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EXTENDED ABSTRACT

Title: Non linear effects of the environmental strategies in the context of an industrial cluster.

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Abstract:

In the current business scenario, the reduction of environmental negative affects caused by the economic activity is one of the key challenges. Market pressures, adjustments in the environmental regulation by governmental agencies or modifications on the corporate social responsibility dynamics are reasons frequently mentioned in order to justify companies start to proactively act on environmental sustainability (Bird et al., 2007, Albort-Morant et al., 2016). However, adopting the proactive environmental strategy may play a crucial role as a determinant of companies' competitive advantages (Nerurkar, 2015).

Different theoretical perspectives have been used on the discussion about implications of the proactive environmental strategies for companies, in the previous research. In particular, the Resource-Based View (RBV) approach is broadly widespread in the research on links between proactive environmental strategy and firm performance (Ryszko, 2016). In fact, the literature on RBV can help inform research on the resources and capabilities needed on sustainable enterprise. In any case, there is no single relationship between environmental proactivity and business performance, since this

association relies on the portfolio of practices in which this proactivity is based (González-Benito and González-Benito, 2016).

Having highlighted the importance of resources and capabilities in sustainability, we now draw together the literature on industrial clusters (Porter, 1990). Being in the same place, companies and organizations take advantage from external knowledge exchanges, since knowledge spillovers are geographically localized and locally bound (Krugman 1991; Jaffe et al. 1993; Alcacer and Chung 2007). According to the cluster literature, companies find reasons to be close to each other in order to gain common external resources and capabilities (among others. Folta et al., 2006; McCann and Folta, 2008). Crossing both views of the sustainability perspectives we claim the need of a distinct analysis of the proactive strategies for the clustered organizations.

Under the aforementioned theoretical framework, one primarily research question challenge for researchers is to know whether it can be established a significant association between competitive advantages and opportunities and the proactive environmental strategies (Gonzalez-Benito & Gonzalez-Benito, 2005).

This research aims to analyze how the environmental proactive strategies influence on the company's performance, under the specific conditions of the industrial cluster context. In our opinion, the particular interorganizational relations ongoing in a cluster advises to formulate specific theoretical premises to apply the RBV on this particular. Moreover, we suggest that beyond a linear relationship between proactive strategies and cluster relationships with company performance they describe an inverted U-shaped curvilinear relationship.

Our study of the Spanish ceramic tile cluster provides evidence on the strategic implications of holding a proactive environmental position in an industrial cluster. We, therefore, contribute to research at the intersection of clusters, and strategy by reconciling potential conflicting results with regard to the strategic benefits of a firm's proactive strategy.

HYPOTHESES

Environmental proactivity green performance.

We consider proactive environmental strategies as the voluntary actions to cut the negative environmental impact of business activities and further gain a competitive advantage of the company (Gonzalez-Benito & Gonzalez-Benito, 2005). Agreeing with the previous research, we argue that proactivity in the environmental strategies can lead to potential competitive advantage.

Leonidou et al. 2015 and Molina-Azorín et al. 2015 among others have already investigated whether the proactive environmental strategy can become some specific differentiation competitive advantages. In the same vein Sharma & Vredenburg, 1998; Aragón-Correa & Rubio-López, 2007 argued that proactive environmental strategy can leverage its unique capabilities that in turn enhance the firm's competitive advantage. Differentiation advantage can be identified as some positive attributes such a distinctive image and position, higher quality or better customer value and innovation compared to those of rivals (Molina-Azorín et al. 2015).

In fact, it can be argued that improvements in firms' resources and capabilities toward environmental strategies will likely improve the quality of their products towards more environmentally alternatives Bıçakcıoğlu, 2018), and in consequences gaining differentiation competitive advantages respect to the competitors (Leonidou et al., 2015; Zeriti, et al., 2014). Moreover, firms often achieve all categories of environmental certificates which help these firms to differentiate themselves in their markets by pursuing a proactive environmental strategy Aragón-Correa, J.A.; Rubio-López,2007; Blomquist et al., 2015).

We go further suggesting that assuming a positive association between a proactive environmental strategy and obtaining competitive advantages, this positive relationship is no longer optimal after a turning point beyond which additional intensity in these proactive strategies no longer generate positive affect on the contrary become negative for the company performance,

H1 There is a non-linear (inverted U-shaped) relationship between proactive environmental strategy and competitive advantage for the clustered firms.

External relationships and green performance.

Reviewing previous literature environmental performance has been associated more and more to higher levels of cooperation with external partners (De Marchi, 2012; Del Río et al., 2011). In fact, the community stakeholders also prove to be a driving force of environmental performance (Kassinis & Vafeas, 2006; Stone, Joseph, & Blodgett, 2004).

One of reasons argued for this association was the higher levels of novelty, uncertainty and variety with respect to the traditional innovative strategies (Cainelli et al., 2015). For instance, the absence of accepted specific technological solutions standards and of measures to evaluate the environmental performance. In addition, the most of the times these green strategies involve changes in all production process from raw materials to logistical which implies coordination and that require a systemic approach (Carrillo-Hermosilla et al., 2010). In fact, environment strategies benefit from sharing complementary knowledge, share risks to respond to stakeholders pressures (Niesten and Jolink, 2020). To sum up ongoing external relationships to develop environmental innovations allows to gain a number of benefits such as improving reputation, risk management, legitimacy other than achieving important environmental performance (Watson et al., 2018). Firms might participate in networks of relations with different types of external partners. Each partner may offers specific knowledge and technological options, and playing different roles in the process of the environmental strategies adopting (Niesten and Jolink, 2020; Melander, 2018; Watson et al., 2018). However, association is positive up to a point of inflection from which additional increases in the intensity of the relationships do not give parallel increases in the results of innovation but can give negative effects (Molina-Morales &Martinez-Fernandez, 2009). The relationship between external relationships and environmental performance is indeed curvilinear, similarly to what emerges in the general innovation literature (Laursen & Salter, 2006).

Accordingly, to above argumentation we formulate the following hypothesis.

H2 There is a non-linear (inverted U-shaped) relationship between environmentally related relationships and the competitive advantage for the clustered firms.

EMPIRICAL SETTING

The empirical study was based in a sample of firms belonging to the Spanish ceramic cluster located in the province of Castellón. This cluster is dedicated to the production of ceramic wall and floor tiles as end products, but also special pieces and auxiliary activities such as the production of frits, glazes, pigments and inks, chemical additives, and raw materials.

This case is appropriate for our study as it has been identified and has received a lot of attention from cluster researchers (Albors-Garrigs & Hervas-Oliver, 2019; del-Corte-Lora, et al., 2016 Exposito-Langa, et al. 2011; Molina-Morales, et al., 2016)

Data Collection

The primary data for this study were collected from the Spanish ceramic cluster at the firm level using an online questionnaire using the platform *Survey Monkey*. The survey was carried out between September 2019 and March 2020 and was directed towards a universe of 189 companies operating in the different cluster activities. We collected a total of 105 questionnaires, 34 of these questionnaires were discarded as they were incomplete. Eventually, a total of 71 questionnaires remained complete and valid.

Variables

Dependent variable

Competitive advantage: To collect the economic and competitive advantage results, we used 9 items accounting for different indicators of economic and competitive advantage. The internal consistency of the items was excellent as the Cronbach's alpha coefficient was 0.900.

Independent variables

Proactive environmental strategy (PES): 9 items have been used to assess the proactivity in the environmental strategy. The internal consistency of the items was excellent, as the Cronbach's alpha coefficient was 0.848.

Environmentally related relationships (ERR): to assess the effect of the relationships in the performance of the company, we asked the company to indicate the level of

collaboration with 8 different kinds of institutions to set up a business model focused on sustainability and/or circular economy. The internal consistency of the items was excellent, as the Cronbach's alpha coefficient was 0.858.

Control Variables

Size: The firm's size is measured by the natural logarithm of the number of employees in the firm. Taking the logarithm reduces the effect of the skewness of the firm size distribution. Following Acs and Audretsch (1991).

Subsector: We asked the respondents their main activity (tile producers, enamels and glasses, additives, machinery, or other activities). We have used this information to create a dummy control variable where 1 means that they are final (tile) producers and 0 that they are not.

Analysis techniques

To test the hypotheses two different quadratic regressions were run in SPSS. In the first quadratic regression we used proactive environmental strategy as independent variable. In the second quadratic regression the independent variable representing environmentally related relationships was used.

RESULTS

We tested hypothesis 1 to check the existence of a non-linear relationship between proactive environmental strategy and competitive advantages for clustered firms. Results seem to confirm the significant relationship adjusted to an inverted U-shape. The regression coefficient b_2 is negative thereby indicating an inverted U-shape relationship. Likewise, we tested a possible inverted U-shape relationship between Environmentally Related Relationships and obtaining competitive advantages for clustered firms as stated in hypothesis 2. Results also may confirm the existence of a nonlinear inverted U-shaped relationship being b_2 a negative coefficient. In both cases, the models are significant. This means that increasing values of the variables PES and ERR run parallel to the increasing values for competitive advantages, although at a certain point additional increases of the independent variables are negatively associated

with obtaining competitive advantages. Figures 1 and 2 show the dispersion graphs of models 3 and 4 where the effect of the inverted U-shape effect can be better seen.

Figure 1. Model 3 dispersion graph

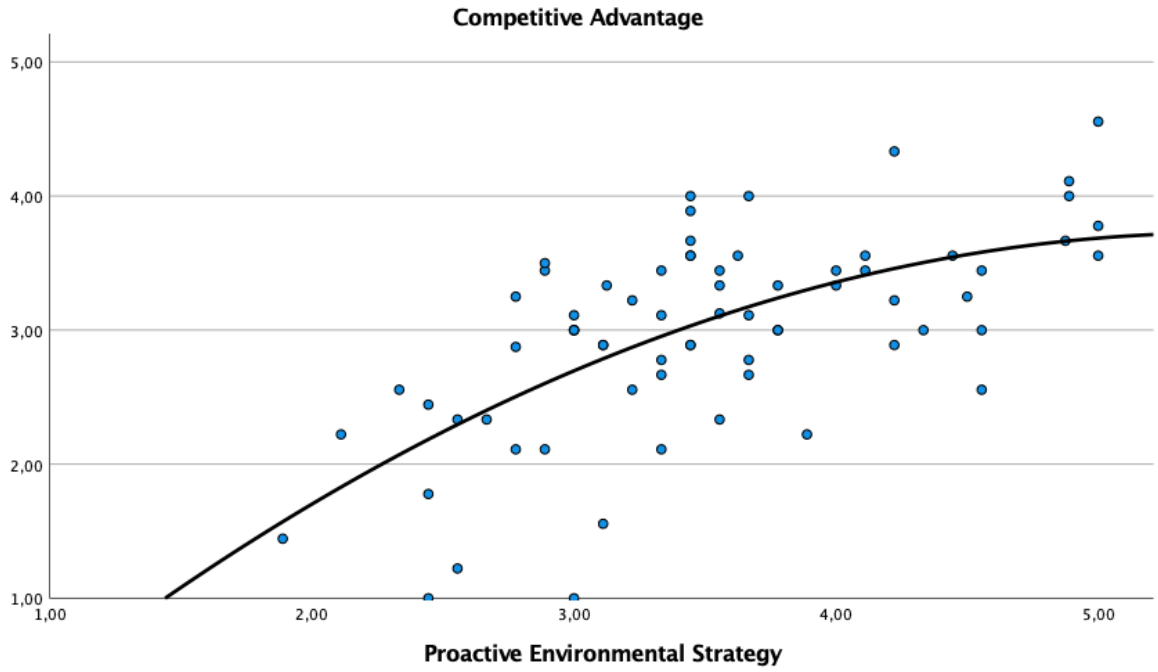
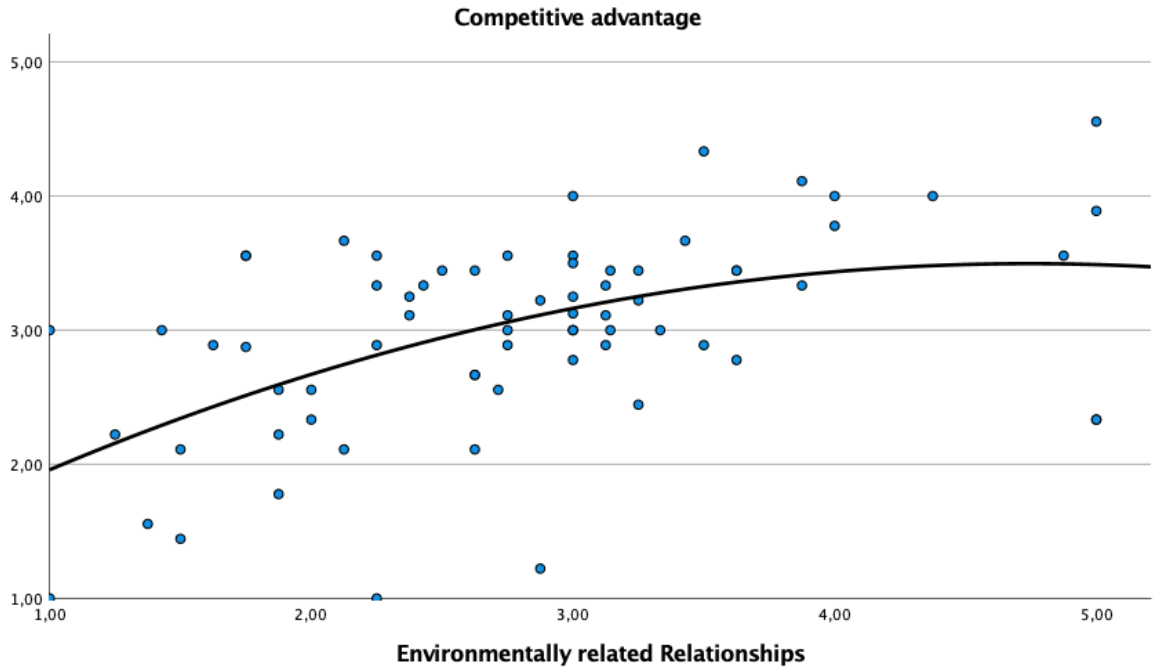


Figure 2. Model 4 dispersion graph.



Our results contribute to the existing literature about green innovation and the particular firm agglomerations such as industrial districts or clusters. Indeed, the implications of the aforementioned research outputs supply interesting food for thoughts to both policymakers and practitioners.

Keywords: *Cluster, Environmental Proactivity, Relationships*
JEL codes: Q56, R11