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A study on a configuration model for facilitating sustainable consumption: A case involving the automobile industry in Italy

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ABSTRACT

An information transition gap exists between cleaner production and sustainable consumption. A previous study shows that adequate product-level sustainability information should be available to consumers. A set of product-level sustainability attributes that capture influencing factors to facilitate sustainable consumption behavior have been proposed. However, the weight of each attribute needs to be determined when these attributes are applied to a specific industry. Therefore, this study aims to further develop a configuration model for the automobile industry by using the knowledge of Italian experts. In this study, semi-structured interviews of experts were conducted, and the analytic hierarchy process (AHP) was applied to collect data for determining the weights of attributes. The data was analyzed by using an AHP software called Super Decisions. This study is the most important step in obtaining accurate weights of attributes in a specific industry from experts. The individual result of each case and their aggregate results regarding the prominence of attributes have been obtained. This configuration model integrated the social and environmental impact of a product for the first time and aims to provide this information to consumers. Furthermore, in the context of a specific industry, the weight of each attribute was provided to further develop an information transition tool to facilitate sustainable consumption. The proposed model is expected to contribute to the studies of developing an information transition approach to promote sustainable consumption and production.

1. Introduction

As the largest single manufacturing sector among European industries, the automobile industry is often described as “the engine of Europe” in the 21st century. The industry directly employs about 1.1 million people and supports another 11–12 million jobs in many other business sectors (Claros, 2013; Jonnaert, 2014). Moreover, management practices, organizational forms, and particularly response to environmental pressures in that sector also influence many other business sectors (Orsato and Wells, 2007). Efforts to respond to increasing environmental pressures are evident through their initiatives and the implications of upgraded technology for manufacturing more and more environmentally friendly cars. The technologies of battery electric, hybrid electric, and plug-in hybrid electric vehicles provide a progressively improving prospect to reduce energy consumption and pollutant emissions (Bradley and Frank, 2009; Faria et al., 2013). Although electric vehicles (EVs) are the fastest-growing vehicle segment in many European markets, their sales are still marginal (OECD, 2015).

When facing a purchasing decision, consumers are already aware of green issues such as depleting natural resources, global warming, and pollution, and they consider these issues when making decisions about purchasing green products (Banytė et al., 2010; Grunert et al., 2014; Schlegelmilch et al., 1996; Young et al., 2010). Furthermore, consumers already have a greater demand for product-level sustainability information and the supply chain and production history to help them make purchasing decisions (Grunert et al., 2014; Marucheck et al., 2011). This is because consumers’ attitudes have moved from satisfying elementary survival needs to representing their lifestyles and values through their purchasing (Meise et al., 2014). By using such information, consumers tend to mix their green knowledge and attitudes with green brand awareness when choosing a green product (Matthes et al., 2014; Zhao et al., 2014). Additionally, recent studies also suggest that when considering full

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transparency of information for products, consumers are ready to pay a premium for a product (Owusu and Anifori, 2013; Xu et al., 2012). Notably, some studies show that consumers would pay for certain socially conscious attributes, such as no animal experimentation or no child labor (Auger et al., 2008), or pay about 10% more as a so–called “ethical price premium” (Pelsmacker et al., 2005).

However, even though consumers are willing to pay a price premium for sustainability or change their consuming habits, the fact is that they still lack sufficient and reliable information that is needed to make informed choices (Jacobsen and Dulsrud, 2007). One of the most important reasons to explain such phenomenon is the limited sustainability–related information transition from sustainable production to sustainable consumption (Caniato et al., 2012; Lebel and Lorek, 2008; Meise et al., 2014).

A number of barriers exist between such environmentally friendly products and their consumers, and this causes the promotion of these products to remain challenging. In the context of the European automobile industry, an analysis of existing barriers between green products and consumers was conducted. The results suggest that the most significant barrier hindering consumers from buying environmentally friendly products is the gap between consumers’ expectations and their perceptions of the product. This “expectation-perception” gap is mainly attributed to the inadequate sustainability-related information supplied to consumers while they are purchasing the product (Shao et al., 2016a). To solve this issue, adequate sustainability-related information should be made publicly available by governments or by organizations for consumers. Moreover, providing sufficient information becomes a pre-request to enable consumers to purchase environmentally friendly products (Shao et al., 2016a, 2016b).

Such sustainability-related information is already intended to be present by a number of indicators that have been proposed by international organizations, academic institutions, and practitioners. However, they mismatch consumers' information demands, especially regarding the assessment domain, the evaluation unit, and information format. Some research that has been conducted reviews several different sections, such as eco-label (Rex and Baumann, 2007), applicable indicators (Nissinen et al., 2007), etc. It was concluded that the majority of such indicators are designed to adapt either to the industrial application or go academic research, but are less adaptable to support the effective communication with stakeholders, specifically non–technical audiences, such as everyday consumers (Caeiro et al., 2012). For example, as discussed by J. Shao (Shao, 2016), most of the applied indicators only provide information on the environmental impact and rarely integrate the social impact of a product in its production phase, e.g., the ITT Flygt Sustainability Indicator (ITT) (Pohl, 2006) and G–Score (Jung et al., 2001). The majority of them only comprise a list of environmental pollutants and are abound with technical terms, such as the Life Cycle Index (LInX) (Khan et al., 2004). Indicators developed by international organizations evaluate sustainability performance based on organization level or set of countries, for example, Total Material Requirements (TMR) (EEA, 2001) and the Environment Performance Index (EPI) (WEF, 2002), and they are difficult to utilize from a consumer's perspective. Marketing-focused approaches, such as Energy Star labels, only provide energy consumption information in the using phase of a product and have not taken into account other phases of a product's life-cycle.

Therefore, most of the present indicators or eco-labels partially disregard consumer needs and hence are less effective for supporting and spurring a more sustainable consumption pattern. A recent study reviewed related indicators and extracted necessary attributes, thereby identifying certain attributes as important when providing sustainability-related information to consumers (Shao et al., 2016b). In this study, first, the most relevant indicators were selected based on five consumer–focused criteria (Caeiro et al., 2012) as the foundation of the framework development. Then, appropriate attributes were extracted according to their assessment content and mapped in a novel metric. To meet consumers’ information preferences, the attributes that are in the dimensions of social and environmental impacts were integrated. As a result, 22 attributes in seven main aspects were identified as important attributes for providing sustainability-related information to consumers (Shao et al., 2016b) (see Table 1).

This list of attributes was generated based on current indicators and it includes CS, CSPI, F–PSI, EPI, G-Score, and E99 (Shao et al., 2016b). It aims to bridge the information transition gap from cleaner production to sustainable consumption by providing information to consumers, mainly focus on the social and environmental impacts of a product in its production phase. Such information transition is promising to promote sustainable consumption and increase the sale of green products. It is because a growing number of researchers have recognized economic advantages in environmental practices for practitioners (Björklund, 2011). The studies show that environmental purchasing has a positive effect on a firm's performance in regards to an increased net income (Carter et al., 2000). Such environmental purchasing is often discussed as an effective way of improving industries' environmental performance that could even become a more powerful change agent than any other corporate function (Preuss, 2001; Zsidisin et al., 1998).

However, before this list of attributes is applied to a specific industry, the weight of each attribute is necessary to be determined. Therefore, this study aims to develop a configuration model for the automobile industry by using the knowledge of Italian experts. Considering the attributes of Regional ozone, Eco-region protection, Over fishing and Land are far from the consideration of auto purchasing for consumers. Therefore, these attributes are excluded in this phase of research. Moreover, as more than five experts suggested in the previous survey, we combined the attribute of Employee training, Employee participation into the attribute of Employee working safety. Therefore, in total 16 attributes, as shown in Table 6, are considered to have a further study. The analytic hierarchy process (AHP) is used to determine the weights of attributes at various levels. AHP, which was devised by Saaty (1980), is commonly used in sustainability assessment research that involves stakeholder participation that seemed to be as the key to sustainability. This method is suitable for this study since it overcomes the shortcomings of other multi-criteria decision analysis (MCDA) techniques and makes directly assigning weights possible. It has been applied in the development of a composite sustainability performance index for the steel industry (Singh et al., 2007), the development process of key performance measures for ELASTIC (Castillo and Pitfield, 2010), EU new economic policy indicators, and more. The data received from interviews are analyzed by using an AHP software called Super Decisions to obtain the prominence value of each dimension and attribute.

In this study, first, relevant methods of indicator development will be briefly reviewed. Then, the methodology of the analytic hierarchy process questionnaire and the interview development process are described in detail. By using this method, analysis results in the context of the European automobile industry are illustrated. Analysis and discussions of the data of each company, as well as aggregated data of three companies, are presented. Finally, conclusions and suggestions are given based on the findings of this research.