

UNIVERSIDAD POLITÉCNICA DE VALENCIA



Estudio de la interrelación entre el eco-diseño y la eco-innovación e identificación de aspectos clave en la innovación sostenible en un sector industrial: aplicación al sector del automóvil.

TESIS DOCTORAL

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Valencia, Abril 2013.

Abstract

Respect for the environment is permeating the modern society at all levels. Citizens, public institutions and companies are aware of their role in the protection of the environment. This work seeks to deepen in the concepts related to the environment that affect the decisions that firms take in they day to day. Due to the relationship of the thesis author with the automotive industry, in which I have developed my professional activity since 1999, the empirical application has been done in this industry, with the main aim of identifying the aspects on which reshape is due to promote proactive environmental actions.

As industry's key activities design and innovation were analysed in depth, and as the sustainable approach is included, eco-design and eco-innovation are the topics centering the research. So, first a literature review on eco-design is done, benefits from the eco design attitude and implementation have been clearly identify in the literature review, as competitiveness improvements, cost reduction, better company image or new product development, but what several researchers have pointed out is that industry need supporting tools for achieving eco design goals.

In the second paper, a wide range of actions that a leader automotive company like Faurecia has been taken over the past few years have been emphasized. This chapter reflects the information collected after the interview with eco-design experts from Faurecia Group to detect environmental objectives followed while the innovating process is taking place, mainly in the design phase.

Observed results are reinforced by the empirical results that show that environmental orientation is influenced by the company's characteristics.

For the Spanish automotive firms, the study has detected that environmental proactivity while innovating is determined mainly by the size of the firms, measured by the total income, total investment, size R&D investment and R&D employees, and also, but less, by the formal R&D activity (number of patents) and export orientation.

Accordingly with the results, bigger companies with higher number of patents and with a wider international presence are more likely to be environmentally oriented when they are innovating. As automotive firm's innovations are focused and take part mainly on the design phase of products, we can conclude that eco-design is more likely

to take part in big companies with high external and innovation orientation and that these companies are eco-innovation drivers throughout the automotive industry.

The study also has found no significant differences on companies' characteristics attending the importance of other aspects like energy and material reduction or environmental legislation accomplishment while innovating. Although, energy and material reduction might be related to environmental innovation, they are also highly influenced by operational facts, so company orientation might be affected by other variables like economic performance, costs structure or its financial situation.

In the third part, the purpose was to identify some of the driving forces behind the environmental orientation of the automotive companies. Specifically, this research proposed the importance of the market information sources (coming from suppliers, clients, competitors and external consultants) to effectively orientate product and process improvements as the key factors in determining the environmental orientation of the automotive industry firms. Using SmartPLS 2.0 software package, the measurement model was confirmed with sufficient reliability and validity for all of the constructs in the research model. Further, the structural model demonstrated that all of the path coefficients were statistically significant.

The consistency in findings would suggest that companies that look for more operational flexibility, to increase production capacity, to reduce labor costs per unit or to reduce energy consumption per unit when they are looking for new innovations are more willing to adopt an environmental orientation too.

On the other hand, firms focused on new products, on increasing or substituting product range, on increasing product quality or on reaching greater market share or new markets, are also more likely to be environmentally orientated.

Finally, we aim to identify groups of companies within the industry, with different behaviour towards the environment and different mechanisms of enhancement of eco-innovative activity with the objective of clarifying the types of activity carried out by each of them.

We found 3 groups of companies which environmental orientation while innovation is driven differently. The biggest group of companies orientate towards environment balancing the internal orientation to improve processes and reduce environmental and cost impact and searching for new market products and niches to tap on the new green demand, eco-balanced.

In another group of companies, market orientation is pushing harder than processes to orientate companies environmental innovation activity. This group is also highly influenced in the innovation process by the market information sources, namely, suppliers, competitors and clients. We called them eco-marketers.

Finally, the last group is opposing the general tendency in those relations, so this group innovative activity towards the market is acting negatively in the environmental orientation of the firms when innovating. It seem, that this group is not able or don't want to see the general path to approach environmental aspects in the innovation process. We called them eco-blind.

Results of this research allow us to classify the automobile sector companies regarding their reactions and their behaviour towards the environment. It also allows us to identify the aspects that influence this classification, which facilitates the decision-making process and the identification of ways to improve their Environmental orientation. The combination of qualitative and quantitative analysis' techniques has allowed us to deeply understand the process and to obtain conclusions that benefit directly the national business structure and, more specifically, the automobile industry's companies who can see their competitive level empowered if they take advantage of the opportunities that the sustainability and that respect for the environment offer them.