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Vertical integration, or the lack of it, can have a significant impact on business performance. While some observers claim that adequate vertical integration can be crucial to survival, others blame excessive integration for causing corporate failure. Examples of the reasons behind moves toward integration and of their success or failure aren't hard to find:

- In mid-1981, Du Pont acquired Conoco Inc. in a \$7.3 billion transaction. Edward Jefferson, chairman of Du Pont, stated that the merger would give the company "a captive hydrocarbon feedstock source" and would "reduce the exposure of the combined companies to fluctuations in the price of energy and hydrocarbons."¹
- In the early and mid-1970s, producers of integrated circuits and finished electronic product manufacturers made a flurry of vertical integration moves into each other's industries. Texas Instruments integrated forward into calculators, watches, and other products. Bowmar, the early leader in hand-held calculators, made a desperate effort to integrate backward into integrated circuit production.

(The move ultimately failed, and Bowmar withdrew from the business.) The president of Commodore, another calculator producer, argued that backward integration was neither necessary nor desirable. "It's well worth it [to spend more for chips]," he claimed, "and to be able to get into and out of a technology when you want to."²

- Some observers have blamed the U.S. automobile industry's woes, in part, on excessive vertical integration. According to Robert H. Hayes and William J. Abernathy, "In deciding to integrate backward because of apparent short-term rewards, managers often restrict their ability to strike out in innovative directions in the future."³

As these cases illustrate, vertical integration moves sometimes involve big commitments of resources and can make or break the fortunes of even a large corporation. Managers of smaller businesses, too, often face "make versus buy" and "use versus sell" choices for certain materials, components, products, or services. Should a manufacturer operate a company-owned trucking fleet or use independent owner-operators? At what point can a small supermarket chain afford to own and operate its own warehouse? Is it wise for Coors to manufacture all of its own beer cans and bottles, or is Anheuser-Busch's approach—buying about half its requirements from suppliers—a better strategy?

These alternatives, and countless others that managers select affecting the vertical scope of a com-

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Editor's note: All references are listed at the end of this article.

pany's (or a business unit's) activities, define a business's vertical integration strategy.

Despite the importance of decisions about vertical integration, managers have few guidelines for this aspect of strategy. Consultants and academic authorities on strategic planning and management have offered numerous prescriptions for success in designing corporate portfolios and for market segmentation, pricing, and product development strategies. But beyond suggesting lists of possible advantages and risks, researchers have little to say about vertical integration. Nor does economic theory offer much in the way of guidance.

In this article I summarize the results of some analyses based on the PIMS (profit impact of market strategies) data base. I undertook the investigation to determine how vertical integration relates to business profitability. To shed some light on the following questions, I analyzed PIMS data for business units with varying degrees of vertical integration:

1. In general, are highly integrated businesses more or less profitable than those that are less integrated?
2. Under what conditions does a high or a low degree of vertical integration appear to be most beneficial?

Before presenting the results of the analyses, I want to give attention to the potential benefits and drawbacks of being vertically integrated that previous studies have identified.⁴

Pluses & Minuses

According to the traditional economic definition, vertical integration is the combination, under a single ownership, of two or more stages of production or distribution (or both) that are usually separate. In the oil industry, for example, the process that takes the oil from the well to the service station is divided into four stages—crude oil production, transportation, refining, and marketing. Some companies specialize in just one of these—Buckeye Pipe Line Company, for instance, focuses on the transportation stage. Other companies combine two or three stages, and the fully integrated major oil companies are involved in all four.

The Pluses

What are the benefits of vertical integration in the oil industry or in any industry that has several distinct production stages?

Transaction costs. In many cases, a major objective of vertical integration is to eliminate, or at least greatly reduce, the buying and selling costs incurred when separate companies own two stages of production and perhaps the physical handling costs as well. Thus, a company that manufactures integrated circuits as well as finished products can operate with little or no sales force, advertising, sales promotion, or market research. Another producer selling to independent customers would need all these activities.

Supply assurance. Vertical integration may also be essential to assure a supply of critical materials. Certainly, this aspect of vertical integration has been a major attraction of that strategy to the petroleum industry, both in its early days and more recently in the OPEC-dominated 1970s.⁵ During the crisis of 1973–1974, with little warning, some companies found their supplies sharply reduced and prices doubling or tripling. Apart from the impact they have on materials costs, shortages of materials in industries with high fixed costs are extremely damaging because they lead to low usage of expensive facilities.

Improved coordination. Even when supplies of materials are certain, vertical integration may permit cost reductions through improved coordination of production and inventory scheduling between stages. Some argue that an in-house supplier can schedule production more efficiently when it has firm commitments from a “downstream” manufacturing or distribution facility than when it deals with independent customers.

Technological capabilities. Some claim that, in general, businesses and companies that are vertically integrated, especially backward, are best equipped to innovate because they participate in many of the production and distribution activities in which change can occur. This argument rests in part on the notion that a critical requirement for successful innovation is adequate coordination of marketing and technical functions and that integration improves coordination.⁶

Higher entry barriers. The more vertically integrated a business, the greater the financial and managerial resources required to enter and compete in it. Established companies in an industry may combine their operations as a way of raising the stakes and discouraging potential new entrants. Of course, this gambit is effective only if vertical integration becomes necessary for competing.

The Minuses

If this strategy offers so many potential gains, why don't more managers employ it? Operating on an

integrated basis brings offsetting costs and risks, the most important of which are increased capital requirements, unbalanced throughput, reduced flexibility, and loss of specialization.

Capital requirements. When a business integrates either backward or forward, it must provide the capital that the newly integrated operations require. Studies based on the PIMS data base and other evidence show that high investment intensity usually leads to low profitability.⁷ The implication is that unless the operating cost savings of vertical integration are substantial, investment intensity will make integration strategies unprofitable.

Unbalanced throughput. A problem inherent in combining various stages of production or distribution is the varying scale of operation that each stage may require for efficient functioning. For example, to achieve costs competitive with those of independent suppliers, a manufacturer may have to produce integrated circuits at a very high volume. But if the manufacturer integrates forward into minicomputers, say, he could find that the "minimum efficient scale" of operation for integrated circuits may be much greater than the volume needed for efficient production of minicomputers.

The fact that scale requirements differ among vertically linked activities suggests that integrated businesses must either operate on a scale large enough to satisfy the requirements of the most volume-dependent production stages or suffer the penalties of operating on inefficient scales at one or more stages. An implication of this line of reasoning is that vertical integration is probably more feasible for businesses with high market shares, which, relative to competitors in that market, involve large-scale operations. The experience of the automobile industry illustrates this point. According to one estimate, General Motors buys 10% to 15% of its standard components from outsiders, while Ford buys 40% to 50%.⁸

Reduced flexibility. Because vertical integration implies commitment to a particular technology or way of operating, it can be an extremely risky strategy. If technology or market changes make the products or methods of one stage in a vertically integrated system obsolete, the integrated company may find adjusting very difficult. In the 1960s, Jonathan Logan, a women's apparel producer, committed itself to double-knit fabrics by investing in a textile mill. Later, when double-knits had gone out of fashion, Jonathan Logan continued to manufacture them, principally to accommodate the mill's production. In 1981, when it finally closed the mill, the company reported a \$40 million write-off.

Loss of specialization. A somewhat hard to pinpoint, but often important, danger of vertical integration is the very distinct managerial approaches that the various stages of production or distribution may require. For instance, retail or wholesale distribution operations seem to need forms of organization, control systems, and management styles that are quite different from those for manufacturing and processing. Up to the mid-1930s, the major U.S. oil companies were expanding their ownership of service stations. Then the companies began to phase out their ownership positions in favor of franchising. A prime reason for this shift was the inflexible way in which companies operated their service stations and priced their products.⁹ This approach may work for manufacturing, but it doesn't for retailing.

Other industries have had problems similar to those of the oil refiners when they attempted to integrate forward into retailing. For instance, in the 1960s the inner-city stores owned and operated by the major tire producers suffered severely when mass merchants started competing with them and consumers moved to the suburbs. Integrated manufacturers such as Robert Hall and Bond, the men's clothing producers, and Sherwin-Williams, the paint producer, all had similar difficulties during the 1970s. While other reasons may also account for these companies' troubles, it appears that their efforts to run geographically dispersed retail chains were handicapped by a "manufacturing mentality."

Is It Profitable or Isn't It?

Since vertical integration entails both benefits and risks, it is reasonable to expect the payoff of a strategy of increased integration to vary according to the market and competitive conditions in which a business operates. To explore the profit impact of variations in vertical integration, I have used the PIMS data base.

The PIMS research program has been described in several published accounts.¹⁰ Consequently, only a very brief discussion of this data base is necessary here.

The data used in the analysis are for "businesses," not companies. Each business is a subdivision of a company, usually a product division or a product line that is distinguished from other parts of the company by the customers it serves, the competitors it has, and the resources it employs. The use of business unit data is of particular importance in the analysis of vertical integration. A company can be vertically integrated and treat the linked segments either as a single, combined business or as separate units. The PIMS data include some measures of the extent of vertical integration that go beyond the business unit level. But profitability and other performance mea-

asures are confined to the reporting business units. Hence, the data base allows us to explore the effects of vertical integration strategies that are implemented *within* single business units. Only to a very limited extent, however, can we examine the impact at a company level.

As of early 1982, the PIMS data base contained financial, market, and strategic data on 1,742 business units over four or more years. In the analysis reported here, I have excluded service and distribution businesses both because the samples of these kinds of operations are small and because the meaning of vertical integration in service and distribution industries is less clear than in manufacturing. The sample used here therefore consists of 1,649 manufacturing-processing industry businesses. They cover consumer products, industrial goods and components, and raw and semifinished materials. The data for each business unit are for four-year periods during the 1970s; only the most recent four years of this information are used.

PIMS Measures

The PIMS data base includes two types of vertical integration measures—absolute and relative. The absolute measure is value added as a percentage of sales for each business unit. *Value added* is defined as sales revenue minus all purchases (materials, components, supplies, energy, and services) by one business from other businesses. (Purchases from another business in the same parent corporation are treated as “outside” purchases.) Thus, value added as a percentage of sales is simply

$$\frac{\text{Sales} - \text{purchases}}{\text{Sales}} \times 100$$

To explore how differences in this ratio are related to profitability, one has to make an adjustment. Because each business unit’s value-added measure includes net profit, increases in profitability arising from many sources other than vertical integration will also increase value added and thus create an apparent positive relationship between the two factors.

To eliminate the tautological relationship between the ratio of value added to sales ratio and profitability, I have constructed an adjusted ratio in which *reported* net profit is replaced by an *average* rate of return on each business unit’s invested capital. The Appendix shows the method of calculation used.

In the analysis that follows, I use adjusted value added as a percentage of adjusted sales (as defined

in the Appendix) as the primary measure of each business unit’s degree of vertical integration (I use “VA/S” to refer to this measure). The businesses in the data base vary greatly in VA/S, from a low of around 20% to a high of 90%. The average for the 1,649 businesses is 56%, half of them being clustered between 45% and 65%.

Business units’ VA/S differ, no doubt, because they operate in different industries or product markets, where norms vary. To supplement the VA/S measure of vertical integration, therefore I use an additional measure of relative vertical integration. This *relative* measure is based on PIMS participants’ responses to the following question: In comparing the degree of backward vertical integration of this business with that of each of its leading competitors, do you find this business’s less, about the same, or greater? Responses to this question indicate that more than 60% of the PIMS businesses integrated to about the same extent as their competitors.

Finally, the businesses reported whether their parent companies were vertically integrated (backward *and* forward) to a greater or lesser extent than others in the industry. Where a business was integrated to the same degree as competitors but the company was more (or less) so, either the company or one or more of its competitors had carried out a vertical integration strategy but organized the component activities into separate business units. While we can compare businesses that vary in terms of overall company vertical integration, our measures of performance, including profitability, are limited to those of the reporting business unit itself. Because transfer prices among vertically linked businesses may be distorted in one direction or another, performance at this level may or may not be a reliable indicator of the total effect of integration on the company.

To test the general propositions about vertical integration strategies listed earlier, then, we can compare the profit and other performance results that business units varying in degree of integration have achieved. As I indicated, I use both absolute and relative measures.

Vertical Integration & Profitability

Exhibit 1 shows average pretax profit margins, investment-to-sales ratios, and returns on investment for businesses with differing levels of vertical integration as measured by VA/S percentages. As expected, profit margins expressed as percentages of sales rise as VA/S increases. The differences in profit margins are modest up to a VA/S of 60%, but from that point, profits rise consistently with increasing integration.

Investment intensity, however, rises along with VA/S over the whole range of the data. As a result,

Exhibit I Vertical Integration and Profitability

Vertical integration measured by adjusted VA/S	Net profit as percent of sales	Investment as percent of sales	Net profit as percent of investment (ROI)	Number of businesses
Under 40%	8%	38%	25%	267
40%–50%	8	45	22	341
50%–60%	9	54	20	389
60%–70%	10	56	22	338
Over 70%	12	65	24	314

the pretax rate of return on investment declines up to the point where VA/S is between 50% and 60%. Beyond an integration level of 60%, investment intensity increases more slowly than profit margins, and ROI consequently rises with increasing vertical integration.

The “V-shaped” relationship between VA/S and ROI suggests that profitability is highest at the two opposite ends of the spectrum. Either a very low or a very high level of integration yields an above-average rate of return, while earnings are lowest in the middle. This pattern is identical to one reported by Edward Bowman in a study of minicomputer and computer peripherals manufacturers. Bowman interpreted the pattern to mean that a company “can do most of its work itself, such as research and development, production, and service, and be relatively successful. On the other hand, it can be low on value added, essentially a purchased-component assembler, and also successful. The middle ground is apparently a questionable strategy.”¹¹

The data in Exhibit I suggest that what Bowman found in a single industry also applies to manufacturers in general. (Supplementary analyses show the same V-shaped pattern for consumer and industrial products manufacturers. The only exceptions were producers of raw and semifinished materials, for which ROI declined consistently over the whole range from low to high VA/S.)

The figures in Exhibit I demonstrate clearly how rising investment requirements offset the higher profit margins associated with intensified vertical integration. If integration can somehow be achieved without the penalty of a proportionally higher investment base, then increasing vertical integration should be extremely beneficial. *Exhibit II* shows that this is, indeed, the case. Here the PIMS businesses are sorted into nine groups on the basis of both VA/S and investment intensity. The data indicate

Exhibit II Vertical Integration, Investment Intensity, and Return on Investment

Adjusted VA/S	Investment as percent of sales					
	Under 40% Average ROI		40%–60% Average ROI		Over 60% Average ROI	
Under 50%	31%	(322)*	19%	(196)	8%	(90)
50%–65%	35	(165)	19	(233)	10	(182)
Over 65%	38	(91)	26	(180)	12	(190)

*The number of businesses in each cell is shown in parentheses.

that when investment intensity is constant, ROI steadily increases as levels of VA/S rise.

The lesson seems clear: if a company’s management can carry out a strategy of increasing integration without greater investment intensity, this strategy usually leads to higher profitability. But the data also show that the winning combination of high VA/S and low investment intensity is uncommon. Of the 461 businesses in the highest VA/S group (over 65%), fewer than one-fifth also had low levels of investment intensity.

Relative Vertical Integration & Profitability

As noted earlier, cross-sectional differences in the VA/S among businesses are mainly due to differences in the nature of the markets or industries in which they operate. To the extent that this is true, one might conclude that the main implication of the data in Exhibit I is that it pays to be in the kinds of businesses in which VA/S is inherently very low or very high. In many cases, however, managers have to make strategic choices about a business unit’s relative degree of vertical integration. Is it profitable to be more highly integrated than the industry norm?

Exhibit III shows the average ROI performance for PIMS businesses whose relative vertical integration varied. These data are given separately for consumer and industrial products businesses; as I mentioned earlier, the feasibility of forward integration, backward integration, or both depends on where a business is located in a production-distribution system. Exhibit III shows measures of relative integration at both the business unit level and the company level.

The data in Exhibit III suggest that for both consumer and industrial product manufacturers, backward vertical integration slightly enhances ROI. For consumer products manufacturers, ROI is also higher when the parent company is more forward integrated than competitors are. This result is somewhat surprising; forward integration in consumer

goods industries presumably means, in most cases, operation of company-owned wholesale and retail distribution facilities or both, which (as I argued earlier) often require different management systems and styles than manufacturing does. The ROI figures shown in Exhibit III are of course for the manufacturing components of the companies involved. Possibly these businesses earn above-average rates of return at the expense of their captive downstream customers.

Scale & Profitability

As I have said, large businesses should more often be able to use vertical integration strategies than their smaller competitors because large companies are more likely to be able to operate at efficient scales at each stage of activity. Of course, sometimes a company can integrate backward or forward on the basis of the shared requirements of two or more businesses that operate in separate product markets. For example, Texas Instruments produces semiconductors and other components that go into end products such as calculators, watches, and microcomputers. In other words, ways exist to achieve efficient scale other than by having a large share in a single market. Nevertheless, other things being equal, large market

share businesses should derive greater benefit from increasing vertical integration.

Exhibit IV shows that these effects do, indeed, depend on size. Here I've grouped the PIMS businesses according to relative market share, defined as the ratio of a business unit's market share to the combined shares of its three largest competitors. For businesses with small relative shares—less than 25% of those of their three largest competitors combined—ROI is significantly lower when a business is highly vertically integrated. This relationship applies both to the absolute level of integration, measured by VA/S, and to relative backward integration at the business unit level. For businesses with relative market shares over 25%, ROI is highest for the high and low extremes of integration based on the VA/S measure. When relative share exceeds 60%, however, ROI rises consistently with increasing relative backward integration.

Relative forward integration is analyzed in Exhibit IV on the basis of comparisons among each business unit's parent company and competing companies. The relationship between this kind of integration and ROI is irregular. For businesses with small market shares, the extent of forward integration seem-

Exhibit III	Relative Vertical Integration and Profitability			
	Relative vertical integration*	Type of business		Average ROI
		Consumer products	Industrial products	
	Average ROI	Average ROI		
At business unit level:				
Backward integration				
Less	20%	(106)†	21%	(316)
Same	22	(277)	22	(730)
More	23	(58)	26	(162)
At company level:				
Backward integration				
Less	23	(115)	20	(302)
Same	21	(255)	23	(678)
More	24	(71)	24	(228)
Forward integration				
Less	19	(64)	23	(208)
Same	22	(343)	22	(822)
More	27	(34)	22	(178)

*In each case, the degree of vertical integration is compared with that of leading competitors in the market that the business unit serves.
†The number of businesses is shown in parentheses.

Exhibit IV Vertical Integration, Relative Market Share, and Profitability

Vertical Integration	Relative market share*					
	Under 25%		25%–60%		Over 60%	
	Average ROI	Average ROI	Average ROI	Average ROI	Average ROI	Average ROI
Adjusted VA/S						
Under 50%	14%	(235)†	26%	(202)	33%	(171)
50%–65%	14	(188)	19	(204)	29	(188)
Over 65%	9	(113)	22	(150)	31	(198)
Relative backward integration						
Less	14	(193)	24	(139)	30	(90)
Same	13	(293)	21	(351)	31	(363)
More	11	(50)	23	(66)	34	(104)
Relative forward integration at company level						
Less	14	(110)	27	(84)	29	(78)
Same	13	(361)	22	(396)	31	(408)
More	15	(65)	19	(76)	34	(71)

*Relative market share is a business unit's market share, expressed here as a percentage of the combined share of its three largest competitors.

†The number of businesses is shown in parentheses.

Note: The differences among the three market-share groups are statistically significant at the 99% probability level. In a multiple regression model that includes all major PIMS profit determinants, the coefficient of VA/S is negative but insignificant for small-share businesses. For businesses with relative shares above 25%, VA/S has a significant negative coefficient ($p > 0.99$) and $(VA/S)^2$ has a significant positive coefficient ($p > 0.99$).

ingly makes no difference; for high-share businesses, operating in a vertically integrated company helps profitability. For those in between—namely, those with relative shares between 25% and 60%—ROI is highest when the parent company is less integrated than competitors.

The figures in Exhibit IV, then, provide some support for the idea that the net effects of vertical integration vary according to the size of the business unit. The data also show that competitors with large market shares are more likely to pursue vertical integration strategies. For instance, more than 35% of the businesses with relative shares greater than 60% reported VA/S over 65%, whereas just 20% of the business units with small market shares reported this figure.

Market Stability

To test the proposition that vertical integration strategies are more effective when market conditions and technology are stable, I compared the relationship between ROI and VA/S for businesses in very stable and not very stable conditions. I divided the data base according to high and low real-growth rates, maturity of markets, degree of technological change, and rates of new product introduction. None of these analyses showed significant differences in the impact of vertical integration on profit. Apparently, integration strategies can be successful in both stable and unsettled markets.

Materials Costs

As mentioned earlier, some observers have advanced the notion that companies make integration moves like the Du Pont-Conoco merger because they find integrated organizations less vulnerable to increases in raw materials costs. If this is a valid theory, then a high VA/S should have the biggest impact on profitability when materials costs are growing most rapidly. To test this hypothesis, I separated the PIMS businesses into groups with high and low inflation in materials costs and set the dividing line at 10% annual rate of increase (see *Exhibit V*).

The results are the opposite of the prediction. Among businesses that experienced rapid materials-cost inflation, ROI was highest when vertical integration was low, and vice versa. Possibly this situation reflects the greater capital intensity and fixed costs of highly vertically integrated business units. Whatever the explanation, the data certainly cast doubt on the notion that integration provides insurance against the effects of inflation.

Product Innovation

The final hypothesis that I tested concerns the relationship between vertical integration and prod-

Exhibit V Vertical Integration, Cost Inflation, and Profitability

	Adjusted VA/S		
	Under 50%	50%-65%	Over 65%
Rate of inflation in materials costs	Average ROI	Average ROI	Average ROI
Under 10% per year	21%	21%	24%
Over 10% per year	27	21	20

Note: The difference between the two groups is statistically significant. In a multiple regression equation in which ROI was the dependent variable and all the major PIMS profit determinants were independent variables, the coefficient of VA/S was positive for businesses whose materials costs rose by less than 10% annually ($p > 0.97$). For businesses with cost growth above 10%, the coefficient was negative ($p > 0.975$).

uct innovation. Are highly integrated businesses more innovative? *Exhibit VI* shows the percentages of sales that new products generated for businesses with low, medium, and high VA/S. (Here “new products” are items introduced during the preceding three years.) The exhibit shows separate figures for businesses competing in mature versus growth markets, for businesses in which major technological change had occurred recently versus those where it had not,

Exhibit VI Vertical Integration and Product Innovation

	Adjusted VA/S	
	Under 50%	Over 50%
	Average percent of new products	
Product life cycle stage		
New and growing markets	16%	19%
Mature and declining markets	5	8
Recent technological change		
No	5	8
Yes	12	18
Market share		
Under 15%	8	12
15%–30%	8	10
Over 30%	4	10

and for businesses with small, medium, and large market shares.

The results indicate that highly integrated businesses do generate more new products. In Exhibit VI, I use a cutoff of 50% to separate high from low VA/S because the data were essentially the same for all businesses beyond the 50% level. In both mature and growing markets, high levels of integration correspond to high rates of new product introduction. The same pattern holds regardless of whether technology is changing or whether the business has a small market share or a strong competitive position. Thus, the experience of the PIMS businesses lends support to the notion that vertical integration facilitates product innovation. In some instances, the need to innovate might justify a vertical integration strategy even if the move exacted some penalty in short-term profitability.

Evaluating Vertical Integration Strategies

Is vertical integration profitable? Sometimes yes, sometimes no. The statistical analyses reported here do not, of course, provide any formula for determining just how a particular integration strategy will affect performance. But the experiences of the PIMS businesses, together with other evidence drawn from various industries, do suggest some guidelines for evaluating the possible benefits and risks of integration.

1. Beware heightened investment needs. When a high level of vertical integration hurts ROI, it is usually because investment intensity is rising. An ideal strategy is one in which value added increases but the investment base does not. No doubt, the best way to ensure the investment base is to develop proprietary products or processes whose value derives from superior performance rather than from extensive in-house manufacturing or processing. Successful producers of cosmetics and other personal care products, for example, often enjoy ratios of value added to sales of 70% or more without heavily investing in plant and equipment. In much the same way, some companies in the computer industry have modest in-house manufacturing operations but very high VA/S. These companies add value through technical skills in design and customer service or both, not through production of standardized components.

Unfortunately, far more often, rising capital requirements accompany rising vertical integration. Many businesses seem to follow the path from "northwest" to "southeast" in Exhibit II. When they do, the return on investment tends to fall. Are most decisions to increase vertical integration, then, mis-

takes? No doubt many of them are. Managers probably often underestimate the investment needed to support moves into their suppliers' or customers' businesses.

They may also view vertical integration moves as means of defending profitable core businesses. This reasoning is no doubt often valid, and accepting modest profits in one part of a business if it promises high rates of return elsewhere is perfectly sensible. The question is, how much is this kind of insurance worth? The data in Exhibit II indicate that the cost is often excessive.

2. Consider alternatives to ownership. In the traditional sense of the term, vertical integration is an arrangement based on ownership of activities linked up and down. In some cases, at least, manufacturers can reap some of the benefits of integration without owning all the stages. A manufacturer might, for example, reduce transaction costs via long-term contracts with independent suppliers. This approach is apparently more common in Japanese than in American industry. Hayes and Abernathy say that "long-term contracts and long-term relationships with suppliers can achieve many of the same cost benefits as vertical integration without calling into question a company's ability to innovate or respond to innovation."¹²

3. Avoid "part-way" integration. The V-shaped relationship between vertical integration and profitability (see Exhibit I) suggests that some businesses may suffer because they don't carry their linking strategies far enough. Recall that the most profitable businesses are those at the extremes of the vertical integration spectrum. In general, the least profitable position is an intermediate one. The implication is that, on this dimension of strategy, a clearly defined position is most likely to succeed. In the vertical scope of a business, managers should be wary of taking gradual, piecemeal steps that can lead to the unrewarding middle ground.

4. Carefully analyze scale requirements. A significant risk in many vertical integration strategies is that a production or distribution stage has too small a scope to be run competitively against independent suppliers or customers. Presumably for this reason, the PIMS data show that integration is much more likely to pay off for businesses with quite large market shares.

Just what scale of operation makes a given integration strategy effective depends, of course, on the technologies available in the situation. The conclusion I draw from the statistical data, however, is that mistakes are fairly common. Quite a few small-share businesses are highly integrated and, on average, un-

successful. Some of them, at least, suffer from what Peter Drucker calls "being the wrong size." Excessive vertical integration is not the only route to becoming wrong sized, but it may well be one of the usual ones.

5. *Be skeptical of claims that integration reduces raw materials costs.* Economists have long questioned the idea that vertically integrated businesses or companies are somehow insulated from fluctuations in the costs of key raw materials. Unless it monopolizes materials supply, they ask, why should a vertically integrated enterprise be able to supply itself at anything less than open market prices? The data in Exhibit V indicate that skepticism about cost advantages is often well-founded.

All of these guidelines may seem unduly negative. Each points to possible dangers or illusions associated with increased vertical integration. Given that integration strategies often involve big investments,

caution does seem advisable. On the other side, however, vertical integration is often a highly successful strategy. Especially for businesses and companies that enjoy strong market positions, increased integration can pay off in both profitability and greater product innovation.

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4. For a more extensive discussion of the potential benefits and limitations of vertical integration, see Michael E. Porter, chap. 14, *Competitive Analysis* (New York: Free Press, 1980).
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Appendix Adjustment of Ratio of Value Added to Sales as a Measure of Vertical Integration

Many companies use value added—or, specifically, its ratio to sales—as a measure of the extent of vertical integration. The logic of the measure is straightforward: the more that stages of production and distribution are combined within an enterprise, the higher the ratio of value added to sales. At the limit is the business that is completely self-contained—it makes no purchases from outside suppliers, and the ratio of value added to sales is 100%. At the opposite extreme is the business that performs only a single, narrowly defined function—for example, the broker who sells a commodity on a commission basis.

While the ratio of value added to sales (VA/S) clearly rises with increasing vertical integration, VA/S is not a good measure of vertical integration. As defined, value added includes a business unit's pretax profits. Suppose that profits increase for some reason totally unrelated to vertical integration. Then VA/S will also rise, but clearly it would be incorrect to treat such a change as an increase in vertical integration.

The same reasoning applies to differences among businesses. If businesses A and B are identical in all respects except that A has a profit of 20% of sales while B has one of only 10%, treating the resulting ten-point spread in their VA/S as a difference in degree of vertical integration would be inappropriate.

The fact that value added includes net profits poses an especially difficult problem for an analysis of the

relationship between vertical integration and profitability. If no adjustment is made in the VA/S measure, then both VA/S and measures of profitability such as ROI will reflect many things that affect profits. The result will inevitably be a high—but spurious—positive relationship between the two. Some way must therefore be found to adjust VA/S to eliminate, or at least minimize, the tautological relationship between it and profitability.

I derived the adjusted measure of VA/S used in this analysis as follows:

1. I subtracted net profit from each business unit's reported figures for value added. (For businesses reporting net losses, I do not add losses back to the reported value-added amount.) For businesses that earned positive profits, I also subtracted net profit from reported sales.
2. A "normal" profit, amounting to 20% of investment at book value, is added to value added and to sales. (The 20% figure is approximately the average pretax, pre-interest rate of return for the businesses in the PIMS data base.)
3. The adjusted VA/S, used as a measure of vertical integration, is simply

$$\frac{\text{Value added} - \text{net profits} + 20\% \text{ of investment}}{\text{Sales} - \text{net profits} + 20\% \text{ of investment}}$$

- Mitchell (Washington, D.C.: American Enterprise Institute, 1976), p. 105.
6. Edwin Mansfield and Samuel Wagner, "Organization and Strategic Factors with Probabilities of Success in Industrial Research and Development," *Journal of Business*, April 1975, p. 180.
 7. Bradley T. Gale, "Can More Capital Buy Higher Productivity?" HBR July–August 1980, p. 78.
 8. Robert A. Leone, William J. Abernathy, Stephen P. Bradley, and Jeffrey Hunker, "Regulation and Technological Innovation in the Automobile Industry," report to the Office of Technology Assessment (Washington, D.C., July 1981), p. 43.
 9. Gale, *ibid.*
 10. See Sidney Schoeffler, Robert D. Buzzell, and Donald F. Heany, "Impact of Strategic Planning on Profit Performance," HBR March–April 1974, p. 137, and Robert D. Buzzell, Bradley T. Gale, and Ralph G.M. Sultan, "Market Share: A Key to Profitability," HBR January–February 1975, p. 97.
 11. Edward H. Bowman, "Strategy, Annual Reports, and Alchemy," *California Management Review*, Spring 1978, p. 70.
 12. Hayes and Abernathy, p. 73.