

Formulating Vertical Integration Strategies¹

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A framework is proposed that develops the dimensions of vertical integration strategies and proposes key factors that might augment their uses within various scenarios. These represent new hypotheses and conjectures about make-or-buy decisions that require empirical testing. If the framework is valid, strategists could formulate better hybrid vertical integration strategies by recognizing the hypothesized effects of these forces on the industries that might be linked.

Managers need a ready supply of raw materials and services, as well as a ready market for their firms' outputs. The business arrangements that are used to control these risks are forms of vertical integration. They may include vertical acquisitions, or internal development of supplying or distributing units, or other means of extending firms' control over outsiders.

The Phenomenon of Vertical Integration

Vertical integration is a corporate strategy that has been misunderstood. It has long been a key force in the development of high productivity and managerial sophistication in U.S. business (Chandler, 1977). Vertically integrated corporations have been key engines of change in the past and have enhanced shareholder wealth (Lubatkin, 1982). Yet earlier findings that "dominant verticals" (Rumelt, 1974) and vertical mergers were least successful as diversifications (Baker, Miller, & Ramsperger, 1981) may have soured managers and academic researchers on the usefulness of this strategy unnecessarily. Oftentimes researchers did not recognize that vertical integration could be an effective strategy, provided it was used prudently, because they often took an overly aggregated view of it. Because critics have not discerned how the important dimensions of vertical integration might be adapted over time (as industries change),

they have not recognized how to make this a more durable and keen competitive weapon. Because successful vertical integration strategies require the cooperation of several strategic business units (SBUs), the formulation of such strategies is in the province of the chief executive officer (CEO). In some cases, effective vertical integration may even require temporary subsidization of one business unit at the expense of another. Decisions regarding such SBU coordination (and resource allocations among them) must be made by the chief strategists. Thus effective vertical integration strategies need to reflect both business unit and corporate level strategy requirements.

This paper proposes a framework for developing effective vertical integration strategies. It was developed by synthesizing the theoretical foundations established by the industrial economics and strategic management literatures with firms' observed behaviors. Thus it suggests a new way to look at vertical integration and the forces that affect firms' choices concerning vertical linkages. It develops normative propositions concerning which generic vertical strategies might be more appropriate under different competitive circumstances, and it uses examples of firms' successes or failures in using vertical integration to suggest how traditional concepts of this strategy might be amended to reflect effective industry practices. These suggestions are new hypotheses, which will require empirical testing. Vertical integration is one of the first diversification strategies that firms embrace. Unfortunately, some firms seem to use it in a manner that seems inappropriate for their circumstances. The issue of vertical integration

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deserves additional analysis because it has been misunderstood in the past, and because the development of a more rigorous means of analyzing this strategy (and the performance it promises) could result in the formulation of more effective industry linkages, more rapid technological improvements, stronger global strategies, and better use of vertical integration. Table 1 summarizes many of the advantages and risks associated with vertical integration.

The narrow case in which a firm's major diversification strategy has been only vertical is not the focus of this inquiry. Instead, it considers the larger universe of firms that have linked two or more SBUs through vertical relationships and have diversified in other ways as well. Rumelt (1974) would have found that many of the more diversified firms in his *Fortune* 500 sample also had vertical transfers of goods or services in-house, had that been the focus of his inquiry. Thus Rumelt reported that 22 percent of the firms in his sample embraced a dominant vertical strategy in 1969 (up from 20 percent in 1949), but vertical linkages also existed within the highly diver-

Table 1
Some Advantages and Disadvantages
of Vertical Integration

<i>Advantages</i>	<i>Disadvantages</i>
<i>Internal benefits</i> Integration economies reduce costs by eliminating steps, reducing duplicate overhead, and cutting costs (technology dependent)	<i>Internal costs</i> Need for overhead to coordinate vertical integration increased costs
Improved coordination of activities reduces inventorying and other costs	Burden of excess capacity from unevenly balanced minimum efficient scale plants (technology dependent)
Avoid time-consuming tasks, such as price shopping, communicating design details, or negotiating contracts	Poorly organized vertically integrated firms do not enjoy synergies that compensate for higher costs
<i>Competitive benefits</i> Avoid foreclosure to inputs, services, or markets	<i>Competitive dangers</i> Obsolete processes may be perpetuated
Improved marketing or technological intelligence	Creates mobility (or exit) barriers
Opportunity to create product differentiation (increased value added)	Links firm to sick adjacent businesses
Superior control of firm's economic environment (market power)	Lose access to information from suppliers or distributors
Create credibility for new products	Synergies created through vertical integration may be overrated
Synergies could be created by coordinating vertical activities skillfully	Managers integrated before thinking through the most appropriate way to do so

sified firms he had classified in other ways. If previous studies of vertical integration used classification rules similar to Rumelt's, they also may have understated its true activity level. For example, Federal Trade Commission data for 1948 to 1972 concerning large acquisitions (assets larger than \$10 million) indicate that less than 15 percent of these were vertical mergers; and Salter and Weinhold's (1979) list of \$100 million or more acquisitions made during 1975-1978 indicated that only 4 percent were vertical. Thus an illusion was perpetuated that vertical integrations were rare, except in the oil, rubber, basic metals, and forest products industries. But, in fact, acquisitions that are classified as being otherwise "related" to the firm's core businesses may also have provided new distribution channels or other assets that are vertically related to them.

Acquired firms are bundles of assets rather than single business units, as Occidental Petroleum discovered when courting Cities Service (and as Du Pont learned while absorbing Conoco). Acquisitions can offer vertical linkages as well as nonvertical diversifications. Corporate strategists must decide whether to retain the business units acquired incidentally in this fashion; and if they are vertically related, strategists must decide whether to encourage intra-firm commerce (subsidy) or demand arms-length transactions between vertical sister units. Thus, more seemingly unrelated mergers have vertical elements to them than is generally recognized, but oftentimes strategists see no advantage to encouraging vertical relationships between in-house units. This may occur because the opportunities for vertical competitive advantage have passed in some industries. In other cases, however, this occurs because managers did not recognize how to exploit the advantages of vertical integration effectively.

The Legacy of Vertical Integration

Vertical integration has been an important managerial innovation and a necessary technological step in developing certain industries, but it may not be appropriate in the same form under all circumstances. For example, ownership of ore mines, ships, foundries, rolling mills, and fabricating plants was necessary for steel companies to lower costs and improve productivity in the 1890s. In its early years, Ford Motor Company owned and operated every stage of processing from iron ore to finish-and-trim operations (except tires and glass). In these early

years, suppliers may not have been as willing to share Ford's gamble in persuading consumers to purchase "horseless carriages," so Ford had to develop components to its specifications for itself. There were substantial economies associated with vertical integration once Ford had overcome the public's resistance to purchasing this novel product, and these cost advantages rewarded Ford's gamble. Ford's integrated strategy and logistical system enabled large numbers of consumers to afford low priced and reliable automobiles in 1910 (Chandler, 1977) because it lowered Ford's costs of procurement, standardized its components, and facilitated an end-to-end production process. This is the type of vertical integration behavior one might expect within emerging industries where firms must provide their own infrastructures and other supplies.

By 1983, however, the automobile industry had matured such that uncertainties regarding generic product demand were reduced. Ford's outside suppliers were willing to invest in tooling and other assets to supply the automakers, and high degrees of internal transfers were no longer necessary if uneconomic. (And the throughput of U.S. automakers was not large enough for vertical integration to remain as economic as it once was.) The challenge from Japanese automakers was difficult to meet when firms such as Ford were so strategically inflexible. Moreover, vertical integration had lost some of its attraction because managers (who often resented having to buy from sister units) did not understand the role that vertical integration played in their firm's corporate scheme. Often firms did not have the supporting mechanisms needed to reap the maximum synergies that might be available from vertically integrated linkages, or they misapplied them in other ways (Williamson, 1975). In brief, in theory, many firms favor making rather than buying key resources and services, but their inability to manage integration taint their appreciation of this strategy. Moreover, the use of vertical integration must change with time. The competitive damage created by excessive integration can be substantial, as in the examples of the U.S. automobile and steel industries in 1983.

Antitrust decisions also have created a tarnished image of vertical integration. Economists, who did not consider the particular requisites of diverse firm's corporate strategies, have reinforced a unidimensional view of vertical integration based

on theories of market power and the ideal of perfectly competitive industries (Adelman, 1979; Blair & Kaserman, 1978; Comanor, 1967; Dennison, 1939; Frank, 1925; Jewkes, 1930; and Lavington, 1925). These scholars largely have not recognized that different motives for vertical integration—such as technological leadership, to secure access to raw materials, or competitive preemption—might exist within the same industry; nor have they considered the diversity of ways in which vertical integration strategies might be formed (Adams & Dirlam, 1964; Clevenger & Campbell, 1977; Greenhut & Ohta, 1979; Larson, 1978; Mancke, 1972; Perry, 1980). For example, firms vary in how many tasks they perform in-house, in the number of buyer-seller linkages downward in a vertical chain they forge, and in the form of control employed. Few economic scholars, except perhaps Bork (1954), McGee and Bassett (1976), and Porter (1980), have recognized the ways in which vertical integration could make industries more competitive (rather than less so). Most economic scholars have held one view of vertical integration, a view based heavily on the convenient assumption of a monopolist, instead of considering how firms might use this strategy differently.

Because industry structures differ, it is not surprising that many approaches to vertical control could satisfy managers' needs for a ready supply of raw materials or a ready market for their factories' output. The successes some firms had with strategies of full integration, long vertical chains, and other variations is surprising, however. Some firms, such as Robert Hall or Botany Industries, have suffered notable failures from vertical integration of the wrong type and/or its use at the wrong time (Harrigan, 1983a). But if managers better understood the many dimensions of vertical integration and the key forces that affect their abilities to execute vertical strategies well, they could better avoid fundamental errors associated with vertical integration and maximize the benefits available in joining dissimilar but related businesses. Briefly, managers would not attempt to create synergies in cases where external forces made integration too risky or their internal systems made communications inadequate.

A New Look at Vertical Integration

The old concept of vertical integration as being 100 percent owned operations that are physically interconnected to supply 100 percent of a firm's needs is

outlooked. Under appropriate circumstances, quality control and access to stable supplies can be obtained through quasi-integration arrangements. Firms could contract for R&D services, for example, to utilize the technology of genetic engineering in product development, or they could form joint ventures to obtain this capability. Firms could have components engineered to their tight and highly specific instructions by outsiders, as do Japanese automobile manufacturers, for example. And if their bargaining power is sufficient, firms can use a *kanban* or "just in time" system of inventory control that shifts the burden of holding costs to their suppliers (Ohmae, 1982).

If firms prefer not to use outsiders as extensions of their corporate entity, a variety of other vertical arrangements are possible. Some firms may conclude that they need not undertake certain activities at all. Eli Lilly, for example, uses outsiders exclusively with respect to merchandise its ethical pharmaceuticals. Tandy/Radio Shack, by contract, uses primarily its own retail outlets to distribute personal computers, but it has been increasing its use of outsiders. In other situations, firms may find that they can enjoy the integration economies, uncertainty reduction, competitive intelligence, and other benefits that internal vertical linkages may provide through outsiders. The key in using vertical integration is recognizing which activities to perform in-house, how to relate these activities to each other, how much of its needs the firm should satisfy in-house, how much ownership equity needs to be risked in doing so, and when these dimensions should be adjusted to accommodate new competitive conditions. Briefly, the concept of vertical integration should be expanded to encompass a variety of arrangements by which the firm can use outsiders (as well as its own business units) to forge an optimal vertical system for supplying goods, services, and capabilities.

The Dimensions of Vertical Strategy

In any vertical integration strategy, conscious (or unconscious) decisions are made regarding: (1) the breadth of integrated activities undertaken; (2) the number of stages of integrated activities; (3) the degree of internal transfers for each vertical linkage; and (4) the form of ownership used to control the vertical relationship.

Breadth of Integrated Activities

The breadth of integrated activities is the number of tasks that firms perform in-house. Firms performing many upstream or downstream tasks in-house are broadly integrated; firms performing few vertically related tasks are narrowly integrated.

Traditional concepts of vertical integration did not address the number of integrated activities that firms might undertake. Figure 1 contrasts the old view, represented by firm A, with examples of the expanded concept of vertical integration proposed here. In Figure 1, firm A is not as broadly integrated as are firms B and C. Circumstances in which firms might choose the broadest integrations successfully are suggested elsewhere.

Stages of Integrated Activities

The number of stages undertaken in the dimension of vertical integration that many traditional views have embraced. Figure 1 shows that firm A has more stages than firms B or C, because its activities extend from ultra-raw materials to retail outlets, but firm C is engaged in a greater number of steps in the vertical chain. Although Figure 1 depicts the transformation process as an extension of adjacent stages activities, it is possible for firms to skip a stage in the chain (by using outsiders for an intermediate processing step) in order to monitor costs better, to save on asset investments for facilities that would be underutilized if brought in-house, or for other reasons.

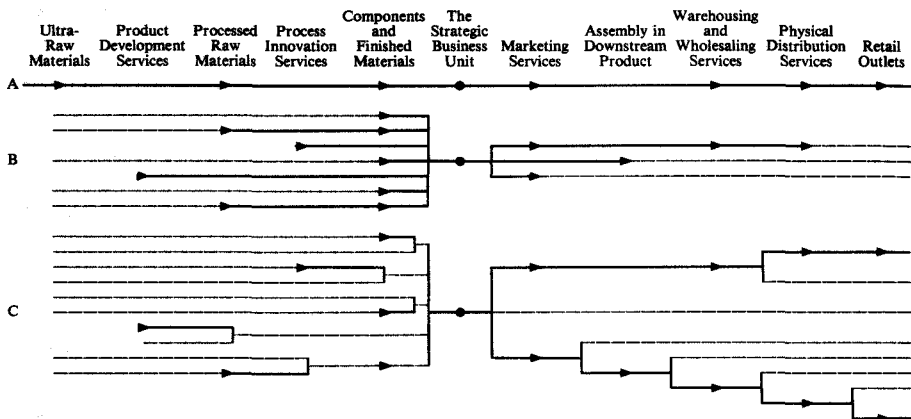
Degree of Internal Transfers

The degree of integration is the proportion of a resource transferred internally, and fully integrated firms transfer almost 100 percent of a particular service or material in-house. In Figure 1 only firm C is "taper integrated" with respect to services and materials upstream and downstream. Firms A and B are "fully integrated."

Form of Ownership Arrangement

The form of integrated ownership indicates the proportion of a firm's equity invested in a vertically linked venture, and in some environments carefully specified contracts, franchises, joint ventures, or other forms of quasi-integration can be good alternatives to wholly-owned ventures. Figure 1 does not illustrate different forms of ownership, but these

Figure 1
Vertical Integration Configurations



Key: ————— Solid lines indicate intrafirm transfers.

..... Dotted lines indicate external purchases or sales.

A In A, the strategic business unit is flanked by integrated sister units upstream and downstream. The firm is engaged in many stages of integrated activity, and all transfers of products and services within the vertical chain are made in-house (high *degree* of integration). The relationship between any two business units in A is "fully integrated."

B In B, the business unit's upstream and downstream sisters engage in many activities. Thus the firm is *broadly* integrated. The firm is engaged in many stages of integration, but the length of the vertical chain differs for various inputs. As drawn, the firm is "fully-integrated" for the inputs it does supply in B because it transfers those inputs in-house.

C In C, the business unit purchases more inputs or services from (or sells more to) outsiders than in B. The firm is less *broadly* integrated than in B. It is engaged in many stages of activity downstream for one output. It is *taper* integrated for many inputs, including product development services, because the business unit purchases some inputs and services from outsiders and sells some outputs to outsiders.

alternatives could be identified by the percentage of total equity firms risked in a particular vertical relationship. There are situations in which partial or no ownership may be preferred to wholly-owned vertical linkages.

Vertical Integration Strategy Alternatives

How can firms best manage their needs for scarce supplies or access to distribution channels? Several alternatives are suggested that encompass the dimensions of vertical integration strategy. The mix or combinations of these approaches are hypothesized to change over time, as industry conditions change or as firms' needs to control adjacent industries tightly change (Sichel, 1973). These alternatives are: nonintegration, quasi-integration, taper integration, and full integration. Previous theories of vertical integration did not recognize the different dimensions comprising it; thus combining their use to create generic strategy alternatives represents a new approach

to thinking about this problem.

Nonintegration. Strategies for attaining materials and markets with no internal transfers and no ownership are like contracts. They are especially attractive when firms are reluctant to buy specialized assets, need to lower breakeven points because of underdeveloped demand, or can arrange delivery schedules with suppliers (or distributors) as though they were extensions of the firm's assets. Koppers and Monsanto both used this approach to vertical integration successfully in genetic engineering, in which demand was highly uncertain and technological change occurred rapidly, synergies were low with ongoing businesses in 1981, and the figure had high bargaining power with respect to upstream and downstream markets. Firms risk the lowest proportion of their assets in vertical arrangements involving nonintegrated controls.

Quasi-Integration. Quasi-integrated firms need not own 100 percent of the adjacent business units in the vertical chain to enjoy the benefits of bonding their

interests to other firms' interests. The bond between firms could take the form of cooperative ventures, minority equity agreements, loans or loan guarantees, prepurchase credits, specialized logistical facilities or "understandings" concerning customary arrangements (Blois, 1972; Porter, 1980). Downstream quasi-integration arrangements enable firms to retain a network of qualified distributors to maintain quality images. Upstream "take-or-pay contracts" and *kanban* arrangements enable firms to enjoy the advantages of vertical integration without assuming the risks of it. Whiskey distillers used quasi-integration successfully to penetrate diverse geographical markets, and microcomputer producers used it to obtain software and distribution of their products. The competitive scanning advantages of quasi-integration can be especially effective if firms using it devise intelligence gathering mechanisms to use the information that adjacent firms and competitors might provide.

Quasi-integrated arrangements place greater proportions of ownership equity at risk, but they also provide greater flexibility in responding to changing conditions than a contract may provide. The third ownership alternative, full ownership, is most frequently observed. It assumes that the firm exerts complete control over the activities of the vertically linked businesses. Full ownership risks the greatest proportion of equity, but many firms believe it is easier to manage than contractual or quasi-integrated relationships and prefer it over them (Harrigan, forthcoming).

Taper Integration. When firms are backward or forward integrated but rely on outsiders for a portion of their supplies or distribution, they are "taper integrated." Such firms can monitor the R&D developments of outsiders, reduce vulnerability to strikes and shortages within their systems, and examine the products of competitors while enjoying the lower costs and greater advantages (and profit margins) or vertical integration. Under certain circumstances taper integration is not necessary and firms can add substantial value through upstream or downstream activities, taper integration can be used effectively, as American Cyanamid did in ethical pharmaceuticals by supplying basic and finished chemicals to its Lederle Laboratories subsidiary when it was convenient to do so but relying on outsiders to supply chemicals in other cases. Similarly Amoco (Standard Oil of Indiana) and many other petroleum refiners found that upstream taper integration arrangements

provided them with access to enough crude oil to keep their plants running economically, and that selling a portion of their primary petrochemicals to other firms allowed them to gain scale economies through specialization in processing downstream. Taper integration represents a useful compromise between desires to control adjacent businesses and needs to retain strategic flexibility.

Full Integration. Physically interconnected technologies usually involve high degrees of internal transfers, but full integration also can be used effectively if price competition is not fierce, diseconomies from temporary imbalances are not significant, and little hardship occurs from being cut off from outside market or technological intelligence. Transferring all of the firm's needs for a particular good or service in-house exposes it to increased risks of excess capacity, competitive inflexibility, and loss of information concerning customer or competitive changes. Firms also face higher capital costs and higher exit barriers with this strategy (Harrigan, 1981, 1983b). Nevertheless, Brooks Brothers sells its own tailored suits with success, Courtaulds used its own rayon fiber in textiles, and PPG Industries used its own synthetic soda ash to make glass. These firms were fully integrated with respect to the materials named above without encountering the problems other firms have faced with this strategy alternative. In general, it would seem that full integration works best within stable environments, but for corporate strategy reasons it may be necessary if outside suppliers or distributors are inadequate. Although it seems generally wise to have competitive antennae collecting intelligence upstream and downstream by engaging in some commerce with outsiders, taper integration may not be necessary in some settings in which full integration is the more profitable strategy.

Breadth and Stages of Integration. Firms that perform many activities involved in making a particular product (such as Pfizer in pharmaceuticals and Tenneco in coal gasification) may enjoy synergies with their other businesses. Being broadly integrated also offers them opportunities to capture large profit margins by adding more value themselves. Firms that engage in several vertical stages for each integrated activity they undertake (such as Texas Instruments in microcomputers and Mobil in petroleum refining) can enjoy these synergies at several diverse levels within their organizations. They also can control crucial aspects of their products' quality by par-

ticipating at several stages in the chain of processing. Although it seems evident that integrating broad and long ranging operations could be complex and costly, it is hypothesized that in some cases it could be highly rewarding because such strategies leverage firms' abilities to enter new markets, exploit new technologies, and evaluate the impact of evolutionary changes faster.

Particular combinations of the breadth of activities integrated, number of stages undertaken, degree of internal transfers, and form of ownership control are more likely to be successful for certain firms than others, depending on: (1) the uncertainty surrounding sales growth, industry infrastructure, and other market traits; (2) the likelihood that the industry in question will undergo radical technological change, severe price warfare, or other structural changes causing competition to be volatile; (3) the power of firms to bargain, cajole, or pressure suppliers (or distributors) into performing value adding tasks for them; and (4) firms' strategy needs. (For example, more integration might be used if the firm's CEO concluded that it needed greater control over adjacent parties to attain technological leadership or other objectives.) It is important to note that the most appropriate vertical integration strategies will change over time as industry conditions change, as corporate strategy needs change, and as firms' capabilities evolve. The CEO must assess the relative worth of the strategy alternatives sketched above in light of the forces that key factors exert on the dimensions of vertical integration.

Factors Affecting Vertical Strategies

Four key factors are hypothesized to affect the vertical integration strategies that firms embrace: (1) forces propelling industry evolution and exacerbating demand uncertainty; (2) the nature of competition in the linked industries; (3) the bargaining power of suppliers or distributors (and customers); and (4) corporate strategy requirements. Table 2 details the effects of these factors on the dimensions comprising vertical strategy alternatives. From this presentation and the discussion below, certain combinations of these dimensions are shown to be more appropriate than others when the key factors occur together in certain ways.

Forces Propelling Industry Evolution

Industries evolve in structure as firms make diverse

investments in them and overcome customers' reluctance to adopt new products (or new generations of products). Technological innovation is a major cause of accelerated industry evolution and of increased demand uncertainty. Different vertical integration strategies will be more appropriate if technology changes rapidly (or slowly), depending on whether firms would be technological leaders or followers. Pioneering firms would be more likely to integrate than would technological followers. With this exception, however, less vertical integration is expected early (and late) in an industry's evolution in contrast with the scenario Stigler (1951) envisioned, because of (1) the risks of demand uncertainty and (2) differing needs to prove a new product's worth. Therefore, the most likely pattern of integration behavior one might expect to see overtime (holding other factors constant) is an inverted U-shape.

Demand Uncertainty. When demand conditions become stable, higher degrees of internal integration might be undertaken with ease because one firm's sales volumes can become large (and regular) enough to absorb the output of adjacent plants without incurring costly excess capacity penalties. Because it would take time for the experience spurring sales growth to occur, one would not expect firms within many embryonic industries (as well as declining industries) to be broadly integrated or engaged in many stages of integrated operations. Demand for products in embryonic and declining settings may be highly uncertain. The chief strategist may elect for the firm to undertake more activities or more integrated stages in settings in which pioneering investments are necessary to achieve other corporate objectives, such as the creation of infrastructures, particularly if existing distribution channels are blocked or inappropriate for the firm's needs.

Creating Credibility for New Industries. Vertical integration behaviors in new industries would be expected to differ from those in established industries and to differ from behaviors within embryonic industries that began in the previous century. There were significant differences in the need for infrastructures—channels of distribution, standard means of assessing quality, and so on—supporting the development of the embryonic steel, automobile, and tobacco industries of the last century compared with those surrounding the embryonic industries of the 1980s. In newly developing countries and earlier in the development of U.S. business, it frequently was

Table 2
An Illustration of the Strategic Framework

<i>Strategy</i>	<i>Defining Characteristics</i>	<i>When Appropriate</i>	<i>Advantages</i>	<i>Risks</i>
<i>Degree of integration</i>				
Full integration	All of a particular input (or output) is transferred in-house to a sister business unit. Often adjacent, integrated stages are in balance in their throughput volumes.	In mature and stable environments protect proprietary processes from espionage Maintain tight quality control at all stages If firm seeks technological or quality leadership position Diseconomies from imbalance are not significant Technological changes occur slowly	Superior control of economic environment Avoid foreclosure to inputs or markets Guarantee quality is consistent with corporate image Capture integration economies (especially advantageous if market share leader)	Decreases market power Technology does not provide many integration economies Asset inflexibility Price renegotiations difficult Minimum efficient scale plants are rarely the same upstream and downstream, thus some portion of linkage is likely to be out of balance
Tapered integration	Some portion (but not all) of firm's requirements for an input is supplied in-house or some portion of outputs is sold (consumed) in-house.	Physical interconnection unnecessary Diseconomies in minimum efficient scale plant that are underutilized are substantial If firm seeks technological, quality, or market share leadership in volatile competitive settings New products needing explanations or infrastructure no outsiders provide If firm desires to prod in-house units	Enables firm to monitor outside R&D and marketing practices. Could incorporate outsiders' innovations while gaining capability in-house, as well Enables firm to understand suppliers' (or distributors') cost structures and profit margins Increases bargaining power (implied threat of full integration) Same as full integration with less risk	Subcontractors will not be available to absorb fluctuations in production and demand Access to best suppliers (or distributors) will be cut off (competitive foreclosure) Pay premiums for access to outsiders' goods and services Lower priority as a customer (or vendor), because outsiders are overflow outlets primarily Same as full integration but more advantageous
Nonintegration	No internal transfers of inputs (or outputs) to in-house sister units	Better quality/prices available from outsiders Costs of investing to make components is too formidable or volume consumed is too low (and selling to outsiders would be difficult or a serious diversification from core business of firm) If technology is changing rapidly If price competition (and other competitive tactics) causes market shares to fluctuate wildly If demand is highly uncertain	No penalties from underutilized plants Avoids purchasing highly specific assets (avoids inflexibility) Avoids purchasing large capacity when firm's needs are small Lowers overhead and break-even points Allows preplanned delivery schedules to reduce inventorying costs (<i>kanban</i>)	Quality control may not be as high and market power of firm may be unable to exert control over adjacent firms through contract Subcontractors will not be available to perform needed tasks Firm loses cost advantages of integration economies (where these exist)
<i>Breadth of integration</i>				
Broadly integrated	Many activities (inputs, services, or channels of distribution or consumption) related to the needs of a particular business unit are engaged in. (Broadly integrated strategies need not involve many vertical stages of processing.)	Product differentiability is high No outsiders yet produce goods or services needed Industry structures becoming established and economies becoming apparent	Maintains intelligence concerning component costs and ways to streamline product design (experience curve) Maintains product quality and design secrecy	No scale economies available at the small volumes needed for in-house (and market) consumption Costly setup costs associated with short production runs for disparate components
Narrowly integrated	Few activities (inputs, services, or channels) are engaged in.	When industry structure is embryonic, demand is highly uncertain, or industry is declining When firm's requirements for a particular good or service are low	No penalties from frequent setups or other production costs Access to the innovations of outside suppliers or distributors Lower mobility (or exit barriers)	Loss of access to supplies or other scarce resources Less control over product specifications and quality (unless contracts can be used to control suppliers or distributors satisfactorily)

Table 2 (continued)

<i>Strategy</i>	<i>Defining Characteristics</i>	<i>When Appropriate</i>	<i>Advantages</i>	<i>Risks</i>
Stages of integrated activity				
Many stages	Firm is engaged in many vertically related activities—from ultra-rare materials to distribution to final consumers—in which the buyer-seller relationships could occur.	When product (or components) are state of the art and firm seeks technological leadership When life of product is expected to be eight years or longer When firm is foreclosed by competitors When firm seeks quality leadership	Captures more of value added in vertical chain of processing Firm can create substantial improvements in supplying technology or distribution practices Could create highly differentiated and high quality products Preempt nonintegrated competitors by forcing industry structures to evolve to firm's advantage Control proprietary advantages Reach ultimate consumers more effectively	Synergies foregone if communications systems do not exploit these linkages well Creates exit barriers due to obsolescence Risks of throughput imbalance magnified for each stage added to vertical chain Subcontractors needed to alleviate imbalances in throughput (due to technology or changing demand) will not be available Costly and inefficient if firms do not manage complexity well Involves firms in very diverse activities that may be far from its core strengths
Few stages	Firm is engaged in few vertically related activities in the chain from ultra-rare materials to distribution	When technological or customer scanning is less important When product lives are expected to be short or the new obsolescing technology will be very unlike past processes When product is very young or industry structure is embryonic When demand is declining When physical interconnections are few or not necessary	Outsiders' innovations can be harnessed to improve product quality or design Firm can piggyback on the marketing or brand image expenditures of outsiders	Firm's product perceived as a "me-too" entry Integrated competitors will enjoy superior cost structures and intelligence
Form of ownership				
Wholly-owned	Businesses are wholly-owned by firm.	When contracts or other quasi-integrated forms of control are inadequate When firm desires to protect technology or trade secrets from outsiders When demand is declining (except as a "phase-out" tactic)	Proceeds from investment need not be shared with others Greater strategic flexibility because business units are fully owned and controlled	Same risks as being too integrated on other strategy dimensions above; risk exposure is maximum
Quasi-integration	Less than full ownership and control. Could include joint ventures, franchises, minority equity investments, loan guarantees, or an "understanding" regarding customer relationships	If risk of failure and investment costs are high If economies of integration are insignificant but need for control is strong Technology changes rapidly Industry structures are still embryonic To transfer ownership of an undesirable business unit to outsiders If corporate mission does not require tight control over quality If competition is volatile	Reduces asset investments Allows firm to create "spider's web" of quasi-integrations to sample several firms' approaches to a technological or marketing problem Creates bargaining power over adjacent business units Improves access to new materials or processes Scanning advantages of taper integration with less asset risk Integration economies of taper integration (provided firm manages quasi-integrated relationship effectively) Lowers fixed costs while providing access to adjacent firms' intelligence and skills	Could create mobility or exit barriers if partners are important to other businesses of the firm Costs of managing quasi-integrated relationship exceed benefits of this control system Contractual problems could stymie strategic flexibility and run up administration costs

necessary for firms to undertake many stages of integrated activities (and to provide the necessary infrastructures) in order to help an industry to develop. But now many new industries can use the same infrastructures developed in an earlier era by firms that

once integrated vertically to build them. The major reason for pioneering firms within embryonic industries to undertake many stages of integrated activity now would be to create credibility for a radical new industry. This was once the case in persuading textile

firms to use rayon as well as cotton and wool on their looms; and Celanese forward integrated from rayon to yarn, textiles, and garment manufacture to prove to consumers, as well as textile firms, that its new fiber (rayon acetate) was viable. Similarly ALCOA once forward integrated beyond its current number of integrated stages to fabricate aluminum products to sell to consumers when other metals fabricators would not use its new metal. In the 1980s, however, there seem to be few new industries (except, perhaps, genetic engineering) for which this need to create new market conduits is as high as it was in earlier eras.

When the risks of launching an embryonic industry are quite high, firms can form joint ventures to link supplies and distribution channels; and when demand conditions become stable and certain patterns of competition are recognized as being more successful than others, more internal integration can be safely undertaken. When demand is declining, however, the first linkage that firms in declining industries might be expected to sever are those with owned distribution channels, because making demand dependent on an independent market enables firms to assess more clearly whether pockets of enduring demand exist for the product in question (Harrigan, 1980). This is what Celanese did in acetate, Diamond Shamrock did in acetylene, and Brown Shoe did in leather tanning. In summary, except for the unique situations mentioned above, specialized suppliers or distributors are better suited to provide goods and services to firms in embryonic industries on a contractual basis until uncertainties concerning demand and competitive viability are resolved.

Volatility of Competition

Individual business units would not be expected to favor vertically integrated strategies in settings in which industry structures exacerbate the likelihood of price warfare and depressed profit margins. Because volatile industry structures increase the likelihood that competition will degenerate into the use of tactics that devastate long term profitability and sap the innovative resourcefulness of firms, vertical integration generally should be avoided in such settings. Other things held constant, the greatest number of successful linked stages and the greatest successful breadths of integrated activities would be expected within settings in which competition is stable. The characteristics of hostile industry struc-

tures have been developed in detail elsewhere (Harrigan, 1980; Porter, 1980). The elements of industry structure that affect vertical integration include: product traits, supplier traits, consumer traits, manufacturing technology traits, and competitor traits.

Product Traits. Because differentiated products can justify higher prices (Bain, 1968), higher degrees of internal transfer can be undertaken for such products with greater success even when integration economies are not substantial. In choosing which components or services to produce in-house, however, it is important to understand which attributes of a product create those qualities for which consumers are willing to pay a premium. Noncritical components and services (and those offering poor economics) could be purchased from outsiders and sensitive components and services (and those offering the best economics) produced in-house. By freeing plant space and resources that formerly were devoted to noncritical and uneconomic components and services, firms can undertake a more profitable mix of activities with their resources while tying up the assets of outsiders for low profit activities.

If trade secrets protect some aspect of a firm's products, higher degrees of integration are necessary, as in the case of Polaroid, which stopped purchasing its negative materials from Kodak when its instant *photography patent expired*. (Too much proprietary information was contained there to let competitors produce it.) Similarly, Schlumberger acquired its own custom logic semiconductor house (Fairchild Camera & Instrument) to protect its proprietary knowledge concerning well-logging services, and Dow Chemical often is fully integrated to prevent other firms from learning too much about its processes and designs.

Supplier Traits. The principal motives for firms to integrate backward often include capturing high proportions of value added, controlling product quality (and proprietary knowledge), or overcoming competitors' advantages if the best suppliers are already under contract to others. If competition is escalating on the basis of innovations, however, firms should be wary about embracing high degrees of internal transfers because they cut off their access to the benefits of outsiders' innovations in an environment in which flexibility is crucial to competitive ability. In such settings, it may be desirable to help create another new supplier (through quasi-integration arrangements, which allow the new entity to serve others as well as sponsoring taper integration firm)

rather than fall into the trap of technological inflexibility by fully owning such suppliers and buying inputs only from them.

Consumer Traits. The principal reasons to integrate forward often include capturing high proportions of value added, controlling the quality and image of one's products, and raising customers' switching cost barriers (Porter, 1980). Complex products that require substantial demonstration or explanations and servicing (as microcomputers did in 1978) are strong candidates for downstream linkages. In doing so, firms must be cautious to ensure: (1) that they are not overly dependent on in-house merchandise for resale and (2) that they do not stay forward integrated after the advantages of being so integrated have expired. When products become successful enough to create high customer switching costs, the need for forward integration is lowered, and firms should move away from battlefronts unless they are well positioned to win price wars.

Manufacturing Technology Traits. The technology used in manufacturing must offer substantial integration economies in order for vertical integration to be advantageous (Khandwalla, 1974). Because the minimum efficient scale of some technologies is so much larger than firms' needs for that component, firms that integrate such activities may be forced to enter merchant sales to dispose of their unused outputs from the oversized plant (or run the plant at uneconomic volumes). Integration should be avoided if the costs of excess capacity cannot be offset by charging premium prices. Instead, firms should use subcontractors to perform those tasks that require assets that most firms would use infrequently at present operating scales. Thus, producers of solar collector panels send out for chrome plating, and ethical pharmaceutical firms send out for the bromine chemistry step in production.

Firms must keep aware of their distinctive competences in production to ensure that: (1) their critically skilled laborers—scientific researchers and engineers—are employed (lest they be hired away by competitors), and (2) they avoid being stuck with obsolete assets. If firms are constrained by plant space, it may be wise to purchase simple or low volume components from outsiders. Critically skilled employees thereby can be kept busy on difficult (but challenging) tasks that leverage firms' future capabilities to compete, and the burden of their salaries can be spread over high volume supplying activities. Finally, if technology is changing rapidly, using outsiders to

perform key intermediate processing steps reduces the likelihood that firms will be stuck with vertical resources that become high exit barriers. As long as demand is increasing and firms can avoid price wars in selling their output, vertical linkages will not exacerbate the tendency for competition to become volatile; but unless special efforts are made to overcome these forces, vertical linkages can become high exit barriers as industries mature (Harrigan, 1983b).

Competitor Traits. Efforts made to diminish the pressures of other structural traits toward price warfare can be done by competitors who (1) compete on the basis of price or (2) use vertical integration as a means of foreclosure. "Dominant verticals," the group of narrowly diversified, integrated firms that Rumelt (1974) identified, are most likely to possess the types of strong commitments to vertical integration strategies that function like exit barriers, causing them to act irrationally, by cutting prices to maintain high throughputs in their integrated facilities to the detriment of other competitors.

Firms that use their vertical linkages as a means of foreclosing nonintegrated firms from access to materials, markets, innovations, and competitive intelligence also are damaging competitors because they can escalate the evolution of the industry towards defensive vertical integrations. When many firms have integrated, all face similar pressures to keep their vertical chains efficiently utilized, and price competition becomes more likely than if nonintegrated firms were allowed to supply or purchase excess volumes of materials and services to alleviate imbalances in vertically related technologies. Thus it may be preferable for an industry to have some nonintegrated firms to absorb other firms' excess capacity, lest industry bloodshed result instead.

In summary, high degrees of internal transfer, long vertical chains, and many integrated activities are expected in settings in which industry structures do not exacerbate price warfare or rapid rates of change in products or processes. Because competitors must be able to change tactics rapidly in turbulent industry settings, a highly integrated posture in such settings could reduce a firm's maneuverability and damage its profitability. Even the partial reprieve of substantial integration economies or the ability to charge premium prices to pay for costly idle capacity may not offset the long term corporate damage that being too highly integrated in such settings could create. The tradeoffs that firms will make depend on their overall strategies and market power.

Bargaining Power

Firms that possess the bargaining power needed to obtain secure access to suppliers and distribution channels without damaging their strategic flexibility could reduce their asset exposure and inflexibility by reducing ownership stakes in supplying or distributing business units. Another way is to use the firm's bargaining power to persuade sequent businesses to assume the duties that a firm wishes to avoid (MacMillan, Hambrick, & Pennings, 1982).

The most important determinants of bargaining power are: (1) product specificity to the industry in question; (2) existence of alternative outlets or sources of suppliers; (3) ability to self-manufacture the good/service in question; and (4) dependence of the supplier (or distributor) on the business unit (Porter, 1976a). If firms possess the power to leverage their market positions, they could use this power to control adjacent firms' assets without owning them. Firms that control brand names or patents, for example, could hire outsiders to market their products if communications with downstream parties are less important than other advantages that such arrangements might provide. But if firms' suppliers or distributors possess bargaining power (and if they cannot be persuaded to perform useful services for firms) then those activities may have to be undertaken in-house in order to attain the control that some firms desire. If this situation occurs in settings in which demand is unstable and competition is volatile, the outcome of doing so could be disastrous.

Corporate Strategy Needs

The foregoing arguments that *less* integration is preferable to *more* must be moderated by considerations of corporate strategy needs. Because vertical integration can be costly if used imprudently, corporate strategists must scrutinize the advantages they hope to capture by condoning (or denying) the creation of certain vertical relationships. Vertical integration may be part of a larger strategy involving shared resources and experience curve economies for some businesses, for example, requiring the firm to sustain relationships that the strategy framework otherwise would not recommend.

Some vertical integrations promise to improve long term synergies for the entire firm, although they appear to penalize a particular business unit. Supply side economies, for example, could be gained by sharing manufacturing facilities for components that

could be used in several dissimilar products. Also, vertical integration strategies that increase or enhance innovations by sharing technological information common to separate stages of integration may require more integration than the framework suggests.

The number of stages undertaken, for example, would be expected to be highest if significant synergies are gained or other corporate needs are served. The key determinants of whether (or not) a firm should skip a particular stage in its integrated chain of activities are the task's importance to its corporate mission and the quality of goods or services provided by outsiders. A firm's position within its industry also suggests how many integrated stages it would perform, and firms on the fringes of an industry would be more likely to purchase (rather than produce) materials or services from leader firms whose upstream plants produce in excess of their downstream plants' capacities.

Although firms will vary considerably in which tasks they choose to do in-house, their needs to capture more value added would mean that they performed in-house those tasks for which their expensive and critical resources were best suited. Firms also will integrate those tasks that would enable them to enjoy synergies with other business units, those that are important to their business missions, or that offer high profit margins for them. They most likely would own outright those aspects of their businesses that were most important to them, and they would pool the risks (or extend their control over adjacent firms) for less critical activities supplied by outsiders through quasi-integration arrangements.

The most scarce resource that firms possess is their entrepreneurial ability. Rather than seeing their mix of businesses as streams of cash flows, chief executives should consider them as reservoirs of capabilities. Thus vertical integration strategies would encourage activities and relationships for which personnel with crucial skills (or other scarce capabilities) might otherwise not be retained.

In previous sections, less vertical integration has been anticipated within turbulent settings, particularly those in which technological change occurs rapidly. Firms pursuing technological leadership strategies offer an important exception to this hypothesis, however, because they often are willing to endure the temporary imbalances of full integration when producing sensitive components, and they are willing to absorb the risks of many integrated stages (as detailed in Table 2) in order to be poised to exploit the next

generation of technological innovation. Contrast, for example, the different vertical integration strategies observable in the electronics industry for creating new generations of microprocessors and for producing semiconductor memory chips. Firms will purchase components that are not close to their technological cores if better prices are available from outsiders. Yet they often continue to make some of these components in-house, even if they do not have cost advantages, in order to carry over knowledge to the next generation of active components for which they might seize preemptive or cost advantages (Mac-Millan, 1983). In Figure 2, firms seeking technological, quality, or market share leadership are grouped in the lower rows of the strategy matrix, and those pursuing a generic "focus" strategy (Porter, 1980) are grouped in the top rows. Briefly, in an emerging industry, such as semiconductors, leadership objectives require a greater degree (and more stages) of vertical integration than do focused market niche objectives, because leadership is attained through attainment of integration economies (cost leadership) or command of proprietary knowledge (technological leadership).

Figure 2
An Illustration of
the Strategy Framework for
Vertical Integration in Emerging Industries

Focus	Quasi-Integration (with few internal transfers)	Quasi-Integration
	Taper Integration	Taper Integration
Strategy Objectives	Taper Integration	Taper Integration
Leadership	(Full Integration)	Full Integration
	Volatile	Stable
	Industry Traits Affecting Competitive Conditions	

Finally, it is useful to recognize that any corporate scheme to force vertically related business units to deal with each other without the benefit of "open market" equivalents (for the purposes of transfer pricing and maintaining competitive flexibility) is penalizing one party to the transaction for the sake of the other. Subsidization of uneconomic and non-competitive business units for the sake of ephemeral corporate advantages is a strategic trap that should be carefully scrutinized, lest the advantages gained in such subsidization arrangements be outweighed

by the impairments to competitive flexibility that result. Global competition on several national fronts through an integrated, worldwide logistical system is one example of situations in which the benefits of encouraging vertical linkages are substantial and cross-subsidization may be necessary. Under such circumstances the linkages should be retained while a worldwide market position is being won.

Applications of the Vertical Strategy Framework

Analysis of the forces identified above that make vertical integration more (or less) successful could be applied in portfolio rationalizations and in the timing of key changes in vertical strategies. In cases in which firms gain bundles of assets through acquisitions, including businesses that may be vertically related to ongoing businesses, they could apply this framework to determine how best to use the new supplier/distributor relationship potential created by joining the two firms. In particular, the framework calls attention to situations in which strategists might divest vertical units and deploy released resources elsewhere, because it asks hard questions about the true nature of synergies and the place of vertical integration in corporate strategies.

The generic strategies suggested above and detailed in Table 2 are not intended to be static suggestions to gain access to resources, capabilities, and knowledge. As competitive conditions change, so too must the firm's vertical integration strategy. In particular, changes must reflect revisions in the strategic relationships that strategists envision among their business units. For example, GTE (a telecommunications firm that once had a significant electronics position but divested its semiconductors around 1969) purchased EMI Semi Inc. in 1979 because it recognized its need again for custom integrated circuit designs. Similarly, Tandy/Radio Shack adjusted its distribution policies to reflect new market realities in 1982 by selling some of its microcomputers through outsiders. Hoffman-LaRoche reduced its wholesaling activities (switching exclusively to outsiders); and Exxon brought its U.S. crude oil refining and production capacity back into balance with each other as competitive conditions changed.

When the "strategic window" that favored integration has closed (Abell, 1978) and the cost of emulating competitors' integrated strategies is no longer justified, prudent firms will uncouple their in-

egrated linkages in a timely fashion—before other firms reach similar conclusions about the merits of integration—to dispose of their assets in a healthy market. Firms attempting late disintegrations will face greater exit barriers than will early firms and will realize less value for their assets when they finally do locate a buyer for them (Harrigan, 1980; Porter, 1976b). A key review point for deciding whether to reduce integration is when cash outlays would be required to upgrade vertically integrated technologies. Strategists must recognize that business units that are viable only if they have a guaranteed market (or source of supply) can become cash traps if they are not cut off at that time.

In summary, firms can form vertical joint ventures to obtain the distribution skills and resources they lack, they can purchase marketing contracts, or otherwise avoid risking too many assets in businesses whose product demand is highly uncertain if they possess the market power needed to take a position in businesses they deem too risky to wholly-own. They can use the leverage of their bargaining positions to shift risks to outsiders in a preemptive fashion if they can identify and link up with the best partners for joint ventures, contract processing, or sourcing arrangements. Firms could increase or decrease their breadth of integrated activities or their degree of internal transfers in a timely fashion if they have accurately diagnosed the forces that make vertical integration strategies work well within some settings but not well within others. The key to successful

use of vertical integration is recognizing when and where it offers significant competitive advantages and forging the necessary vertical linkages without creating excessive risks.

Vertical integration can offer temporary state-of-the-art advantages that must be weighed against the advantages of being flexible to exploit the next technological innovation. Firms that commit early to vertical integration, linking themselves in a highly inflexible fashion to a particular technology, risk being wrong, and the cost could be substantial. But if these pioneers are right, vertical integration can be a rationalizing device that forges order in chaotic environments, establishes industry standards, or lowers operating costs significantly. Then the harm of late entry can be substantial. Thus, firms should build pilot plants early to learn about suppliers and distributors before competitors can match these intelligence gains with their own experience. (They could consider the investment a form of R&D.)

Vertical integration is not a costless strategy. Recognizing when outsiders can be entrusted with activities that firms might otherwise perform internally is desirable when firms must ration funds, seek divestiture (or liquidation) candidates, or otherwise consolidate their business units' activities, as well as when they enter new businesses. The problem is a complex one, but the framework proposed herein offers one way of analyzing firms' vertical integration capabilities and improving their strategies.

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