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THE INFLUENTIAL MOTIVATIONS OF GREEN IT DEVICE USE AND THE ROLE OF REFERENCE GROUP PERSPECTIVE

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Abstract

In this study we investigate the determinants of behavior intention to use green IT device for reducing electronic consumption by focusing on the end user aspects of a pro-environmental behavior. We tried to understand motivation theory in explaining the causal relationship between motivation aspects and perceived usefulness. By using a reference group theory, we emphasized on how the reference group moderates the motivations and perceived usefulness relationship. We used Partial Least Square (PLS) to analyze the data sample of 104 and found that intrinsic motivation (perceived enjoyment) is significantly related to the perceived usefulness as well as extrinsic motivation (saving money, legislative pressure) is strongly related to the perceived usefulness. In sum, the perceived usefulness has a strong impact on sustainable use of green IT device. Also, we found that a reference group moderates partially the independent variables and mediation variable.

Keywords: Motivation theory, Reference Group theory, Motivation, Intrinsic, Extrinsic, Green IT device, Perceived usefulness.

1 INTRODUCTION

As an environmental concern with energy issues gradually bring an attention in our society, not only companies but also consumers and users take an account to use green IT device for protecting environment problem (Mohrenfels and Klapper, 2012) and cost-efficient means for an economic benefit (Loock et al., 2012). A recent report announced that households and businesses could reduce energy consumption by 23%, which approximately result in at a cost of \$520 billion if they would replace energy efficient appliances in houses and business sectors (Loock et al., 2012). Although the green and energy saving devices are adopted and used, the reasons why users are willing to use and, more specifically, what types of motivations affect to the behaviour that have a significant impact on the use of green IT device. In particular, people may think dichotomously that it is much related to economic benefits or ecologically sustainable society.

In MIS discipline, Wu and Lederer (2009) address the impact of environment-based voluntariness based on the traditional TAM (Technology Acceptance Model) theory, which it moderated the effects of ease of use and usefulness on behavioural intention. Meanwhile, prior research has investigated the importance of motivational factors and usage (Davis et al., 1992), a social norm interventions at the context of making decisions for energy consumers (Loock et al., 2012), green product information provided by smartphone application (Mohrenfels and Klapper, 2012). Various reasons for the environment friendly behaviour has been suggested, however, most importantly, motivational factors by green IT device users should be firstly considered. Davis et al. (1992) introduced motivations why people use computer because of useful or because of enjoyable to use. Motivation theory refers to both of extrinsic motivation and intrinsic motivation.

However, interestingly, people frequently orient themselves in shaping their behaviour and evaluations and refer to reference group on product and brand purchase decision (Bearden and Etzel, 1982). Socially distant reference group can make an impact on consumers if they appear favourable attitudes toward the members of that group. So that individual brand choice was affected by group influence in marketing literature. In recent studies, Loock et al. (2012) adopted social norm interventions, which investigate on energy audits by social intervention can influence consumption behaviour. On the other hand, information and advertising for green products is more influential a way of consuming a specific product (Mohrenfels and Klapper, 2012). Stern (2000) stated that the environment research field now needs synthetic theories that incorporate variables from more than one perspective toward environmentally significant behaviour. We reviewed recent studies from Wu and Lederer (2009)'s TAM theory, Mohrenfels and Klapper (2012)'s green products brand perception using reference groups, and Loock et al. (2012)'s social intervention for energy customers in the context of pro-environmental choice and communication.

Up to now, behavioural green IT usage or adoption seems largely overlooked in the 'Green IS and Sustainability' theme (Wati and Koo, 2012). Much studies address the application of Green IS for motivating energy reduction in organizational level (Fradley et al., 2012; Hedman et al., 2012, Nishant et al., 2012) rather than consumer level (Loock et al., 2012), which they target on more energy efficient of systems in organizations. In this context, green IT device would enable consumers to reduce energy consumption. As we have already and widely acknowledged that product of electronic car, solar energy systems of individual house, and energy efficient product can have a positive influence on individual behaviour. Even though social and media influence is crucial, the level of influence has ignored in the Green IS and sustainability area. Our study has focused on research for an individual green IT device usefulness would be perceived by individual motivations, in addition, be influenced by media and a person or group influence.

The current study is theoretically conducted by the determinants of a green IT device usefulness by concentrating on the motivational aspects (Davis et al., 1992; Deci and Ryan, 1985) of environmental behaviours under the reference group of media influence (Mohrenfels and Klapper, 2012) and social influence (Loock et al., 2011; 2012). Although Loock et al. (2012)' study applied social norm theory

to the context of energy consuming issue, they investigated on the issue of geographical proximity or distance for energy consumer's behaviour rather than the direct impact of social influence. IS researcher acknowledged that measurement of energy consumption and feedback information from systems or device is essential and critical, and intervention is also required. The purpose of this study is to investigate the two types of motivations in influencing perception of usefulness. The second objective is to look at moderating aspect by affected reference group (social and media influence) to a green IT device usefulness.

2 THEORETICAL BACKGROUNDS

2.1 Motivation theory

The decision to use IT device is determined partly by a rational and emotional calculation of the benefits (Lee et al., 2005). Motivational model has been widely adopted by IS scholars to study user acceptance. For example, Davis et al. (1992) partially adopted motivational model in their TAM theory. Davis et al. (1992, p. 1112) defined extrinsic motivation as the perception that users will want to perform an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as job performance, pay, or promotion. Intrinsic motivation is defined as the perception that users will want to perform an activity for no apparent reinforcement other than the process of performing the activity per se (Davis et al., 1992, p. 1112). Using the similar approach, Venkatesh and Speier (1999) adopted a motivational model to study the influence of pre-training mood on behavior intention to use. In this model, perceived enjoyment, a construct reflecting a feeling of having an enjoyable technology experience, represents the intrinsic motivation.

Several studies have shown that motivation contribute to the explanation of various environmental attitudes and behaviours. Energy usage motivation has identified as extrinsic incentives that is mainly related to a means of dealing with saving money, however, motivation needs to see as a new perspective on encouraging environment behaviour ecologically to be perceived environmentally beneficial. Intrinsic motivation is as a good deal of environmentally responsible behaviour. Individual consumers are encouraged to find their own reasons for recycling materials, reusing to plastic bags, purchasing recycled paper, pro-environmental product consumption, or eco-friendly device use and to continue to perform these behaviours for their sake (De Young, 1985).

Environmental behaviour would significantly impact on energy use, water use, or waste production in household and direct environmental consequences (Poortinga et al., 2004). At a result, people are willing to take action to protect the environment, that is, environmental behaviours. Poortinga et al. (2004) specifically investigate on consumer perspective in the context of household energy consumption. Therefore, we assume that the relationships between motivation and green IT device use have not yet been examined in the context of household energy use under the Smartphone application use.

2.2 Reference Group theory

In marketing literature, a reference group theory is explained as a person or group of people that importantly influence another person's behaviour (Bearden and Etzel, 1982). Reference group influences individual behaviour, lifestyles, self-concept development, and attitude formation by enforcing for conformity to group norms. In sum, group members tend to comply with the group norm, in turn, influence the perceptions, and finally behaviour of members. Accordingly, people can be affected by two types of influence on their decision-making. One is normative, another is informational influence. Normative influence is a desire to comply with the reference group who adopt

value or a thing to make a decision, in contrast, informational influence is a 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, or socially connected group or people. People may enhance values and standards for their behaviour by referring to normative or information examples of a group or another person (Hsu and Lu, 2004). IS researchers have proved that a person's behavioural intentions are influenced by subjective norms as well as attitude (Taylor and Todd, 1995).

On the other hand, seeking information comply with referring to the value of others via communication or observation of decisions (Bearden and Etzel, 1982). Socially reference group can influence consumers if consumers hold favourable attitudes toward the members or activities of that group. This is, they not only make an impact verbally on regarding the decision but also endorse and engage in directly behaviour (e.g., purchasing) products. Advertisers have been used the reference group for persuading product and brands and being consumed in socially delightful circumstance. 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 exposures, which explain how consumers may be affected to use by media exposure. 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.

Research shows that green IT device that consumers expect IT product to be safe, friendly, and protective environment, so that consumer can have an preference for a particular green IT product such as eco-friendly and sustainable IT goods including concept of green brand. Even consumers as increasingly interested in green IT products such as energy saving car, electricity, or solar energy, it is also necessary to not even develop a technology or design a device but also persuade energy consumers to engage more people in choosing a specific green IT product by intervention such like energy efficiency campaigns that perceive more awareness of climate change problem through media (Schuldt et al., 2011). We introduce reference group theory as a way of intervention consumers about green IT device choose and use. Therefore, this study shows that the relationship between motivations and perception can be moderated under the influence of reference group in using green IT device.

2.3 Green IS Device and Use

While studying 'Green IT device', researcher addressed that the intrinsic value of ethic and the importance of eco-sustainability in the decision making process (Molla, 2009). Behaviour intention to use green IT device is explained as an individual's intent to perform an actual usage behaviour for energy saving. The explanation reflects the motivational forces provided by the desire to attain certain outcomes from individuals' action. Watson et al.(2010) indicated that users are likely to reduce their energy consumption in the future under energy saving device usage condition. Individuals are the direct agents who can perform energy efficiency improvement. Individuals who respond positively to the environmental issue by purchasing green technology are predicted to have a stronger intention to perform energy saving activities.

IT industry can reinforce the environmental sustainability of other industries enabling by IT and IS solutions that reduce material consumption, emissions, and energy consumption. Green IS and IT concepts provide the role of resolving environmental sustainability (Molla et al, 2011). Green IT refers to minimizing the negative environmental effect of IT by making the production, use, and disposal of IT (Molla et al., 2011), another part is Green IS which explains the use of information systems to improve environmental sustainability by providing automating, informing, and transforming products, business processes, and business relationships and practices (Molla et al., 2011). On the

other hand, green IT device can be adapted the similar concept of car driving case, that is “receiving more information about the environmental impact of driving habits led people to select their trips more carefully to avoid pollution, generating a change in personal behaviour that may have an enormous overall impact”(p.4) (Mohrenfels and Klapper, 2012).



Figure 1. Green IT device (power manager)

3 RESEARCH MODEL AND HYPOTHESES DEVELOPMENTS

We integrate motivational constructs from self-determination theory and social influence and media influence constructs from reference group theory to develop our research model. In this model, we proposed that the intrinsic and extrinsic motivators will influence perceived usefulness in green IT device. Together, social influence and media influence variables will moderate in perception process. Finally, perceived usefulness in green IT device will affect its sustainable use of green IT device. Our proposed model is presented in Figure 2.

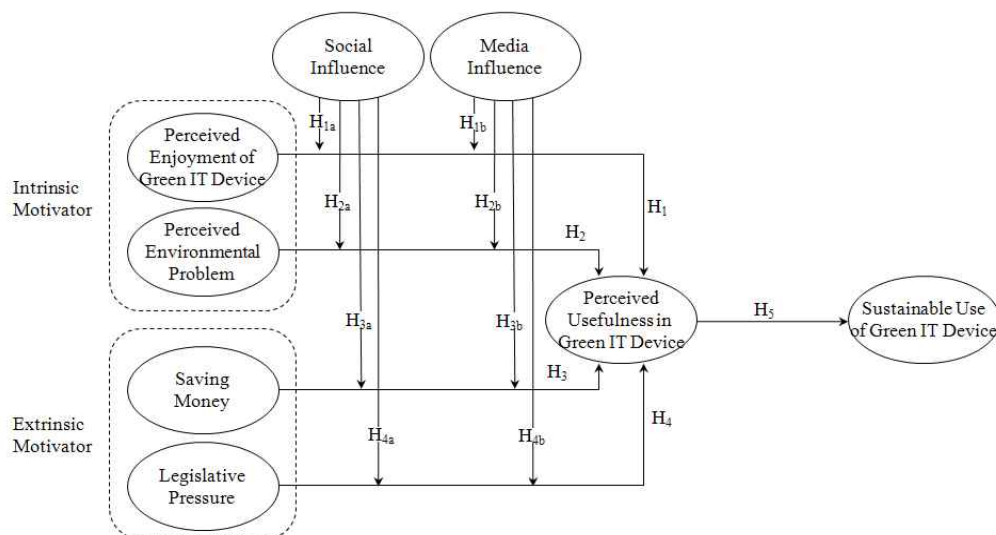


Figure 2. Research Model

3.1 Intrinsic motivation

Pelletier et al. (1998) proposed that self-determined forms of motivation (both intrinsic and extrinsic motivation) were generally significantly related to attitude toward environment. Among individuals who felt the responsibility on the environment, people are likely to make causal contribution to their actions and the nature of their environment by exercising self-influence. Individuals who are intrinsically motivated by perceived enjoyment as well as perceived environmental problem together are performed to satisfy themselves (Ryan and Deci, 2000). For example, some people indicated that they engage in environmentally behavior activities for the pleasure and enjoyment they derive from doing so. 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. Pro-environmental behavior 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). In IS aspect, research has shown a direct relationship between intrinsic motivation and extrinsic motivation. We suggested that intrinsic motivation may enhance time spent on tasks, and in turn, improve quality output and product perception. Thus, we provide our hypotheses as follow:

H₁: The perceived enjoyment influences positively the perceived usefulness in Green IT device.

H₂: The perceived environmental problem influences positively the perceived usefulness Green IT device.

3.2 Extrinsic motivation

Pelletier et al. (1998) posit that highly self-determined motivational subtypes are expected to lead to positive psychological and behavioral consequences. Conversely, low level of self-determination is predicted to have negative psychological and behavioral consequences. From economic model perspective, individuals are argued to be financially motivated to commit to environmental behavior (Nyborg et al., 2006). Kollmus and Agyeman (2002) indicated that people 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. In other words, they choose alternatives with highest benefits against lowest cost. Hence, economic factor drives people adopt new technologies when the benefits from adoption and use exceed the costs (Kraut et al., 1998). On another hand, 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. Consequently, it has been expected that information campaign and legal sanction actually affect individual behavior in any meaning way (Cohen, 2005). Following this argument, we hypothesized that:

H₃: Saving money influences positively the perceived usefulness in Green IT device.

H₄: Legislative pressure influences positively the perceived usefulness in Green IT device.

3.3 Sustainable Use of Green IT device

Stern (2000) proposed that environmental behaviours are classified as an intent-oriented or an impact-oriented perspective. An intent-oriented behaviour is affected by the motivation of the actor, in contrast, an impact-oriented perspective is focusing on its actual impact on the environment. Examples of impact are energy use, water use, or waste production by influential factors. In doing so, Influential factors lead direct environmental consequences, which supports the successful implementation of new

environmental policies, measures, or systems (Poortinga et al., 2004). In most of IS literature, perceived usefulness refers to the prospective user's subjective probability that using a specific application system will increase his or her job performance (Davis et al., 1989). According to TAM, the more useful it is perceived to be, the more positive one's attitude and intention towards using the technology. IS continuance usage model, Limayem et al., (2007) found that co-efficient of perceived usefulness is explained by 63.5 percent compared with 22.8 percent of satisfaction for continuance usage. Therefore, consequently, the sustainable use of Green IT device can be depend on the perceived usefulness in Green IT device. Thus, research following TAM consistently showed a high correlation between perceived usefulness and continued use (Bhattacharjee, 2001b; Limayem et al., 2007). We posit:

H₅: The perceived usefulness in Green IT device has a positive effect on sustainable use of a Green IT device.

3.4 Social influence

This study revealed that people are behaving in an environmentally conscious way for different reasons. Theory of planned behavior has been widely adopted to study environmental behaviors (e.g. Bamberg, 2002; Gardner and Abraham, 2010). Most of these studies found a positive relationship among attitude, subjective norms, behavior intention, and actual green behavior. In this context, the personal norms depend on external support from social environment (Lindenberg and Steg, 2007). Social norm tell individuals whether this behaviour is approved or at least supported by significant others. As social norms are possibly influential factors for consumer behaviour in product usage or end-user in computer, they have been intervene the wide range of behaviours including towel reuse (Goldstein et al., 2008), energy consumption (Loock et al., 2011; Schultz et al., 2007; Siero et al., 1996). Because people have preferences for achieving and maintaining a self-image as socially responsible person, reference group theory well affects a person or a group. Therefore, feedback, communications, or observation that drives feelings of competence during action can enhance intrinsic as well as extrinsic motivations for that action (Ryan and Deci, 2000). In other words, significant others under social relationship may affect the level of motivation of individual. Therefore, we hypothesized that:

H_{1a}- H_{4a}: Social influence moderate between the level of motivation and the perceived usefulness in Green IT device.

3.5 Media influence

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, 1979). Informational influence is an internalization process, which happens when a consumer perceives information as developing his or her knowledge. 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', 'protection', 'green', 'eco' etc. Mohrenfels and Klapper (2012) found that mobile tagging information for green product to consumers heightens the organic brand perception and increases the willingness to pay for. Media influence (i.e., information influence) attributes consumers to acquire issue, relevance, creditability of environment and help them understand as an opportunity for consumers to use more green product ethically and economically. Motivation processing should occur when media influence are highly involved. Relying on the ability of media to influence the audience, we posit that media influence will have a positive effect on the relationship motivations and perceived usefulness.

H_{1b}-H_{4b}: Media influence moderate between the level of motivation and the perceived usefulness in Green IT device.

4 RESEARCH METHODOLOGY

4.1 Data collection

We gained 360 users' contact numbers from a manufacturer which produces a power manager device for saving energy. Subjects were asked to consent to participation in the study supported by the manufacturer 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 and that their response could be only accessed by assigned researchers. 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 increase incentive for collecting data and offered a US\$10 cash reward for each participant who completed the survey because of the hesitant of subjects' participation. The same follow up methods were applied. This effort was initiated to maximize the response rate. We collected more 30 usable responses in the second stage. In sum, we received 104 usable responses of 360 customers (28% response rate). We collected demographic variables including age, gender, occupation, and education level. Of 104 respondents, 98 are male. Among 104 respondents, 49 are around 35-44 years old, 24 are around 25-34, and 18 are around 45-55. Furthermore, more than 50 respondents have a bachelor's degree. In order to assess the possibility of nonresponse bias, a comparison of the early response to those of late response was conducted. A t-test showed no significant difference between those two groups. Thus, nonresponse bias was not considered a problem.

4.2 Analysis and Results

4.2.1 Measures

Measurement items from prior studies were used to measure constructs in this study. All items were measured on a seven-point Likert scale. Measurement items for intrinsic and extrinsic motivation were adapted from MTES (The Motivation towards the Environment Scale). Those items represent possible explanation for one crucial question among individuals, "Why are you doing things for the environment?" (Pelletier et al., 1998). Perceived usefulness measures were adapted from Taylor and Todd (1995). Item measures for media influence was adopted from Venkatraman and Venkatesh (2006) and social influence was adopted from Taylor and Todd (1995). Sustainable use of Green IT device is measured using three questions regarding duration, frequency, and intensity of use with which the respondent currently uses (adapted from Venkatesh et al., 2008).

4.2.2 Measurement model

To validate our measurement model, we examined 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 as a result of the pre-tests we conducted with experts in the field of Green IT device and from the pilot test data gathered in Korea. And, we employed PLS-Graph 3.0 to perform confirmatory factor analysis (CFA) to determine the scope of measured items (see Table 1). Consequently, seven factors were classified.

Constructs	Measured items	Cross loading	t-value	CR	AVE	α
Social influence	People who influence my behavior would think that I should use green IT device	0.969	92.382	0.963	0.928	0.923
	People who are important to me would think that I should use green IT device	0.958	50.447			
Media influence	Media (newspaper, TV, news) exposure about being green influences me to use green IT device	0.919	23.548	0.862	0.758	0.670
	What I heard and seen in the media (newspaper, TV, news) has prompted me to use green IT device	0.820	7.033			
Perceived enjoyment of green IT device	It is my pleasure in mastering new ways to help my environment by using green IT device	0.949	37.891	0.977	0.915	0.969
	It is my pleasure in improving quality of my environment by using green IT device	0.960	35.355			
	I feel good when doing things for environment by using green IT device	0.955	51.174			
	It is my pleasure to contribute to my environment by using green IT device	0.962	53.522			
Perceived environmental problem	I would regret if I am not doing something for environment and further generation	0.759	3.472	0.926	0.808	0.892
	I would feel guilty if I didn't do something for environment and further generation	0.971	6.603			
	I would feel ashamed of myself if I was doing nothing to help the environment	0.951	6.239			
Saving money	By using green IT device, I can get more benefit from the same energy expenditure	0.954	49.219	0.957	0.917	0.910
	By using green IT device, I can save more money by having less electricity bill	0.962	79.930			
Legislative pressure	Government regulation would insist me to use green IT device	0.893	22.346	0.870	0.769	0.695
	Policy on the use of green IT would insist me to reduce my energy consumption	0.861	14.543			
Perceived usefulness in green IT device	This green IT device is of benefit to me	0.843	16.240	0.922	0.797	0.868
	The advantages of this green IT device outweigh the disadvantages	0.894	28.345			
	Overall, using this green IT device is advantageous	0.939	76.043			
Sustainable use of green IT device	Assuming I had access to and afforded green IT devices, I intent to use them	0.936	39.191	0.914	0.841	0.812
	Assuming I had access to and afforded green IT devices, I predict that I would use them in the future	0.899	15.429			

Table 1. Measurement Items and Confirmatory Factor Analysis and Reliability

All factor loadings were above the recommended 0.5 cut-off and were statistically significant (Nunnally & Bernstein, 1994). The internal validity of the measurement model was examined by calculating the composite reliability (CR), average variance extracted (AVE) and Cronbach's α (Fornell and Larcker, 1981). All CR were above the cut-off 0.6 (Nunnally & Bernstein, 1994). The AVE of each measure extracted was equal to or greater than 50% variance, indicating an adequate internal validity. (See Table 1). To assess the discriminant validity, we used Fornell and Larcker's (1981) criteria, where the square root of the AVE associated with a particular construct must be greater than its correlations with other constructs. Table 2 contains the descriptive statistics and intercorrelation matrix. According to the estimates presented in Table 2, each square root of the AVE (diagonal elements) sufficiently greater than the corresponding off-diagonal elements, and, therefore, the measures represented discriminant validity.

Construct	Correlation of constructs								Mean	S.D.
	1	2	3	4	5	6	7	8		
1. Social influence	0.963								5.144	1.208
2. Media influence	0.530**	0.871							4.986	1.239
3. Perceived enjoyment	0.517**	0.295**	0.957						5.748	1.033
4. Environmental problem	0.408**	0.353**	0.463**	0.899					5.522	1.122
5. Saving money	0.197*	0.018	0.206*	0.111	0.958				6.111	0.830
6. Legislative pressure	0.218*	0.215*	0.109	-0.086	0.126	0.877			4.418	1.458
7. Perceived usefulness	0.455**	0.289**	0.412**	0.210*	0.490**	0.388**	0.893		5.615	0.842
8. Sustainable Use	0.462**	0.338**	0.440**	0.247*	0.266**	0.286**	0.564**	0.917	5.923	0.830

*p<0.05, **p<0.01

Note: Diagonal elements in the “correlation of constructs” matrix are the square root of average variance extracted (AVE).

Table 2. Correlation and Descriptive Statistics

4.2.3 Hypotheses Testing

Following the procedures suggested by Cohen and Cohen (1983), hierarchical moderated regression analyses (HMRA) were performed to test the hypothesized relationships. To conduct the HRMA, perceived enjoyment, perceived environmental problem, saving money, and legislative pressure were utilized as independent variables, and social influence and media influence were used as a two moderator variables. The results are shown in Table 3, and Table 4.

To test the moderating effect of the social influence and media influence, the first step in HMRA was to test the effects of main factors on sustainable use of green IT devices. The present study found that three factors (perceived enjoyment: $\beta = 0.265$, $p < 0.001$, saving money: $\beta = 0.387$, $p < 0.001$, and legislative pressure: $\beta = 0.317$, $p < 0.001$) had significant effects on sustainable use of green IT devices, explaining 43.7% of the variance. Therefore, H₁ (perceived enjoyment), H₃ (saving money) and H₄ (legislative pressure) were supported but, H₂ (perceived environmental problem: $\beta = 0.072$, n.s) was not supported. The second step of HMRA analysis was to test the full model by adding interaction terms to the main model. In order to represent these interaction terms, the variables were first mean-centered to reduce multicollinearity and then multiplied together (Aiken and West, 1991).

Items	Model 1	Model 2	Model 3	Model4
Independent variables				
Perceived enjoyment	0.265***	0.184*	0.158	
Environmental problem	0.072	0.018	0.022	
Saving money	0.387***	0.372***	0.392***	
Legislative pressure	0.317***	0.275***	0.255**	
Moderating variables				
Social influence		0.219*	0.246**	
Interactions				
Perceived enjoyment × Social influence			0.082	
Environmental problem × Social influence			-0.008	
Saving money × Social influence			0.198**	
Legislative pressure × Social influence			-0.110	
Perceived usefulness → Sustainable use of green IT device				0.564***
R ²	0.437	0.468	0.513	0.318
Adjusted R ²	0.414	0.441	0.467	0.311
F-value	19.176***	17.242***	11.009	47.588***
ΔR ²	-	0.031	0.045	-

*p<0.05, **p<0.01, ***p<0.001

Table 3. Moderated regression analysis of the effect of social influence

Table 3 revealed that the social influence quasi moderates the effect of saving money on sustainable use of green IT device (social influence: $\beta = 0.246$, saving money \times social influence: $\beta = 0.198$). These result support H_{3a} (the moderating effect of social influence on the relationship between saving money and perceived usefulness in green IT device), but not H_{1a} (the moderating effect of social influence on the relationship between perceived enjoyment and perceived usefulness in green IT device), H_{2a} (the moderating effect of social influence on the relationship between perceived environmental problem and perceived usefulness in green IT device) and H_{4a} (the moderating effect of social influence on the relationship between legislative pressure and perceived usefulness in green IT device).

Items	Model 1	Model 2	Model 3	Model4
Independent variables				
Perceived enjoyment	0.265***	0.246**	0.230*	
Environmental problem	0.072	0.028	0.004	
Saving money	0.387***	0.398***	0.426***	
Legislative pressure	0.317***	0.284**	0.283***	
Moderating variables				
Media influence		0.139	0.070	
Interactions				
Perceived enjoyment \times Media influence			-0.006	
Environmental problem \times Media influence			-0.015	
Saving money \times Media influence			0.225**	
Legislative pressure \times Media influence			-0.032	
Perceived usefulness \rightarrow Sustainable use of green IT device				0.564***
R ²	0.437	0.452	0.494	0.318
Adjusted R ²	0.414	0.424	0.446	0.311
F-value	19.176***	16.157***	10.231***	47.588***
ΔR^2	-	0.361	0.042	-

*p<0.05, **p<0.01, *** p<0.001

Table 4. Moderated regression analysis of the effect of media influence

Also, Table 4 revealed that the media influence pure moderates the effect of saving money on sustainable use of green IT device (saving money \times media influence: $\beta = 0.225$). These result support H_{3b} (the moderating effect of media influence on the relationship between saving money and perceived usefulness in green IT device), but not H_{1a} (the moderating effect of media influence on the relationship between perceived enjoyment and perceived usefulness in green IT device), H_{2b} (the moderating effect of media influence on the relationship between perceived environmental problem and perceived usefulness in green IT device) and H_{4b} (the moderating effect of media influence on the relationship between legislative pressure and perceived usefulness in green IT device).

Finally, the path between perceived usefulness in green IT device and sustainable use of green IT device was positive and significant ($\beta = 0.564$, p<0.001). Therefore, H₅ was supported.

5 DISCUSSION AND CONCLUSION

Several key findings emerged from the current work. There were significant supports for our research model. Firstly, we found that intrinsic and extrinsic motivations are crucial in influencing perceived usefulness in green IT device. However, perceived environmental problem has no direct effect on perceived usefulness. It is likely that both two types of motivation are the main predictor of perceived usefulness in green IT device. Thus, intrinsic and extrinsic motivation contributes in usefulness about green IT technology behavior. We found that perceived enjoyment, saving money, and legislative pressure positively and significantly influenced perceived usefulness and, the perceived usefulness make an impact on sustainable use of green IT device. This finding suggests that internal motivation is the reason for a behavior or a strong internal stimulus around which behavior is organized (Kollmus

and Agyeman, 2002). That is, while actualization of self-expectation may result in pride, enhanced self-esteem, security, or other favorable self-evaluations, violation or its anticipation produce guilt, lost of self-esteem, or other negative self-evaluation (Stern et al., 1999). Perceived pleasureability, however, is attached to self-satisfaction, a sense of purpose, a feeling of meaningfulness and impact (Deci and Ryan, 1985). 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). People are very sensitive to information about incentive. Thus, external rewards (e.g. saving money, policy acceptance) may enhance rather than lower intrinsic motivation (Ryan and Deci, 1977).

Second, we found that motivation (i.e. feelings of personal obligation that are linked to one's self-expectation) (Stern et al., 1999) was significantly influenced by social influence and media influence. People are likely to act in normative act if they feel other people how consider me by observing their social environment. Media influence through TV, newspaper, radio information will form positively green product concept. In other words, social influence and media influence will affect behavior when people know which behavior is appropriate in a given situation. In our study, social influence and media influence only moderate positively between saving money and perceived usefulness. Perceived green IT behavior contains a moral, money, legislative pressure, and social belief, however for consumers, using green IT device are much more important quantitatively and calculatedly toward money saving compare with other environmental behaviours and severely affected by the point of reference group theory.

Lastly, we found perceived usefulness of green IT device have positive effects on sustainable use of green IT device. Although we believe that the current research makes significant contributions to the field, it, of course, has limitations that should be noted. First, given a small size of our sample, findings derived from this study should not be generalized to other population. This research has several contributions. First, this research enriches our understanding of the multiple factors influencing green IT behaviors. This is the first study under technology adoption employing behavioral model such as theory of planned behaviors or technology acceptance model combined with a reference group theory. 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 intrinsic and extrinsic motivation under social norm and media influence 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.

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