



# The antecedents of green innovation performance: A model of learning and capabilities



Gema Albort-Morant\*, Antonio Leal-Millán, Gabriel Cepeda-Carrión

Universidad de Sevilla, Spain

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## ABSTRACT

Environmental management and green practices have a narrow linkage with firm innovativeness. Companies that are pioneers in green innovation strategies might reach and sustain competitive advantages. Thus, successful green innovation performance (GIP) helps firms to achieve greater efficiency as well as to establish and strengthen their core competences. This study focuses on the dynamic capabilities (DC) and ordinary capabilities (OC) like antecedents of GIP, and the relationship between these constructs. Proposing a mediation model to analyze both direct and indirect relationships, this study applies variance-based structural equation modeling through a partial least squares to a sample of 112 firms from the Spanish automotive components' manufacturing sector. The results suggest that both the direct effect and indirect effect of capabilities (DC and OC) on GIP are positive and significant, and improve the prediction of firm's GIP. Furthermore, the structural model supports that DC influence GIP by reconfiguring relationship-learning capabilities (a type of OC).

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## 1. Introduction

The ecofriendly impact of the human behavior is a constantly growing global concern for people, policy makers, countries, and organizations. Governments have applied corrective policies in the last years to diminish or palliate such environmental damage (Chen, 2008). Companies are not immune to this reality. On the contrary, as every multifaceted system in search for the equilibrium that will ensure long-term survival, companies should respond successfully to a dual adjustment dynamic. On the one hand, to reach a clear level of market efficiency, which involves enhancing the use of its resources and capabilities, which always have a limit—competitive adjustment. On the other hand, to overcome a certain degree of consistency with the society within which the organization operates—legitimacy adjustment.

In order to subsist inside the presently stormy and hypercompetitive scenarios, companies must foster innovativeness. To this end, companies must remain up to date of the manifold market changes, fluctuations, and tendencies that are persistently arising. This objective involves a customer orientation, and a green orientation strategy. In this line, the ultimate aim of developing a green product/service innovation strategy deals with enhancing the firm's survival and performance (Laforet, 2009).

The increasing societal demands compel companies to integrate sustainability topics into their regular activity so that companies can reach their social, environmental, and economic goals. Two major driving forces promote green management (Chen, 2008): (1) the international

set of norms and regulations concerning environmental protection, and (2) the consumers' environmental consciousness (Chen, Lai, & Wen, 2006). Whatever are the goals that lead companies to undertake environmental management – complying with environmental laws and regulations, becoming more competitive, gaining legitimacy, etc. – integrating environmental sustainability issues into business strategy and greening the innovation process are becoming a strategic opportunity for companies (Porter & Reinhardt, 2007). Hence, following several studies, environmental management and green practices present a narrow linkage to firm innovativeness (Aragón-Correa, 1998; Pérez-Valls, Céspedes-Lorente, & Moreno-García, 2015).

In this sense, companies that are pioneers on green innovation strategies might be able to reach and sustain competitive advantages. Thus, successful green innovation performance (GIP) helps companies to achieve greater efficiency as well as to establish and strengthen their core competences and to enhance their green image. Consequently, all these actions may eventually enable companies to reach superior performance and higher profitability (Chen, 2008).

Literature on the capabilities-based view and the knowledge-creating view of the firm focuses on both ordinary capabilities (OC) and dynamic capabilities (DC) as the most valuable antecedents that provide sustainable competitive advantage, and on interaction as a key component for the access, attainment and development of new knowledge that is necessary to improve the results of innovation. Interaction may take place within a firm and between firms and other organizations. Firms use different networking mechanisms to access knowledge outside their frontiers. Extensive literature discusses various organizational features corresponding to different mechanisms that facilitate knowledge flows among different actors and enable relational learning activities.

\* Corresponding author.

E-mail addresses: gemalbmor@alum.us.es (G. Albort-Morant), aleal@us.es (A. Leal-Millán), gabi@us.es (G. Cepeda-Carrión).

This situation is even more critical in natural-resources intensive sectors, such as the automotive industry, which causes an important environmental impact. For this reason, firms must consider any measure aiming at improving those sectors' environmental efficiency and at enhancing the GIP. However, little empirical research addresses the question of how different capabilities, as antecedents, affect the improvement of GIP. This study focuses on the automotive sector.

This study examines the extent to which the existing internal capabilities of firms and their interaction with external sources of knowledge – enhancement relationship learning – affect their level of GIP. Section 2 reviews the theoretical framework that forms the basis of this empirical analysis. Section 3 presents an empirical analysis building on information about 112 firms from the Spanish automotive components' manufacturing sector. Finally, Section 4 summarizes the results and discusses the main points arising from the analysis. The results confirm the positive role on GIP of both the direct effect and indirect effect of firm capabilities. Furthermore, the findings support that DC influence GIP by reconfiguring relationship-learning capabilities and accessing knowledge outside firms' boundaries.

## 2. Theoretical background

### 2.1. GIP

In the environmental era, firms should integrate ideas to protect the environment. For this reason, green innovation is essential for firm's business management. An efficient management can create value, leverage a competitive advantage, and increase the firm's performance (Chang & Chen, 2013).

Innovation is an important way to mitigate or avoid environmental damage. Green technologies provide two main benefits for organizations: the commercial rewards from creating environmentally sustainable products, and the financial benefits that can increase competitiveness. Customers around the world want and expect to purchase ever more environmentally friendly products and services. Certainly, green innovation is a strategic need for firms which offers a great chance for meeting customers' demands without harming the ecosystem.

Historically, firms have seen investing in eco-friendly behaviors as an excessive investment, but today's strict ecological rules and the prevalence of environmentalism are changing competitive strategies, policies, and patterns for firms (Porter & Reinhardt, 2007). The 'green' label is an incentive for continuous innovation, creating new market opportunities for firms to satisfy new consumer demands and thus create value and improve performance.

Green innovation can consist of either green products or green processes. Green innovation comprises innovation in technologies for energy saving, pollution prevention, waste recycling, green product design, and corporate environmental management (Chen et al., 2006).

### 2.2. The link between dynamic capabilities, relationship learning – as ordinary capabilities – and the firm's GIP

In line with the resource-based view (RBV), the differences in performance between companies owe to their specific sets of resources and capabilities. Therefore, such resources and capabilities are the source of competitive advantage (Helfat & Peteraf, 2003). The RBV assumes the heterogeneous distribution of resources and capabilities among companies and its maintenance over time (Ambrosini & Bowman, 2009).

At the current period of widespread crisis, with a significant shortage of resources in all sectors, organizations need more than ever to be able to distribute their available resources among the alternatives, to try to adapt in the best way and as quickly as possible to the turbulence of the environment (Prahalad & Ramaswamy, 2004). Consequently, organizations must develop DC to evolve, advance, grow, adapt, and, ultimately, survive. Such DC development allows companies to sit

some firm foundations that support their strategy. Nonetheless, although DC's outlook follows the RBV (Makadok, 2001), and RBV highlights resource combinations selection, DC emphasizes resource regeneration. This way, DC are the capacity of the firm to reconfigure resources into new combinations of ordinary – or operational – capabilities (OC).

The literature offers numerous definitions of DC. The concept of DC has undergone a terminological evolution thanks to the contributions and disagreements of different authors. Teece, Pisano, and Shuen (1997) first coin this concept and define DC as firms' ability to integrate, build, and reconfigure internal and external competencies to manage rapidly changing environments. Cepeda and Vera (2007) and Zahra, Sapienza, and Davidsson (2006) refer to DC as the processes to reconfigure a firm's resources and operational routines in the manner that its principal decision-makers envision and deem appropriate.

This article adopts Pavlou and El Sawy's (2011, p. 243) conceptualization. Extending earlier works by Teece (2007) (sensing the environment to seize opportunities and reconfigure assets), and Teece et al. (1997) (reconfiguring, learning, integrating, and coordinating), these authors propose a framework that contains four DC that function as tools that enable the reconfiguration of existing operational capabilities: (1) sensing, (2) learning, (3) integration, and (4) coordination capabilities.

Several authors propose the need to differentiate among types of processes and routines available in firms. Thus, Zollo and Winter (2002) and Winter (2003) distinguish between ordinary – operational – (zero-order) and dynamic (first-order) capabilities. Ordinary capabilities focus on the operational working of the firm, including both staff and line activities; these are "how we earn a living now" capabilities. Dynamic capabilities relate to the transformation of ordinary capabilities causing changes in the firm's products or production processes, or create new ordinary capabilities.

Karna, Richter, and Riesenkaempff (2015) distinguish five categories of ordinary capabilities: (1) operations/processes, (2) product/service/quality, (3) resources/assets, (4) organization/structure, and (5) customer/supplier relationships. This study uses customer/supplier relationships because of the importance that the innovation literature grants to knowledge sharing and relational learning activities.

When firms share information and knowledge with customers and suppliers, they enhance their knowledge base, capabilities, and competitiveness through relationship-level learning. This framework broadly adopts the meaning from Cheung, Myers, and Mentzer (2011) and the original definition from Selnes and Sallis (2003, p. 86) of the relationship-learning activities:

[Relationship learning activities are] "an ongoing joint activity between the customer and the supplier organizations directed at sharing information, making sense of information, and integrating acquired information into a shared relationship-domain-specific memory to improve the range or likelihood of potential relationship-domain-specific behavior".

Relationship learning is thus a process to increase future behavior in a relationship. This study proposes that relationships vary in terms of their relationship learning capabilities (RLC), and thus some relationships perform better because they have developed appropriate learning mechanisms. Following Selnes and Sallis (2003), this study's research model presents RLC as a construct comprising three ordinary capabilities: (1) information sharing capability (ISC), (2) joint sense-making capability (JSC), and (3) knowledge integration capability (KIC).

The foundation of cooperative nets between companies and stakeholders is critical in innovation progress (Bossink, 2002). Through alliances and relationships, organizations can effectively innovate by sharing complementary assets and skills (Powell, 1998). Organizations can consequently create partnerships, joint ventures, inter-firm nets, and R&D conglomerates (Doz, Oik, & Smith Ring, 2000). This idea is the basis of Chesbrough's (2003) open innovation theory, which argues that companies can combine external and internal ideas and market

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