DETERMINANTS OF GREEN PRACTICE INFUSION: A CONCEPTUAL MODEL

Chieh-Yu Lin*

Yi-Hui Ho**

ABSTRACT

While environmental considerations have become a fundamental part of business strategies, there is a challenge for managers and academicians to explore the integration of environmental concepts and business operations. Although a number of studies on green practice adoption can be found in the literature, few of them analyzed the infusion of green practices in organizations. This paper focuses on the determinants of green practice infusion. The main purpose of this paper is to build a conceptual model exploring the factors that affect organizational infusion of green practices in a firm. Drawing on the innovation diffusion theory, this paper groups the determinant factors into technological, organizational and environmental dimensions. We proposed several propositions about the influences of determinant factors on green practice infusion. This paper can extend the scope of research on green management in green practice infusion.

Keywords：Green practice infusion, Determinant factors, Technological factors, Organizational factors, Environmental factors

* Professor, Department of International Business, Chang Jung Christian University

No.1, Changda Rd., Gueiren District, Tainan City 71101, Taiwan, R.O.C.

** Assistant Professor, Department of International Business, Chang Jung Christian University

No.1, Changda Rd., Gueiren District, Tainan City 71101, Taiwan, R.O.C.

Introduction

Green management has become critical concerns of business research. Many researchers have surveyed firms' implementation of environmental management practices, and proposed various explanations as to what factors influence firms' adoption of green practices. As implementing green practices can be regarded as an important means of solving firms' environmental problems, it is particularly important to learn more about the factors influencing green practice implementation. However, scarce attention has been paid on analyzing the infusion behaviors associated with green practices. Companies may be able to achieve considerable environmental performance by successfully implementation green practices into their work systems.

Green practice implementation is a multiphase process consisting of adoption and infusion phases (Winn & Angell, 2000). Infusion refers to the extent to which an innovation's features are in widespread usage in a complete and sophisticated way (Fichmen 2001; Yan & Fiorito, 2007). Green practice infusion is the incorporation of green practices into work structures. Successful implementation of green practices requires significant involvement in developing operational responses to environmental issues. It is important to understand the infusion of green practices within organizations. Some researchers have analyzed the infusion of green practices within organizations, concerning with the extent to which these practices have been implemented (Fussel & Georg, 2000; Stead, McKinney & Stead, 1998; Winn & Angell, 2000). However, these studies focused on exploring the infusion process of green practices within an organization. Much remains to be learned empirically about the factors influencing organizational infusion of green practices. To fill the research gap, this paper studies the infusion of green practices.

The main purpose of this paper is to study the factors that affect organizational infusion of green practices in a firm. An understanding of the determinant factors of green practice infusion is essential for researchers to best understand the issues that need to be addressed as well as for practitioners to best implement green practices. Due to the lack of research on determinants of organizational infusion of green practices, this paper can broaden the scope of research on environmental management by providing some explanations as to what factors influencing green practice infusion.

Organizational Infusion of Green Practices

To achieve environmental performance, many companies attempt to implement several green practices. Applying environmental criteria into corporate operations requires exploring new resource combinations and deploying existing resources in new ways (Hart, 1995). Green practice implementation involves using new or modified processes and techniques to reduce environmental harms. As innovation is the use of new technical and administrative knowledge, the implementation of green practices can be regarded as an innovation process. Innovation consists of any practice that is new to organizations, including equipments, products, processes, policies and projects (Kimberly & Evanisko, 1981; Damanpour, 1991). Several researchers (Lin & Ho, 2011; Rothenberg & Zyglidopoulos, 2007; Ziegler, Seijas Nogareda, 2009) have analyzed environmental issues from the perspective of innovation.

From the innovation diffusion perspective, implementing innovations is a multiphase process and has been divided into a variety of phases (Damanpour & Schneider, 2006; Rogers, 2003). Innovation diffusion is a stage-based process of spreading a new technology within a universe of potential adopters. The adoption of an innovation does not guarantee that there is a widespread usage of the innovation within the organization to fulfill the full potentials of the innovation. A new technology may be introduced with a great enthusiasm and widespread initial acquisition; nevertheless it may fail to be thoroughly deployed among many firms.

Cooper and Zmud (1990) suggest a six-stage model of innovation diffusion, consisting of (1) initiation: scanning organizational problems, collecting and evaluating the information for innovation solutions, and finding the "right" innovation application for the organization, (2) adoption: getting organizational support and resource commitment for innovation implementation by negotiation, (3) adaptation: installing the innovation application, adjusting both the innovation and organizational procedures to achieve a good fit, and preparing employees to use the innovation, (4) acceptance: encouraging employees to commit to using the innovation application in their work, (5) routinization: using the innovation application to become a part of the working procedures and employees' habit, and (6) infusion: using the innovation application in a more integrated manner to obtain its full potential in supporting the organization's work. Rogers (2003) summarizes that the adoption process of innovations can be grouped into three more general phases of pre-adoption, adoption decision, and post-adoption.

Zhu, Kraemer and Xu (2006) simplified above six stages into three stages of initiation, adoption, and infusion.

Like the implementation of other kinds of innovation, green practice implementation is also a process consisting of multiple stages, i.e. initiation activities, the managerial decision to adopt the green practices, and infusion activities. Companies may be able to achieve considerable environmental performance by successfully diffusing green practices into their work systems in all diffusion stages (Fussel & Georg, 2000). Winn and Angell (2000) address that corporate greening starts with top management awareness of the need for corporate responses to environmental issues, leads to policy commitment, and ideally, ends with implementation at the operational level. The infusion stage is the conclusion of technology implementation and is a post-adoption behavior. It means that technology has been embedded and routinized in organization. Green practice infusion is the incorporation of green practices into work structures.

Infusion refers to the extent to which an innovation's features are in widespread usage in a complete and sophisticated way (Fichmen 2001; Yan & Fiorito, 2007). The extent to which innovation infusion is reached is positively related to the performance of the work that the innovation supports (Taylor & McAdam, 2004). Therefore, successful implementation of green practices requires significant involvement in developing operational responses to environmental issues. It is important and necessary to understand the infusion of green practices within organizations. However, prior literature has focused more on the issues of green management adoption decision. Little attention has been paid on analyzing the infusion behavior associated with green practices. Some researchers have analyzed the infusion of green practices within organizations, concerning with the extent to which these practices have diffused (Fussel & Georg, 2000; Stead *et al*., 1998; Winn & Angell, 2000). However, these studies focused on exploring the infusion process of green practices within an organization. For example, Stead *et al*. (1998) suggest that infusion (institutionalization) is a pivotal organizational process which determines whether a firm's environmental performance results in improved operating efficiency and market opportunities or in increased legal and regulatory hassles.

Determinants of Green Practice Infusion

A review on current research on environmental management reveals that, up to date, there

is no literature give an analysis on the factors influencing infusion of green management practices in organizations. To fill the research gap, this paper attempts to study the factors affecting the infusion of green practices. Although a body of research has proposed several factors influencing green practice adoption, factors affecting adoption decision may actually have the opposite effects upon infusion behavior (Cooper & Zmud, 1990; Damanpour & Schneider, 2006; Tornatzky & Fleischer, 1990; Zhu *et al*., 2006). In general, the infusion of green practices could be influenced by a variety of factors. Because implementing green practices can be seen as an innovation process, studies on explanations as to what factors influence innovation infusion will be helpful for modeling green practice infusion.

Several studies have proposed a variety of factors influencing innovation infusion. While a variety of determinants of innovation infusion have been proposed in the previous studies, these factors can be grouped into technological, organizational and environmental context. According to the innovation diffusion theory (Rogers, 2003; Tornatzkey & Fleischer 1990), a model for any innovation diffusion needs to consider different factors that can influence the inclination to use the innovation in its specific technological, organizational, and environmental contexts of an organization. The technological, organizational, and environmental (TOE) framework (Tornatzkey & Fleischer, 1990) is widely used in studying innovation infusion. The TOE framework identifies three aspects of a firm's context that have influences on innovation infusion. Technological dimension includes technology issues associated with the firms. Organizational dimension refers to descriptive measures such as company size, the quality of human resources, top management strategic behavior, and the availability of slack resources. Environmental dimension is the arena in which a firm conducts its business, including competitors, access to resources, industrial environment, and government regulations. Therefore, based on the TOE framework, this paper attempts to study the influences of technological, organizational, and environmental factors on the infusion of green practices in organizations.

Technological Factors

Characteristics of an innovation such as compatibility, complexity, and relative advantage may affect innovation diffusion (Jeyaraj, Rottman & Lacity, 2006; Rogers, 2003; Tornatzky & Klein, 1982). The perceived technological characteristics of an innovation can be considered as cognitive beliefs reflected in an attitude towards the innovation. Several technological

characteristics can affect its diffusion, including complexity, compatibility, relative advantage, triability, observability, ease of use, perceived usefulness, information intensity, uncertainty, and so on.

Adoption costs include the required financial and human resources in implementing and using green practices. Costs have been long posited as a barrier for the adoption of innovations (Rogers, 2003; Iacovou, Benbasat & Dexter, 1995; Torantzky & Klein, 1982). However, some researchers argue that high adoption costs may motivate innovation adopters to treat the innovation more seriously and implement it more actively in order to make the innovation more cost-effective (Cooper & Zmud, 1990; Rogers, 2003). Unfortunately, there is still lack of empirical evidence for this argument because previous studies on innovation infusion have not yet taken adoption costs into account. The present study argues that high adoption cost will make a firm treat the green practice more seriously and reinforce the infusion of the green practice within the firm. Therefore, the following proposition is proposed:

P1: *Adoption cost of green practices has a positive influence on green practice infusion.*

Complexity is the degree to which an innovation is perceived to be relatively difficult to understand and use. It will increase the difficulty in innovation diffusion (Rogers, 2003). Green practices incorporate both tacit and explicit knowledge. The tacit knowledge may be inherent in identifying sources of pollution, reacting quickly to accidental spills, and proposing preventive solutions (Boiral, 2002). It leads to the ambiguity of the practices. Ambiguity is a major barrier to the transfer of best practice within a firm (Szulanski, 1996). A firm is apt to implement innovation when knowledge is shared easily within the organization. Efficient knowledge sharing can lead to better innovative capabilities in terms of higher order learning, and consequently can improve organizational performance including environmental management effectiveness (Etzion, 2007). A green practice with high complexity contains a lot of tacit knowledge that requires laborious efforts to learn and diffuse. The difficulty in learning and sharing tacit knowledge makes it relatively difficult to infuse a green practice. Therefore, the following proposition is proposed:

P2: *Complexity of green practices has a negative influence on green practice infusion.*

Compatibility is the degree to which an innovation is perceived as being consistent with the existing values, experiences, and needs of the firms (Rogers, 2003). Compatibility is relevant to

green practice diffusion. Because several green practices are additions to companies' current technologies and processes, diffusion of green practices is not a single event but can be described as a process of knowledge accumulation and integration. Green practices that are more compatible to a company's current technologies and processes will be more easily to be diffused within the organization. Fit between previous experiences and environmental actions may generate a greater environmental effectiveness (Etzion, 2007). To lessen possible objection against the infusion of green practices, a company will be more likely to implement a green practice that is more compatible with the company's current operational knowledge. Therefore, the following proposition is proposed:

P3: *Compatibility of green practices has a positive influence on green practice infusion.*

Relative advantage is the perception that an innovation is more advantageous than its substitute idea. Companies are more likely to implement a technology which is able to provide better performance and higher economic gains than the other technologies. Relative advantage is positively related to the diffusion of innovation (Rogers, 2003; Tornatzky & Klein, 1982). Potential organizational benefits of green practices include reduced energy and natural resource consumption, reduced waste and pollutant emission, improved environmental and financial performance, and greater responsiveness to social environmental expectation (Etzion, 2007; Hart, 1995). In a study of the Spanish pulp and paper industry, Del Rio Gonzalez (2005) suggests that economic and financial advantages are important technological characteristics that influence the adoption of clean technologies. The perceived net benefits that the green practice offers will serve as motivations for companies to implement the green practice. Therefore, the following proposition is proposed:

P4: *Relative of green practices has a positive influence on green practice infusion.*

Organizational Factors

The organizational context implies the processes and attributes that constrain or facilitate innovation. Several studies have discussed the influences of a variety of organizational characteristics such as quality of human resources, top management's leadership, organizational support, organizational culture and organizational size on innovation diffusion (Damanpour & Schneider, 2006; Taylor & McAdam, 2004), and environmental strategy (Etzion, 2007; Gonzalez-Benito & Gonzalez-Benito, 2006). Sufficient organizational resources and qualified

organizational capabilities are two relevant organizational characteristics advancing innovation (Damanpour, 1991; Jeyaraj *et al*., 2006) and environmental performance (Hart, 1995; Russo & Fouts, 1997). The availability of resources, management support, organizational learning capabilities, and human resources will influence the adoption of green practices.

The quality of human resources is an essential factor influencing innovation diffusion (Fichman & Kemerer, 1997; Tornatzky & Fleischer, 1990). Qualified human resources are helpful to diffuse innovations because of their competent learning capabilities. Implementing green practices is a complex process requiring cross-disciplinary coordination and significant changes in the existing operation process (Russo & Fouts, 1997). The recipient's lack of absorptive capacity is one of the major barriers to the transfer of technical knowledge within a firm (Szulanski, 1996). To overcome knowledge barriers to green practice infusion, employees need extensive, specialized training to learn the principles underlying the innovation. Employees with competent learning capabilities will be apt to increase their absorptive capacity through training programs that can advance green practice infusion. Therefore, the following proposition is proposed:

P5: *Quality of human resources has a positive influence on green practice infusion.*

Organizational support is the extent to which a company helps employees use green practices. Providing incentive for innovation diffusion and ensuring the availability of financial and technical resources for innovation have positive effects on the implementation of innovation (Damanpour & Schneider, 2006; Jeyaraj *et al*., 2006; Lee, Lee & Kwon, 2005). For the development of environmental management, organizational support is essential because the employees will be motivated to implement green behavior and the resources required for adopting green practices will be more easily available. Many green practices require the collaboration and coordination of different departments and divisions during diffusion process. To ensure successful diffusion, green initiatives are usually endorsed and encouraged from the top management (Gonzalez-Benito & Gonzalez-Benito, 2006). The central task of top management is to obtain resources and assemble them into organizational capabilities so that the company is able to implement green practices to achieve environmental competitive advantage (Judge & Elenkov, 2005). Therefore, the following proposition is proposed:

P6: *Organizational support has a positive influence on green practice infusion.*

Company size has been repeatedly taken as a relevant organizational characteristic influencing companies' innovation diffusion (Frambach & Schillewaert, 2002; Rogers, 2003) as well as environmental activities (Del Brio & Junquera, 2003; Etzion, 2007; Gonzalez-Benito & Gonzalez-Benito, 2006). In general, large companies tend to adopt innovations and green practices more easily than small ones because they have sufficient resources and strong infrastructures. Small companies, in contrast, may suffer from the lack of financial resources and professionals, which results in difficulties in adopting green practices. However, some researchers argue that, due to less flexible structure, lower ability to adapt and more difficulty in assimilating change, larger companies may be more difficult than smaller companies in the infusion of innovations (Dampour & Schneider, 2006; Zhu *et al*., 2006). Therefore, the following proposition is proposed:

P7: *Company size has a negative influence on green practice infusion.*

Environmental Factors

The environmental factors in this study refer to the standard conceptualization of external environment in the organizational behavior literature. The external environment in which a company conducts its business is an important factor affecting innovation adoption and environmental strategy. Certain environmental variables such as environmental uncertainty, environmental munificence, governmental support, industry type, competition, and network relations are often discussed in the literature of innovation diffusion (Damanpour & Schneider, 2006; Jeyaraj *et al*., 2006) and environmental management (Etzion, 2007; Gonzalez-Benito & Gonzalez-Benito, 2006). Environmental uncertainty and external resource availability are consistently regarded as two primary environmental factors influencing innovation diffusion and environmental strategy (Rothenberg & Zyglidopoulos, 2007). Stakeholder pressure is another relevant environmental factor influencing organizational environmental behaviors, and is widely involved in research on environmental issues (Buysse & Verbeke, 2003).

Environmental uncertainty refers to frequent and unpredictable changes in customer preferences, technological development, and competitive behavior perceived by the managers. It has been viewed as the most relevant environmental characteristic that affects a firm's decision making (Li & Atuahene-Gima, 2002). Managers facing uncertain business environments tend to be more proactive and use more innovative strategies than managers in less turbulent

environments. Under high environmental uncertainty, companies will attempt to gather and process information frequently and rapidly to address environmental changes, and also tend to pay more efforts on innovation and increase the rate of innovation to maintain a competitive advantage (Damanpour, 1991; Kimberly & Evanisko, 1981). Implementing green practices can be regarded as a technical innovation process that can improve a company's environmental performance. Companies are more likely to invest in resources to implement green practices to generate the capacity to improve environmental performance in uncertain environments. The infusion of green practices is expected to be positively associated with the perceived environmental uncertainty. Therefore, the following proposition is proposed:

P8: *Environmental uncertainty has a positive influence on green practice infusion.*

Governmental support is a relevant environmental factor influencing technical innovation. The governments can advance technical innovation through several encouraging policies such as providing financial incentive, technical resources, pilot projects, and tax breaks (Tornatzky & Fleischer, 1990; Scupola, 2003). Implementing green practices relies to some extent on the availability of external resources. Munificence of resources in the business environment increases the degree to which a company engages in environmental management (Rothenberg & Zyglidopoulos, 2007). The government can raise the munificence by providing tax incentives for alternative energy technologies, and bank financing at lower rates for environmental technologies (Aragon-Correa & Sharma, 2003). A positive association between green practice infusion and governmental support is expected. Therefore, the following proposition is proposed:

P9: *Governmental support has a positive influence on green practice infusion.*

Stakeholders are individuals or groups who affect a company's activities and are also affected by the company's activities. Stakeholder pressure is regarded as the most prominent factor influencing a company's environmental strategy (Buysse & Verbeke, 2003; Sharma & Henriques, 2005). According to the stakeholder theory, organizations carry out activities to satisfy their main stakeholders. Among various groups of stakeholders, customers and regulators are arguably viewed as a company's most important stakeholders (Christmann, 2004; Etzion, 2007). A body of research reveals the positive relationships between firms' environmental activities and customer and regulatory pressure. The infusion of green practices will be positively associated with customer and regulatory pressure. Therefore, the following propositions are

proposed:

P10: *Regulator pressure has a positive influence on green practice infusion.*

P11: *Customer pressure has a positive influence on green practice infusion.*

Summary

To help organizations implementing green practices successfully, it is necessary to give an analysis on the factors influencing green practice infusion in organizations. An understanding of the determinant factors is essential for practitioners to best implement green practices. Although a body of research has proposed several factors influencing green practice adoption, none of them analyzed the factors influencing green practice infusion. This paper proposes a model on the factors affecting green practice infusion in organizations. The determinant factors are classified into environmental, organizational and technological factors. The study can broaden the scope of research on environmental management. Based on the proposed green practices infusion concept, the future study can equip research on green practice infusion with some empirical evidence.

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