

A firm-level composite indicator of eco-innovation and its link with marketing innovation in placement: a comparison of two European countries.

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In recent years we are facing a growing attention paid by governments, organizations and companies on environmental issues. Technological innovations have been found to be pivotal in achieving greater efficiency and sustainability. Less attention has been devoted to the role of non-technological innovations, such as organizational and marketing innovations in contributing to the environment. Only few studies have focused on the role of different marketing innovations in leading to positive consequences for the environment. Moreover, among the 4Ps marketing innovations (design and packaging, price, placement, promotion), the role of placement innovation with respect to the environment has received little or no attention. Innovation in placement involves the types of sales channels employed for selling products (e.g., franchising, direct sales, sales through internet or mobile) and modifications in the design of sales channels (OECD, 2005).

In this respect, the present study aims to shed light on the environmental contribution driven by innovation in placement in achieving environmental benefits, through an empirical analysis of the Community Innovation Survey in Portugal and Germany related to the period 2012-2014, which represents the latest available wave where the module on 'environmental benefits of innovation' is present. A second contribution of the present work is represented by the different way of summarizing eco-innovation by type of EBs. In particular, the composite measure that we propose overcomes limitations typical of binary measures (loss of information in eco-innovation intensity), count measures (potential double counting problem), multinomial outcomes resulting from cluster-based strategies (difficulty in cluster interpretation/lack of comparability by countries). Finally, the consideration of the two countries allows us to figure out more clearly the relationship between marketing innovation and EBs across different contexts. The two countries substantially differ in terms of their sensitivity towards sustainability and eco-innovation and their economic and institutional background. Germany is one of the leading countries in both sustainable development and innovation, and has been consistently recognized as an eco-leader from 2012 to 2021 (Eco-innovation scoreboard), having a strong tradition of societal and political awareness of sustainability challenges. Portugal, on the other hand, has been identified as 'a close to the EU average' eco-performer from 2012 to 2021 (Eco-innovation scoreboard).

We first constructed a composite eco-innovation indicator at the firm level on each eco-innovative firm starting from a set of ten indicators of environmental benefits. To this end, a PCA-based strategy was adopted that involves three main steps: i) normalization; ii) use of principal components analysis (PCA) to construct weights; iii) aggregation.

As a second step, we run a fractional regression model where the composite eco-innovation indicator is function of the four marketing innovations, with a specific focus on product placement innovation. A series of robustness check (e.g., the use of inflated beta regression model) were performed to strengthen the results.

Results show that the introduction of a placement marketing innovation yields to a higher involvement in innovations with environmental benefits in both countries examined. This result appears to be robust as it is consistent when considering both Germany and Portugal. Placement innovation involves the delivery of products to shops or to end consumers: the

delivery can be optimized to reduce pollution, and to generate environmental benefits. Decentralized distribution of items and enabling local stores to manage recycled items are additional possible ways of obtaining environmental benefits. Companies are called to consider introducing a product placement innovation as it could represent a meaningful step towards sustainability.

Keywords: Environmental benefits of innovation, eco-innovation composite indicator, product placement innovation.