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Asymmetric modeling of organizational innovation

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ABSTRACT

This study revisits the theory, data, and analysis in Hervas-Oliver and Sempere-Ripoll (2014) and applies fuzzy-set qualitative comparative analysis (fs/QCA) to organizational innovation effects and the influence on them of technological innovations. The influence of technological innovations (product and process) on organizational innovation and its effects is an inconclusive debate. Using fuzzy set comparative qualitative analysis (fs/QCA) on Hervas-Oliver and Sempere-Ripoll's (2014) 9,369 organizational innovators, the present study offers more complex and nuanced antecedent conditions relating to organizational innovation beyond Hervas-Oliver and Sempere-Ripoll (2014) analysis based on traditional multiple regression symmetric method. This present study finds different sufficient configurations or combinations of causal antecedent conditions which improve the importance of organizational innovation effects. New evidence from fs/QCA extends our knowledge about the impact of technological innovation on the importance of organizational innovation effects, correcting and extending previous incomplete and myopic results based on symmetric (regression) methods.

1. Introduction

This study revisits the theory, data, and analysis presented in Hervas-Oliver and Sempere-Ripoll (2015). In doing so, this article responds to the call made by Woodside (2013a; 2013b) to move beyond symmetric thinking toward the use of a promising asymmetric research paradigm which uses algorithms. This new approach echoes Gigerenzer's (1991) thesis of the non-neutrality of scientific tools associated with thinking and theory crafting. In particular, this study replicates the provocative question of Hervas-Oliver and Sempere-Ripoll (2015) about organizational innovation, using their own data, which has been less studied by organizational scholars: does the introduction of technological (product and process) innovation influence the performance of organizational innovations? They use symmetric test only, through multiple regression analysis, a methodological strategy over simplistic, avoiding a complex and more nuanced view of the data. On the contrary, the use in the present study of fuzzy set comparative analysis (fs/QCA) allows us to avoid the constraints and empirical illusions characteristic of multiple regression analysis and symmetric methods when responding to the question posit in Hervas-Oliver and Sempere-Ripoll (2015), which using fuzzy terms turns to be: what configurations of technological innovations and other organizational variables lead to the improvement of organizational innovation effects? The present study's goal consists of answering that question by using asymmetric modeling, assessing thus the Hervas-Oliver and Sempere-Ripoll (2015) findings and theoretical implications.

Contrary to what Hervas-Oliver and Sempere-Ripoll (2015) posit, using traditional symmetric methods, this study proposes that the improvement of the importance of organizational innovation effects does not depend on the individual introduction of technological innovation, or other organizational variables, but on particular configurations or combinations of them. Set theory methods such as fs/QCA assume that the influence of attributes or actions (technological innovations and other organizational variables) on a specific outcome (the importance of organizational innovation effects) depends on how the attributes or antecedent conditions are combined, rather than on the levels of the individual attributes per se.

As Hervas-Oliver and Sempere-Ripoll (2015) posits, despite the Oslo Manual's (2005) classification of innovation into four types (product, process, organizational, and marketing innovations), to date research does not examine innovation types, interrelationships and their combined impact on organizational innovation performance (e.g. Damanpour, 2014). The few works analyzing those interrelationships focus on technological performance, omitting its influence on organizational innovation performance (e.g. Battisti & Stoneman, 2010; Evangelista & Vezzani, 2010).

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Following this chain of thought, Hervas-Oliver and Sempere-Ripoll (2015) address this subject and disentangle the specific impacts on the implementation of organizational innovation that result from the introduction of either a technological product innovation or a technological process innovation. Hervas-Oliver and Sempere-Ripoll (2015) propose that the introduction of technological process innovation relates positively to the importance of organizational innovation effects, and that the introduction of product innovations does not increase the importance of organizational innovation effects. Using data from the CIS (Community of Innovation Survey, Eurostat) their study tests the two hypothesis, finding partially statistical significant support for them.

The present study utilizes Hervas-Oliver and Sempere-Ripoll (2015) data and fuzzy set comparative qualitative analysis (fs/QCA) to go beyond the constraints that multiple regression analysis imposes (see Woodside, 2013a, 2013b; Woodside, 2014; Woodside & Zhang, 2012) in order to respond to the above research question, and in doing so contributes to the organizational innovation literature by providing new evidence based on asymmetric modeling. In addition, this paper contributes to the fs/QCA methodology by providing a comparison of fs/QCA results with comparative qualitative analysis (QCA) in order to show the incremental evidence or insight provided by fs/QCA.

Fs/QCA is a set-theoretic method that understands cases as configurations of causes and conditions, rather than treating each independent variable as analytically distinct and separate from the rest. The method empirically examines the relationships between the outcome of interest (organizational innovation effects in our case) and all possible combinations (high/low or absent) of its predictors (technological innovations and other organizational variables).

Our study responds to the existing limitations of Hervas-Oliver and Sempere-Ripoll (2015) of employing a symmetric-multiple regression-analysis, the dominant logic used in management related topics. In doing so, this work posits that the current symmetric-based dominant logic is less informative and less theoretically useful than an alternative logic based on asymmetric tests (McClelland, 1998; Woodside, 2014). Going beyond the net effects of the main and interaction terms in symmetric tests, this paper focuses on fs/QCA insights into the influence of technological innovations on organizational innovations. This provides richer rewards that come from using conventional regression analysis techniques. The use of fs/QCA captures the complexities underlying managers' decisions to adopt technological innovations, as well as their impact on organizational innovation effects. Our findings include complex and nuanced insights into the relationship between combinations of antecedent conditions and the importance of organizational innovation effects.

Our study contributes to management theory in three ways. First, it introduces a new approach for assessing antecedent conditions of organizational innovation effects. By employing fs/QCA, evidence about organizational innovation and its effects, and the influence on those effects of technological innovation, does not suffer the limitations that occur when using the dominant conventional symmetric tests in the conversation (e.g. Battisti & Iona, 2009; Mol & Birkinshaw, 2009). Thereby, we are able to bring additional and provocative insights into the theoretical realm and thus expand theory. The contribution of the present study is in demonstrating an alternative perspective that leads to different approaches to disentangle the antecedent conditions of organizational innovation by demonstrating that the application of fs/QCA explains better complexity and provides alternative insights to the topic. Second, it contributes to assisting managers and practitioners by identifying when a combination of specific technological innovations and other managerial decisions increases or reduces the importance of organizational innovation effects, and so offers alternative strategies or actions for improving organizational innovation effects. Third, this study contributes by increasing the application of the new logic of asymmetric methods in management sub-fields (Chung & Woodside, 2011; Fiss, 2007; Ordanini, Parasuraman, & Rubera, 2014; Ragin, 2008; Woodside, 2013a, 2013b; Woodside, 2014; Woodside & Zhang, 2012).

The paper is organized as follows: after the Introduction, section two presents a literature review and a summary of the revisited paper, namely Hervas-Oliver and Sempere-Ripoll (2015); section three describes the fs/QCA methodology and the empirical study; the results are presented in section four; and in section five, conclusions and their implications are discussed.

2. Hervas-Oliver and Sempere-Ripoll's findings and conclusions

Hervas-Oliver and Sempere-Ripoll (2015) posit that product and process technological innovations impact differently on organizational innovation (Edquist, Hommen, & McKelvey, 2001; Hollen, Den Bosch, Frans, & Volberda, 2013). Their study argues that the rationale for the extra gains from the integration of technological and organizational innovations is rooted in the strategic management perspective's resource-based view of the firm (RBV) (e.g. Barney, 1991; Peteraf, 1993), through which it can be understood that joint adoption permits the integration of diverse assets and the construction of a consistent system of interrelated activities which mutually reinforce one another (Porter, 1996; Rivkin, 2000; Siggelkow, 2001). Also, they claim that the economics mainstream offers a similar explanation in the complementarities approach. Milgrom and Roberts (1995: 81) refer to "complements" as a relation among groups of activities, stating that "…if the levels of any subset of activities are increased, then the marginal return to all of the remaining activities rises." Thus, organizational and technological *process* innovation capabilities usually reinforce one another (Hollen et al., 2013), while in contrast, it is not necessary for technological *product* innovations to be introduced at the same time, and in line with, organizational innovations. Hervas-Oliver and Sempere-Ripoll's (2015) main findings include regressions of each antecedent condition on organizational innovation. Results suggest that the joint adoption of new technological processes and organizational innovations produces a substantial benefit that would be lost if each were introduced separately. Hervas-Oliver and Sempere-Ripoll (2015) results confirm their hypotheses related to process innovation and partially confirm those referred to product innovations: the introduction of technological process innovation leads to more important organizational innovation effects; the introduction of technological product innovation does not lead to more important organizational innovation effects. In fact, the introduction of product innovation diminishes the importance of organizational innovation effects.

As Hervas-Oliver and Sempere-Ripoll (2015) conclude, the introduction of technological process innovation relates positively to the importance of organizational innovation effects. The reason for this close interrelationship between technological and organizational innovation is that if it be assumed that most process innovations are production and efficiency oriented (Damanpour, 2014; Hollen et al., 2013; Volberda, Van Den Bosch, & Heij, 2013; Wheelwright & Clark, 1992) then the application of new technologies provides an opportunity for production re-structuring, but outcomes will depend on how the new technological processes are integrated with the way an enterprise is organized (Damanpour, 1991; Ettlie & Reza, 1992; Hollen et al., 2013). In contrast, product innovations mainly relate to market objectives, concluding that the introduction of product innovations does not increase but diminishes the importance of organizational innovation effects. They also comment that the rationale for this second result is that technological product innovation is generally aimed at improving a product or promoting access to a new market, whereas organizational innovations are aimed at achieving internal objectives and efficiencies (Boer & During, 2001).

Overall, and after the examination of these results, their study proposes net effects of product and process innovation on organizational innovation, finding positive effects from process innovation and no effect from product. It seems that the analysis predicting net effects using regressions is too simplistic, as it hides underlying complexity in the data. The Hervas-Oliver and Sempere-Ripoll (2015) method based