Dare to Be Green: The Role of Environmental Passion and Green IT Identity on Green IT Practices

Completed Research Full Papers

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Abstract

Individuals play a role in environmental sustainability including green IT practices. We use the Theory of Planned Behavior and create a model to examine the influence of environmental passion and green IT identity on behavioral intention to practice green IT. We test the model with a respondent group from the IT industry. The findings indicate environmental passion is an important indicator of favorable green IT attitude and is directly related to green IT identity. However, green IT identity has a direct influence on green IT intentions suggesting a contribution to behavior that is independent of attitude. We discuss the implications of green IT identity for research and practice.

Keywords

Environmental Passion, Green IT Identity, Theory of Planned Behavior and Partial Least Squares.

Introduction

Globally, about 20 to 50 million metric tons of e-waste are disposed of every year. In 2016, the weight of e-waste was equivalent to nearly nine Great Pyramids of Giza or 4500 Eiffel Towers (United Nations University 2017). E-waste consists of the products and by-products of the information technologies used in our lives and daily activities. The resource requirements of information technologies over their lifespan consist of the raw materials for manufacturing, the power for operation, and the resources for their disposal or recycling. As the technological innovations that bring efficiencies to business, education, and society continue to increase, so does e-waste.

Green IT and green computing are synonymous terms referring to the practice of environmentally sustainable computing. Green IT is a broad term defined as the “Activities to minimize the negative impacts and maximize the positive impacts of human behavior on the environment through the design, production, application, operation, and disposal of IT and IT-enabled products and services throughout their lifecycle” (p.208) (Elliot 2011). Sustainability, as defined by the World Commission on Environment and Development, is a strategic approach to meeting current needs without compromising the ability of future generations to meet their needs. Green IT is concerned with minimizing damage to the environment by the strategic manufacture, management, use and disposal of information technology. Green IT includes the efficient use of IT to protect the environment and save energy in a global environment increasingly dependent on IT. Hence, at the core of green IT is sustainability. One IS study emphasizes reducing energy use associated with information systems (Loock et al. 2013) focusing on one goal of green IT, to increase energy efficiency while managing the increasing performance requirements of technology. Our study takes a different tact. We explore individuals’ attitudes and beliefs to understand how individuals may be motivated toward green IT practices.

Specifically, we examine environmental passion and green IT identity to investigate the role of one’s self-concept in green IT behavior. Passion is an important factor in models describing why individuals do what they do (Vallerand et al. 2003). IT identity, in general, refers to the entwinement of individuals and their relationships with technology interactions (Carter 2015). We operationalize green IT identity to investigate how it is formed and how it facilitates green IT attitudes and pro-green IT behaviors. Using the
framework of the Theory of Planned Behavior (TPB) (Ajzen 1991), we create and test a research model using the responses of individuals in the IT industry. Our research questions include the following: What factors shape green IT attitude? What is the role of green IT identity in pro-green behavior? What are the determinants of intentions to practice green IT?

**Background**

Self-identity is a salient component of self-perception, and to self-identify is to apply a socially meaningful category to describe oneself (Rise et al. 2010). When one self-identifies, one has incorporated the meanings and expectations of the category into the self (Stets and Burke 2000). For example, if one holds a green IT identity, the individual perceives that is who they are because that is what they do. The individual has integrated the meaning of green practices and activities into his self-concept. Psychologists suggest the behaviors associated with self-identity are a process of self-verification, and individuals are motivated to maintain their identity and act consistently (Stets and Burke 2000). Consequently, behaviors may become habitual due to the need to reinforce and confirm one's sense of self by and through performing the behavior.

Theoretically, researchers have challenged the idea that self-identity influences behavior in addition to traditional TPB variables. However, in research using TPB frameworks, self-referent identity labeling was found as a significant driver of behavior (Biddle et al. 1987) and self-identity as a green consumer was significantly related to intentions to consume organic produce (Sparks and Shepherd 1992). In sum, self-identity is found to significantly influence intentions above the effect of attitude. Identity theorists (e.g. (Biddle et al. 1987) suggest the motivational roots of attitudes and norms differ from that of self-identity. Thus, precedent exists for including green IT identity as an antecedent of behavioral intentions in TPB models.

**Theory and Hypotheses**

The Theory of Planned Behavior (TPB) is well-known theory supporting much IS research. In 1985, Ajzen presented TPB, and in 1991 revisited the theory and focused on understanding the relationship between individual behavior and behavioral intentions. TPB purports intentions are driven by an individual's attitude toward the behavior, the subjective norms surrounding the performance of the behavior, and one's perceived control over performing the behavior. TPB emphasizes that the intention or willingness to act is the strongest proximal determinant of actual behavior (Ajzen 1985) and (Ajzen 1991).

Environmental studies researchers use the TPB to understand how individual attitudes and beliefs influence behavior beneficial to the environment. For example, researchers examined individuals' beliefs and behavior to determine how to motivate green computing activities (Chow and Chen 2009). Other researchers focus on the influence of organizational leadership in shaping employees’ harmonious passions toward pro-environmental behavior (Robertson and Barling 2013). Our research model is shown in Figure 1. We incorporate environmental passion in the TPB framework to examine its influence on individual attitude and the formation of green IT identity. The traditional factors of TPB (subjective norm, behavioral control) are included as antecedents of behavioral intentions toward green IT.

Environmental passion is defined as a positive emotion that inspires an individual to engage in pro-environmental behaviors (Robertson and Barling 2013). Social psychologists describe passion, in general, as something especially meaningful to the individual and as an inclination propelling one toward happiness and optimal functioning (Vallerand 2008). Because one's passion is personally meaningful, a passion for the environment would be related to one's positive attitude toward activities relevant to the environment. Thus, we expect an individual's environmental passion has a positive effect on the formation of attitude toward green IT practices, leading to the following:

**Hypothesis 1:** Environmental Passion is positively related to Attitude.

When a passion becomes internalized, it begins to define the individual (Vallerand et al. 2003). For example, one with a passion for tennis may define him/herself as a tennis player. A passion represents a strong inclination that may drive the individual to spend greater time, attention and energy on a passion-related activity whereby the passion becomes self-defining (Vallerand et al. 2003). When an activity is internalized, the individual identifies with the activity to a greater extent (Mageau et al. 2009). As the
passion becomes internalized by participation in green IT practices, the individual is likely to form a self-concept or self-identity related to green IT (c.f. (Sparks and Shepherd 1992)), leading to the following hypothesis.

Hypothesis 2: Environmental Passion is positively related to Green IT Identity.

Identity refers to how individuals subjectively perceive themselves (Arbore et al. 2014). It consists of multiple aspects including values, commitments, personal traits, and goals (Bagozzi, 2012). Self-identity is regarded as distinct from attitude, although expressing itself through attitude in relationship to performing a behavior (Sparks and Shepherd 1992). Thus, it follows that a green IT identity would be positively related toward affirmative attitudes regarding green IT.

Hypothesis 3: Green IT Identity is positively related to Attitude.

Individuals’ attitudes about a behavior are likely to reveal their psychological assessment of the behavior (Ajzen 1991). Therefore, attitudes generally influence individuals’ decisions regarding performing or not performing a behavior. For example, attitude was influential in the decision to perform green computing (Chow and Chen 2009). It follows that a positive attitude toward a behavior will facilitate, rather than hinder, the performance of the behavior. Thus, we expect when individuals have a favorable attitude toward green IT, they would be more likely to practice green IT, leading to the following:

Hypothesis 4: Attitude is positively related to Intention to practice green IT.

In the sociological and psychological literature, a person’s identity has a significant influence on behavior (Epstein 1973), (Markus 1980), (Rosenberg 1981) and (Turner 1982). Furthermore, repeated behaviors may affect one’s self-concept thereby becoming a vital part of one’s identity (Charng et al. 1988). Identity is a direct determinant of the readiness to engage in pro-green practices (Sparks and Shepherd 1992). Thus, the more one identifies with green IT practices the more that identity facilitates intentions to perform green IT behavior.

Hypothesis 5: Green IT identity is positively related to Intention to practice green IT.

Figure 1. Research Model

In the sociological and psychological literature, a person's identity has a significant influence on behavior (Epstein 1973), (Markus 1980), (Rosenberg 1981) and (Turner 1982). Furthermore, repeated behaviors may affect one's self-concept thereby becoming a vital part of one's identity (Charng et al. 1988). Identity is a direct determinant of the readiness to engage in pro-green practices (Sparks and Shepherd 1992). Thus, the more one identifies with green IT practices the more that identity facilitates intentions to perform green IT behavior.

Hypothesis 5: Green IT identity is positively related to Intention to practice green IT.
The TPB emphasizes that behavioral intention is influenced by behavioral, normative, and control beliefs (Ajzen 1991). Subjective norm refers to social pressure that may affect the individual’s intention to perform a behavior. It represents what one thinks about the opinions of others regarding the performance of the behavior (Ajzen 1991). Therefore, subjective norm is an important motivator of individual intentions, such as the practice of green IT.

**Hypothesis 6: Subjective Norm is positively related to Intention to practice green IT.**

Perceived behavioral control originated from self-efficacy theory as an individual’s perceived ease or difficulty in performing a behavior (Bandura 1982). It is conceptually related to self-efficacy and refers to one’s beliefs about factors that help or hinder a behavior. Prior research shows its effectiveness as a driver of the intention to practice a behavior (e.g. (Ajzen 1991); (Armitage and Conner 2001). Thus, when individuals believe they are in control or have the ability to practice green IT, they will intend to do so, leading to the following:

**Hypothesis 7: Perceived Behavioral Control is positively related to Intention to practice green IT.**

Pro-environmental behavior is defined as “behavior that consciously seeks to minimize the negative impact of one’s actions on the natural and built world” (Kollmuss and Agyeman 2002). Similarly, pro-green IT behavior describes the actual practices taken to minimize the environmental impact of technology. Intention reflects the individual’s readiness to perform a specific behavior and is a direct determinant of the behavior (Ajzen 2002). In prior research, pro-green IT practices are significantly influenced by intention to practice green IT (Chow and Chen 2009). Thus, we hypothesize the following:

**Hypothesis 8: Intention is positively related to Pro-Green IT behavior.**

**Methodology and Measures**

We employed a company specializing in respondent panels for data collection purposes. Panel data is a viable source for sample data in IS research (Steelman 2014) and a reasonable method to obtain respondents from the IT industry. The survey participants were directed to read short descriptions and definitions of green IT and were provided with general examples of green IT practices prior to responding to the survey questions. All items were measured on a 1-7 Likert scale and are shown in Appendix A.

A total of 157 participants successfully completed the survey. The respondents consisted of 66% male and 34% female. Ages ranged from 22% under age 25, 54% between 26 and 35 years, and the remainder (24%) over 35 years. The respondents represent a global sample, although a majority (58%) are from North America.

The items for environmental passion construct originated from the scale of (Robertson and Barling 2013). We adopted the attitude scale and pro-green behavior scales of (Chow and Chen 2009) to measure green IT attitude and pro-green behaviors. The items for green IT identity originated with (Arbore et al. 2014b). Subjective norm, perceived behavioral control, and intention items were modified from (Taylor and Todd 1995).

We used partial least squares structural equation modeling (PLS-SEM) and SmartPLS 3 software (Hair et al. 2011) to test the research model. PLS-SEM is well-suited for studying the relationships among numerous endogenous variables and for our objective of maximizing explained variance. To achieve at least 80% statistical power with a minimum R of 0.10 in dependent variable (pro-green IT behavior) at a 5% significance level, the recommended sample size is 144 (Cohen 1992). Our sample (N=157) is sufficient to meet these criteria.

**Measurement Model Analysis**

The measurement model was evaluated using a 5000 bootstrap resampling of the data as recommended to stabilize parameters (Hair et al. 2011). Cronbach’s alpha measures ranged from 0.757 to 0.914, above the 0.70 threshold (Hulland 1999) and composite reliabilities (CR) ranged from 0.860 to 0.940, all above the recommended 0.70 for internal consistency (Bagozzi et al. 1991) and (Hair et al. 2011). The Average Variance Extracted (AVE) was between 0.671 and 0.865, above 0.50, indicating sufficient convergent validity(Bagozzi et al. 1991) (Bagozzi and Yi 1988). Table 1 details the measurement model results. Table 2
shows the construct correlations with the square root of the AVE in bold on the diagonal (i.e., Fornell-
Larker criterion), showing each construct shares more variance with its items than with other constructs,
supporting discriminant validity. The items’ loadings and cross loadings in Table 3 also indicate
discriminant validity as each item loads higher on its assigned construct than other constructs. The HTMT
ratio of between-trait correlations to within-trait correlations are all below the 0.9 threshold (Hair et al.
2011) except the constructs attitude and intentions which have an HTMT of 0.96. While values closer to 1
may indicate lack of discriminant validity, the traditional evaluations (Fornell-Larcker and Loadings)
indicate acceptable discriminant validity between the constructs.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Cronbach’s Alpha</th>
<th>CR</th>
<th>AVE</th>
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</thead>
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<tr>
<td>Passion</td>
<td>0.914</td>
<td>0.940</td>
<td>0.796</td>
</tr>
<tr>
<td>Attitude</td>
<td>0.797</td>
<td>0.881</td>
<td>0.711</td>
</tr>
<tr>
<td>GreenID</td>
<td>0.898</td>
<td>0.925</td>
<td>0.712</td>
</tr>
<tr>
<td>SNorm</td>
<td>0.831</td>
<td>0.896</td>
<td>0.741</td>
</tr>
<tr>
<td>PBC</td>
<td>0.757</td>
<td>0.860</td>
<td>0.671</td>
</tr>
<tr>
<td>Intentions</td>
<td>0.852</td>
<td>0.910</td>
<td>0.772</td>
</tr>
<tr>
<td>Behavior</td>
<td>0.832</td>
<td>0.923</td>
<td>0.865</td>
</tr>
</tbody>
</table>

Table 1. Reliability and Consistency

<table>
<thead>
<tr>
<th>Passion</th>
<th>Passion</th>
<th>Attitude</th>
<th>GreenID</th>
<th>SNorm</th>
<th>PBC</th>
<th>Intent</th>
<th>Behavior</th>
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</thead>
<tbody>
<tr>
<td>Passion</td>
<td>0.892</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Attitude</td>
<td>0.693</td>
<td>0.843</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>GreenID</td>
<td>0.682</td>
<td>0.688</td>
<td>0.844</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>SNorm</td>
<td>0.556</td>
<td>0.364</td>
<td>0.429</td>
<td>0.861</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PBC</td>
<td>0.711</td>
<td>0.795</td>
<td>0.633</td>
<td>0.483</td>
<td>0.819</td>
<td></td>
<td></td>
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<tr>
<td>Intentions</td>
<td>0.677</td>
<td>0.797</td>
<td>0.751</td>
<td>0.382</td>
<td>0.729</td>
<td>0.879</td>
<td></td>
</tr>
<tr>
<td>Behavior</td>
<td>0.555</td>
<td>0.529</td>
<td>0.522</td>
<td>0.328</td>
<td>0.503</td>
<td>0.589</td>
<td>0.925</td>
</tr>
</tbody>
</table>

Table 2. Correlations and Fornell-Larker Criterion
Table 3. Loadings and Cross-loadings

**Structural Model**

The path coefficients for the model are presented in Table 4. Hypothesis 1 and 2 are supported indicating environmental passion has a significant influence on both attitude (0.419, p<0.001) and green IT identity (0.682, p<.001). Green IT identity is also significantly related to attitude (0.402, p<.001) supporting H3. Support for H4 and H5 is indicated in that attitude and green IT identity significantly influence intention (0.411, p<.001; .357, p<.01; respectively). Unexpectedly, the relationship between subjective norm and intention is not supported (H6, -0.008, p > .05). Both H7 and H8 are significant, self-efficacy is related to intention (0.181, p<.05) and intention influences pro-green IT behavior (0.589, p<.001).

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Path coefficient</th>
<th>t-Value</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Environmental Passion → Attitude</td>
<td>0.419</td>
<td>3.268</td>
<td>Supported</td>
</tr>
<tr>
<td>H2: Environmental Passion → Green IT Identity</td>
<td>0.682</td>
<td>10.214</td>
<td>Supported</td>
</tr>
<tr>
<td>H3: Green IT Identity → Attitude</td>
<td>0.402</td>
<td>3.416</td>
<td>Supported</td>
</tr>
<tr>
<td>H4: Attitude → Intention</td>
<td>0.411</td>
<td>3.894</td>
<td>Supported</td>
</tr>
<tr>
<td>H5: Green IT Identity → Intention</td>
<td>0.357</td>
<td>3.011</td>
<td>Supported</td>
</tr>
<tr>
<td>H6: Social Norm → Intention</td>
<td>-0.008</td>
<td>0.158</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H7: Perceived Behavioral Control → Intention</td>
<td>0.181</td>
<td>2.022</td>
<td>Supported</td>
</tr>
<tr>
<td>H8: Intention → Pro-Green IT Behavior</td>
<td>0.589</td>
<td>7.039</td>
<td>Supported</td>
</tr>
</tbody>
</table>

Table 4. Results of Hypotheses Tests

We included variables in the model to control for age, gender, income, ethnicity and region. None of the controls were significantly related to the dependent variable. Overall, a large portion of the variance in attitude is explained by environmental passion and green IT identity (R2=56.7%) and environmental passion contributes substantively to green IT identity (R2=46.5%). The model explains a large portion of the variation in intentions to practice green IT (R2=72.4%) and pro-green behavior (R2=34.7%).
Discussion

One purpose of our study is to explore how individuals may be motivated toward pro-green IT behaviors. We are concerned with identifying antecedents of a green IT attitude and intentions to practice green IT. In doing so, we integrate and examine the roles of environmental passion and green IT identity. Our respondents represent a global sample of individuals in the IT industry. This group is more likely to hold a vested interest in IT and better able to perceive the current rate of technology change and innovation. Hence, their awareness of e-waste is likely more salient than the general population of technology users and their perceptions may better inform how to encourage green IT practices.

Using the TPB framework, we incorporated environmental passion as an antecedent of both attitude and green IT identity because attitude and identity do not arise independent of other factors. Several important take-aways result from our study. First, environmental passion is a significant factor in the formation of green IT identity. Importantly, environmental passion is a general term. It represents a wide range and scope of concerns and issues about the environment. Thus, it is instructive the respondents link environmental passion to green IT identity. This suggests a passion for the environment is important and perhaps necessary to facilitate the development of green IT identity. Future research is needed to understand if this relationship is valid in the general population of technology users for which e-waste may not be particularly salient. Nevertheless, for those in the IT industry, a high level of environmental concern is a determinant of green IT identity. Furthermore, environmental passion positively influences attitudes toward green IT practices. When individuals hold a deeper concern for the environment, they may be more knowledgeable about e-waste and its environmental impact. Practically, organizational emphasis on the environment and the impact of e-waste may be instrumental in encouraging positive employee mindsets (attitude) about green IT activities.

Secondly, green IT identity is not trivial. Environmental passion does not directly influence behavioral intentions (0.072, p < .05) regarding green IT practices. However, passion does indirectly influence intention via attitude (0.172) and green IT identity (0.243). This suggests environmental passion alone may not be sufficient to stimulate green IT intentions. Passion appears to operate through the relationship

![Figure 2. Research Model Results](image-url)
with attitude and identity. Even though one may have a passion for the environment, that passion may not result in pro-green behavioral intentions without a favorable attitude toward green IT practices or the formation of a green IT identity. The importance of green IT identity should not be underestimated because green IT identity has a direct effect on both attitude and intentions. A green IT identity represents a particular self-concept. Taking on a new identity closes the gap between the actual self and the possible self (Granberg 2006) - what one may strive to be. This suggests a green IT identity is motivational in that it impels the individual to perform practices that confirm the identity, as our model demonstrates. It is logical that as green IT is integrated into personal values, commitments and goals, this identity would be expressed in positive attitudes and tendencies toward green IT practices. The total effect of green IT identity on behavioral intention (0.522) surpasses that of attitude on intentions (0.411). This suggests the relative importance of identity to the behavioral outcomes in our study.

Because identity verification and consistency are a need, there is bidirectional causality between identity and behavior (Stets and Burke 2000). That is, one's identity is reinforced as one performs a behavior. Psychologists suggest habitual or repeated behaviors affect one's self-concept; repeated behaviors convey meaning and become important to the individual (Chang et al. 1988). This is not necessarily the case between attitude and behavior. The performance of a behavior may not reinforce positive attitudes about the behavior. For example, an individual may turn off his computer each night to conserve energy while maintaining a negative attitude about having to do it. Additionally, a green IT identity is likely to remain relatively stable whereas attitude may vacillate between positivity and negativity, although that is a question for future research. We suggest a positive green IT attitude, absent green IT identity, may not lead to sustainable intentions. However, routinized, repetitive green IT practices may contribute to the formation of a green IT identity.

Theoretically, our findings imply green IT identity plays a substantive role in behavioral intentions beyond that of attitude and perceived behavioral control in a TPB framework. The notion that identity drives behavioral outcomes offers another avenue for future green studies. Our findings support prior research (e.g. (Sparks and Shepherd 1992); (Biddle et al. 1987)) suggesting self-identity is a factor contributing to behavioral intentions independently of attitude.

**Limitations and Conclusion**

Common method bias is a potential threat to the validity of our results. We implemented the marker variable approach and Harman’s single-factor test (Podsakoff et al. 2003) to evaluate common method bias. An exploratory factor analysis (EFA) resulted in multiple factors with no one factor accounting for a majority of the covariance, suggesting common method bias is limited.

Because the HTMT indicates a potential problem with discriminant validity among the attitude and intentions items, we recommend future studies to pre-test items for these constructs to conclusively establish the uniqueness of each construct. Additionally, our respondents represent a global sample associated with the IT industry. It is unknown how the model’s relationships might change with other populations of technology users. Future studies might also detail specific green IT practices, in contrast to general practices, to determine changes in the model’s relationships.

Our study contributes to the green IT literature in multiple ways. We operationalize our model at the individual level to explore how individuals are motivated to perform pro-green behaviors. We use a well-known theory in the IS literature to model the influence of environmental passion and identity in addition to traditional TPB variables. We find environmental passion is important yet may not be sufficient to motivate intentions to perform sustainability behavior. Importantly, one’s identity has a significant effect on both attitudes and intentions to practice green IT. We suggest green IT identity should be further explored as a critical determinant of sustainability practices in society and organizations.

**REFERENCES**


### Appendix A.

**A. Environmental Passion**
1. I am passionate about the environment.
2. I enjoy practicing environmentally friendly behaviors.
3. I passionately encourage others to be more environmentally responsible.
4. I have voluntarily donated time or money to help the environment in some way.
5. I feel strongly about my environmental values.

**B. Subject Norm**
1. My friends would think that I should practice Green Information Technology.
2. Generally speaking, I want to do what my friends think I should do.
3. Generally speaking, I want to do what my boss or professors think I should do.

**C. Perceived Behavioral Control**
1. I feel comfortable practice Green Information Technology on my own.
2. It is important to me to feel comfortable practicing Green Information Technology.
3. I could easily operate any technology equipment in a more efficient and environmentally responsible way on my own.

**D. Attitude**
1. Practicing Green Information Technology is a wise idea.
2. I like the idea of practicing Green Information Technology.
3. Practicing Green Information Technology is a would be pleasant.

**E. Intention**
1. I intend to practice Green Information Technology.
2. I intend to practice Green Information Technology and not print projects, papers or assignments unless necessary.
3. I intend to practice Green Information Technology frequently.

**F. Green IT Identity**
1. Practicing Green Information Technology reflect my identity.
2. Practicing Green Information Technology reflect who I am.
3. Practicing Green Information Technology express the personality that I want to communicate to others.
4. Practicing Green Information Technology reflect the way that I want to present myself to others.
5. Practicing Green Information Technology suits me well.

**G. Pro Green Information Technology Behavior**
1. I often practice Green Information Technology.
2. I often have practiced Green Information Technology.