GREEN INFORMATION TECHNOLOGIES ADOPTION: A MANAGERIAL PERSPECTIVE

Chun Fong Lei, Department of Management and Marketing, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong, P.R. China, 10900544r@connect.polyu.hk

E. W. T. Ngai, Department of Management and Marketing, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong, P. R. China, eric.ngai@polyu.edu.hk

Abstract

Green information technologies (IT) adoption is a plausible attempt for organizations to tackle the current environmental problem. Moreover, it can also be regarded as a means to improve organizational image and economic performance. Efforts have been devoted to investigate the factors leading to organizational Green IT adoption. However, despite of the important role organizational decision makers in organizational Green IT adoption, the research studies in the Green IT literature have seldom investigated the formation of decision makers’ intentions to Green IT adoption. Therefore, in this research study, a research model is developed to investigate how organizational factors affect the formation of an organizational decision maker’s intention to Green IT adoption through the mediation of managerial perceptions. The research model predicts that the discretionary slack and strategic orientations of an organization, including organizational futurity, innovation and environmental orientation, would affect the organizational decision maker’s perceptions on environmental preservation and Green IT. These include managerial interpretation on environmental preservation and relative advantage of Green IT, which in turn will affect the formation of the organization decision maker’s intention to Green IT adoption. The hypotheses developed in this research study will be tested in the future.

Keywords: Green IT, Adoption, Managerial Perception, Managerial Interpretation, Strategic Orientation.
1 INTRODUCTION

The relationship between information technology (IT) and environmental sustainability has gained the attention of IS researchers. IS researchers started to investigate issues relating to the “systemic application of ecological-sustainability criteria (such as pollution prevention, product stewardship, use of clean technologies) to the creation, sourcing, use and disposal of the IT technical infrastructure as well as within the IT human and managerial practice (Molla, Cooper & Pittayachawan, 2011, p.73)”, which is also known as Green IT. Among those research studies, most are focused on the design and benefits (Califf, Lin & Sarker, 2012), and only a small proportion have investigated organizational Green IT adoption. Since the benefits of Green IT cannot be realized unless it has already been adopted, it is necessary to pay more attention to the organizational adoption of Green IT. In the Green IT adoption literature, the formation of decision makers’ direct perception on Green IT and their intention to Green IT adoption have been ignored. Since “[o]rganizations do not make decisions – individual do” (Liedtka, 1991, p. 543), the literature is far from providing a full picture in understanding organizational Green IT adoption. This research study seeks to fill this gap by investigating how organizational resources and strategic orientations will sharpen the decision makers’ perceptions on Green IT, which in turn will affect the formation of their intentions to Green IT adoption. The research study seeks to answer to following research questions:

- Will a decision maker’s managerial perceptions (i.e., the managerial interpretation on environmental preservation and relative advantages of Green IT) play the role in shaping the intention to Green IT adoption?
- Will discretionary slack and strategic orientations sharpen those managerial perceptions?

2 MODEL DEVELOPMENT

Green IT adoption is both an environmental strategy and an organizational innovation. Environmental strategy is a patterned series of actions that are "intended to manage the interface between business and the natural environment" (Sharma, 2000, p. 682). Organizational innovation refers to the situation that an organization has adopted an idea or practice that is new to the organization (Mohr, 1969). The adoption of Green IT is considered as an organizational innovation because Green IT is a new practice that has not been adopted yet. Green IT can also be regarded as an environmental strategy, since it is an attempt to enhance the environmental performance of IT without compromising its economic performance (Jenkin, Webster & McShan, 2011).

2.1 Managerial Perceptions and Intention to Green IT Adoption

2.1.1 Managerial Interpretation and Intention to Green IT Adoption

As strategic issues such as environmental preservation are usually ambiguous (Sitkin & Weingart, 1995), how they would be handled usually depends on the decision makers’ interpretations, i.e., managerial interpretation. A strategic issue can be either interpreted as an opportunity or a threat (Sharma, Pablo & Vredenburg, 1999). This interpretation depends on the following attributes of the focal issue: negative-positive, loss-gain, and uncontrollable-controllable (Jackson & Dutton, 1988). The negative-positive continuum reflects a decision maker’s affective response to the issue (Dutton & Jackson, 1987). The loss-gain continuum reflects a decision maker’s evaluation on the potential to gain or lose because of the focal issue. The uncontrollable-controllable continuum reflects a decision maker’s self-efficacy in controlling the possible outcomes (Jackson & Dutton, 1988). These three attributes are correlated, although not perfectly so (Dutton & Jackson, 1987). If the managerial interpretation is an opportunity, it implies that the focal issue is perceived as positive, gainable and
controllable; conversely, if the managerial interpretation is a threat, it implies that the focal issue is perceived as negative, loss-making and uncontrollable (Martocchio, 1992). Since decision makers seek to minimize risk and loss, as well as maximize gains, when environmental preservation as the focal issue is interpreted as an opportunity to maximize the gain, the decision maker will be likely to take action to seize this opportunity. In turn, the decision maker will be likely to form the intention to Green IT adoption; conversely, when it is interpreted as a threat, to minimize risk and loss, the decision maker will be likely to avoid the threat. In turns, the decision maker will be unlikely to form the intention to Green IT adoption.

H1: The greater the extent to which environmental preservation is interpreted as an opportunity, the greater the likelihood of intention to Green IT adoption.

2.1.2 Relative Advantage and Intention to Green IT Adoption

Relative advantage refers to the perception on the degree to which the focal innovation will bring more benefits than other substitutes do (Lin & Ho, 2011). Since the intention to adopt a technology is usually driven by the perception on the benefits of adoption (e.g., Lee & Shim, 2007; Mehrten, Cragg & Mills, 2001), the intention to Green IT adoption should also be driven by the perception on the benefits of Green IT, i.e., the relative advantage of Green IT. The relative advantage of Green IT brought to the discussion usually includes the improvement of economic and environmental benefits (Melville, 2010) as well as reputation (Butler & Daly, 2009). Given the profit seeking nature of businesses and the increase in awareness of environmental issues, the following hypothesis is proposed:

H2: Higher level of relative advantage of Green IT leads to a stronger intention to Green IT adoption.

2.1.3 Relative Advantage and Managerial Interpretation

The perceived relative advantage of Green IT would impact on the interpretation of environmental preservation through affecting the following attributes: negative-positive, loss-gain, and uncontrollable-controllable. For the negative-positive aspect, given that Green IT is a solution to improve environmental performance without compromising long term economic performance, when this relative advantage is recognized, decision maker would tend to have a more positive attitude towards environmental preservation. For the loss-gain aspect, since Green IT can both improve the corporate image and reduce operating costs (Butler & Daly, 2009; Thambusamy & Salam, 2010), decision makers should be more likely to think that they will gain from environmental preservation. For the uncontrollable-controllable aspect, as the relative advantage of Green IT covers both the economic and environmental performance, which is welcomed by a wide range of organizational stakeholders, the recognition of the relative advantage of Green IT will make the decision makers think that their actions in environmental preservation will be less constrained by the stakeholders in the organization. Moreover, the recognition of the relative advantage of Green IT will give the decision maker a feeling of control because Green IT can be considered as the solution for tackling the focal issues (Jackson & Dutton, 1988). Therefore, the following hypothesis is proposed:

H3: The higher the degree to which the relative advantage of Green IT is recognized, the greater the extent to which environmental preservation is interpreted as an opportunity.

2.2 Organizational Context and Managerial Perceptions

2.2.1 Strategic Orientations and Managerial Interpretation

Strategic orientation is also known as competitive posture, which is defined as the usual manner an organization perceives and adapts to external stimuli (Bozarth & Edwards, 1997; Moore, 2005). It
usually reflects the values of the organization (Banerjee, Iyer & Kashyap, 2003). Three strategic orientations will be included in the research model because of their relatedness to environmental strategy and organizational innovation. They are organizational futurity orientation (OFO), organizational innovation orientation (OIO), and organizational environmental orientation (OEO).

Organizational futurity orientation (OFO) refers to an organization’s emphasis on effectiveness considerations or efficiency consideration on making important strategic decision, i.e., the consideration of longer-term versus short-term (Souder & Bromiley, 2012; Venkatraman, 1989). When compared to organizations with low OFO, organizations with high OFO tend to exhibit wider visions, encourage the investment in projects without explicit short-term values, make judgment based on larger amount of information, and align their perspectives with their stakeholders with different beliefs and attitudes (Wang & Bansal, 2012). Because of the attributes mentioned above, organizations with high OFO are more likely to recognize the potential value of environmental preservation, to tolerate for the non-existence of short-term value of environment preservation, and to gain support from stakeholders on environmental preservation, than organizations with low OFO do. Therefore, the following hypothesis is provided:

\( H_4: \) The higher the degree to which an organization is futurity oriented, the greater the extent to which environmental preservation is interpreted as an opportunity.

Organizational innovation orientation (OIO) refers to “an organization’s openness to new ideas and propensity to change through adopting new technologies, resources, skills, and administrative systems” (Zhou, Gao, Yang & Zhou, 2005). It can also be termed as technological orientation, seeks to improve the flexibility of an organization. Moreover, it would enhance the willingness to change and remove the barriers to change of an organization (Grinstein, 2008). Because of the attributes mentioned above, members of an innovation oriented organization should have a favorable attitude and show less resistance to organizational change (Jones, Cline & Ryan, 2006). Therefore, the following hypothesis is provided:

\( H_5: \) The higher the degree to which an organization is innovation oriented, the greater the extent to which environmental preservation is interpreted as an opportunity.

Organizational environmental orientation (OEO) refers to an organizations’ attitude towards the inclusion of environmental sustainability into their strategic considerations and operational activities, and in turns, reflect the organization’s philosophy on environmental sustainability (Roxas & Coetzzer, 2012). Members of organization with high OEO are more likely to show a favorable attitude to organizational decisions on environmental preservation. A focal issue is interpreted as a threat because the decision maker perceives that others would constraint his/her actions and there is no freedom to decide on the alternatives (Jackson & Dutton, 1988). As decision members would face fewer constraints from other organizational members in organizations with high level of OEO than in organizations with low level of OEO, the following hypothesis is provided:

\( H_6: \) The higher the degree to which an organization is environmental oriented, the greater the extents to which environmental preservation is interpreted as an opportunity.

2.2.2 Strategic Orientation and Relative Advantage

The strategic orientations of an organization would affect how an organizational member evaluates the benefits of an alternative through three interrelated paths. First, strategic orientations affect the meaning of information examined. Decision makers tend to treat information or cues aligning to the strategic orientation favorably (Ginsberg & Venkatraman, 1992). Second, strategic orientations affect the target of information gathering. For example, managers in an organization with a strategic orientation emphasizing efficiency will pay more attention to the information concerning the improvement of efficiency (Milliken, Dutton & Beyer, 1990). Third, strategic orientations affect the breadth of information surveillance. Since organizational members tend to perform “issue selling” when issues sold are predicted to be valued and accepted by the top management (Ashford, Rothbard,
Piderit & Dutton, 1998; Howell & Higgins, 1990), given that decision makers are likely to pay attention to and treat information aligning to strategic orientations favorably, organizational members tend to perform “issue selling” on the issues aligning to the organization’s strategic orientation. Given that the organizational adoption of Green IT is an organizational innovation, decision makers in organizations with high level of OIO will be more likely to receive a wider range of information concerning Green IT and to pay attention to the information concerning Green IT than decision makers in organizations with low level of OIO do. Therefore, the following hypothesis is provided:

H7: The higher the degree to which an organizational is innovation oriented, the greater the extent to which relative advantage of Green IT adoption is recognized.

Given that the adoption of Green IT can be considered as an environmental strategy, decision makers in organizations with high level of OEO will be more likely to receive a wider range of information concerning Green IT and to pay attention to the information concerning Green IT than decision makers in organizations with low level of OEO do. Therefore, the following hypothesis is provided:

H8: The higher the degree to which an organizational is environmental oriented, the greater the extent to which relative advantage of Green IT adoption is recognized.

As the economic benefits of environmental strategy implementation are mostly indirect benefits, organizations which have implemented environmental strategy are not able to immediately enjoy the benefits brought by environmental strategy implementation (De Giovanni, 2012). Given the fact that the adoption of Green IT is an environmental strategy without immediate return and require an initial investment, and since high level of OFO can widen an organization’s vision and help it recognize the economic value of the long term investment (Wang & Bansal, 2012), we expect that decision makers in organizations with high level of OFO will perceive higher level of economic benefits of Green IT adoption than decision makers in other organizations do. Moreover, long term relative advantage and economic benefits are inseparable from the considerations of environmental sustainability (Chen, Boudreau & Watson, 2008). Therefore, the following hypothesis is provided:

H9: The higher the degree to which an organization is futurity oriented, the greater the extent to which relative advantage of Green IT adoption will be recognized.

2.2.3 Discretionary Slack and Managerial Interpretation

No matter the individual or organizational context, the availability of allocable resources would affect a person’s mindset and actions. In the organizational context, the availability of discretionary slack, which refers to resources able to be freed, allocated, and utilized by a person (Sharma, 2000), would affect how an organizational decision maker perceives a strategic issue (Etzion, 2007). Since discretionary slack can support decision makers in searching and finding opportunities on innovation to tackle the issues, as well as in responding rapidly on the changing environment (Bowen, 2002), the following hypothesis is therefore provided:

H10: The greater the degree of discretionary slack provided to decision makers in environmental management, the greater the likelihood of their interpreting environmental preservation as an opportunity rather than as a threat.
3 RESEARCH METHODOLOGY AND IMPLEMENTATION

3.1 Proposed Measurement – Independent Variables

All the questions are 7-point Likert scale questions. Unless specified, the respondents select answers from “strongly disagree” to “strongly agree”. Managerial interpretation is measured by a 5-item scale adapted from the study by Sharma (2000). A sample item is, “I am likely to lose rather gain by actions to preserve the environment”. Relative advantage is measured by a 3-item scale, which has adapted from the study by Lin and Ho (2011). A sample item is, “The Green IT can provide better environmental performance”. Discretionary slack is measured by a 2-item scale, which was also used by Sharma (2000). Respondents select answers from “very low” to “very high”. A sample item is “Extent of discretion in investment of resources for environmental decisions”. OIO is measured by a 4-item scale adapted from the study by Wei and Wang (2011). A sample item is, “Our company pays close attention to innovation”. OFO is measured by a 5-item scale adapted from two studies (Morgan & Strong, 2003; Venkatraman, 1989). A sample item is “Our criteria for resource allocation generally reflect short-term consideration”. OEO is measured by a 4-item scale adapted from the study by Banerjee et al. (2003). A sample item is “At our company, we make a concerted effort to make every employee understand the importance of environmental preservation”.

3.2 Proposed Measurement – Dependent Variable

The intention to Green IT adoption will be developed in this research study, because of the following reasons: First, although general reflective measurement of intention to adopt new technology might be adapted to measure intention to Green IT adoption, because Green IT covers a number of initiatives which may not be highly correlated with each other (i.e., the decision maker may intend to adopt some of the Green IT initiatives, but not others) and correlations among items is one of the criteria of reflective measurements, the reflective measurement is not suitable for measuring the intention to Green IT adoption. Second, although a number of research studies have developed formative measurement on Green IT adoption, most of them are validated using the validation process for reflective measurement (Molla, 2009; Molla et al., 2011). Following the practice of Xia and Lee (2003), the development of the measurement of Intention to Green IT Adoption (IGITA) is divided into four phases: (1) conceptual development and initial item generation, (2) conceptual refinement and item modification, (3) data collection, and (4) data analysis and measurement validation.
3.3 Proposed Measurement - Control Variables

Measurements of mimetic, normative, and coercive pressures will be adapted from the paper of Liang et al. (2007). All of which adopts a 3-item 7-point Likert scale. Measurements of environmental uncertainty will be a 5-item 7-point Likert scale used by Becker & Knudsen (2005). Measurement of social desirability will be a 13-item 5-point Likert scale used by Reynold (1982). Type of ownership will be assessed by asking whether the company is publicly-owned or privately owned. Lai and Wong (2012) have adopted a similar measurement.

3.4 Implementation

The data will be collected from both public and private companies. The targeted respondents are the persons who are involved in the decision making in technology adoption and environmental strategy (e.g., CEO, IT manager or environmental manager). The public companies will be selected from those listed on the Hong Kong Stock Exchange (HKEx). The public companies with duplicated addresses and chairpersons would be excluded, in order to preserve the variety of the sample. The private companies will be randomly drawn from the list on found on the website of Companies Registry in Hong Kong. About 600 private companies would be randomly drawn from the list. All the data will be collected from the key decision makers responsible for establishing IT strategy. Invitation letters attached with questionnaire and postage-free return envelope would be sent to each selected organization at each phase of data collection. One month later, a reminder would be sent to the companies which have not returned the questionnaires. One month after sending out the first reminder cards, second reminder cards will be sent out. One month after sending out the second reminder cards, third reminder cards will be sent out. One month later, phone calls will be made to the companies which have not returned the questionnaires. If the companies require for a new set of questionnaires, new sets of questionnaires will be sent to them again. Two week after sending the questionnaires, phone calls will be made to the companies again.

References


