

Treble Innovation Firms: opening innovation frontiers in manufacturing

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Abstract

Manufacturing firms can develop three forms of innovation: product, process, and service. Previous research has mostly analysed service innovation in isolation, whilst this study aims at comparing profit position of firms adopting simultaneously all technological innovations (treble innovation firms). Based on the Resource-Based View (RBV) premises, we argue that treble innovation firms can build on innovation cross-fertilization to develop valuable, rare and inimitable resources that translates in to a higher profitability. Furthermore, consistently with RBV, we also expect treble innovation firms to benefit more from open innovation because they can save considerably more in internal R&D development whilst keeping a differentiated offer. We test our hypotheses on a random and representative survey to 423 Spanish manufacturing firms, for which 22% are treble innovators. Our results support our hypotheses. Hence, we find causal evidence supporting that treble innovation firms obtain supernormal profits. Our results also confirm that open innovation positively moderates the relationship between treble innovation firms and performance, but this moderation is significant only when internal R&D expenditures are low.

Keywords: Open Innovation, Service Innovation, Resource-Based View, Manufacturing firms, Returns on Sales.

Extended Summary

Product companies are using emergent technologies from the digital world to offer a wide range of innovations and obtain greater value from the product throughout its lifespan (Vendrell-Herrero et al., 2017; Opazo-Basáez et al., 2018). Such innovations do not only entail product and process innovations, but also service innovations that lend the firm considerable extra capacity to create value (Bustinza et al., 2018). An illustrative example of this is the case of Apple. The firm's strategy can now no longer be simply summarised as one

that optimises to the utmost the manufacture of products and processes with its emblematic slogan “Designed by Apple in California, Assembled in China”. Rather, it is developing a whole range of cloud-based services that not only enable there to be greater interactivity with the customer, but that these in turn relaunch the intrinsic value of its products. Recent data refers to the fact that the division of services is the only thing that is keeping the level of company sales afloat¹.

The example of Apple merely illustrates the move on the part of manufacturers towards a broader outlook on innovation by simultaneously incorporating process, product and service innovations. This paper contributes to innovation management literature by identifying these types of firm and classifying them as treble innovation firms.

On an increasingly competitive and globalised market, these firms are becoming more and more common—in a representative sample of Spanish manufacturers, we found that approximately one in every five medium-sized enterprises may be classified as treble innovation firms. The growing popularity of these types of firm is significant because it reinforces the notion that these different types of innovation complement each other – something that has been studied with only two types of innovation (i.e. Visnjic et al., 2016), albeit not one that has been taken into consideration in the case of three simultaneous innovations. Hence, this study constitutes a response to the call for those that combine the synchronised adoption of technological and innovation management (Alexiev et al., 2018).

This study uses the Resource-Based View (RBV) of the firm as a theoretical framework – this theory determines the fact that the firm needs to control and exploit limited, inimitable and valuable resources in order to increase its competitive advantage (Teece, 2006). Accordingly, pursuing this theory and evolutionary view of innovation in which intangible resources are deemed complementary to each other (Hannola et al., 2018), we hypothesize that treble innovation firms are more profitable than firms that already have product and process innovations, in an attempt to evaluate the marginal benefit of the most recent evolutionary step in the innovation process in manufacturing industries. In accordance with our estimations using matching techniques, manufacturers with product, process and service innovations at their disposal retain approximately eleven out of every hundred Euros gained in turnover, whereas firms featuring product and process innovation may retain only around five out of every hundred Euros. This six Euro difference per every hundred Euros is both

¹ Apple shifts focus to services business. Available at <https://www.ft.com/content/68e80a44-9b28-11e6-b8c6-568a43813464>

statistically significant and robust in terms of various specifications, including doubly robust estimations.

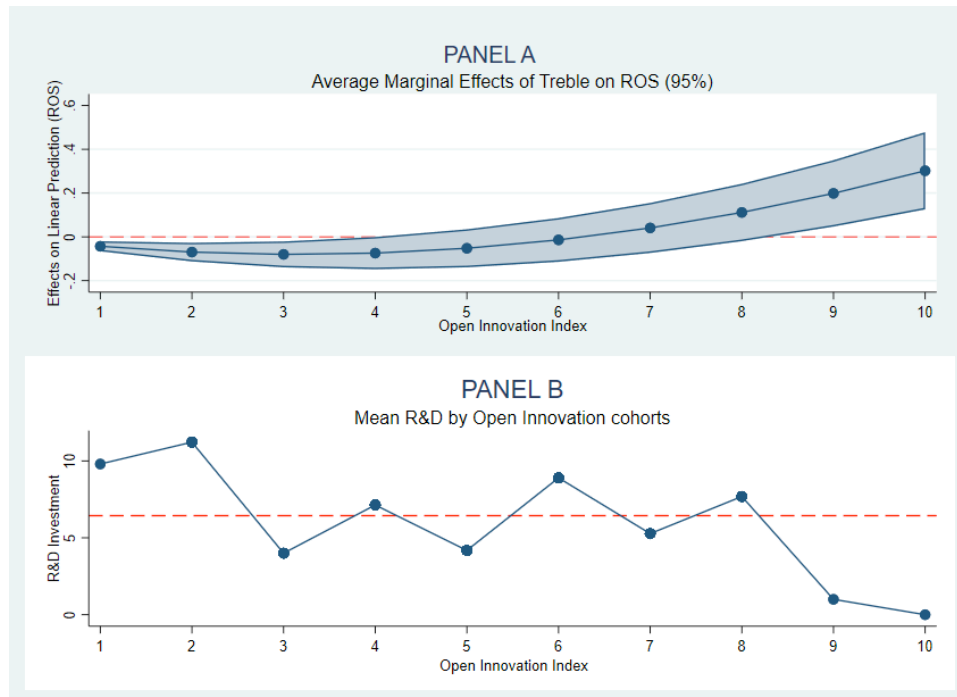
However, the fact should be taken into account that medium-sized firms have limited resources at their disposal (De Massis et al., 2018), and it is therefore difficult to envisage how they might simultaneously develop the three types of innovation internally. In this respect, we argue that such firms somehow need to gain knowledge from external organisations belonging to the same production chain as is the case with suppliers, competitors and customers (Tsinopoulos et al., 2018). In other words, treble innovation firms have greater incentive to implement open innovation systems that may enable them to access such knowledge (Mowery, 2009).

At first glance, there would appear to be an inconsistency in using RBV while at the same time maintaining that open innovation is necessary to ensure that treble innovation firms may be profitable. When all is said and done, this theory argues that the firm needs to maintain control over its most valuable resources (Barney, 1991). Despite this apparent inconsistency, a recent formal model developed by Alexy et al. (2018) has enabled these two theoretical views to find some common ground. The conceptual model suggests that two open innovation systems will be profitable while at the same time remain in keeping with the theory based on resources and capacities only under two conditions: (i) when this entails a significant saving in terms of developing internal innovation, or (ii) when this enables those intangible resources that remain protected in the organisation to be systematically exploited. As per Figure 1 this paper is the first to validate the predictions made by Alexy et al. (2018), as it not only shows that firms with multiple resources are the ones that benefit most from open innovation, but also show that benefit is apparent only when there is a significant saving in R&D investment.

Within predictions about the theory of resources and capacities, we find that strategic resources need to be complemented so as to thus be able to increase channels for creating and gaining business value (Teece, 2006). And within this conceptual framework, the core hypothesis put forward in this work is that firms with an extensive, varied innovation portfolio may gain greater financial returns. By using an evolutionary view of innovation in manufacturing industries (Bustinza et al., 2019; Visnjic et al., 2019), this research finds substantial, robust evidence to suggest that resources that are innovatory in nature are indeed complementary. This result makes a contribution to previous evidence that compared the complementary nature of having two simultaneous innovation results in the firm (i.e. Najafi-Tavani et al. (2018) for product and process; Visnjic et al. (2016) for product and service; or

Alexiev et al. (2018) for service and management), because it adds the possibility of extending up to three types of innovation result: product, process and service, and in this respect, the results are clear.

Figure 1. The moderation role of open innovation and the relationship with R&D investment.



NOTE: To calculate Open innovation our survey collects binary information on whether the firm uses different types of external knowledge sources when developing product, process and/or service innovation. Our open innovation index equals the sum of all sources of innovation plus one ($\sum IS+1$). In that way the index has a minimum of 1 (no sources of external innovation) and a maximum of 10 (all possible sources of external innovation). The dependent variable in the analysis is Returns on Sales (ROS). The red line in Panel B denotes the mean R&D investment for treble innovation firms (6.4%).

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