

A Bird in the Hand or Two in the Bush? Integration Trade-offs in Technology-grafting Acquisitions

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Technology-grafting acquisitions are the acquisitions of technology-based entrepreneurial firms by established firms. They are often motivated by the need to bring products speedily to market, as well as develop future product pipelines. We argue that these are conflicting objectives; a trade-off between short and long-term performance arises because acquisition integration has opposite effects on the strength of the organizational linkages between target and acquirer, and on the continued innovative capacity of the target firm.

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Introduction

In recent years, many leading companies in the information technology sector, including household names like Microsoft, Intel, Lucent, Hewlett-Packard, Sun Microsystems, IBM and Cisco Systems, have made acquisitions of small technology-based firms to complement their internal product development efforts. Such transactions are special instances of David and Goliath technology partnerships, in which large established firms attempt to combine their capabilities in commercialization, manufacturing and distribution with the product innovation capacities of

smaller entrepreneurial firms. Acquirer's in effect 'graft' the product innovation capacities of the target firm onto their own asset base (Puranam, 2001). Value creation in these technology-grafting acquisitions arises from creating organizational linkages (through post-merger integration) between the complementary capabilities of established firms and entrepreneurial start-ups.

The growing importance of technology-grafting acquisitions is often ascribed to increasing time-to-market pressures as well as the need to develop a rich product pipeline. However, our research suggests that these may be conflicting motives. Developing a rich product pipeline requires that the target firm's product development capability be coupled to the commercialization capability of the acquirer, through strong organizational linkages. However, creating strong organizational linkages simultaneously disrupt the product development capabilities of the target, resulting in a longer time-to-market for products immediately after the acquisition. In other words, developing fertile product pipelines and meeting immediate time to market pressures are inconsistent goals; the former depends on generating strong organizational linkages between the targets product design capabilities and the acquirer's commercialization capabilities, whereas the latter depends on minimizing the disruption to the organizational conditions of the target

firm. Thus, acquirers are faced with choosing between 'the bird in hand' and 'the two in the bush'.

Our analysis validates the existence of such a trade-off in a sample of 207 technology-grafting acquisitions by 49 acquirers in the IT manufacturing sector in the US. Consistent with our expectations, we found that following a high integration strategy lengthens the time-to-market of the first product after acquisition, but results in more frequent subsequent product launches — a richer product pipeline. Conversely, adopting a low integration strategy enables shorter time-to-market with the acquired firm's products immediately after the acquisition, but results in a poorer, less frequent, stream of subsequent products.

The Logic of Technology-grafting Acquisitions

In over 30 interviews with corporate development managers across seven large acquirers in the IT industries,¹ time-to-market and product pipeline development emerged as salient motives for technology-grafting acquisitions. Since product cycles in the IT industries may be as short as 8–12 months, the importance of getting the target firms products to market as soon as possible after the acquisition is clear. As one senior manager from Symantec put it:

In the past internal development bore the brunt of growth prospects, but *de novo* innovations are becoming riskier, more expensive and more time consuming... high tech firms are going outside to get companies with talented people and proven products that can meet market demands and generate technological throw-offs for the future.

His counterpart from Cisco Systems echoed this view:

If we're not good at something, we've got Silicon Valley. It's our lab. (We)look at startups if we are too far behind competitors to take the time to build from scratch.

At the same time, acquirers also see acquisitions as a means to develop product pipelines beyond meeting immediate time-to-market pressures- the birds in the bush are also important. As one manager from Cisco Systems said:

Usually we purchase a specific piece of technology or a product. But that is only half the story, we also want the team which will generate innovation in the future.

His colleague concurred:

For us it is never only the box or the block that is already here- it's all about the next generation product.

A manager from Intel specifically stated that this was

the most important criterion they used to select targets:

When looking at a target we typically ask, will the technology be developed? Will the team stick around? Will there be a next generation product?

Thus, time-to-market with products from the acquisition, as well as a fertile pipeline of future products are both important motives in technology grafting acquisitions. However the economic logic of such acquisitions suggests an inherent trade-off between these two objectives.

Value creation in technology-grafting acquisitions involves two sets of activities. First, the target's technical team develops a product and second, the acquirer deploys its commercialization capabilities to take the product to market and thus generate revenues. For example, Cisco Systems has an extensive set of complementary assets that aid commercialization — a distribution network, brand equity and installed base, and a standardized New Product Introduction process that enables relatively smooth transitions from prototype to market. Cisco's value creation logic for its acquisitions was to leverage these strengths in conjunction with the target firm's capabilities at product development (O'Reilly, 1998)². The tension between time-to-market and pipeline development arises because leveraging the acquirer's commercialization capabilities, such as reputation, brand name, distribution channels, sales force, manufacturing etc. often requires significant co-ordination between the acquirer and target, which is often achieved through post-acquisition organizational integration between them. The trade-off lies in the fact that organizational integration also disrupts the capacity for innovation of the target firm.

The Costs and Benefits of Organizational Integration

Post-acquisition integration involves the alignment of incentives and the creation of communication channels by breaking down the internal boundaries between target and acquirer. Eventually, the objective is to create a shared culture between them, so that the target and acquirer are truly a single organization (Haspeslagh and Jemison, 1991). Increasing the level of organizational integration increases the likelihood that new product ideas arising from the target's product development efforts are successfully commercialized — it increases the strength of the organizational linkage between product development and commercialization. Further, the benefits of organizational integration i.e. better coordination and knowledge flows, increase over time, as a shared culture and common methods of communication develop between the technical personnel of the acquirer and target (Figure 1).

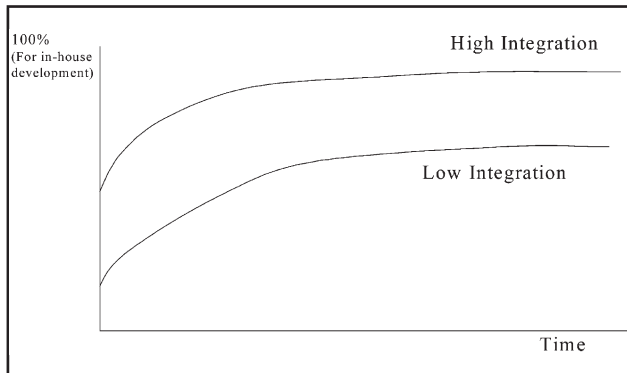


Figure 1 Linkage between Product Development and Commercialization

Note: The strength of the linkage between the target's product development capabilities and the acquirer's commercialization capabilities increases with time and with the level of integration. It may asymptotically approach the linkage strength for a comparable internal development project.

However, organizational integration also results in significant organizational disruption. First, the dissolution of the target firm as a distinct organizational unit also implies that it becomes more difficult to measure its performance independent of other organizational units within the acquirer. While this has the effect of aligning the target firm employees' incentives with the acquirer's broader goals, it also blunts the hitherto strong and direct link between target firm employees' efforts and rewards. This reduction in incentive intensity will likely result in decreased effort. Second, highly-talented engineers are often attracted to smaller organizations because of their ability to offer high-powered incentives. Such engineers are likely to leave after their firm has been fully integrated into the acquirer, which would critically undermine the target firm's product development capacity (Zenger, 1994). Third, the change processes involved in organizationally integrating the target firm with the acquirer may also disturb the routine functioning of the target firm, thus endangering the chances of bringing its products speedily to market.

While some minimum level of disruption would occur automatically with acquisition irrespective of the level of integration chosen, in general, the disruptive effects increase with the level of integration. Thus, greater integration lowers the likelihood that new product development projects will be generated by the target firm. In the limit, the disruption may be severe enough to make the target firm's product development capabilities completely defunct. This would correspond to a significant amount of turnover among the product development teams of the target firm. However, unlike the benefits of strengthened organizational linkages that accrue from following a high organizational integration approach, disruption is likely to be a one-time effect. Once the implementation of the integration decision is completed, the organizational conditions of the target

firm reach a steady state, which define the new (albeit lower) level of productivity for the product development teams. This implies that the disruption effects of integration are manifested mainly in the period immediately following the acquisition, and then decline (Figure 2).

Combining the arguments for the costs and benefits of integration, we can see why there is a trade-off between short-term (time-to-market) and long-term (subsequent product pipeline development) performance. We expect that on average, the disruption effects would dominate the coordination benefits in the period immediately after the acquisition because the full costs of integration are borne immediately while the benefits play out over a longer period. Therefore, all else being equal, higher integration *decreases* the chances of a speedy first product launch i.e. time-to-market of the first product launch is likely to be large.

If no product is launched after an acquisition, it could be because the product development capabilities of the target have been disrupted to a point below the threshold, *or* because of the failure of the acquirer to link its commercialization capabilities to the target product development capabilities in a fruitful manner. Successful launch of the first product signals the fact that the target has 'survived' the disruption effects following the acquisition. The product development capabilities of the target firm lie above the productivity threshold (Figure 1). Subsequent product launches will then occur if the acquirer is able to commercialize the product pipeline of the target. The possibility of this happening is higher with greater levels of integration because of the strengthened organizational linkages between product development and commercialization. The effect is strengthened by the fact that subsequent product pipeline development occurs later, allowing coordi-

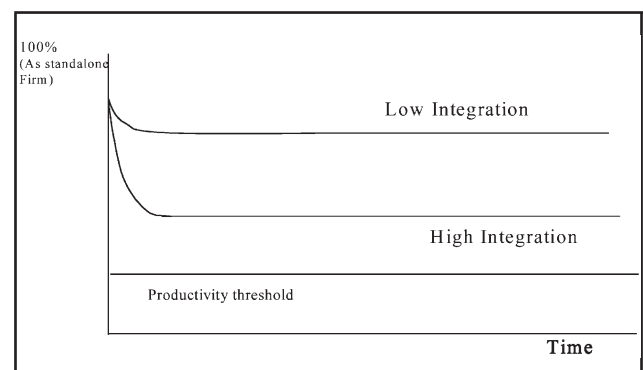


Figure 2 Target's Product Development Capabilities

Note: The disruption to the target firm's product development capabilities increases with the level of integration (relative to that of a standalone firm) but after an initial period, reaches a new steady state. If the product development capabilities of the target firm are disrupted below a threshold level (the productivity threshold, e.g. substantial turnover in the development teams), then the target's capacity for generating product innovation has been destroyed.

nation benefits more time to reach their full potential. All else being equal, higher integration *increases* the number and frequency of subsequent products in a technology-grafting acquisition.

Sample and Data Analysis

To systematically study the relationships between time-to-market, product pipeline development and organizational integration, we collected data on technology acquisitions in the US IT hardware industries. This sector is often cited as being extremely active in acquisitions of entrepreneurial firms by established firms for their technology (*Business Week* September 1999; *Fortune* November 8, 1999). The sector also contains the company that is most prolific in making technology-grafting acquisitions — Cisco Systems and we invested considerable effort in understanding Cisco's acquisition processes to guide our understanding of the phenomenon and context. Acquiring firms were selected from manufacturing industries connected to computing and communications. The acquirers had been listed continuously in COMPUSTAT between 1988 and 1998, and had at least 1000 employees at every point of time in the sample. These criteria identified established firms in these industries. The acquirers had made at least one acquisition motivated primarily by obtaining technology of a target that was an independent firm (as opposed to a divestment), had less than 500 employees at the time of the acquisition.

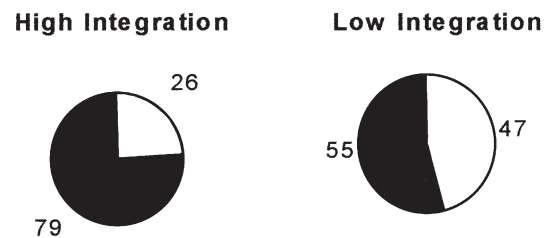
After identifying the sample, we collected data from several secondary sources such as SDC Platinum, COMPUSTAT, Lexis-Nexis, Dow Jones Interactive, and CORPTECH. We could obtain data on 207 acquisitions by 49 acquirers. Our product launch data consisted of the counts and dates of products announced by the acquirer in the trade press. Trade journals that cover the IT industry usually mention the acquisition that laid the foundation for a current product launch. Time-to-market of the first product after the acquisition was simply the number of days between the acquisition announcement and the announcement of the first product, while subsequent product pipeline development was measured as the number and timing of subsequent product launches.

We classified the integration approach adopted in each acquisition into high integration and low integration categories. These two integration approaches represent two extreme alternatives in post-acquisition integration — either the target firm is organizationally absorbed into the acquirer and loses its distinctive entity as an administrative unit, or it is preserved as a distinct organizational entity within the merged firm. To measure the level of integration, we examined the CORPTECH database in the first and second year after the acquisition. CORPTECH conducts an annual survey of technology firms and units within firms that maintain independent P&L or

distinct status as operating entities. The continued appearance of the target firm in the CORPTECH database published in the second year after the acquisition was taken to imply a low integration approach (INTEGRATION LEVEL = 0). All other acquisitions cases were classified as a high integration approach (INTEGRATION LEVEL = 1).

The results indicate that with a high integration approach, the launch of the first product after the acquisition is delayed, or may never happen if the disruption effects push the targets product development capabilities below the threshold level. In our sample, of 207 acquisitions, 105 acquisitions were fully organizationally integrated into the acquirer. Of these, only 26 (24.7 per cent) produced any products after the acquisition. In contrast, of the 102 acquisitions that involved lower levels of organizational integration, 47 targets (46 per cent) produced at least one product after the acquisition. In terms of hazard rates (which incorporate not only the number but also the timing of product launches), our statistical modeling suggests that a low integration approach shortens the time-to-market of the first product by about half.

Graph 1. Successful Launch of First Product After the Acquisition



26 of 105 acquired firms managed with high integration levels launch a new product

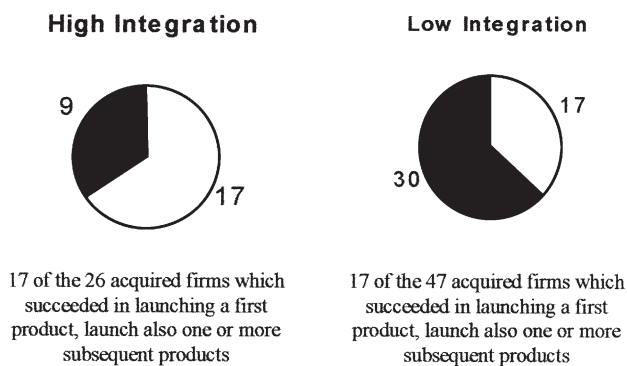
47 of 102 acquired firms managed with low integration levels launch a new product

The situation is significantly different when examining subsequent product launches, conditional on the first. Of the 73 target firms that launched at least the first product, 26 (or only 35 per cent) had undergone a high level of organizational integration. About 17 of these 26 targets, however, (that is two out of three of them) generated one or more subsequent products. In contrast, of the 47 targets that underwent a low level of organizational integration only 17 (that is less than 36 per cent) generated one or more subsequent products. In terms of hazard rates, our results indicate that a high integration approach raises the speed of launching subsequent products by as much as two and a half times. Thus, conditional on the first product, subsequent product launches occur in quick succession with a high organizational integration approach. With a low integration approach, the first product launch takes place relatively soon after the acquisition, but subsequent product launches are few and far between.

Graphs 1 and 2 present data that support this general pattern of results. Thus, organizational integration of

the target into the acquirer has different effects on short-term and long-term performance. Time-to-market immediately after the acquisition, and the frequency of subsequent product launches (pipeline development) appear to be conflicting objectives, as adopting a high integration approach favors the latter but not the former. Figure 3 shows the overall pattern of results from the analysis we conducted to examine the relationship between organizational integration, and time-to-market of the first product, as well as subsequent product pipeline development.³

Graph 2. Successful Launch of Subsequent Products



Discussion and Conclusions

We examined the link between organizational integration, time-to-market and product pipeline development in the acquisitions of technology-based entrepreneurial firms by established firms. Our results suggest that organizational integration of the target firm into the acquirer's organization generates

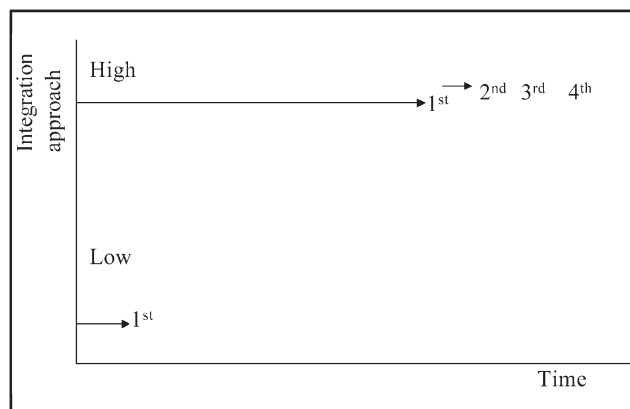


Figure 3 Time-to-Market for First and Subsequent Products

Note: With a high integration level, the disruption effects are large. Either the target's product development capabilities are permanently destroyed, or significant delay occurs in getting the first product to market. However, if the target's product development capabilities stay above the productivity threshold and the first product is eventually launched, then a rich product pipeline ensues. Conversely, a low integration level implies low levels of disruption to the target's product development capabilities, but also weaker linkages to the acquirer's commercialization capabilities. Thus, subsequent product pipeline development is sparse.

short-term disruption effects and long-term coordination benefits. We conclude that time-to-market and subsequent product pipeline development can be antithetical motives. Fundamentally, our results reiterate the axiom that there is no free lunch. Acquiring a small firm with a product that has advanced beyond proof of concept may alleviate problems such as fear of cannibalization and lack of incentive intensity faced in internal development efforts (Chesbrough, 2000), but these gains are at least partly offset by the disruption effects that accompany attempts at organizational integration. Our results also suggest implications for current managerial practice. First, we should be wary of dismissing technology-grafting acquisitions as failures solely on the basis of short-term disruption effects. Losing some employees and delays in first product launch may well be normal, anticipated costs of building a rich product pipeline for the longer term. Second, we note however that development of a fruitful product pipeline may not be a universal objective, particularly in situations of high uncertainty, demand unpredictability or rapid technological change. In such cases, the 'bird in hand' may truly be worth as much or more than the 'two in the bush'. It is therefore essential that managers make absolute clarity in their mind as to which of the two priorities they see as dominating, and act accordingly in their post-acquisition integration approach.

Additional implications for managerial practice can be deduced from the limitations of this study. Data limitations led us to treat the integration decision as a dichotomous variable, although in practice, intermediate levels of integration may be achievable. Thus, our results suggest that acquirers should explore intermediate levels of integration rather than think in terms of all or nothing when it comes to organizational integration. Finally, a variable outside the scope of our study, the speed of integration, could play a role in optimizing on the inter-temporal trade-off. We assumed that integration implementation takes place shortly after announcement, an assumption that we judge to be plausible given the relatively small size of targets and the deal flow that acquirers in our industry setting experience. In practice, acquirers may be able to time their integration processes favorably, where a gradual process of integration follows a period of non-integration (Haspeslagh and Jemison, 1991; Birkinshaw *et al.*, 2000). In this way, they may be able to influence the development of coordination benefits and disruption costs over time.

Acquiring start-up firms for their technological capabilities can be a powerful strategy for established firms facing rapid technological change and competition. However, the challenge of preserving the long-term innovative capacity of target firms while simultaneously building the organizational linkages that enable fertile product pipeline development may be overwhelming. The trade-off we have identified between short and long-term performance at least

partially explains why such acquisitions often end in disappointment⁴; acquirers have been pursuing incompatible objectives. It is inherently difficult to get both the 'bird in hand' as well as the 'two in the bush'.

Acknowledgements

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Notes

1. The firms involved in this stage of the research were Cisco Systems, Lucent, Intel, Xerox, Hewlett-Packard, Symantec and Sun Microsystems. These firms had cumulatively undertaken more than 120 acquisitions of the technology-grafting variety since 1990. The fieldwork involved interviews of 45–90 minutes each with corporate development managers in these firms, a pilot questionnaire survey in one firm (Hewlett-Packard), and examination of internal documents on acquisition management practices at these firms, all conducted between May 1999 and June 2000.
2. The division of labor between upstream and downstream phases of technology commercialization is not unique to the IT industries; such relationships are well documented between large pharmaceutical and small biotechnology firms. They are manifestations of what Williamson has termed a 'systems solution' to the need for innovation, in which established and entrepreneurial firms specialize in the later and earlier stages of innovation respectively, and benefit from gains in trade (also see Grandstand and Sjolander, 1990).
3. For full detail of the data and empirical modeling, see Puranam (2001).
4. A PriceWaterhouseCoopers report released in 1999 estimated that about 80% of technologically motivated acquisitions in the time period of 1994–1997 have failed to achieve their objectives. A study by the Hay group of Philadelphia in the same period found that as many as 60 per cent of such acquisitions suffer from severe problems in the post-merger integration stage.

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