

Chapter 68

Five Drivers of Eco-Innovation: Insights From Parsimonious Model Using a Content Analysis Approach

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ABSTRACT

Today, firms are faced with a number of environmental challenges such as pollution, scarcity of natural resources, global warming a growing demand for environmentally friendly products. Complexity of sustainability issues in operations management leads this study to determine a parsimonious model of eco-innovation. Most of the research findings have emphasized the effect of innovation on company's economic benefits. However, there are inadequate studies in respect to eco-innovation and its impact to business and environmental sustainability. This paper focuses on determinants of drivers of eco-innovation and its outcome on sustainable business performance. Content analysis is used in order to explain the phenomena of eco-innovation in operations management and categorize the determinants of drivers. The unit of analysis of this study is driver or factor of eco-innovation which are commonly found in entire articles reviewed. The scope of review encompassed articles published between the years 1994 to 2012. Results indicate that a parsimonious model of eco-innovation consists of five drivers. More comprehensive and robust findings could be obtained by testing this model and broadening the scope of study.

1. INTRODUCTION

Aware living in world with finite resources, cleaner production has promoted green technology as tools for resource efficiency. Green technology is the solution that will provide a balance in terms of the environment, economics and society (New Straits Times, 2013). The green innovation movement should consider the green activities in supply chain. The success of eco-innovations in sustainable supply chains

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aiming a low-carbon economy is related to a broad range of human critical success factors. Development of low-carbon innovations in products can be supported by a carbon footprint assessment mapping CO₂ emissions during all of the steps of the product development process (Jabbour et al., 2015). Practitioner and academia are discovering the substitute for green energy sources and production (Kamarudin Bakar et al., 2011). Eco-innovation is not only focusing of production process to reduce the pollution load on the environment but it also makes good business sense as prevention technique. In recent decades, the expansion of economic activity is a contributing factor to the global environmental problems such as global warming and resource scarcity. However, as businesses are responsible for the environmental concerns (OECD, 2009) companies are seen shifting from traditional practices to greener practices (Laperche and Uzunidis, 2012; Ekins, 2010; Tyl, Millet and Vallet, 2010). The expectation is that the management of a firm should help shoulder the burden by practicing eco-innovation, which will benefit the entire ecosystem with an increased quality of life (Fernando et al., 2016). Firms can meet sustainable business performance in the aspect of economic, social and environment through eco-innovation (Olson et al., 2011; Pujari, 2006). In today's business practices, it is vital to know how firms can create and add value (environmental and monetary) to their products and services through innovation (EC, 2010). It is also critical to create and increase the awareness of eco-innovation among the business world. For that reason, this study is adopting the simplest assumption in the formulation of a concept to identify the relative important dimensions and a parsimonious model of eco-innovation. The importance of a parsimony lies in refinement of the model so that it is precise and eliminate redundancies (Ma et al., 2008).

Eco-innovation project has been associated with service knowledge workers. The service inconsistency had threatened the firm ability to meet certain level of eco-innovation. Service is an intangible factor that often provides people who have consumed a service with long-life memories. Unlike a product, a service is often delivered without prior quality control testing. Thus, service inconsistency can become a major concern (Wahyuni -TD & Fernando, 2016). The OECD was established 3,100 special projects in seven industrialized countries (including Japan, Germany, Norway, Hungary, Canada, France, and United States), the aim of these projects to introduce advance and green environmental technology. Special projects were assigned to assists the industry on cleaner production technologies or to end of pipe technologies (Arundel and Kemp, 2009). Based on findings from green environmental technology projects by OECD, the percentage of cleaner production technologies ranges are from 57.5% (Germany) to 86.5% (Japan), as shown in Figure 1. Furthermore, more than 75% of the respondents from the seven countries reported that the majority of their projects to adopt environmental technologies were for cleaner production technologies. These results indicate that end-of-pipe technologies are typically introduced to cope with regulatory compliance, while the implementation of cleaner production technologies is driven by the potential for increasing manufacturing efficiency and reducing costs of operations. Based on the empirical results from OECD, eco-innovation is growing important as it reduces resource or pollution. Hence, cleaner production technologies or eco-innovation are seen as being superior and advantageous to end-of-pipe technologies for economic and environmental reasons.

Countries such as Norway, Germany and Finland have invested heavily in R&D infrastructures and research aimed at innovating through service. Between 1995 and 2005, significant increases in total services embodied in manufacturing were evident in few countries such as Turkey, Poland and the United States. Along the years, Figure 2 shows a shift in industrial structures towards manufacturing products that are more service intensive. Thus, the statistic shows the existence of service innovation and the capability are relatively important to the manufacturing companies in order to make the core products are more attractive to customers.

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