

**The Need for Scale as a Driver of Alliance Formation:  
Choosing between Collaborative and Autonomous Production**

Bernard Garrette, Xavier Castañer and Pierre Dussauge<sup>1</sup>

HEC School of Management, Paris

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In this paper, we reconsider why firms choose to form horizontal alliances when launching a new product rather than to undertake such a project on their own. We observe that past work on alliance formation has focused on resource complementarity as the main driver for inter-firm collaboration and, on this basis, has identified firm characteristics that induce them to collaborate. We propose that scale-related motives are also a major driver of alliance formation and argue that firms forming scale alliances exhibit different profiles than those forming complementary alliances.

Recent work on alliance formation claims that a firm's propensity to collaborate results from both need and opportunity (Eisenhardt and Schoonhoven, 1996; Ahuja, 2000). Indeed, firms will consider collaborating when they do not possess the full range of resources required to carry out an activity alone; conversely, they will only have opportunities to collaborate provided they possess valuable resources that make them attractive to potential partners. In other words, firms tend to collaborate when their strengths compensate for a potential partner's weaknesses while their weaknesses are compensated by the partner's strengths. A typical example is a start-up firm having developed a breakthrough innovation teaming up with an established industry incumbent possessing strong marketing capabilities (Teece, 1986). This view of alliance formation suggests that the main driver of inter-firm collaboration is the complementarity in the resources owned by the various partners (Shan, 1990; Mitchell and Singh, 1992). Recent empirical work on alliance formation finds indeed that a firm is most likely to form alliances when it is simultaneously strong in some resource categories and weak in others (Ahuja, 2000). We claim that this result stems from the type of alliances studied in most existing research, i.e. predominantly complementary alliances.

We propose that the complementarity view of inter-firm collaboration does not apply to all types of alliances. As suggested by prior literature (Hennart, 1988; Kogut, 1988; Sakakibara, 1997; Dussauge, Garrette, and Mitchell, 2000, 2004), we argue that alliance formation can also be motivated by the pursuit of scale benefits. In other words, firms may be led to collaborate not so much because they lack one kind of resource altogether but because, regardless of any resource type in particular, their overall resource endowment is too limited in quantity for them to undertake the considered project on their own. In this perspective, firms do not form alliances only to exploit complementary resources but may also decide to collaborate in order to pool similar resources. In this view, alliance formation is still motivated by a need, i.e. a lack of sufficient critical resources. The opportunity to cooperate however is quite different in nature: it stems from the existence of potential partners with similar needs rather than from the availability of potential partners with complementary resources.

Thus, in this paper, we focus on scale alliances and examine the factors that lead a firm to undertake a project in collaboration rather than autonomously. This different focus leads us to formulate predictions on alliance formation that differ from most previous work which we claim has largely overlooked such scale alliances. As argued, in scale alliances, the benefit of collaborating is to jointly overcome the common need for critical resources. However, collaborating also has a cost (Kogut, 1989; Hamel, Doz and Prahalad, 1989) and, logically, firms will engage in alliances only when the benefits of collaboration exceed its cost (Contractor and Lorange, 1988; Gulati, 1998). We argue that weaker firms have a greater need than larger ones to form scale alliances and will therefore find greater relative benefits in collaboration. Indeed, firms with limited resource endowments will often be faced with the dilemma of either collaborating or not undertaking the project altogether. Stronger firms will generally have the

option of carrying out the project on their own and have little incentive to incur the cost associated with collaboration. As a consequence, we predict that the firms most likely to form scale alliances are weaker firms.

## **BACKGROUND**

Early theoretical work on alliance formation suggested that two main motivations lead firms to enter into alliances within their industry: (i) increasing efficiency and/or market power, and (ii) exploiting asset complementarity and/or acquiring new capabilities (Mariti and Smiley, 1983; Ghemawat, Porter and Rawlinson, 1986; Porter and Fuller, 1986; Kogut, 1988; Hennart, 1988; Nohria and Garcia-Pont, 1991). These motivations are necessary drivers of alliance formation but could be achieved through other means (market transactions or industry consolidation). Transaction cost arguments have thus been introduced to justify when alliances become the preferred option (Hennart, 1988; Kogut, 1988).

Early empirical studies tried to discriminate between the two above mentioned motivations. Results showing that larger firms had a greater propensity to form alliances provided support for a market power argument (Berg and Friedman, 1978) while the observation that firms forming alliances operated in slightly different industry segments supported the complementarity / capability acquisition rationale (Berg and Friedman, 1981).

More recently, numerous empirical studies have examined how these motivations are related to both industry-level (Ghemawat, Porter and Rawlinson, 1986; Harrigan, 1988; Nohria and Garcia-Pont, 1991; Burgers, Hill and Kim, 1993; Gulati, 1998) and firm-level factors conducive to the formation of alliances. Studies on firm-level factors have focused on the

following characteristics of those firms likely to have the highest propensity to form alliances: firm size, competitive position, product portfolio and resource endowment (Shan, 1990; Mitchell and Singh, 1992; Eisenhardt and Schoonhoven, 1996; Ahuja, 2000).

Shan (1990) examined firm-level determinants that lead high technology start-up firms to team up with established companies to commercialize an innovation rather than to go to market alone. The results of this study show that smaller firms and industry followers are more likely to collaborate, while larger competitors and technology leaders tend to favor independent market entry. This suggests that the main driver of alliance formation is an insufficient stock of critical resources. All the firms examined in this study are high-tech start-ups that provide their established partner with a valuable innovation, thus creating new business opportunities for this partner.

Mitchell and Singh (1992) focused on the other party in alliances, i.e. industry incumbents that choose to collaborate with innovators to expand into a new technical domain. Their results demonstrate that stronger competitors are more prone than weaker players to form pre-entry alliances, suggesting that more attractive partners are presented with more alliance opportunities and can therefore more easily enter into promising partnership agreements. This appears to contradict Shan's (1990) conclusions. However, Mitchell and Singh (1992) also found, like Shan (1990), that latecomers into the new domain are more likely to collaborate. This suggests that alliance formation is induced by both a need, as argued previously by Shan (1990), and opportunities stemming from a firm's attractiveness as a potential partner.

Eisenhardt and Schoonhoven (1996) have explicitly built on this view, claiming that alliance formation is driven by both strategic needs and social opportunities. In a study on entrepreneurial semiconductor firms, they have shown that firms tend to enter alliance

agreements when they are in a vulnerable strategic position, either because they are competing in emergent or highly competitive industries or because they are pursuing pioneering technical strategies, which the authors interpret as denoting a strategic need. Eisenhardt and Schoonhoven (1996) also found that the studied firms were more likely to collaborate when they were in “strong social positions”, i.e led by large, experienced and well-connected top management teams, which they interpret as creating greater opportunities for collaboration.

The above mentioned studies examine alliances formed by small innovative firms with established industry incumbents. Such an endeavor creates a high degree of complementarity between potential partners, suggesting in turn that this complementarity is the primary driver of alliance formation (Teece, 1986). The general conclusion of these studies is twofold: those small innovating start-ups most likely to collaborate are the weaker or more vulnerable firms; in contrast, those industry incumbents most likely to cooperate with such start-ups are the stronger competitors. Indeed, all start-ups are potentially attractive partners because of the innovation they can contribute to the alliance; those most likely to cooperate are the firms that are the least able to exploit their innovation on their own. Conversely, most established incumbents seek innovations with which to expand their business, those most likely to cooperate are those in a position to cherry-pick and exploit the most promising innovations thanks to their manufacturing and commercial capabilities.

Ahuja (2000) extended the same line of reasoning to alliance formation among leading incumbents in a mature industry. Consistent with the above argument, he found that industry incumbents with the highest propensity to collaborate are those that have greater technical or commercial capital. Based on the argument that alliance formation is driven by both inducements and opportunities, he also found that simultaneous ownership of strong technical and commercial

capital reduced a firm's propensity to collaborate. In other words, firms most likely to collaborate are those that are strong in some resource categories and seek a complement in some other resource category. Again, Ahuja (2000) finds that opportunities to collaborate are a function of the firms' attractiveness and that collaboration is induced by some resource need.

In sum, all these studies on firm level factors driving alliance formation have in fact focused on complementary (link) alliances. However, as mentioned earlier, theories on motivations for alliance formation argue that access to complementary resources is only one of two possible alliance motivations (e.g. Hennart, 1988). Empirical work on alliance activity in various industries bears this distinction by showing that both scale and link alliances co-exist in most industry settings, are formed by firms pertaining to different strategic groups and lead to contrasted outcomes (Nohria and Garcia-Pont, 1991; Dussauge et al., 2000, 2004). Little is known, however, on the firm-level factors that drive firms to form scale alliances. While one of the main findings of studies on complementary alliances is that those industry incumbents most likely to collaborate are the leading competitors in the industry, we argue that focusing on scale alliances leads to opposite predictions: those industry incumbents most likely to form scale alliances are competitors in a weaker position.

## **THEORY DEVELOPMENT**

Following Hennart (1988), we use the scale-link typology of alliances. This typology categorizes alliances according to the partners' contributions to the joint activity. Scale alliances, in which partners contribute similar resources for the same stages in the value-chain, aim at producing economies of scale for those activities that firms carry out in collaboration. Link

alliances, in contrast, aim at combining different skills and resources from each partner. Link alliances include partnerships in which one partner provides market access to products or technologies that the other firm has developed. Scale alliances primarily produce efficiency gains by pooling similar assets from the partners, carrying out business activities in which both firms have experience.

The classical resource-based approach (Penrose, 1959) suggests that a firm's resource endowment determines its growth. Indeed, according to Penrose (1959), most resources are fungible, that is, they can be redeployed to additional uses, other than the current one. The same argument has been applied to more intangible competences (Hamel and Prahalad, 1990; Teece, Pisano and Shuen, 1997: 529).

Building on this resource-based view of firm growth, we propose that scale alliances are formed primarily within the partner firms' core business, while link alliances are formed to pursue expansion opportunities at the frontiers of the partner firms' current businesses. Combining different resources through link alliances is unnecessary in business areas where firms are already active because, by definition, such firms possess all the categories of discrete resources needed to operate. Combining different resources may in contrast create innovation opportunities (Brown and Eisenhardt, 1995) that allow the partner firms to extend the limits of their existing business, either by entering adjacent product-market areas or by substituting existing products and technologies with innovative ones. On the contrary, pooling greater quantities of similar resources in scale alliances favors growth within the boundaries of the core business by enhancing efficiency on current product lines or by mobilizing sufficient resources to fuel the ongoing renewal of product lines. Innovation in scale alliances is not radically different from what each partner would have achieved on its own, had it had sufficient resources. In



contrast, innovation in link alliances stems from the combination of different resources contributed respectively by each partner and could not be achieved by any partner on its own: such innovation is likely to take place outside the scope of the core business of either partner. Indeed, most empirical research on alliances, which we argued focuses on link alliances, conceptualizes these alliances as mechanisms to take advantage of business opportunities that would have been outside the reach of each partner on its own: Mitchell and Singh (1992) examine how alliances between incumbents and innovators allow entry into new technical sub-fields of the industry; Shan (1990), as well as Eisenhardt and Schoonhoven (1996), study how start-ups and established competitors collaborate in order to market new technologies. The few studies that explicitly consider scale alliances (Nohria and Garcia-Pont, 1991; Dussauge and Garrette, 1995; Dussauge et al., 2000, 2004) show that such alliances are formed by direct competitors exhibiting similar features (size, geographic origin, etc.), all facing similar issues, which choose to collaborate in order to maintain or enhance their position in their core business.

Because of these distinctive resource features of scale and link alliances, the decision to form one or the other type of alliance is an alternative to radically different baseline strategies. Scale alliances are essentially an alternative to autonomous production in the firm's core business. Link alliances in contrast are formed primarily to pursue new business developments that would be left aside if no partnering opportunities were available. In other words, in scale alliances, partnering firms face the choice of collaborating or going it alone; in link alliances, partnering firms face the choice of collaborating or forgoing a new business opportunity.

In a context where it might consider forming a scale alliance, a firm possessing resources (assumed here to be fungible) in sufficient quantities is more likely to choose autonomous production over collaboration because of the financial, organizational and strategic cost of

cooperating with a competitor (e.g. Hamel, 1991). If on the contrary, the focal firm lacks sufficient resources and rejects collaboration, it will be forced to give up the considered investment altogether and therefore compromise growth or even ongoing presence in entire areas of its core business, the only other choice being to merge.

In contrast, in a position where firms might consider forming a link alliance, most of them will not have the option of pursuing the same new business opportunity on their own, at least in the short run. In such a context, a firm can choose not to form the alliance and not to implement the considered project, without jeopardizing its position or growth in its core business. In this case, taking advantage of such a business opportunity alone will require the acquisition of different resources, and therefore lead to either long term investments to develop such resources internally or to the acquisition of an existing firm that possesses the needed resources. Overall, scale alliances are primarily defensive in nature while link alliances support more offensive strategies. It can be noted here that scale and link alliances are not substitutes for one another. In other words, a firm is almost never confronted with the choice of forming either a scale or a link alliance. Instead, firms face one of the following two choices: (i) forming a scale alliance or producing autonomously, or (ii) forming a link alliance or not engaging in the considered project.

Given the differences between scale and link alliances outlined above, it is unlikely that those factors leading firms to form link alliances will also motivate the formation of scale alliances. As most past research on alliance formation has implicitly focused on link alliances, their conclusions may not be generalizable to all alliance types. Research focusing specifically on the formation of scale alliances would contribute to a broader understanding of collaboration as an alternative to other strategic and organizational choices. In addition, most existing research has examined the propensity of firms to collaborate, and has thus compared collaboration to non

collaboration, which implicitly includes both producing alone and not engaging in the considered project. Our focus on scale alliances leads us to contrast firms choosing to collaborate with firms choosing to produce autonomously.

In scale alliances, the very co-existence of similar needs in multiple industry incumbents creates the opportunity for collaboration. Indeed, if several firms are simultaneously limited in their growth by a constrained stock of resources, they have a mutual incentive to pool their resources in order to undertake activities jointly. While the benefits of scale advantages can theoretically accrue to all industry incumbents, the costs of collaboration create a disincentive to collaborate. Collaboration costs include coordination costs, the risks associated with mutual dependence as well as a competitive risk (Hamel, 1991). Only those firms that most need additional stocks of a given resource contributed by other partners will engage in scale alliances. Stronger competitors have the option to produce on their own. Moreover, stronger firms will be reluctant to enter into scale alliances because the costs and risks involved will more than outweigh the expected benefits. Hence, the following proposition:

*Scale alliances are predominantly formed by weaker competitors seeking to maintain or enhance their position in their core business.*

## **EVIDENCE FROM AIRCRAFT PRODUCTION**

To provide empirical support for the above proposition, we examined new product development project launches in the aircraft industry worldwide between 1949 and 2000. We studied 334 new aircraft projects undertaken either through alliances or on a single-firm basis by all 130 major aircraft manufacturers in the Western hemisphere. In this industry, we considered

as horizontal alliances those projects that were carried out by several firms sharing the prime contracting responsibility. In contrast to collaborative projects, we defined as autonomous projects those projects that were implemented under the authority of a single prime contractor. This definition of autonomous production does not preclude outsourcing large parts of the project to suppliers, including through vertical partnerships.

Sharing the prime contracting responsibility in aircraft production results in the formation of scale alliances since all prime contracting partners contribute resources in all major functional areas: R&D, manufacturing, marketing and sales. Because the industry is characterized by considerable and ever increasing economies of scale (Hartley, 1991), new aircraft projects require the mobilization of substantial resources that may be beyond the reach of any individual company even when the company in question has produced similar products in the past (Hartley and Martin, 1990; Dussauge and Garrette, 1995). The resources required to launch a new project include both tangible and intangible resources such as R&D facilities and capabilities, manufacturing assets, and access to large enough markets.

As expected, we find that aircraft manufacturers are more likely to form scale alliances rather than to autonomously undertake a new aircraft project when:

- They are small relative to their industry peers,
- They have access to a smaller market base, and
- Their experience in the considered product category is more limited.

These results support the idea according to which scale alliances are primarily formed by weaker competitors.

## CONCLUSION

Overall, the extant literature on link alliances and our results on scale alliances suggest that scale and link alliances exhibit more radical differences than usually thought. They differ in their motivations: scale alliances are formed to pool resources that all partners possess but in quantities too limited to achieve their goals; link alliances are formed to complement one partner's set of resources with a different set of resources possessed by the other partner. Firms enter into scale alliances in order to maintain or grow their position in their core business while they form link alliances to seize new business opportunities. Because of this, scale and link alliances are alternatives to contrasted baseline strategies: scale alliances are essentially an alternative to autonomous production, while link alliances are an alternative to forgoing the considered new business opportunity altogether. Scale alliances are formed primarily for defensive purposes while link alliances support expansion strategies. Logically, scale alliances are formed by firms in a weaker and more vulnerable position while those firms best positioned to take advantage of opportunities afforded by link alliances are the dominant competitors in the industry. Finally, as shown in prior work, scale and link alliances raise different management issues, create different levels of risk and lead to contrasted outcomes (Dussauge et al., 2000; 2004). Indeed, scale alliances primarily raise efficiency issues while link alliances create mutual dependence between the partners and can result in potentially damaging inter-partner learning (Hamel, 1991).

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