

## STRATEGY

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# When and when not to **vertically integrate**

*A strategy as risky as vertical integration can only succeed when it is chosen for the right reasons.*

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### **Article at a glance**

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### When to integrate

"Vertical integration" is simply a means of coordinating the different stages of an industry chain when bilateral trading is not beneficial. Consider hot-metal production and steel making, two stages in the traditional steel industry chain. Hot metal is produced in blast furnaces, tapped into insulated ladles, and transported in molten form at about 2,500 degrees perhaps 500 yards to the steel shop, where it is poured into steel-making vessels. These two processes are almost always under common ownership, although occasionally hot metal is traded; for several months in 1991, Weirton Steel sold hot metal to Wheeling-Pittsburgh, almost ten miles away.

Such trading is rare, however. The fixed asset technologies and frequency of transactions would dictate a market structure of tightly bound pairs of buyers and sellers that would need to negotiate an almost continuous stream of transactions. Transaction costs and the risk of exploitation would be high. It is more effective, lower cost, and lower risk to combine these two stages under common ownership.

Exhibit 1 lists the kinds of costs, risks, and coordination issues that should be weighed in the integration decision. The tough part is that these criteria are often at odds with each other. Vertical integration typically reduces some risks and transaction costs, but it requires heavy setup costs, and its coordination effectiveness is often dubious.

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<sup>1</sup>See, for instance, Richard P. Rumelt, *Strategy, Structure, and Economic Performance*, Cambridge, MA: Harvard University Press, 1974.

## Criteria for integration decisions

Exhibit 1

Setup costs	Transaction costs	Transaction risks	Coordination effectiveness
Capital (e.g., equipment, acquisitions)	Information collection and processing	Possibility of unreasonable price changes	Run lengths, inventory levels
Systems development	Legal	Supply or outlet foreclosure	Capacity utilization
Training	Sales and purchasing	Insulation from market (e.g., from technical changes, new products)	Delivery performance
			Quality

There are four reasons to vertically integrate:

- The market is too risky and unreliable—it “fails”;
- Companies in adjacent stages of the industry chain have more market power than companies in your stage;
- Integration would create or exploit market power by raising barriers to entry or allowing price discrimination across customer segments; or
- The market is young and the company must forward integrate to develop a market, or the market is declining and independents are pulling out of adjacent stages.

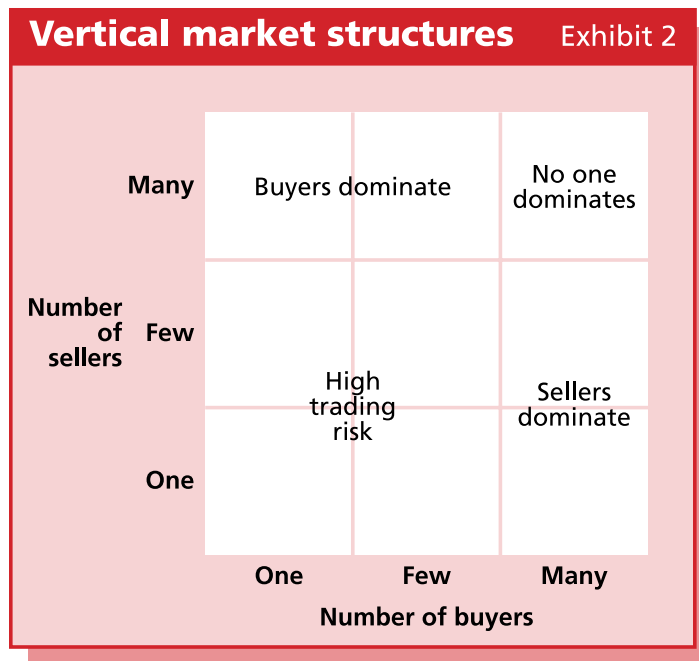
Some of these are better reasons than others. The first reason—vertical market failure—is the most important one.

### Vertical market failure

A vertical market “fails” when transactions within it are too risky and the contracts designed to overcome these risks are too costly (or impossible) to write and administer. The typical features of a failed vertical market are (1) a small number of buyers and sellers; (2) high asset specificity, durability, and intensity; and (3) frequent transactions.

In addition, broader issues that affect all markets—uncertainty, bounded rationality, and opportunism—play a special part in a failed vertical market. None of these features, taken individually, necessarily signifies a vertical market failure (VMF), but when they are all present, chances are good the market has failed.

**Buyers and sellers.** The number of buyers and sellers in a market is the most critical—although the least permanent—variable determining VMF. Problems arise when the market has only one buyer and one seller (bilateral monopoly) or only a few buyers and a few sellers (bilateral oligopoly). Exhibit 2 illustrates the possible market structures.



Microeconomists have realized that rational supply and demand forces alone do not set transaction prices and volumes deterministically in such markets, as they do in all other vertical market structures. Rather, the terms of transactions, especially price, are determined by the balance of power between buyers and sellers—a balance that is unpredictable and unstable.

Where there is only one buyer and one supplier (especially in long-term relationships that involve frequent transactions), each attempts to leverage its monopoly status. As commercial conditions change unpredictably over time, this leads to a lot of haggling and attempts at exploitation, which are costly and risky.

Bilateral oligopolies have especially complex coordination problems. If, for example, there are three suppliers and three customers, each player sees five other players with whom the collective economic surplus must be shared. If players are not careful, they will collectively compete away all the surplus and pass it along to customers. In order to avoid this, they might try to create monopolies at each stage of the chain, but anti-trust laws prevent them. So players merge vertically, creating, in this case, three players instead of six. When each then sees only two other players seeking slices of the surplus, they have a better chance of behaving rationally.

We relied on this concept to advise a company on whether to continue to run an in-house shop that supplied machining services to the company's steel plant. An analysis showed that the shop was very costly, relative to outside contractors. Some managers wanted to close the shop. Others countered that this would leave the plant vulnerable to disruptions; there was a small number of potential outside suppliers, including only one heavy machine shop within 100 kilometers.

We recommended that the shop be closed if it failed to be competitive on scheduled work and most light machining jobs. This work was predictable, used standardized machines, and could be done by several outside suppliers. Therefore, it was low risk and had low transaction costs. However, we recommended that a slimmed-down heavy machine shop be maintained in-house for breakdown work requiring very large lathes and vertical borers. This work was unpredictable, only one local outside supplier could provide it, and the costs of any delay in bringing the plant back on stream were enormous.

**Assets.** If this combination of problems occurs only in bilateral monopolies or close-knit bilateral oligopolies, aren't we just talking about an oddity with infrequent practical significance? No. Many vertical markets that appear to have numerous players on each side are, in effect, composed of groups of bilateral oligopolists tightly bound together. The groupings arise because asset specificity, durability, and intensity raise switching costs to the point where only a small segment of the apparent universe of buyers is truly available to the sellers, and vice versa.

There are three principal types of asset specificity that compartmentalize industries into bilateral monopolies and oligopolies. *Site specificity* occurs when buyers and sellers locate fixed assets, such as a coal mine and power station, in close proximity to minimize transport and inventory costs. *Technical specificity* occurs when one or both parties to a transaction invest in equipment that can only be used by one or both parties and that has low value in alternative uses. *Human capital specificity* occurs when employees develop skills that are specific to a particular buyer or customer relationship.

The upstream aluminum industry has high asset specificity. This industry has two principal stages of production: bauxite mining and alumina refining. Mines and refineries are usually located close together (site specificity) because of the high cost of transporting bauxite, relative to its value, and the 60 percent to 70 percent volume reduction typically achieved during refining. Refineries are tailored to process their own bauxite, with its unique chemical and physical properties; switching suppliers or customers is either impossible or prohibitively expensive (technical specificity). Consequently, mine-refinery pairs are locked together economically.

These bilateral monopolies exist despite the apparent presence of dozens of buyers and sellers. In fact, the preinvestment phase of the transaction relationship between a mine and a refinery does not suffer from bilateral monopoly. A number of bauxite miners and alumina refiners around the world line up and bid whenever a greenfield mine and refinery are in the offing. However, the market quickly becomes a bilateral monopoly in the postinvestment phase. The miner and the refiner who exploit the greenfield opportunity are locked together economically by asset specificity.

Because industry participants realize the perils of VMF, the mine and the refinery usually end up under common ownership. Around 90 percent of bauxite

transactions occur under vertical integration or quasi-vertical arrangements, such as joint ventures.

Auto assemblers and their component suppliers can also be locked together, as when a component is specific to a particular make and model. When the amount of research and development (R&D) investment in the component is high (asset intensity), it is risky for the component supplier and auto assembler to be independent. Either side is vulnerable to opportunistic recontracting, especially if, for example, the model is a surprising success or failure. To avoid the dangers of bilateral monopolies and oligopolies in such cases, auto assemblers tend to backward integrate or, following the example of the Japanese, enter into close-knit contractual arrangements with carefully chosen suppliers—where the strength of relationships and contracts prevents risks of opportunistic exploitation inherent in arm's length sales between “compatible” parties.

Postinvestment phase bilateral monopolies and oligopolies caused by asset specificity are the most frequent cause of VMF. The effect of asset specificity is magnified when the assets are also capital intensive and durable and when they give rise to high fixed-cost structures. While the existence of a bilateral oligopoly increases the risk of supply or outlet disruption, high capital intensity and high fixed costs increase the costs of any production disruption because of the magnitude of both cash and opportunity costs incurred during the interruption. Asset durability increases the time horizon over which the risks and costs are relevant.

Taken together, high asset specificity, intensity, and durability often cause high switching costs for both suppliers and customers. Their presence is one of the most important contributing factors to decisions to vertically integrate across a wide range of industries.

*Transaction frequency.* High transaction frequency is another factor that will promote VMF, when it is accompanied by bilateral oligopolies and high asset specificity. Frequent transactions raise costs for the simple reason that haggling and negotiating occur more often and allow for frequent exploitation.

Exhibit 3 plots transaction frequency and asset characteristics on a matrix that suggests appropriate vertical coordination mechanisms. When buyers and sellers seldom need to interact, vertical integration is usually not necessary, whether asset specificity is low or high. When asset specificity is low, markets can operate effectively using standard contracts such as leases and credit sale agreements. And when asset specificity is high, the contracts may be quite complicated but integration is still not necessary. An example would be major public construction projects.

Even if transaction frequency is high, low asset specificity will mitigate its effects. For example, trips to the grocery store don't usually require complicated negotiations. But when assets are specific, durable, and intensive, and transactions

Transaction-asset matrix		Exhibit 3
Transaction frequency	Often	Standardized transactions (e.g., groceries)
	Seldom	Vertical integration (e.g., bauxite, specialized auto components)
		Detailed, standardized contracts (e.g., office lease, credit sale arrangements)
		Detailed, probably unique contract (e.g., major public construction projects)
		Low High
		Asset specificity, durability, and intensity

are frequent, vertical integration is likely to be warranted. Otherwise, transaction costs and risks will be too high, and complete contracts to eliminate these uncertainties will be difficult to write.

**Uncertainty, bounded rationality, and opportunism.** Three additional factors have subtle but important implications for vertical strategy. *Uncertainties* make it difficult for companies to draw up contracts that will guide them as circumstances change. In the machine shop example, the major uncertainties included the timing, nature, and severity of plant breakdowns and the supply and demand balance in the local markets for machining services. With such a high level of uncertainty, the company was better off maintaining its in-house shop for breakdown work. The work will proceed more smoothly, cheaply, and with a lower risk if this part of the chain is integrated.

*Bounded rationality* also inhibits companies from writing contracts that fully describe transactions under all future possibilities. This concept, formalized by economist Herbert Simon, is that human beings have a limited ability to solve complex problems.<sup>2</sup> One of Simon's students, Oliver Williamson, noted the effect of bounded rationality on market failure.<sup>3</sup>

Williamson also introduced the notion of *opportunism*: when given the chance, people will often cheat and deceive in commercial dealings when they perceive that it is in their long-term interest to do so. Uncertainty and opportunism can often be seen to drive vertical integration outcomes in the markets for R&D services and the markets for new products and processes generated by R&D. These markets often fail because the end product of R&D is largely information about new products

<sup>2</sup>Herbert A. Simon, *Models of Man: Social and Rational*, New York: John Wiley, 1957, p. 198.

<sup>3</sup>Oliver E. Williamson, *Markets and Hierarchies: Analysis and Antitrust Implications*, New York: Free Press, 1975.

and processes. In a world of uncertainty, the value of new products and processes to a purchaser is not known until it has been observed. But the seller is reluctant to disclose information before payment because a preview could give the product away. The situation is ripe for opportunism.

When specific assets are required in the development and application of the new ideas or when the originator cannot protect its property rights through patents, companies will probably benefit from vertical integration. For buyers that would mean developing their own R&D departments; for sellers that would mean forward integrating.

For example, EMI, the developer of the first CAT scanner, should have forward integrated into specialized distribution and servicing, as producers of sophisticated medical equipment typically do.<sup>4</sup> But it did not have these assets at the time, and they are slow and costly to build. General Electric and Siemens, which were integrated across R&D, engineering, and marketing, reverse-engineered the scanner, improved on it, provided more training, support, and servicing, and captured the major share of the market.

While uncertainty, bounded rationality, and opportunism are ubiquitous, they do not always have the same intensity. This observation may explain some interesting patterns in vertical integration across countries, industries, and time. For example, Japanese manufacturers in industries like steel and autos are less backward integrated into supplier industries, such as components and engineering services, than are their Western counterparts. Instead, they rely on relatively few contractors with whom they enjoy fairly stable, nonadversarial relationships. One of the possible reasons that contributes to Japanese manufacturers' willingness to rely on outsiders is that opportunism is not as rife in Japanese culture as it is in Western culture.

#### Defending against market power

Vertical market failure is the most important reason to vertically integrate. But companies sometimes integrate because a company in an adjacent stage of the industry chain has more market power. If one stage of an industry chain exerts market power over another and thereby achieves abnormally high returns, it may be attractive for participants in the dominated industry to enter the dominating industry. In other words, the industry is attractive in its own right and might attract prospective entrants from both within the industry chain and outside it.

The Australian ready-mix concrete industry is notoriously competitive because there are low barriers to entry and because there is cyclical demand for what is essentially a commodity product. Participants often engage in price wars and generally earn low returns.

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<sup>4</sup>David J. Teece, "Profiting from technological innovation," *Research Policy*, 1986, Volume 15, pp. 285–305.



By contrast, the quarry industry, which supplies sand and stone to the ready-mix manufacturers, is extremely profitable. Limited quarry sites in each region and high transport costs from other regions create high barriers to entry. The few players, recognizing their mutual interests, charge prices well above what would occur in a competitive marketplace and earn an attractive economic surplus. These high-priced quarry products are an important input cost for ready-mix concrete. Therefore, the concrete companies have backward integrated into quarries, largely via acquisitions, and now three large players control about 75 percent of both the concrete and quarry industries.

It is important to note that entry via acquisitions will not create value for the acquirer if it has to hand over the capitalized value of the economic surplus in the form of an inflated acquisition price. Often, the existing players in the less powerful stages of an industry chain pay too much for businesses in the powerful stages. In the Australian concrete business, at least some of the quarry acquisitions would seem to have destroyed value for the acquirer. Recently one of the large concrete makers acquired a small, integrated quarrying and concrete-making operator at an inferred price/cashflow multiple of twenty. It is very difficult to justify such a premium, given that the acquirer's real cost of capital is about 10 percent.

While players in weak stages of an industry chain have clear incentives to move into the powerful stages, the key issue is whether they can achieve integration at a cost less than the value of the benefits to be achieved. Unfortunately, in our experience, they often cannot.

Managers often mistakenly believe that, as an existing player in the industry, their entry into a more attractive business within the chain is easier than it is for outsiders. However, the key skills along an industry chain usually differ so substantially that outsiders with analogous skills from other industries are often superior entrants. (Outsiders, too, can dissipate the stage's value; if one firm can scale the barriers and enter the attractive stage, other new entrants may be able to do the same.)

#### Creating and exploiting market power

Vertical integration also makes strategic sense when used to create or exploit market power.

**Barriers to entry.** When most competitors in an industry are vertically integrated, it can be difficult for nonintegrated players to enter. Potential entrants may have to enter all stages to compete. This increases capital costs and the minimum efficient scale of operations, thus raising barriers to entry.

One industry where vertical integration added to entry barriers was the upstream aluminum industry. Until the 1970s, the industry's three stages—bauxite mining, alumina refining, and metal smelting—were dominated by the six vertically integrated majors: Alcoa, Alcan, Pechiney, Reynolds, Kaiser, and Alusuisse. The

markets for the intermediate products, bauxite and alumina, were too thin for a nonintegrated trader. Even integrated entrants were repelled by the \$2 billion price tag (in 1988 figures) for efficient-scale entry as a vertically integrated player.

Even if this barrier could be scaled, an entrant would need to find immediate markets for the roughly 4 percent it would be adding to world capacity—not an easy task in an industry growing at about 5 percent annually. Not surprisingly, the vertical integration strategies of the majors were the predominant cause of the industry’s sizable barriers to entry.

Similar entry barriers exist in the automobile industry. Auto manufacturers are usually forward-integrated into distribution and franchised dealerships. Those with strong dealer networks tend to have exclusive dealerships. This means that new entrants must establish widespread dealer networks, which is expensive and time consuming. Without their “inherited” dealer networks, manufacturers like General Motors would have lost more market share than they already have to the Japanese.

Using vertical integration to build entry barriers is often, however, an expensive ploy. Furthermore, success is not guaranteed, as inventive entrants ultimately find chinks in the armor if the economic surplus is large enough. For example, the aluminum companies eventually lost control of their industry, mainly as a result of new entrants using joint ventures.

**Price discrimination.** Forward integration into selected customer segments can allow a company to benefit from price discrimination. Consider a supplier with market power that sells a commodity product to two customer segments with different price sensitivities. The supplier would like to maximize its total profits by charging a high price to the price-insensitive segment and a low price to the price-sensitive segment, but it cannot do so because the low-price customers can resell to the high-price customers and, ultimately, undermine the entire strategy. By forward-integrating into the low price segment, the supplier prevents reselling. There is evidence that the aluminum companies have forward-integrated into fabrication segments with the most price-sensitive demands (such as can stock, cable, and automobile castings) and have resisted integration into segments where the threat of substitution is low.

#### Responding to industry life cycle

When an industry is young, companies sometimes forward-integrate to develop a market. (This is a special case of vertical market failure.) During the early decades of the aluminum industry, producers were forced to forward-integrate into fabricated products and even end-product manufacture to penetrate markets that traditionally used materials such as steel and copper. The early manufacturers of fiberglass and plastic, too, found that forward integration was essential to creating the perception that these products were superior to traditional materials.<sup>5</sup>

<sup>5</sup> See E. R. Corey, *The Development of Markets for New Materials*, Cambridge, MA: Harvard University Press, 1956.

However, our experience suggests that this rationale for forward integration is overrated. It is successful only when the downstream business possesses proprietary technology or a strong brand image that prevents imitation by “free rider” competitors. There is no point in developing new markets if you cannot capture the economic surplus for at least several years. Also, market development will be successful only if the product has some real advantages over its current or potential substitutes.

When an industry is declining, companies sometimes integrate to fill the gaps left by the independents that are pulling out. As an industry declines, weaker independents exit, leaving core players vulnerable to exploitation by increasingly concentrated suppliers or customers.

For example, after the US cigar industry began to decline in the mid-1960s, Culbro Corporation, a leading US supplier, had to acquire distribution companies in key markets along the east coast. Its major competitor, Consolidated Cigar, was already forward-integrated, and Culbro’s distributors had “lost interest” in cigars and were giving priority to numerous other product lines.<sup>6</sup>

### When not to integrate

Do not vertically integrate unless absolutely necessary. This strategy is too expensive, risky, and difficult to reverse. Sometimes vertical integration is necessary, but more often than not, companies err on the side of excessive integration. This occurs for two reasons: (1) decisions to integrate are often based on spurious reasons, and (2) managers fail to consider the rich array of quasi-integration strategies that can be superior to full integration in both benefits and costs.

#### Spurious reasons

The reasons used to justify vertical integration strategies are often shallow and invalid. Objectives like “reducing cyclicalities,” “assuring market access,” “moving into the high value-added stage,” or “getting closer to customers” are sometimes valid, but often not.

**Reducing cyclicalities or volatility in earnings.** This is a common but rarely valid reason for vertical integration—a variation on the old theme that internal portfolio diversification is valuable to shareholders. This argument is invalid for two reasons.

First, returns in contiguous stages of an industry chain are often positively correlated and are subject to many of the same influences, such as changes in demand for the end product. Hence, combining them into one portfolio has little impact on total portfolio risk. This is the case in the zinc mining and zinc smelting businesses, for example.

<sup>6</sup>See Kathryn R. Harrigan, *Strategies for Declining Businesses*, Lexington, MA: Lexington Books, 1980, chapter 8.

Second, even if returns are negatively correlated, the smoothing of corporate earnings is not all that valuable to shareholders, who can diversify their own portfolios to reduce unsystematic risk. Vertical integration in this case adds value for managers but not for shareholders.

**Assuring supply or outlets.** Owning captive supply sources or outlets, it is argued, eliminates the possibility of market foreclosure or unfair prices and insulates companies from short-run supply and demand imbalances in intermediate product markets.

Vertical integration can be justified where the possibility of market foreclosure or “unfair” prices is a symptom of VMF or of structural market power held by suppliers or customers. But where there is an efficient market, it is not necessary to own supply or outlets. A market participant will always be able to trade any volume at the market price, even though the price might seem “unfair” relative to costs. A firm that is integrated across such a market only deludes itself when it sets internal transfer prices that are different from market prices. It may even make suboptimal output and capacity decisions if integrated for this reason.

The subtle, although critical, factors that determine when to assure supply or outlets are the structures of the buying and selling sides of the market. If both sides are competitively structured, integration does not add value. But if the structural conditions give rise to VMF or a permanent power imbalance, integration may be justified.

Several times we have observed the interesting case where a group of oligopolists that supply a low-growth commodity product to a reasonably fragmented, low-power buying industry use forward integration to avoid price-based competition. The oligopolists understand that competing for market share on the basis of price is folly, except perhaps in the very short run, but they cannot resist the urge to steal market share. Hence, they forward integrate to secure all of their large purchasers.

Such behavior is rational so long as price competition is avoided—and so long as the oligopolists do not pay acquisition prices for downstream customers that are above their standalone net present values. This sort of forward integration makes sense only when it helps preserve oligopoly profits in the upstream stage of an industry chain in which a permanent power imbalance exists.

**Capturing more value.** The popular prescription that firms should move into the high value-added stages of an industry chain is often combined with another sacred belief of the 1980s—that firms should move closer to their customers. Both prescriptions lead to increased vertical integration, usually forward integration toward final customers.

Although there probably is a positive correlation between the profitability of a stage in an industry chain and both its absolute value added and its proximity to final consumers, we believe the correlation is weak and inconsistent. Vertical integration strategies based on these assumptions usually destroy shareholder wealth.

It is *economic surplus*—not value added or closeness to the customer—that drives superior returns. Economic surplus is the return an enterprise receives in excess of its full costs of being in the business, including a fair return on capital. It is merely coincidental if the surplus arising in one stage of an industry chain is proportional to its value added (defined as the sum of full cost and surplus, less the cost of inputs sourced from the preceding stage in the industry chain). However, economic surplus is more likely to arise close to the customer because there, according to economists, you can get your hands directly on any available consumer surplus.

The general prescription should therefore be: *integrate into those stages of the industry chain where the greatest economic surplus is available, irrespective of closeness to the customer or the absolute size of the value added.* Recall, though, that the consistently high-surplus stages must, by definition, be protected by barriers to entry, and the vertically integrating entrant must be able to scale those barriers at a cost less than the value of the surplus available. Usually the barriers to entry include the skills required to run the new business, and the entrant often does not possess those skills despite experience in an adjacent stage of the industry chain.

Consider the Australian cement and concrete industry chain (Exhibit 4). Economic surplus is not proportional to the value added in the individual stages of production. In fact, the highest value-added stage, transport, does not even earn an adequate return on capital, whereas the smallest value-added stage, fly ash, earns a high economic surplus. Also, economic surplus is not concentrated at the customer end but, if anything, occurs upstream. In fact, our experience suggests that the pattern of economic surplus along industry chains is highly variable and needs examination on a case-by-case basis.

#### Quasi-integration strategies

Managers sometimes overintegrate because they fail to consider the rich array of quasi-integration strategies available. Long-term contracts, joint ventures, strategic alliances, technology licenses, asset ownership, and franchising tend to involve lower capital costs and greater flexibility than vertical integration. Also, they often provide adequate protection from VMF and market power held by customers or suppliers.

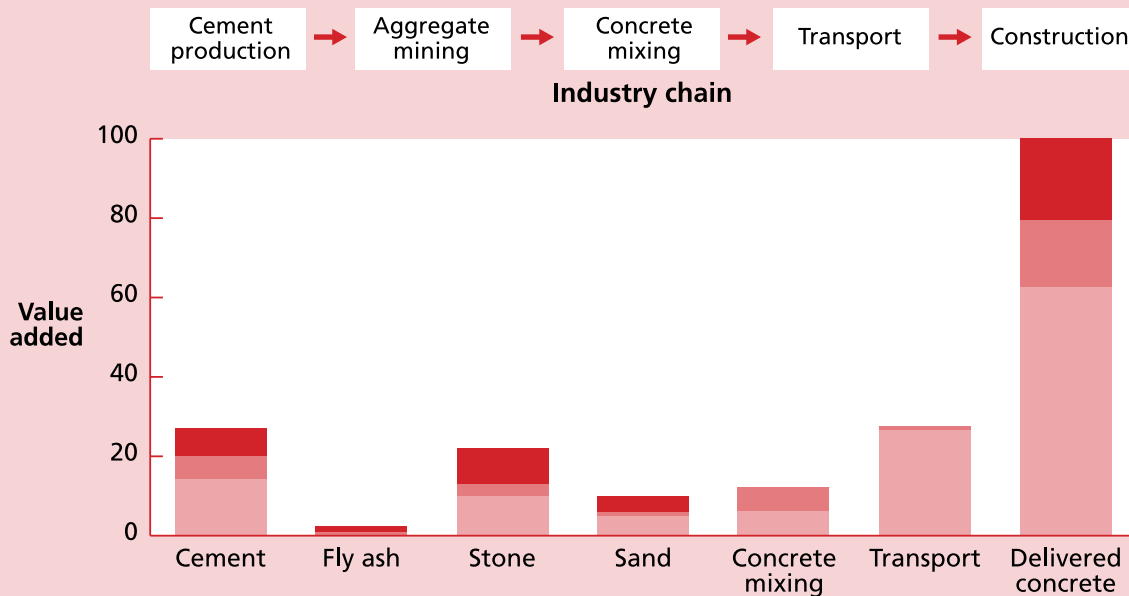
Joint ventures and strategic alliances, for example, allow firms to exchange certain goods, services, information, or expertise while maintaining a formal trade relationship on others. Such mechanisms also allow the companies involved to retain their corporate identities and to avoid the risk of antitrust prosecution. The potential mutual advantages can be maximized, and the natural conflict in trade relationships can be minimized.

## Australian cement and concrete industry: Value added versus economic surplus

Exhibit 4

Index: Delivered price of concrete per ton = 100

■ Cash operating costs 
 ■ Fair return on capital 
 ■ Economic surplus



For these reasons, a majority of the upstream aluminum industry's plants are now joint ventures. These structures facilitate the exchanges of bauxite, alumina, technical know-how, and nation-specific knowledge; provide forums for oligopolistic coordination; and manage relations between global corporations and host-country governments.

Asset ownership is another quasi-integration arrangement. The host firm retains ownership of the critical assets in adjacent stages of the industry chain but contracts out all other aspects of ownership and control in these adjacent stages. For example, assemblers of products like motor vehicles and steam turbines own the specialized tools, dies, jigs, patterns, and molds that are unique to their key components. They contract with suppliers for the actual manufacture of components but protect themselves from opportunistic exploitation by owning the assets. Asset ownership is often all that is needed to thwart the opportunism associated with physical capital.

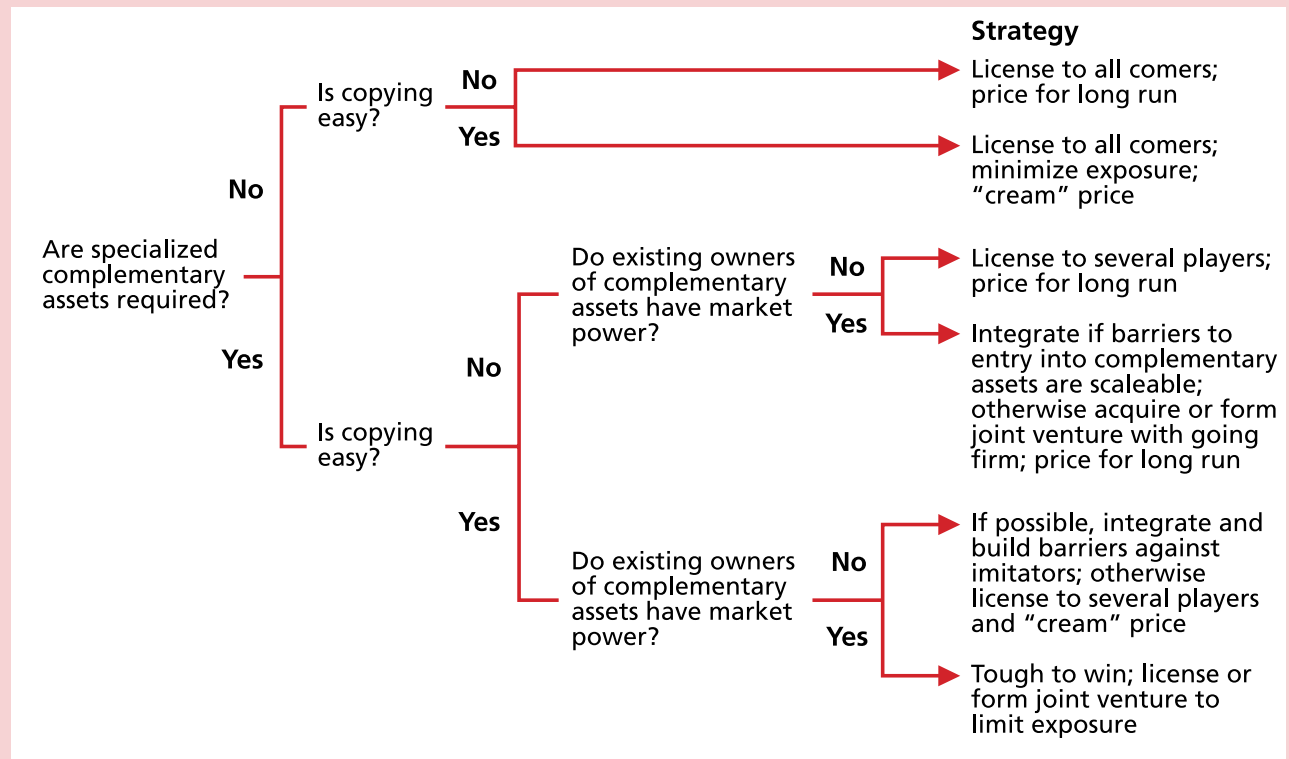
Similar arrangements are also possible on the downstream side. Franchises allow the host enterprise to control distribution without the drain on capital and management resources that full integration would require. Here, the host firm avoids ownership of the physical assets, as they are not especially specific or durable, but retains property rights on the intangible "brand" assets. By holding the right to cancel franchises, the host firm can control standards, as McDonald's does with quality, service, cleanliness, and value.

Licensing arrangements should always be considered as an alternative to vertical integration where buying and selling of technology is concerned. Markets for R&D and technology are prone to failure because it is difficult for innovators to protect their property rights. Often an innovation is valuable only when joined with specialized complementary assets, such as skilled marketing or service teams. Licensing may be the answer.

Exhibit 5 is a decision-making framework for the innovator of a new technology or product. It shows, for example, that when the innovator is protected from imitators by a patent or trade secret and specific complementary assets either are not critical or are available in competitive supply, the innovator should license to all comers and price for the long run. This strategy typically applies to industries like petrochemicals and cosmetics. As copying becomes easier and complementary assets more critical, vertical integration may be required, as illustrated earlier by the CAT scanner example.

## Vertical strategy framework for innovators

Exhibit 5



Source: For a detailed analysis of the thinking summarized here, see D. J. Teece, "Profiting from Technological Innovation," *Research Policy*, Volume 15, 1986, pp. 285–305.

### Changing vertical strategies

Companies should change their vertical integration strategies when market structures change. The structural factors most likely to change are the number of buyers and sellers and the importance of specialized assets. Of course, a company should also alter its strategy, even in the absence of structural change, when that strategy turns out to be wrong.

#### Buyers and sellers

In the mid-1960s, the crude oil market exhibited all the features of a vertically failed market (Exhibit 6). The top four sellers accounted for 59 percent of industry sales and the top eight accounted for 84 percent. The buying side was equally concentrated. The number of relevant buyer-seller combinations was further reduced because refineries were geared to process specific types of crude. The assets were highly capital intensive and long lived, transactions were frequent, and the need for continuous plant optimization increased the level of uncertainty. Not surprisingly, there was almost no spot market, and most transactions were conducted in-house or through ten-year fixed contracts in order to avoid the transaction costs and risks of trading on an unreliable, vertically failed market.

Changes in oil industry vertical market structure			Exhibit 6
Structural element	1966	1985	
Number of sellers	Top 4 = 59% Top 8 = 84%	Top 4 = 26% Top 8 = 42%	
Number of buyers	Equally concentrated as selling side	Much less concentrated than before	
Asset characteristics			
• Specificity	Refineries geared to specific crude and unable to process the variety of crudes necessary to function as spot purchaser	Refineries much more flexible and able to process wide range of crudes	
• Intensity	Highly capital intensive	Highly capital intensive	
• Durability	20+ years	20+ years	
Transaction frequency	Very frequent	Very frequent	
Uncertainty	Daily plant optimization changes	Daily plant optimization changes	
Vertical coordination mechanism	<ul style="list-style-type: none"> <li>• Virtually no spot market</li> <li>• Most transactions via vertical integration or ten-year fixed contracts</li> </ul>	<ul style="list-style-type: none"> <li>• Half of transactions on spot market</li> <li>• Independents growing</li> <li>• Vertical integration declining</li> </ul>	



However, over the past twenty years, there have been fundamental shifts in underlying market structure. The nationalization of oil reserves by OPEC producers (replacing the “Seven Sisters” with multiple national suppliers), combined with the huge growth of non-OPEC suppliers such as Mexico, has reduced seller concentration enormously. By 1985, the market share of the top four sellers had fallen to only 26 percent and the top eight to 42 percent. Concentration of refinery ownership had also fallen substantially. Furthermore, technological advances have reduced asset specificity by allowing modern refineries to process a much wider range of crudes with much lower switching costs.

The increase in the number of buyers and sellers and the decrease in switching costs have greatly reduced the need for vertical integration by allowing the development of an efficient market for crude oil. It is estimated that around 50 percent of transactions are now traded on the spot market (even by the large, integrated players), and there is a growing number of nonintegrated players.

### Disintegration

Three forces seem to favor a general trend toward vertical disintegration during the 1990s. First, many companies integrated in the past for spurious reasons and should now, even in the absence of structural change, disintegrate. Second, the emergence of a powerful market for corporate control is increasing pressure on overintegrated companies to restructure themselves—either voluntarily or at the hands of corporate raiders. And third, worldwide structural changes are occurring in many industries that increase the advantages and reduce the risks of trading. The first two reasons are self-explanatory, but the third reason needs elaboration.

In many industry chains, the costs and risks of trading have been reduced by increases in the number of buyers or sellers or both. Industries such as telecommunications and banking are being deregulated to allow the entry of new players into national monopolies and oligopolies. Also, growth of the newly industrialized countries, including Korea, Taiwan, Hong Kong, and Mexico, has greatly increased the universe of potential suppliers in many industries, such as consumer electronics.

Similarly, the globalization of consumer markets and the pressures on individual firms to become “insiders” in each national market they serve are prompting many companies to build new manufacturing facilities in countries to which they previously exported. This, of course, increases the number of components buyers.

The growing need for manufacturing flexibility and corporate focus is another force that reduces the costs and increases the benefits of trading. For an auto manufacturer that assembles thousands of components, each of which may be characterized by increasing technological complexity and by shortening product life cycles, it is difficult to maintain excellence in all areas. Purchasing from specialist suppliers and focusing on design and assembly can provide benefits.

In addition, managers have become more experienced and comfortable with quasi-integration techniques such as long-term preferred supplier relationships. In many industries, purchasing departments have transformed their adversarial stance toward suppliers into a cooperative one. The US car industry, for example, is reducing its level of vertical integration and the number of suppliers to concentrate on establishing fewer, more cooperative independent supply agreements.

Working against these forces, however, is a trend toward consolidation. As conglomerates like Beatrice Foods are disaggregated, the pieces are finding their way into the hands of companies that use them to increase their own shares of particular markets. Our experiences suggest, however, that the forces promoting globally competitive industry structures are generally winning out.

In addition to the pressures to disintegrate industry chains, there are pressures on firms to disintegrate the business systems within their own stages. Low-cost foreign competitors are pressuring corporations to be more cost effective. Advances in information and communications technologies are reducing the costs of bilateral trading.

Although these forces tend to favor industry chain and business system disintegration, a word of warning is warranted. Our suspicion is that some managers, caught up with the zest to “downscale,” “be like the Japanese,” or “take a nonadversarial approach to suppliers,” will end up throwing a few babies out with the bathwater. They will disintegrate some activities that are in fact critical because of VMF; they will form some strategic alliances that turn out to be institutionalized piracy; and they will find that “cooperative” sole suppliers have not forgotten how to flex their muscles after their competing suppliers have been thoroughly banished.

In all cases, decisions to integrate or disintegrate should be analytical rather than fashionable or instinctual. To that end, we have developed a step-by-step vertical restructuring framework (Exhibit 7). The key point, again, is this: do not vertically integrate unless absolutely necessary.

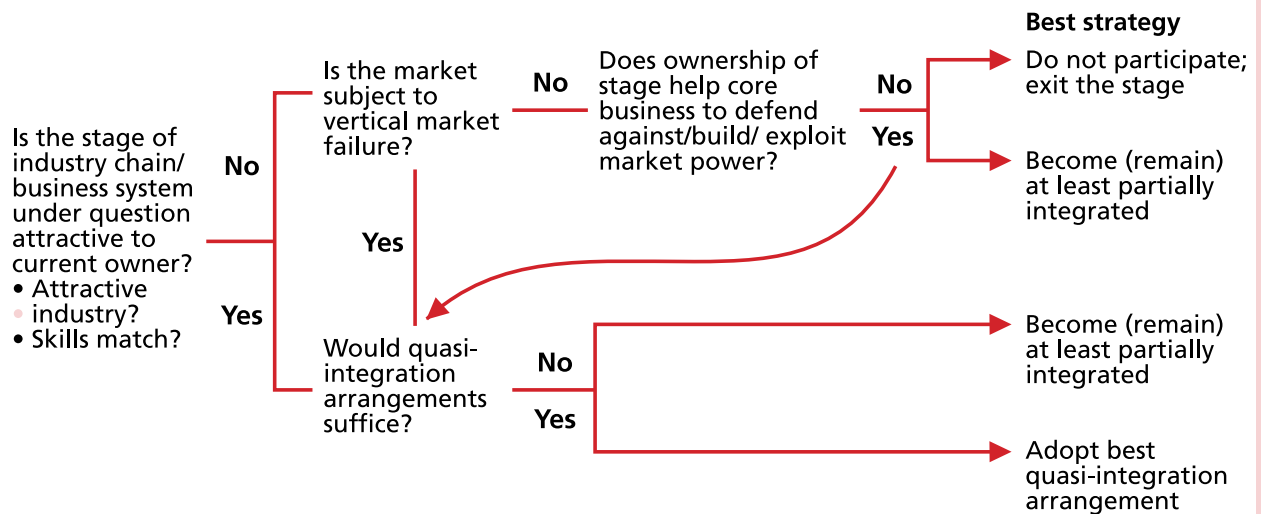
### **Using the framework**

We have successfully applied this framework in a number of situations where clients were trying to resolve make/buy decisions, such as the following:

- Should a steel plant retain all parts of its machine shop?
- Should a large exploration and mining company have its own legal department or use outside law firms?
- Should a bank produce its own checkbooks or contract the task to outside printers?
- Should a telecommunications company with 90,000 employees have its own in-house training unit or use outside trainers?

## Vertical restructuring framework

Exhibit 7



We have also used it to study strategic issues, such as the following:

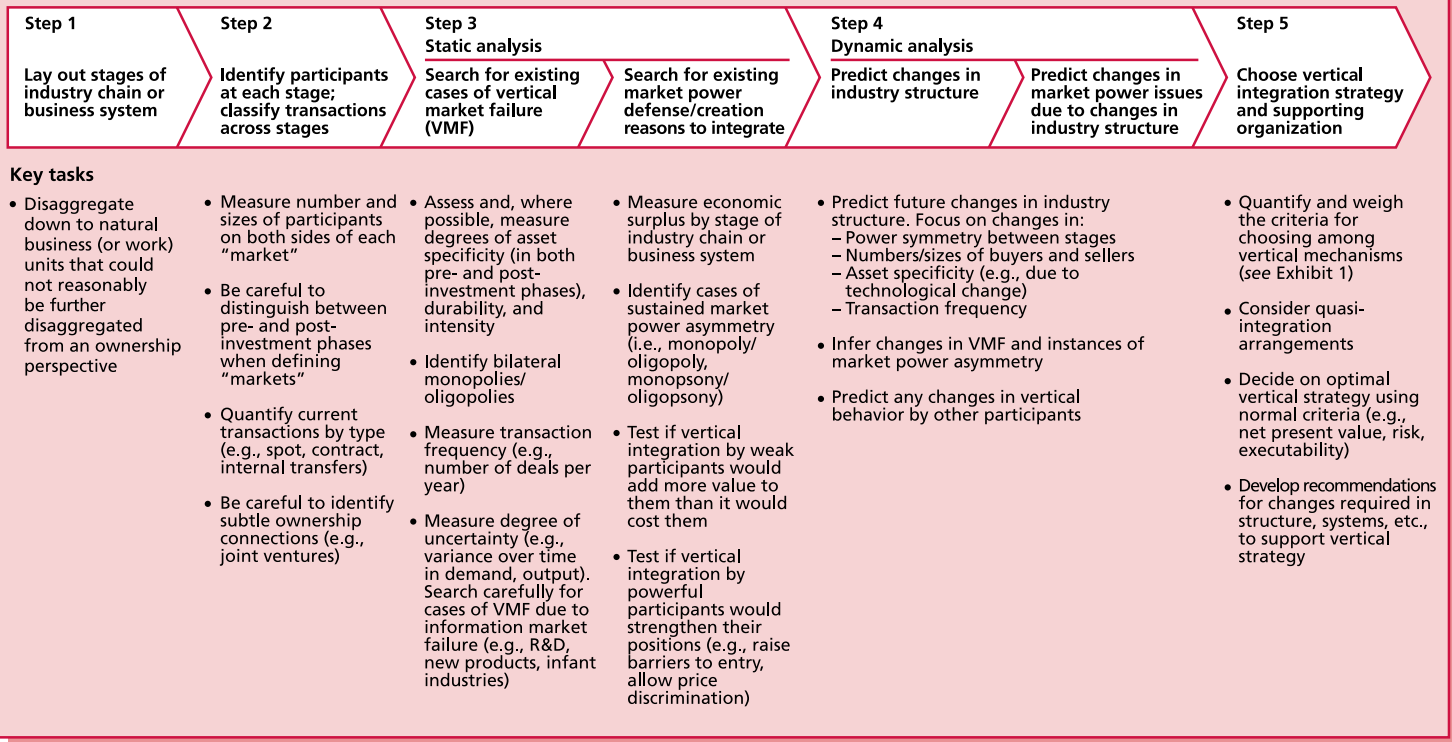
- Which parts of a retail bank's business system (for example, product development, branch network, ATM network, and central computer processing) should it own?
- What mechanisms should a government-owned research organization use to trade its services and knowledge with private industry customers?
- Should a miner and metals processor forward-integrate into metals fabrication?
- What mechanisms should an agribusiness company use to penetrate the Japanese imported beef market?
- Should a brewer divest its network of "tied" pubs?
- Should a natural gas producer integrate downstream into pipelines and power generation?

### Process

The process described in Exhibit 8 largely speaks for itself, but several points are worth emphasizing. First, where major strategic decisions are being made, companies should work hard to quantify the various factors. For example, it is usually critical to quantify the switching costs you would face if you became locked into a supply arrangement by investing in the assets specific to that arrangement. Similarly, you should quantify the transaction costs incurred when buying from or selling to third parties.

## Applying the framework

Exhibit 8



Second, most vertical integration analyses require an understanding of the behavior of small groups of buyers and sellers. Tools like supply and demand analysis help scope the set of feasible behavior, but cannot be used to predict behavior deterministically, as they can in more competitive market structures. Predicting competitor behavior and determining optimal strategy often requires the use of such techniques as pay-off matrices and competitive games. This sort of problem solving is as much art as science, and we have found that it is critical for senior executives to have hands-on involvement in it so that they understand and believe the assumptions about competitor behavior that must often be made.

Third, the process is analytically demanding and time consuming if followed comprehensively. An initial rapid pass through the steps can help identify key issues and generate hypotheses. This approach allows subsequent in-depth analysis to be highly focused.

Fourth, prospective users should expect a lot of resistance. Vertical integration issues seem to be one of the last bastions within business strategy where gut feel and tradition reign supreme. We have found no magic solutions to this problem, but one approach is to find examples of other companies in your industry, or in analogous

industries, that illustrate your thesis. Another idea is to attack faulty logic head on by decomposing it and revealing its weak links. Involving everyone in the problem solving itself is probably the most effective approach of all.

Vertical integration is a difficult strategy. It is usually costly and long lived, hence risky. It is not surprising, therefore, that some managers get it wrong—a problem for them, but an opportunity for insightful and bold strategists adept at exploiting others' mistakes. *Q*

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