses H1 to H10.

Social norms together with media influence explained 26.8% of variance in perceived pleasureability. Media influence accounted for 30.0% of variance in social norms and 4.9% of variance in legislative pressure. And media influence explained 0.1% of economic factor. Perceived pleasureability together with social norms, legislative pressure and economic factor explained 46.7% of variance in attitude to EST. Lastly, attitude to EST accounted for 39% of variance in EST use.

<Table 2> Measurement Model from Factor Analysis

| Constructs and variables | Standardized factor loadings | | | | | | | Cronbach's α |
|---|---|---|---|---|---|---|---|---|
| Media Influence | | | | | | | | |
| 1. Media (newspaper, TV, news) exposure about being green influences me to use EST. | 0.901 | | | | | | | 0.670 |
| 2. What I heard and seen in the media (newspaper, TV, news) has prompted me to use EST. | 0.843 | | | | | | | |
| Perceived Pleasureability | | | | | | | | 0.969 |
| 1. It is my pleasure in mastering new ways to help my environment by using EST. | | 0.944 | | | | | | |
| 2. It is my pleasure in improving quality of my environment by using EST. | | 0.956 | | | | | | |
| 3. I feel good when doing things for environment by using EST. | | 0.960 | | | | | | |
| 4. It is my pleasure to contribute to my environment by using EST. | | 0.966 | | | | | | |
| Social Norms | | | | | | | | 0.923 |
| 1. Friends who influence my behavior would think that I should use EST to reduce my energy consumption. | | | 0.963 | | | | | |
| 2. Significant others who are important to me would think that I should use EST to reduce my energy consumption. | | | 0.964 | | | | | |
| Legislative Pressure | | | | | | | | 0.695 |
| 1. Government regulation would insist me to use EST. | | | | 0.863 | | | | |
| 2. Policy on the use of EST would insist me to reduce my energy consumption. | | | | 0.892 | | | | |
| Economic Factor | | | | | | | | 0.910 |
| 1. By using EST, I can get more benefit from the same energy expenditure. | | | | | 0.955 | | | |
| 2. By using EST, I can save more money by having less electricity bill. | | | | | 0.961 | | | |
| Attitude to EST | | | | | | | | 0.887 |
| 1. Using EST is a good idea. | | | | | | 0.891 | | |
| 2. Using EST is a wise. | | | | | | 0.912 | | |
| 3. I am satisfied with my use of EST | | | | | | 0.839 | | |
| 4. Using EST is pleasant. | | | | | | 0.845 | | |
| Intention to Use EST | | | | | | | | 0.812 |
| 1. Assuming I had access to and afforded energy- saving technology, I intent to use them. | | | | | | | 0.933 | |
| 2. Assuming I had access to and afforded energy saving-technology, I predict that I would use them in the future. | | | | | | | 0.902 | |

<Table 3> Reliabilities and Discriminant Validity

| Construct | Composite Reliability | AVE | Correlation of Constructs | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| (1) Media Influence | 0.865 | 0.762 | 0.873 | | | | | | |
| (2) Perceived Pleasureability | 0.977 | 0.915 | 0.295** | 0.957 | | | | | |
| (3) Social Norms | 0.963 | 0.928 | 0.530** | 0.517** | 0.963 | | | | |
| (4) Legislative Pressure | 0.870 | 0.769 | 0.215* | 0.109 | 0.218* | 0.877 | | | |
| (5) Economic Factor | 0.957 | 0.918 | 0.018 | 0.206* | 0.197* | 0.126 | 0.958 | | |
| (6) Attitude to EST | 0.927 | 0.761 | 0.269** | 0.550** | 0.473** | 0.391** | 0.330** | 0.872 | |
| (7) Intention to Use EST | 0.914 | 0.842 | 0.338** | 0.440** | 0.462** | 0.286** | 0.266** | 0.619** | 0.918 |

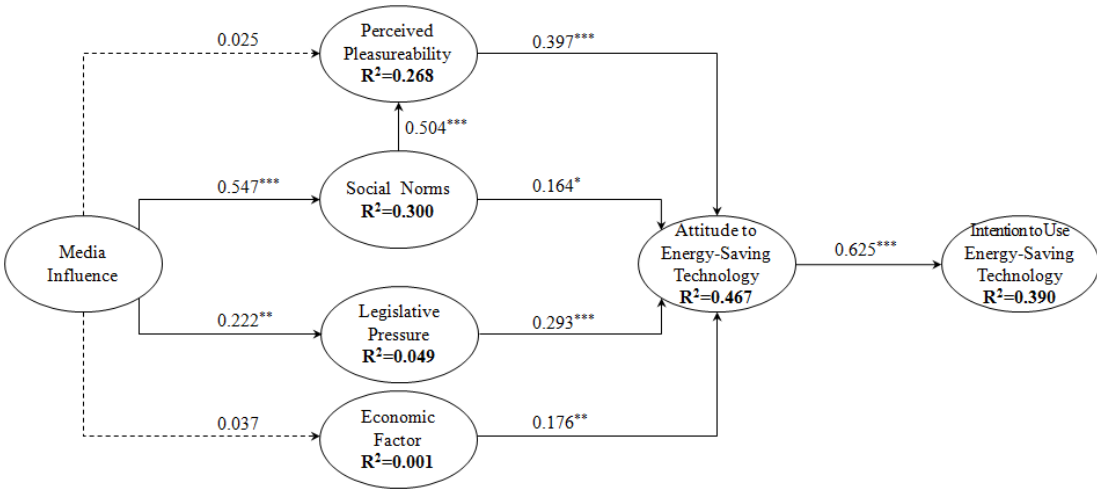
Note: Diagonal elements in the "correlation of constructs" matrix are the square root of the average variance extracted (AVE). "For adequate discriminant validity, diagonal elements should be greater than their corresponding off-diagonal elements" (Bhattacherjee and Sanford, 2006 p. 815).

* $p < 0.05$, ** $p < 0.01$

## Ⅴ. Discussion and Conclusion

Several key findings emerged from the current work. There were significant supports for our integrated model. First, we found direct effect of attitude and intention to use of EST. This finding is consistent with the TAM theory that explains the causal links users' attitude and intention to use IS (Szajna, 1996). While attitudinal models such as technology planned behavior indicate that people are likely to decide to act after weighting the costs and benefits of the consequences (Fransson and Garling, 1999), TAM theory suggested that intention to accept technology is mainly influenced by the person's attitude toward the IS, and the attitudes are formulated by beliefs a person forms about the IS. Theoretically, we found that people formed favorable attitude as an important determinant of environmentally friendly behavior. In our study, we revealed that attitude is a main determinant of intention to use EST.

Secondly, we found that goal framing aspects (perceived pleasurability, social norms, legislative pressure, and economic factor) significantly influence attitude to EST. Perceived pleasureability (*hedonic goal frame*) positively and significantly influenced attitude EST. This finding suggests that internal motivation is the reason for a behavior or a strong internal stimulus for attitude around which behavior is organized (Kollmus and Agyeman, 2002). Although perceived pleasureability, however, is attached to self-satisfaction, a sense of purpose, a feeling of meaningfulness and impact (Deci and Ryan, 1985), keep in mind that the concept of perceived pleasureability could be relatively motivated from the concept of social norms even though both variables are intrinsically and extrinsically intertwined. Social norms are attached to what people may choose to perform a behavior. So if more important referents think they should, and they are sufficiently motivated to comply with the referents' moral sanctions. That is, social norm may result in perceived pleasuability by other favorable evaluations. People basically feel pleasure promptly by significant others to whom they feel attached or related (Deci and Ryan, 1985). This fact indicates that relatedness, the need to feel belongingness and connectedness with others, is centrally im-




* $p < 0.1$, ** $p < 0.05$, *** $p < 0.001$

<Figure 4> Hypotheses Results

portant for internalization. Thus, the internalization is more likely to be in evidence when there are ambient supports for feelings of pleasurablity. When studying EST, researchers need to deal with the intrinsic value of ethic or pleasurability and the importance of eco-sustainability in the decision making process (Molla, 2009).

At third, we found both extrinsic variables (economic factor and legislative pressure) have positive effects on attitude to use EST. Some studies suggested that that people motivation to engage in environmental behaviors is driven by a sense of social responsibility, more than a desire to save financially (Leonard-Barton, 1981). This argument is true for behaviors that are not strongly constrained by context or personal capabilities (Stern, 2000). In a *gain goal-frame*, people are very sensitive to information about incentive (Lindenberg and Steg, 2007). Thus, contextual factors and personal capabilities should be taken into account. Furthermore, the significant relationship of those external factors and behavioral attitude does not mean that intrinsic variables are becoming less important. In some cases, external rewards (e.g., saving money, policy acceptance) may enhance rather than lower intrinsic motivation (Ryan and Deci, 2000).

Finally, we found that media are crucial in influencing both social and legislative pressure. However, they have no direct effect on perceived pleasurability and economic factor. It is likely that media influence is the main predictor of social norms and legislative pressure. As indicated by McQuail (1987) in his mass communication research, media have a strong impact through constructing social reality or framing social reality. Thus, media contribute in developing social norms about EST behavior. This study indicated that media influence is essential in affecting social norms (t = 0.547) in social context. People need to possess particular information about the capability of technology in order to start believing that it is important to do something to change the situation (Pelletier et al., 1998). In a certain level of media information, people may be convinced that the problem is serious and important enough to justify their immediate ac-

<Table 4> Standardized Structural Estimates and Tests of Main Hypotheses

| Hypotheses | Path | | | Estimates | *t*-value | Results |
|---|---|---|---|---|---|---|
| H1 | Attitude to EST | → | Intention to Use EST | 0.625 | 7.615 | Supported |
| H2 | Perceived Pleasureability | → | Attitude to EST | 0.397 | 3.768 | Supported |
| H3 | Social Norms | → | Attitude to EST | 0.164 | 1.898 | Supported |
| H4 | Legislative Pressure | → | Attitude to EST | 0.293 | 3.329 | Supported |
| H5 | Economic Factor | → | Attitude to EST | 0.176 | 2.127 | Supported |
| H6 | Social Norms | → | Perceived Pleasureability | 0.504 | 4.672 | Supported |
| H7 | Media Influence | → | Perceived Pleasureability | 0.025 | 0.243 | Not Supported |
| H8 | Media Influence | → | Social Norms | 0.547 | 7.338 | Supported |
| H9 | Media Influence | → | Legislative Pressure | 0.222 | 2.004 | Supported |
| H10 | Media Influence | → | Economic Factor | 0.037 | 0.378 | Not Supported |
| $R^2$ | | | | | | |
| Perceived Pleasureability: | 0.268 (26.8%) | | | | | |
| Social Norms: | 0.300 (30.0%) | | | | | |
| Legislative Pressure: | 0.049(4.9%) | | | | | |
| Economic Factor: | 0.001(0.1%) | | | | | |
| Attitude to EST: | 0.467(46.7%) | | | | | |
| Intention to Use EST: | 0.390(39.0%) | | | | | |

tion (Pelletier, 2002). To this extent, people are likely to activate their internalization process and perceive environmental behaviors as social activities.

Although we believe that the current research makes significant contributions to the field, it, of course, has some limitations that should be noted. First, although most scales adopted in this study have been validated in prior research, economic factor scales were self-developed for the purpose of this study. The scales exhibited high reliability and validity, but additional study is warranted to further validate the scales. Second, given a small size of our sample, findings derived from this study should not be generalized to other population. Moreover, remaining that 98% of our respondents are males, studies with additional female sample are necessary to further generalize the findings.

This research has several contributions. First, this research enriches our understanding of the multiple factors influencing EST. This is the first study under EST use context that integrates hedonic goal, normative goal, gain goal, and media variables into one single model. Despite employing behavioral model such as theory of planned behaviors or technology acceptance model, this study adopted goal-framing theory, enhanced by media influence. Second, to the best of our knowledge, there are few, if any, prior studies that measure the relationship between social norms and perceived pleasurability, particularly in environmental technology adoption research. Unlike the other technology adoption behaviors that emphasize on *social norms*, EST requires a more intrinsically motivation.

These findings do indicate that social norms and the role of media are important. It is likely that social norms is formulated much by media and directly influence pro-environmental attitude. The effects of social norms and perceived pleasureability

are mediated, indicating the importance of internalization process of extrinsic motivation. To validate the findings, future research should examine the power of social norms in different types of environmental technologies. Even though Lindenberg and Steg (2007) argued that cost or hedonic aspects are not necessary in a normative goal frame, we found that those three goal frames (*hedonic, goal gain, and normative*) are correspondingly important. Considering the significance impacts of social norms, perceived pleasureability, economic factor, and legislative pressure, the three types of goal frames warrant both investigation and potential elaboration. Consistent with Stern (2000), we argued that different type of environmental behavior has different determinant behaviors. In other words, different types of causal variables are important, depending on the particular behavior.

We also provided several practical implications for IT practitioners, government or policy maker, and environmental activists. IT practitioners may learn that producing environmental technology product is not related to the cost and benefit calculation *per se*. IT managers and marketing managers should be aware of the importance of the role of media in influencing the behavior intention. For government and policy makers, this study may provide a new input to introduce a more environmentally consumption behaviors policy. Even though the environmental impact of any individual's personal behavior is small; such individual behaviors have environmentally significant impact only in the aggregate, when many people independently do the same things (Stern, 2000). In other words, this study suggests that a legislative approach to the end-users may help both producers and governments to greening the environment. For environmental activists, our findings suggest that media can be used to influence social norms and government. Hence, environmental activists may design such program campaign that promotes internalized moral issues. Lastly, this study shows that social norms (*normative frame*) along with perceived pleasureability (*hedonic frame*) and cost reduction (*gain goal frame*) are important to promote energy reduction. Though the importance weight of each goal frame varies across different situation, we argued that normative and hedonic approach would bring a long-term commitment to pro-environmental behavior.

## Ⅵ. Acknowledgement

This work was supported by the National Research Foundation of Korea Grant funded by the Korean Government (NRF-2013S1A3A2043345).

## <References>

[1] Ahn, T., Ryu, S., and Han, I. (2007) .The Impact of Web Quality And Playfulness on User Acceptance of Online Retailing. Inform*ation & Management, 44*(3), 263-275.

[2] Ajzen, I. (1991). The Theory of Planned Behavior. Organizational Behavior and Human Decision Processes, *50*(2), 179-211.

[3] Bagozzi, R. P. and Dholakia, U. (1999). Goal Setting and Goal Striving in Consumer Behavior, *Journal of Marketing, 63*, 19-32.

[4] Bang, Y. and Lee, D. (2013). Effects of Transaction Characteristics on Distributive Justice and Purchase Intention in the Social Commerce, *Asia Pacific Journal of Information Systems*, *23*(2), 1-20.

[5] Bamberg, S. (2003). How Does Environmental Concern Influence Specific Environmentally Related Behaviors? A New Answer to an Old Question. *Journal of environmental psychology*, *23*(1), 21-32.

[6] Barclay, D., Thompson, R., and Higgins, C. (1995). The Partial Least Squares (PLS) Approach to Causal Modeling: Personal Computer Adoption and Use an Illustration. *Technology Studies*, *2*(2), 285-309.

[7] Bearden, W. O., and Etzel, M. J. (1982). Reference Group Influence on Product and Brand Purchase Decisions. *Journal of Consumer Research*, *9*(2), 183-194.

[8] Bhattacherjee, A., and Sanford, C. (2006). Influence Processes for Information Technology Acceptance: an Elaboration Likelihood Model. *MIS Quarterly*, *30*(4), 805-825.

[9] Brandon, G., and Lewis, A. (1999). Reducing Household Energy Consumption: A Qualitative and Quantitative Field Study. *Journal of Environmental Psychology, 19*(1), 75-85.

[10] Brekke, K. A., and Rege, M. (2003). In Advertising as Manipulation of Social Learning, Proceedings of the (VI) Meeting of the Society For The Advancement of Economic Theory, Rodos, Greece.

[11] Campbell, D. T., and Fiske, D. W. (1959). Convergent and Discriminant Validation by the Multitrait- Multimethod Matrix. *Psychological Bulletin*, *56*(2), 81-105.

[12] Cha, H.S. (2012). Factors Influencing the Adoption of Location-Based Smartphone Applications: an Application of the Privacy Calculus Model, *Asia Pacific Journal of Information Systems*, *22*(4), 7-29.

[13] Chia, S. C. (2006). How Peers Mediate Media Influence on Adolescents' Sexual Attitudes and Sexual Behavior. *Journal of Communication*, *56*(3), 585-606.

[14] Chin, W. W. (1998). The Partial Least Squares Approach to Structural Equation Modeling. In G. A. Marcoulides (Ed.), M*odern Methods for Business Research*. 295-336. Mahway, NJ: Lawrence Erlbaum.

[15] Clark, C. F., Kotchen, M. J., and Moore, M. R. (2003). Internal and External Influences on Pro-Environmental Behavior: Participation in a Green Electricity Program. *Journal of environmental psychology*, *23*(3), 237-246.

[16] Cohen, M. A. (2005). Individual and Household Environmental Behavior: What Does Economics Contribute to The Discussion? *Environmental Law Institute, News and Analysis*, *35*, 10754-10762.

[17] De Young, R. (2000). Expanding and Evaluating Motives for Environmentally Responsible Behavior. *Journal of Social Issues*, *56*(3), 509-526.

[18] Deci, E. L., and Ryan, R. M. (1985). *Intrinsic Motivation and Self-Determination in Human Behavior*. New York, NY: Plenum.

[19] Fornell, C. R., and Larcker, D. F. (1981). Two Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*, *18*(1), 39-50.

[20] Fransson, N., and Garling, T. (1999). Environmental Concern: Conceptual Definitions, Measurement Methods, and Research Findings. *Journal of environmental psychology*, *19*(4), 369-382.

[21] Fujii, S. (2006). Environmental Concern, Attitude toward Frugality, and Ease of Behavior as Determinations of Pro-Environmental Behavior Intentions. *Journal of environmental psychology*, *26*(40), 262-268.

[22] Gardner, B., and Abraham, C. (2010). Going Green? Modeling the Impact of Environmental Concerns and Perceptions of Transportation Alternatives on Decisions to Drive. *Journal of applied social psychology*, *40*(4), 831-849.

[23] Gatersleben, B. (2000). Sustainable Household Metabolism and Quality of Life: Examining the Perceived Social Sustainability of Environmentally Sustainable Household Consumption Patterns. Unpublished doctoral dissertation, Faculty of Psychological, Pedagogical, and Sociological Sciences, University of Groningen, the Netherlands.

[24] Gefen, D., and Straub, D. (2005). A Practical Guide to Factorial Validity Using PLS-Graph: Tutorial And Annotated Example. *Communications of the association for information systems*, *16*, 91-109.

[25] H'Mida, S. (2009). Factors Contributing in the Formation of Consumers' Environmental Consciousness and Shaping Green Purchasing Decisions. Proceedings Of The International Conference On Computers & Industrial Engineering, 957-962.

[26] Han, J., Kang, S. and Moon, T. (2013). An Empirical Study on Perceived Value and Continuous Intention to Use of Smartphone, and the Moderating Effect of Personal Innovativeness, *Asia Pacific Journal of Information Systems*, *23*(4), 53-84.

[27] Henningsen, M. L. M., Henningsen, D.D., Cruz, M. G., and Morrill, J. (2003). Social Influence in Groups: A Comparative Application of Relational Framing Theory and the Elaboration Liklihood Model of Persuasion. *Communication Monographs*, *70*(3), 175-197.

[28] Hsu, C-L., and Lu, H-P. (2004). Why Do People Play On-line Games? An Extended TAM with Social Influences and Flow Experience. *Information & Management*, *41*(7), 853-868.

[29] Igbaria, M., Parasuraman, S., and Baroudi, J. J. (1996). A Motivational Model of Microcomputer Usage. *Journal of management information systems*, *13*(1), 127-143.

[30] Kaiser, F. G., Ranney, M., Hargig, T., and Bowler, P. A. (1999). Ecological Behavior, Environmental Attitude, and Feelings of Responsibility for the Environment. *European psychologist*, *4*(2), 59-74.

[31] Karahanna, E., and Straub, D. W. (1999). The Psychological Origins of Perceived Usefulness and Ease-of-Use, *Information & Management*, *35*, 237-250.

[32] Kollmus, A., and Agyeman, J. (2002). Mind The Gap: Why do People Act Environmentally and What are the Barriers to Pro-Environmental Behavior? *Environmental Education Research*, *8*(3), 239-260.

[33] Kraut, R. E., Rice, R. E., Cool, C., and Fish, R. S. (1998). Varieties of Social Influence: The Role of Utility and Norms in the Success of a New Communication Medium. *Organizational science*, *9*(4), 437-453.

[34] Lee, N., Jin, Y. and Kown, O. (2013). Roles of Treat and Coping Appraisal in Adoption of Green Information Technology: Ordered Protection Motivation Theory Perspective, *Asia Pacific Journal of Information Systems*, *23*(2), 87-109.

[35] Leonard-Barton, D. (1981). Voluntary Simplicity Lifestyles and Energy Conservation. *The Journal of Consumer Research, 8*(3), 243-252.

[36] Lindenberg, S.(2001). Social Rationality Versus Rational Egoism. In J. Turner (Ed.), Handbook Of Sociological Theory, pp. 635-668. New York: Kluwer Academic/Plenum.

[37] Lindenberg, S., and Steg. L. (2007). Normative, Gain and Hedonic Goal Frames Guiding Environmental Behavior. *Journal of social issues*, *63*(1), 117-137.

[38] McQuail, D. (1977). The Influence and Effects of Mass Media. In Curran, J., Gurevitch, M. and Woolacott, J. (Ed.), Mass Communication and Society, 7-23. Sage Publication, Inc.

[39] McQuail, D. (1987). Mass Communication Theory: An Introduction. (3rd ed.). (1994).Thousand Oaks, CA: Sage.

[40] Melville, N.P. (2010). Information Systems Innovation for Environmental Sustainability. MIS Quarterly, *34*(1), 1-21.

[41] Molla, A. (2009). Organizational Motivations for Green IT: Exploring Green IT Matrix and Motivation Models. *Proceedings of PACIS 2009*, 1-13.

[42] Mostafa, M. M. (2007). A Hierarchical Analysis of the Green Consciousness of the Egyptian Consumer. *Psychology & Marketing*, *24*(5), 445-473.

[43] Nunnally, J. C., Bernstein, I. H., and Berge, J. M. T. (1967). Psychometric Theory. (3rd ed.), (1994), New York, NY: McGraw-Hill,

[44] Nyborg, K., Howarth, R. B., and Brekke, K. A. (2006). Green Consumers and Public Policy: on Socially Contingent Moral Motivation. *Resource and energy economics*, *28*(4), 351-366.

[45] Paulraj, A. (2008). Environmental Motivations: A Classification Scheme and its Impact on Environmental Strategies and Practices. *Business Strategy and the environment*, *18*(7), 453- 468

[46] Pelletier, L. G. (2002). A Motivational Analysis of Self-Determination for Pro-Environmental Behavior. In Handbook of Self-Determination Research, In Deci, E.L & Ryan, R. M.(Eds.).(2004). New York, NY: The university of Rochester Press.

[47] Pelletier, L. G., Tuson, K. M., Green-Demers, I., Noels, K., and Beaton, A. M. (1998). Why Are You Doing Things for the Environment? The Motivation toward the Environment Scale (MTES). *Journal of applied social psychology*, *28*(5), 437-468.

[48] Poortinga, W., Steg, L., and Vlek, C. (2002). Environmental Risk Concern And Preferences for Energy-Saving Measures. Environment and Behavior, *34*(4), 455-478.

[49] Poortinga, W., Steg, L. Vlek, C. (2004). Values, Environmental Concern, and Environmental Behavior: A Study into Household Energy Use. *Environment and Behavior*, *36*. 70-93.

[50] Poortinga, W., Steg, L., Vlek, C., and Wiersma, G. (2003). Household Preferences for Energy Saving Measures. A Conjoint Analysis. *Journal of Economic Psychology, 24*(1), 49-64.

[51] Rios, F. J. M., Martinez, T. L., Moreno, F. F., and Soriano, P. C. (2006). Improving Attitudes Toward Brands with Environmental Associations: An Experimental Approach. *Journal of Consumer Marketing*, *23*(1), 26-33.

[52] Robinson, P. (2001). Theorizing the Influence of Media on World Politics: Models of Media Influence on Foreign Policy, *European Journal of Communication*, *16*(4), 523-544.

[53] Robinson, J. P., Shaver, P. R., and Wrightsman, L. S. (1991). Criteria for Scale Selection and Evaluation. In J. P. Robinson, P. R. Shaver & L. S. Wrightsman (Eds.), *Measures of Personality and Psychological Attitudes*. San Diego, CA: The Academic Press.

[54] Ryan, R. M., and Deci, E. L. (2000). Self-Determination Theory and The Facilitation of Intrinsic Motivation, Social Development, and Well-Being. *American Psychologist*, *55*, 68-78.

[55] Schultz, P.W., Nolan, J.M., Cialdini, R.B., Goldstein, N.J., and Griskevicius, V. (2007). The Constructive, Destructive, and Reconstructive Power of Social Norms. *Psychological Science*, *18*(5), 429-434.

[56] Schwartz, S. H. (1977). Normative Influences on Altruism. In L.Berkowitz (Ed.), Advances in Experimental Social Psychology 10, pp. 221-279. New York: Academic Press.

[57] Stern, P. C. (2000). Toward a Coherent Theory of Environmentally Significant Behavior. *Journal of social issues*, *56*(3), 407-424.

[58] Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., and Kalof, L. (1999). A Value-Belief-Norm Theory of Support For Social Movements: The Case of Environmentalism. *Human ecology review*, *6*(2), 81-98.

[59] Szajna, B. (1996). Empirical Evaluation of The Revised Technology Acceptance Model. *Management Science, 42*(1), 85-92.

[60] Tamborini, R., Bowman, N. D., Eden, A., Grizzard, M. and Organ, A. (2010). Defining Media Enjoyment as the Satisfaction of Intrinsic Needs. *Journal of Communications, 60*(4), 758-777.

[61] Taylor, S., and Todd, P. A. (1995). Understanding Information Technology Usage: A Test of Competing Models. *Information systems research*, *6*(2), 144-176.

[62] Van der Heijden, H. (2004). User Acceptance of Hedonic Information Systems. *MIS Quarterly, 28*(4), 695-704.

[63] Venkatesh, V. and Davis, F.D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science, 46*(2), 186-204.

[64] Venkatesh, V., Brown, S. A., Maruping, L. M., and Bala, H. (2008). Predicting Different Conceptualizations of System Use: The Competing Roles of Behavior Intention, Facilitating Conditions, and Behavioral Expectation. *MIS Quarterly*, *32*(3), 483-502.

[65] Venkatesh, V., Speier, C., and Morris, M. G. (2002). User Acceptance Enablers in Individual Decision Making About Technology: Toward an Integrated Model. *Decision Sciences*, *33*(2), 297-316.

[66] Venkatraman, S., and Venkatesh, V. (2006). *Too Much of a Good Thing: Negative Aspects of Non-Work Internet Use*. available on http://cisnet.baruch.cuny.edu/koufaris/candidates/srini/srini1.pdf, 2006.

[67] Vredenburg, H., and Westley, F. 1993. Environmental Leadership in Three Contexts: Managing for Global Competitiveness. *Proceedings of the International Association of Rusiness and Society*, 495-500.

[68] Wanta, W., Golan, G., and Lee, C. (2004). Agenda Setting and International News: Media Influence on Public Perceptions of Foreign Nations. *Journalism and Mass Communication Quarterly*, *81*(2), 364-377.

[69] Watson, R. T., Boudreau, M-C., and Chen, A. J. (2010). Information Systems and Environmentally Sustainable Development: Energy Informatics and New Directions for the IS Community. *MIS Quarterly*, *34*(1), 23-38.

## ◆ About the Authors ◆

**Chulmo Koo**

Chulmo Koo is an associate professor and the dean of convention management department, college of hotel & tourism management, Kyung Hee University. He received B.S. degree from the college of humanities at Ajou University and M.S. degree from the department of management business systems at Ajou University. He received his Ph.D. degree from the business school at Sogang University. His current research interests include smart tourism, management information system. His papers have been published in Telematics and Informatics, Technological Forecasting & Social Change, Computers in Human Behavior, Information & Management, Behavior & Information Technologies, Electronic Markets, IT and People, International Journal of Information Management, Total Quality Management & Business Excellence, Information Development, and so on. He is a managing director of smart tourism research center.

**Namho Chung**

Namho Chung is a Professor at the faculty member of College of Hotel & Tourism Management and the director of Smart Tourism Research Center at Kyung Hee University in Seoul, Republic of Korea. He received his Ph.D degree in MIS from Sungkyunkwan University. His research interests include travel behavior, information search and decision making, destination marketing, knowledge management and the development of information systems for destination management organizations. His research work has been published in journals such as Information & Management, International Journal of Information Management, Computers in Human Behavior, Behavior and Information Technology, Electronic Commerce Research and Applications, Journal of Travel research, Tourism Management, International Journal of Tourism Research and others.

Submitted: April 8, 2015; 1st Revision: March 10, 2016; Accepted: March 10, 2016