

# How Do Non-Technological Shocks Affect Interfirm Collaboration?

**Leonardo Corbo**

*Catholic University of Portugal*

## *Abstract*

*Shocks generate high uncertainty creating the need for firms to search for solutions to cope with the changed business landscape. One such response is the creation of new partnerships. Yet, do all shocks affect the interorganizational responses that follow equally? This article proposes that distinguishing between technological and non-technological shocks can be a useful lens to look at how interfirm collaboration changes in the face of a shock. Using the September 11, 2001 terrorist attacks as an illustrative example of non-technological shock, the authors describe how it affected collaboration in the air transport industry.*

## **Distinguishing between non-technological and technological shocks**

The expression “uncertainty is the new normal” is pervasive in our society. It reflects the increasing amount of unpredictability that organizations and their people deal with on a daily basis. Yet, the majority of this uncertainty can be labeled as “comfortable uncertainty” which is a bearable amount of unpredictability that managers can cope with without needing to significantly alter established routines and practices within their organization. This type of uncertainty develops in a relatively linear fashion as industries evolve and can be generated by changes in consumer demand as a product moves from one stage to another of its life cycle or the introduction of an updated version of a pre-existing product. What is probably harder for organizations to manage is the uncertainty stemming from unforeseen but temporary events of significant magnitude. This less predictable form of uncertainty carries higher transformative power as it is more difficult to anticipate and industry players have little or no influence on it.

## **Non-Technological Shocks and Interfirm Collaborations**

---

Radical changes play a significant role in reconfiguring positions of leadership and questioning the status quo of established players.<sup>1,2</sup> In an effort to understand the transformative power of disruptive processes, academic research has often focused on a particular type of disruption which takes the form of a technological breakthrough and examined its impact on firms and industries.<sup>3,4</sup> The exploration of these dynamics has also led researchers to investigate the factors that shape the interplay between incumbents and challengers ultimately dictating who are the winners and the losers in the face of a radical innovation.<sup>5</sup> For instance, Apple and Google have successfully challenged Nokia's leadership through their new mobile operating systems while Netflix was able to defeat Blockbuster by streaming video content over the internet. Evidence shows that many industry leaders suffer in the face of radical innovations and examples of industries where new entrants were able to get significant market shares due to a switch in the technological paradigm range from watches, with the transition from mechanical to quartz, to portable music with the transition from portable cassette and CD players to digital music players.

Technological shocks generate innovation opportunities but at the same time create a great deal of uncertainty. One of the ways through which firms respond to the uncertainty generated by a major disruption is by creating alliances. These forms of growth are particularly suitable for unsettled times as they require less resources compared to organic growth and at the same time require less commitment and coordination with respect to mergers and acquisitions. The ferment in alliance activity following a major disruption will affect the structure of the industry collaboration network in less predictable ways than before the shock, ultimately shaping industry boundaries. For example, following the rise of the Internet in the early 1990s there was a dramatic increase in the number of IT alliances formed which continued until the early 2000s. An important feature of significant increases or decreases in alliance activity in technology-intensive settings is that they act as early signals of a subsequent technological breakthrough.<sup>6</sup> Unfortunately, the predictive power of such shocks does not hold for disruptive events that are not related to technology and whose locus is exogenous to an industry. Examples of non-technological events include natural disasters, a sudden financial recession, wars, pandemics, and terrorist attacks. As comprehensive as these findings may be in providing insights on collaborative dynamics, they may present a truncated understanding of the issues related to situations far from equilibrium that are not directly related to technology-driven disruptions. Another viewpoint to the question of how interfirm collaboration evolves and for which reasons could be that of

exploring how exogenous and non-technology related events dictate the speed and the nature of collaboration within a specific industry.

### **The link between non-technological shocks and interfirm collaboration**

As industries reach their maturity stage, it becomes easier to identify which actors occupy more prominent positions and which ones are more at the margins of an industry. From time to time, however, such equilibrium is punctuated by a sudden and unexpected event (e.g., financial crises, natural disasters, and industrial accidents) that, depending on its magnitude and duration, can partly or totally alter the pre-existing order. These events act as an occasion for change opening up opportunities otherwise difficult to obtain. One such occasion is provided by the chance that industry actors have following a shock to modify their position in the industry network through partnerships or acquisitions. Put differently, although managers cannot anticipate when the shock will take place and how big its effect will be, they can exert influence on how their firms will adapt to it. Understanding which solutions are more effective in the face of an exogenous event is a fundamental undertaking for those firms aspiring to gain positional advantages in such moments of transition.

When designing their alliance networks, alliance managers may consider several dimensions that include one-to-one partnerships (i.e., their direct bilateral ties), clusters consisting of mutual agreements among few players and the overall network in which they are embedded. Because alliance networks evolve in a linear and predictable fashion, it is likely that firms with many alliances already in place will tend to attract a considerably higher amount of new partners compared to competitors having a smaller number of partners. Moreover, partners sharing similar attributes will be more likely to form alliances such that, in principle, it would be easier for a firm with high, rather than low, reputation to form an alliance with another highly reputed firm. At the intersection between dyadic relationships and the overall industry network, we can consider subsets of actors and the possible ties among them. Thus, when structuring their alliance portfolios, alliance managers may consider the amount of indirect partnerships (i.e., their partners' partners) turning into direct ones, a phenomenon known as triadic closure. The position the company will occupy in the industry network will thus be a byproduct of the dimensions described above. Because alliance portfolios are often the result of a "sedimentary" accumulation process, it may be only when firms experience a severe rupture in the system that new scenarios may come into existence. Observation of this phenomenon raises a

simple yet puzzling question. How does a non-technological shock affect alliance activity?

### **How collaboration changes following a non-technological shock**

A widely accepted example of non-technological shock is provided by the September 11, 2001 (i.e., 9/11) terrorist attacks. On that day, the world witnessed one of the worst tragedies as two planes flew into the towers of the World Trade Centre in the city of New York killing more than three thousand people. Many industries were directly affected by the disaster including airline, insurance and agriculture and food.<sup>7</sup> With respect to air transport, the effect of the crisis that followed led few prominent airlines (e.g., TWA in North America and Sabena in Europe) to discontinue operations and many others to adopt strict cost-cutting measures. In this scenario, the need for collaboration became more felt than usual resulting in an increased amount of one-to-one partnerships (which typically take the form of code-sharing agreements between airlines) and adherence to multilateral alliances. The latter take the form of airline groupings where members share not only their codes but often recognize their frequent flyer programs, share same spaces at airport terminals and conduct joint marketing activities. The amount of airlines joining one of the three multilateral alliances (i.e., oneworld, SkyTeam, and Star Alliance) increased by 25% between 2002 and 2005.

Building new relationships brings benefits such as additional customers or entry into new markets but at the same time raises the complexity and the costs of managing a wider alliance portfolio. Hence, unless necessary, an increase of the alliance portfolio will be a very gradual and slow process. In a study using the airline industry as the empirical setting, Corbo and his associates used several diagnostic indicators to explore if and how airlines collaborated differently in the wake of the 9/11 attacks.<sup>8</sup> Not only the study confirmed that airlines were more inclined to form partnerships in the aftermath of the shock, but the changes in partnering behavior led to a change in the overall industry network structure. Such changes included an increase in the amount of partnerships between diverse airlines, suggesting that complementarity acquires more value in times of crisis, and an increase in the amount of partnerships forged by more marginal airlines, indicating that non-technological shocks act as structure-loosening events.<sup>9</sup> Overall, these results suggest the need for a more explorative behavior on the part of the actors hit by the shock which confirms the general finding that periods of high uncertainty require a more entrepreneurial posture.<sup>10</sup> However, this tendency was mitigated by a simultaneous increase in clustering in the post-9/11 period which is indicative of a tendency towards consolidation of existing ties.

The empirical findings of the study summarized above provide a tentative answer to the question of how collaboration changes in the face of a non-technological shock. In the context of the airline industry, firms responded to the negative shock by pursuing a mix of explorative – seeking highly diverse partners – and exploitative ties – forging alliances with partners' partners – therefore morphing the industry network into a hybrid one. What is particularly significant is that this transformation was not temporary and limited to the immediate aftermath of the shock but persisted in the longer term. One conclusion that can be drawn is that changes provoked by non-technological shocks such as wars, terrorist attacks or natural disasters affecting partnering behavior and network structure differ from the ones generated by technology shocks. The effects of the latter often tend to affect firms and their networks temporarily before equilibrium is re-established. For instance, Romanelli & Tushman showed that most firms accomplish profound change within two years.<sup>11</sup> One possible explanation for the slower-paced changes taking place following a non-technological shock could be attributed to the higher cognitive effort that managers need to make sense of such unforeseen shocks. Accordingly, a higher amount of time will be needed for resilience strategies to be implemented but, once these changes are put in place, their effects are likely to endure possibly until a new major non-technological shock takes place.

### Author

*Leonardo Corbo is Assistant Professor of Management at Católica Porto Business School and Research Fellow at the LUISS Creative Business Center of LUISS Guido Carli University. Previously, he has worked as a Postdoctoral Research Fellow at LUISS Guido Carli University. He holds a PhD in Management from the University of Bologna. He has held visiting scholar positions at Kellogg School of Management, Northwestern University and Sauder School of Business, University of British Columbia. His research interests include alliances and networks, business model innovation and new venture creation. Leonardo regularly engages in research and consulting projects in a variety of industries including automotive, air transport, food, and mobile payments. His recent academic works have been published in Journal of Air Transport Management and Organization Studies. Prior to joining academia, Leonardo worked in the marketing department at FIAT's headquarters in Turin, Italy.*

*email: lcorbo@porto.ucp.pt*

---

### Endnotes

1. Schumpeter, J.A. (1950). *Capitalism, Socialism and Democracy* (3rd edition). New York: Harper & Brothers.
2. Fligstein, N. (2001). Social skill and the theory of fields. *Sociological Theory*, 19, 105-125.

## Non-Technological Shocks and Interfirm Collaborations

---

3. Abernathy, W.J. & Clark, K.B. (1985). Innovation: Mapping the winds of creative destruction. *Research Policy*, 14(1), pp.3-22.
4. Tushman, M.L. & Anderson, P. (1986). Technological discontinuities and organizational environments. *Administrative Science Quarterly*, 31(3), 439-465.
5. Ansari, S.S. & Krop, P. (2012). Incumbent performance in the face of a radical innovation: Towards a framework for incumbent challenger dynamics. *Research Policy*, 41(8), 1357-1374.
6. Schilling, M.A. (2015). Technology shocks, technological collaboration, and innovation outcomes. *Organization Science*, 26(3), 668-686.
7. Makinen, G. (2002). *The economic effects of 9/11: A retrospective assessment*. Library of Congress, Washington DC Congressional Research Service.
8. Corbo, L., Corrado, R., & Ferriani, S. (2016). A new order of things: Network mechanisms of field evolution in the aftermath of an exogenous shock. *Organization Studies*, 37(3), 323-348.
9. Madhavan, R., Koka, B.R., & Prescott, J.E. (1998). Networks in transition: How industry events (re) shape interfirm relationships. *Strategic Management Journal*, 19(5), 439-459.
10. Rowley, T., Behrens, D., & Krackhardt, D. (2000). Redundant governance structures: An analysis of structural and relational embeddedness in the steel and semiconductor industries. *Strategic Management Journal*, 21(3), 369-386.
11. Romanelli, E. & Tushman, M.L. (1994). Organizational transformation as punctuated equilibrium: an empirical test. *Academy of Management Journal*, 37(5), 1141-1166.