

Formalized Problem-solving Practices and The Impact of Collaborations with Suppliers on Firms' Innovative Performance

Isabel Maria BodasFreitas^{ab*}, Roberto Fontana^{cd}

*Corresponding author

^aGrenoble Ecole de Management, Grenoble, France. Isabel-Maria.BODAS-FREITAS@grenoble-em.com

^bDISPEA, Politecnico di Torino, Torino, Italy. isabel.bodasdearaujofreitas@polito.it

^cDepartment of Economics and Management, University of Pavia, Pavia, Italy

^dKITeS – Bocconi University, Via Sarfatti 25, 20139, Milano, Italy. roberto.fontana@unibocconi.it

Abstract

Innovation is a multi-iterative search and problem-solving process characterized by uncertainty. This is particularly the case when industry-level knowledge is not available to map and guide a firm's innovation search (Katila and Chen, 2008). As a way of dealing with uncertainty firms tend to rely upon collaboration with external actors (Powell *et al.*, 1996; Ahuja, 2000; Cassiman and Veugelers, 2002). Collaboration with suppliers in particular enables firms to increase their pool of available resources to search and identify a variety of potential solutions, as well as to select among those the most appropriate solutions, and consequently to reduce uncertainty in the process of new products development (Clark, 1989; Clark and Fujimoto, 1991; Hoegl and Wagner, 2005).

Formalized problem solving organizational practices can also be used by firms to reduce the uncertainty associated to new product development. Some firms invest in the identification and codification of best practices on how to monitor, identify, evaluate, and select different knowledge and technological alternatives into stable formal steps and routines in order to shorten and make more efficient problem-solving activities and improve 'collective creativity' (Zollo and Winter, 2002; Hargadon and Bechkly, 2006).

Both external collaborations and the use of organizational practices affect firms' innovative performance. Prior evidence on inter-firm collaboration has shown that firms' decision to organize their sourcing activities into shared-governed organization improve their innovative performance. Specifically, collaboration with suppliers has been shown to increase product quality, market responsiveness, and to reduce lead times of new product development, (Clark, 1989; Clark and Fujimoto, 1991; Chung and Kim, 2003; Petersen *et al.*, 2005). Prior findings have also shown that the extent of the benefits depends on the technological and relational characteristics of the parts involved in the collaboration and on both the content and intensity of their relationship (Croom, 2001; Corsten and Felde, 2005; Petersen *et al.*, 2005; Hoegl and Wagner, 2005).

An extensive literature has also well documented how the impact of formalized organizational practices on innovation may vary depending on the degree of novelty of the innovation. Benner and Tushman (2002) show that formalized practices enhance firms' exploitative innovation but limit the extent of exploratory innovation. Jansen *et al.* (2006) show that centralization negatively affects exploratory innovation, and formalization enhances

exploitative innovation. While the use of formalized routines generally leads to a rapid convergence towards technological and market solutions, their use may also lead to select out too soon radically different solutions (Lazer and Friedman, 2007). Hence, the use of formalized organizational practices may facilitate or hinder the innovative benefits that firms can reap from innovation.

This literature mainly focuses on the impact of formalized organizational practices on the innovation activity and performance of the focal firm as an isolated organization. It does not consider that knowledge identified, selected, and used within the firm can also be developed in collaboration with external actors. It also neglects the broad context in which innovations are carried out as the presence of industry-level knowledge may contribute to reduce uncertainty and affect the degree of novelty of the innovation (Katila and Chen, 2008).

In the case of collaboration with customers, Foss *et al.* (2011) have shown that the use of new organizational practices, notably, intensive vertical and lateral communication, rewarding employees for sharing and acquiring knowledge, and high levels of delegation of decision rights completely mediate the contribution of customer knowledge to innovation. While this work has extended the analysis of the performance of collaborations to consider the moderating role of organizational practices, the analysis is restricted to a subset of general practices and it does not focus on specific organizational practices targeted at innovation development and problem solving.

Formalization of problems solving practices improves a firm's capability to identify, select, and integrate knowledge into new products. Evidence has highlighted how the use of specific formalized routines generally enables firms to accelerate convergence towards specific technological and market solutions. It is likely that these practices, rather than the general ones analyzed by Foss *et al.* (2011), play an important role in moderating the outcome of collaborations with suppliers. Our study looks at how formalized organizational practices *for problem solving* acts as a moderator of the impact of collaborations *with suppliers* on a firm's innovative performance. We argue that the moderating effect varies depending on whether a firm's innovation development process occurs in the presence or absence of industry-level knowledge.

Our line of argument is the following. Collaboration with suppliers for new product development provides a firm with an opportunity to increase the variety of solutions that can be considered and tested as well as to reduce uncertainty and costs related to innovation. The marginal benefits from collaboration in term of reduction of uncertainty should be the higher the lower the amount of information already available. The use of formalized problem solving practices helps firms to search and select through the variety of proposed solutions. However, the presence of problems solving practices will bias firms toward alternatives that are compatible with the solutions already tried by the focal firm or by their competitors. Within this context, the adoption of formalized problem solving practices moderates the impact of collaboration on the benefits from innovation unevenly. On the one hand, when industry-level information is available they would focus on solutions already tried by the focal firm or by their competitors. On the other hand, when industry-level information is not available as the presence of formalized problem-solving practices, by reducing the variety of alternatives too soon and limiting the use of unconventional knowledge, hinders the ability to effectively use the knowledge gained from the collaboration.

Our empirical investigation is based upon data from a sample of French manufacturing firms for which information is available in the Changements Organisationnel et Informatisation (COI) and in the European Community Innovation Survey (CIS 6) databases. The COI is a

questionnaire to French firms with more than 10 employees surveying the adoption of organizational practices and routines in the year of the survey (2006) and in the 3 preceding years (2003). CIS instead surveys firms on the determinants of their innovation activity in the three years period 2004-2006. For the purpose of our analysis, we concentrated on the sample of 1,595 manufacturing firms that have responded to both COI and CIS 6 surveys. From the CIS survey we extract information on collaboration with suppliers, and innovation performance measured by the share of turnover due to products new-to-market and products new-to-firm. From the COI survey we collect information on the firms' organizational practices that were in place before collaboration with suppliers eventually occurred. We use these measures to perform an analysis of the impact of collaboration with suppliers on the innovation performance of firms in our sample. We use Tobit regression models with robust standard errors to analyze the moderating impact of formalized problem-solving practices on the benefits that collaboration with suppliers brings to the performance of exploratory and exploitative innovation.

Our findings suggest, first, that collaboration with suppliers generally improves the innovation performance of firms, though the effect is stronger when industry-level knowledge is not available; second, that adoption of formalized problem solving practices does not improve the benefits from collaboration in the presence of industry-level knowledge; third, that adoption of formalized problem solving practices reduces the benefits from collaboration in the absence of industry-level knowledge. These findings are robust to changes in the estimation techniques, to controls for potential sources of endogeneity of collaboration with suppliers, as well as to different measures of problems solving practices.

This study makes several new contributions. First, within the context of distributed innovation, it considers the impact of collaboration with suppliers for new product development on the benefits from innovation. This complements the existing literature which focuses mainly on the role of customers and users (von Hippel, 2005; Urban and von Hippel, 1988). Second, it extends the recent contribution (Foss *et al.*, 2011) on the role of organizational practices as moderators for the role of external actors on innovation to the case of formalized problems solving practices. Third, by arguing that the moderating effect varies, it is consistent with the stream of literature that argues that the degree of novelty of innovation also depends on whether a firm's innovation development process occurs in the presence or absence of industry-level knowledge (Katila and Chen, 2008).

References

- Ahuja, G. (2000) The duality of collaboration: inducements and opportunities in the formation of interfirm linkages. *Strategic Management Journal*, 21(3), 317–343.
- Benner, M.J., Tushman M. (2002). Process Management and Technological Innovation: A Longitudinal Study of the Photography and Paint Industries. *Administrative Science Quarterly*, 47, 676-706.
- Benner, M. J., Tushman, M. L. (2003) Exploration, and Process Management: The Productivity Dilemma Revisited. *The Academy of Management Review*, 28(2), 238-256.
- Cassiman, B., Veugelers, R., (2002). R&D cooperation and spillovers: some empirical evidence from Belgium. *American Economic Review*, 92, 1169–1184.
- Chung, S., Kim, G. M. (2003). Performance effects of partnership between manufacturers and suppliers for new product development: the supplier's standpoint. *Research Policy*, 32, 587–603.

- Clark, K.B. (1989). Project scope and project performance: the effect of parts strategy and supplier involvement on product development. *Management Science*, 35, 1247–1263.
- Clark, K.B., Fujimoto, T. (1991). *Product development performance: strategy, organization, management in the world auto industry*. Harvard Business School Press, Boston, MA.
- Corsten, D., Felde, J., (2005). Exploring the performance effects of key-supplier collaboration: An empirical investigation into Swiss buyer-supplier relationships. *International Journal of Physical Distribution & Logistics Management*, 35(6), 445 – 461.
- Croom, S. R. (2001). The dyadic capabilities concept: examining the processes of key supplier involvement in collaborative product development. *European Journal of Purchasing & Supply Management*, 7 (1), 29–37.
- Foss, N.J., Laursen, K., Pedersen, T. (2011) Linking Customer Interaction and Innovation: The Mediating Role of New Organizational Practices. *Organization Science*, 22(4), 980–999.
- Hargadon, A. B.; Bechky, B. A. (2006). When Collections of Creatives Become Creative Collectives: A Field Study of Problem Solving at Work. *Organization Science*, 17(4), 484-500.
- Hoegl, M., and Wagner, S.M. (2005).Buyer-Supplier Collaboration in Product Development Projects.*Journal of Management*, 31(4), 530-548.
- Jansen, J.J.P., van den Bosch, F.A.J. andVolberda, H.W. (2006). Exploratory innovation, exploitative innovation, and performance, effects of organizational antecedents and environmental moderators.*Management Science*, 552(11): 1661-1674.
- Katila, R., and Chen, E.L. (2008). Effects of Search Timing on Innovation: The Value of Not Being in Sync with Rivals. *Administrative Science Quarterly*, 53, 593–625.
- Lazer, D., and Friedman, A. (2007).The network structure of exploration and exploitation.*Administrative Science Quarterly*, 52, 667–694.
- Petersen, K. J., Handfield, R. B.; Ragatz, G. L. (2005). Supplier integration into new product development: coordinating product, process and supply chain design. *Journal of Operations Management*, 23, 371–388.
- Powell, W., Koput, K.W. and Smith-Doerr, L. (1996) Interorganizational Collaboration and the Locus of Innovation: Networks of Learning in Biotechnology. *Administrative Science Quarterly*, 41(1), 116-145.
- Zollo, M. and Singh, H. (2004). Deliberate learning in corporate acquisitions: Post-acquisition strategies and integration capability in US bank mergers. *Strategic Management Journal*, 25, 1233–1256.