Sourcing for Competitive Advantage

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SOURCING FOR COMPETITIVE ADVANTAGE

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Sourcing has recently received substantial attention in both the business press and in large manufacturing firms. On one hand is it damned for "hollowing American industry" while on the other hand is it praised for improving profitability. This paper looks at sourcing from a strategic perspective and develops managerial frameworks and guidelines for identifying and analyzing sourcing opportunities. The authors believe that many sourcing errors have been made by viewing sourcing as a pure cost decision and failing to conduct a more strategic analysis.
SOURCING FOR COMPETITIVE ADVANTAGE

According to Akio Morita, Chairman of Sony Corporation, "American companies have either shifted output to low-wage countries or come to buy parts and assembled products from countries like Japan that can make quality products at low prices. The result is the hollowing of American industry. The U.S. is abandoning its status as an industrial power." Is this true? It need not be. Whether sourcing is right for you and what kind of sourcing (e.g., subassemblies, finished product, design, etc.) depends on your strategy generally and your competitive advantage specifically. If sourcing causes you to lose control of your competitive advantage then Morita is right, but if it does not or alternatively if it enhances your competitive advantage then sourcing becomes a valuable aspect of overall business strategy. We believe this is the key, to analyze sourcing from a strategic perspective. Consider the sad case of the U.S. consumer electronics industry where many Asian competitors originally entered the U.S. market as suppliers for domestic firms. Typically, these decisions to source rather than continue manufacturing were cost driven, but ignored significant sources of competitive advantage embodied in the control of product and process technology. Once the Asian firms gained dominance in these areas it only took a matter of a few years to establish independent U.S. distribution. Similarly, we believe that many companies today are making a major mistake by looking only at cost factors and ignoring a more strategic analysis. By contrast, consider the sourcing of laser printer engines from Canon by Apple Computer. This technology, although difficult and expensive to master, is not central to the core of Apple's competitive advantage. The Apple basic printers are almost always sold in conjunction with the Apple's Macintosh line of microcomputers and its unique software technology. The result of sourcing is increased product and sales leverage without the dilution of either technical or financial assets by a secondary technology, and this is accomplished at an acceptable level of risk exposure.
The purpose of this paper is to show that sourcing as a component of strategy need not detract from sustainable competitive advantage, but that properly understood it can actually enhance it. Throughout the focus is on understanding sourcing as a component of strategy and not merely as a lower cost operational alternative to internal production. We do agree with Morita on one point: whether sourcing is well thought out or not it is certainly pervasive in U.S. business. Learning to understand it is not an intellectual exercise, it is a pragmatic necessity.

Sourcing involves a myriad of decisions: what to source; whether to source the design, the product, or both; from whom to source; whether or not to have multiple sources; how to structure the sourcing relationship; how to control the risks and hidden costs of sourcing; how to manage the information flow; and so forth. When a business begins to face up to these questions it usually finds itself ill-prepared to answer them. No one is likely to be an advocate for sourcing. The managers of R&D, engineering, manufacturing, and marketing all have biases and vested interests; anything that is sourced necessarily reduces the scope of at least one of these functions and often creates conflicts of interest among them. As a result, the primary responsibility for sourcing decisions of necessity falls to the general manager of the business often with conflicting recommendations from direct reports. In the following sections we will provide frameworks and guidelines to assist in the consideration of sourcing from a strategic perspective. We have divided the discussion into four parts: "identifying sourcing opportunities," "evaluating sourcing opportunities," "the hidden costs of sourcing," and "risks in sourcing."

These are based on our research over a four period during which we tracked numerous major sourcing decisions through public information, conducted dozens of interviews about sourcing decision in one large diversified multinational,
participated in some of these decisions, and conducted several interviews in
two other large firms to confirm our observations.

IDENTIFYING SOURCING OPPORTUNITIES

We find that sourcing often arises as a defensive response to a lack of
cost competitiveness. For example, the decisions of the three major U.S.
automobile producers to source small cars from Japanese and Korean producers
were largely driven by a perceived inability to produce small cars at a com­
petitive cost. Of course, lack of cost competitiveness can be and often is a
real problem that must be addressed by sourcing or other means. The problem
is that focusing on responding to a lack of cost competitiveness as a reason
for sourcing ignores the larger strategic context of the decision which may
contain numerous risks and disregards other sourcing opportunities driven by
different considerations. For instance, in the case of the U.S. consumer
electronics industry mentioned above sourcing largely ignored both the inevi­
table loss of product technology on which future success depended and the
encouragement of a group of powerful competitors. As C.J. Van der Klugt, vice
chairman of Philips M.V. has observed: "First you move the industrial part to
the Far East. Then the development of the product goes there because each
dollar you pay to the overseas supplier is ten cents you're giving them to
develop new devices and new concepts to compete against you."^2

We believe that sourcing should be motivated by a broad based strategic
analysis that focuses on sourcing as a means to gain, maintain and defend sus­
tainable competitive advantage. The key concepts underlying competitive ad­
vantage have been extensively developed by Porter in a book with that title
while a framework that helps explain the sustainability of competitive advan­
tage has been presented in a Harvard Business Review article by Ghemawat. Although much of the discussion of competitive advantage had focussed
primarily on low cost and differentiation, in our discussions with general managers it has become apparent that a more extensive categorization of the sources of competitive advantage is useful, especially when dealing with business strategy involving important manufacturing issues. There are indeed many specific routes to achieving competitive advantage but for our purposes they can be conveniently classified into six major categories: cost, differentiation, technology, distribution, market access, and flexibility. Exhibit 1 contains a summary discussion of these sources of sustainable competitive advantage.

Exhibit 2 illustrates a framework for thinking about sourcing decisions strategically. This exhibit arrays the sources of competitive advantage against a breakdown of a final product into a vertical integration chain consisting of five generic categories: raw materials, components, subsystems, finished goods and services. (Services obviously includes product services and repair but could also include design and peripheral plant services such as security.) It should be noted that within each category there may be numerous specific product elements as, for example, an automobile may be thought of as composed of subsystems including the engine, transmission, brakes, body, etc. The resulting matrix illustrates how sourcing can be considered in terms of its potential impact on competitive advantage. It should be noted that the matrix per se is not vital to a strategic analysis of sourcing opportunities, but it is useful as a compact notation for structuring the analysis described below. Although we have participated in the identification of sourcing opportunities where this matrix was explicitly used we have also observed others where the thinking the matrix embodies was used implicitly. It is the strategic thinking behind it that is important.

One aspect of a strategic sourcing analysis needs further consideration at the outset. In sourcing one can choose to retain primary control over design
or source to functional specifications. In sourcing to your own design you retain primary control of the design function and capability. In sourcing to functional specifications you are essentially sourcing design services. A business must ask how crucial the design capability is to sustainable competitive advantage and evaluate the risks in sourcing it. Furthermore, a business should not overlook the possibility that sourced design services may be superior to internal capabilities.

Identifying sourcing opportunities consists of six steps.

(1) What is the strategy for the business? It is first necessary to clearly identify the strategy for the business. Primarily this involves identifying the actual, intended, or potential sources of competitive advantage and determining how sustainable they are. Specifically a business needs to identify and understand how important each of the six sources of sustainable competitive advantage are to their strategy.

(2) Evaluate the importance of each product element within each category of achieving sustainable competitive advantage. Conceptually, this involves asking how important the elements in each block of the matrix are to sustainable competitive advantage, already having evaluated the importance of each source of sustainable competitive advantage to the business strategy. For each element care must be taken to understand the contribution it makes to the source or sources of sustainable competitive advantage on which the strategy is based. This analysis should result in a strategic prioritization of the product elements within and across categories. In some categories certain elements will be important while others will not. In other categories all or none of the product elements will be important.

(3) For low priority elements consider using sourcing to enhance cost or increase flexibility without obvious undue risks. By definition, low priority elements are not critical to achieving sustainable competitive advantage.
Hence, if sourcing can enhance cost or increase flexibility without undue risks it should be seriously considered. In the case of cost this reduces to the traditional "make or buy" decision. Many complex electronic systems manufacturers are discovering that their cost positions can be greatly enhanced by outsourcing a variety of components such as circuit boards, wiring harnesses, power supplies, metal cabinets, etc. These are sourced either from world class manufacturing suppliers for these components or simply from suppliers whose labor and overhead rates are significantly lower than their own. This covers a great variety of components and sub-assemblies where either the manufacturing economies of scale and experience are in the supplier industry (e.g., engines for power lawn mowers) or the labor and overhead costs of the supplier are dramatically lower due to some specific advantage.

(4) For high priority elements consider sourcing where it can aid in the achievement of sustainable competitive advantage. By definition, high priority elements are critical to achieving sustainable competitive advantage. Hence, for sourcing to make sense it should aid in the achievement of sustainable competitive advantage. Extreme care must be taken here since the basis of the strategy is at risk in these sourcing decisions. It is at this point that many sourcing errors are made. It has been our experience that firms often source product elements that are crucial to the long term strategy for short term cost reasons rather than looking at the strategic implications. The result is a loss of control over competitive advantage and often a mortgaging of the future for short term gains.

An example of effective sourcing to achieve sustainable competitive advantage was the sourcing of electronic control modules by a Canadian electric range manufacturer. The business had previously purchased electro-mechanical control modules from a sister division. The sourcing of electronic control units gave the firm's ranges a superior technology and a differentiated image
based on technology and product appearance. In addition, once the basic mod­
ule was installed, options could be added inexpensively since they mainly in­
volved additional software. This provided primarily a differentiation advan­
tage for high end ranges but in a cost effective manner. Furthermore, since
the source was a German electronics firm with no interest in manufacturing
ranges but a large interest in designing and manufacturing electronic compon­
ents, the risk of creating a future competitor were minimal.

(5) Based on "3" and "4" develop a ranked list of potential sourcing op­
portunities. When the list of sourcing opportunities has been identified it
should be ranked by some rough measure of overall importance. One conceptual
method of developing a rough ranking of the opportunities is to first estimate
the financial benefit of specific features and price reductions to your cus­
tomer over the product's life cycle and then to compare these to a key compe­
titor's product as a benchmark.

(6) Compare the sourcing opportunities identified to the best available
alternatives. For each sourcing opportunity identified the question of alter­
natives needs to be raised. The base option of continuing "as is" needs to be
considered along with other approaches such as additional plant investment or
increased spending on research and development. All such analyses and discus­
sions need to be conducted in the context of the strategic analysis conducted
in steps "1" and "2" above.

To illustrate the use of sourcing from a strategic perspective, consider
how General Electric's Medical Systems business has used sourcing to improve
competitiveness. G.E.'s overall strategy is to deliver highly differentiated
complex diagnostic imaging products such as magnetic resonance (MR), CAT-SCAN,
ultrasound, x-ray, etc. to global markets in a cost effective manner. In or­
der to become more competitive, they embarked on an active sourcing campaign
to reduce costs by some $30m. This involved sourcing a variety of components
and subassemblies like cabinets, wiring harnesses, circuit boards, and numerous other noncritical items mostly from nearby suppliers in the Midwest for use in their Milwaukee plant. However, at the same time they built a new plant to produce the complex magnets for MR which embody significant competitive advantages rather than continue to source this key technology from an English firm. In addition, they entered into joint ventures in Japan and Korea to secure a broader product line, access to the far eastern markets, and low cost manufacturing facilities. Finally, they recently acquired CGR in Europe for product line and distribution reasons. Taken together these actions suggest that sourcing is an integral part of their strategy to enhance sustainable competitive advantage.

EVALUATING SOURCING OPPORTUNITIES

Once a prioritized list of sourcing opportunities has been developed as discussed in the previous section then an approach must be available to evaluate the relative benefits, costs, and risks for each opportunity. Furthermore, this approach must permit the comparison of various sources (vendors) for each opportunity. We believe that many mistakes are made at this stage because the analysis is reduced to traditional make or buy decision driven only by costs (often only direct product costs). Here too substantial organizational resistance is likely to surface as functional managers scurry to protect their turf. What is needed is a way to get at the key issues, to ask the difficult questions and to rigorously structure the analysis.

Sourcing Balance Sheet

The basic conceptual tool for the analysis of sourcing opportunities is the sourcing balance sheet as shown in exhibit 3. The sourcing balance sheet is based on the business system or the value chain, a useful tool of
strategic analysis. The value chain disaggregates a firm into its strategically relevant activities. Of these activities the primary ones may be categorized at a generic level as inbound logistics, operations, outbound logistics, marketing and sales, and service. Supporting these primary categories are procurement, technology development, human resource development, and firm infrastructure. Within each of the generic categories there may be several specific activities. For example within operations there may be parts machining, assembly, production planning and quality control.

The sourcing balance sheet (exhibit 2) shows a conceptual tabulation of the benefits and costs of a sourcing decision across the primary categories of the value chain. Some of these benefits and costs can usually be quantified while for others only qualitative judgements (sometimes crude judgments) will be available. The important point is not to use the sourcing balance sheet as a rigid form for detailing an analysis, but as a means for facilitating the discovery and analysis of important issues and questions. In some situations this may call for "filling in" most of the boxes, while in others merely "checking off" the boxes to ensure that all bases have been covered may suffice. In some cases many boxes will remain "blank" because of the narrow nature of the impact while in other cases the broad impact will require considerations in most of the boxes. Again, as with the vertical chain we have seen thorough analyses done without explicitly using the sourcing balance sheet. But, we have also seen the value of implicitly using the sourcing balance sheet to get at hard issues.

The sourcing balance sheet arrays the benefits and costs in three categories: strategic advantage or disadvantage, linkages, and interrelationships. Strategic advantage or disadvantage refers to the impacts on the six sources of competitive advantage discussed earlier. Cost, differentiation, technology, distribution, market access, and flexibility all need to be
considered. For example sourcing of fashion design for a clothing manufacturer may improve differentiation in marketing, while offshore sourcing of castings for a manufacturer of heavy equipment may decrease costs and give the potential for market access through countertrade. Interestingly, if only cost is considered here and interrelationships and linkages are omitted the analysis reduces to the traditional make or buy.

Linkages refer to the impact on other primary and support activities in the value chain that are related to the activity under consideration. These impacts may have both positive and negative implications for competitive advantage. For example, sourcing a major subassembly to functional specification may reduce costs in assembly, incoming logistics, and design; but reduce differentiation in marketing and require new training costs and procedures in service. It is important to remember that although the sourcing balance sheet explicitly lists only the primary activities of the value chain, the linkages will often be to support activities such as R&D or human resource management. Interrelationships refers to relationships with other business units of the firm. For example, the decision to source finished product to fill out a product line will obviously have benefits in the marketing and sales activities of a business unit but it may also positively impact the distribution costs of other businesses of the firm if they share distribution channels which are operating under capacity. Alternatively, if the shared distribution channels are operating at or on near capacity the additional load may degrade costs and response times in other businesses or require further investment in distribution. Such interrelationships are often ignored in a traditional "make or buy" analysis.

To use the sourcing balance sheet to organize the analysis of a sourcing opportunity we suggest seven general steps.
1. Collect data from various potential suppliers and develop estimates about variables such as cost, quality, volume, and delivery. This data will be useful in developing the analysis as one proceeds through the sourcing balance sheet. Other data requirements are also likely to appear.

2. Determine what activities may be directly affected and how they may be affected. For example, consider the opportunity to source a finished product that is currently manufactured in-house at a significant volume. All of the activities in the categories of inbound logistics and operations are likely to see a reduction in their work load. At the same time activities within the marketing and sales category may need to change various aspects of the marketing mix such as price and advertising.

3. Determine what impacts these changes could have on the six sources of competitive advantage. In our example this may mean that direct product cost will decline because of the ability to reduce the work force in the categories of inbound logistics and operations. Furthermore in the marketing and sales category there may be changes in cost, differentiation and flexibility to respond to changes in demand.

4. Determine what impacts there may be to other activities through linkages and how these impacts may affect competitive advantage. For the example of a finished product this may mean that customer service can now be more easily performed by third party service organizations and hence differentiation through customer service may be reduced. Often there will be some arbitrariness to whether impacts are identified and analyzed here or under items "2", "3" or "5". The distinctions can be fuzzy. This makes no difference. What is important is that all significant impacts are identified and analyzed.

5. Determine what other activities could be performed differently, re-grouped with other activities or eliminated. Assess the impact of these changes on competitive advantage. Again we are considering linkages, but here
the emphasis is on actively pursuing chances to exploit the sourcing opportunity under consideration rather than tabulating impacts. In the example it may be possible to close one of the plants at considerable cost savings by reallocating production among the remaining plants.

6. What are the impacts due to interrelationships on other businesses? How will this affect their competitive advantage? Particularly important to consider here are any shared resources such as plants, engineering, distribution, or sales. A serious error we have encountered all too often is for one business within a company to independently decide to source components or subassemblies that are produced in a facility shared with other businesses. The resulting reduction in throughput in the facility causes those businesses that remain to be burdened with significantly higher overhead impacting their competitiveness.

As an example of impacts due to linkages and interrelationships consider Digital Equipment's recent decision to cancel an internal project to build a microprocessor and source one from MIPS Computer Systems. This will permit Digital to rapidly get a powerful workstation in place that uses the industry standard Unix operating system. Strategically this should permit Digital to quickly respond to significant competitive threats from Apple, Compaq and Sun. However, departing from their own VMS operating system will negatively impact Digital's efforts to develop and sell its superior networking expertise and internal computer compatibility. Numerous impacts will occur in marketing, software development, and service across a broad spectrum of Digital's business.

7. Estimate the overall impact on competitive advantage. This calls for conceptually "summing up" the sourcing balance sheet to arrive at a preliminary decision. (Risks and hidden costs need to be considered before a final
decision can be recommended.) In rare cases only will this result in a simple "hard" number for both benefits and costs. Much more commonly this calls for a managerial judgement of benefits and costs based on a few "hard" numbers, some numerical estimates and some qualitative considerations. In fact we have found that it is not unusual for qualitative considerations to dominate as they often do in strategic decisions. Often the "summing up" in this step involves a comparison of several potential sources or of several different approaches to reconfiguring the value chain that have been identified in the previous steps. (e.g., closing a plant versus using the decrease in volume to improve upward volume flexibility and order response times.)

THE HIDDEN COSTS OF SOURCING

Almost no one still views sourcing as a virtually cost free way to acquire components, subsystems, and/or finished goods with maximum flexibility. In this view the only significant cost is writing the contract. Nevertheless our experience in inter-viewing dozens of managers involved in sourcing suggests that they tend to underestimate the costs and overestimate the flexibility. There are in fact significant hidden costs to managing a sourcing relationship. An awareness of these costs is important in deciding to source and in managing the sourcing relationship.

In any substantial sourcing relationship provision must be made for functional specialists to manage the various relations with the source firm. Specialties such as product engineering, quality control, and production planning and scheduling are often necessary to achieve adequate coordination. In fact it is often useful to have an overall "sourcing manager" with a team composed of functional specialists. These functional specialists will be responsible for the traditional roles they would have were production conducted internally, except that they need to work in conjunction with their counterparts at
the source firm. Working through others in a separate economic entity demands, in addition to technical competence, interpersonal and managerial skill beyond that often required for internal manufacturing.

Closely related to the issue of functional specialists is the need to coordinate capacity decisions in any significant sourcing relationship. A source must determine the capacity necessary to serve the sourcing firm in much the same way such a decision would be made if production were conducted internally. What can make this decision important to the sourcing firm is the long-term nature of significant sourcing relationships. Having capacity in a source does not free a firm from responsibility for that capacity and allow it to adjust its purchases in any fashion. Rather, if the relationship is to be maintained the financial viability of the source must be considered. A mutually profitable relationship is essential. This suggests careful consideration of the necessary capacity and a willingness to share some of the costs incurred if capacity built in good faith, after thorough consultation, turns out to be excessive. Failing to have mechanisms to share such costs of mutual decisions can doom a firm to an increasingly adversarial relationship and potentially result in a costly switch to a new source. Furthermore, having such a situation develop is likely to lessen the interest in a relationship and increase the required return for other potential sources.

The control system in the sourcing firm is often the source of significant hidden costs that can interact with the costs of capacity just discussed. In divisionalized companies the financial control systems and processes may seek to limit current assets and to encourage low cost financing through interest free accounts payable. This is often reinforced by an incentive compensation scheme that emphasizes ROI. This approach, if not adapted to a sourcing relationship, can encourage (or even demand) that the source absorb all costs of
adapting to fluctuating demand. For example, when demand drops off or fails to materialize as forecasted, the incentives may be to force the costs of excess inventory (either directly through holding the inventory or through the extension of accounts payable deadlines) onto the source. Couple this situation with a source firm that practices lifetime employment and the strain on the source may become intolerable. We reviewed one situation where a division of a large US multinational was sourcing a critical product in its line from a Japanese supplier. The product, a capital good, embodied significant technological advantages and was critical to the overall success of the sourcing division. The US firm had encouraged the source to add substantial capacity in anticipation of demand. This capacity involved significant fixed costs including implied lifetime employment as well as long-term commitments to the suppliers of the source. When demand failed to materialize, at even near the level anticipated, the source was repeatedly pressured to cut production substantially below agreed levels and to carry high inventory levels. This was driven by working capital controls in the US firm. The net result was that the source almost failed financially and the US multinational was forced to make an equity investment to assure the flow of the critical product. Situations such as this suggest examining the role that control systems and incentive compensation play in a sourcing strategy.

**RISKS IN SOURCING**

The cost/benefit analysis just described should be prudently combined with an analysis of the risks. These risks include the balance of bargaining power inherent in the industry structures, macroeconomic factors, political exposure, competitor creation, workforce alienation, and de-skilling.

The economic structure of the supplier industry will determine the amount of bargaining power participants in this industry can exert. The greater the
inherent bargaining power of the supplier industry the greater the risks in sourcing from the industry in terms of both the workability and the longevity of the relationship. Hence it is important to understand the structure of the supplier industry and how it impacts bargaining power. Fortunately this is an area of strategic analysis that has received significant attention.\textsuperscript{10}

Macroeconomic factors become important because of the global nature of business. The macroeconomic environment of countries change over time. These changes may negate an initial cost advantage either directly or as a result of currency fluctuations. (Witness the recent dramatic drop in the dollar relative to the yen.) Sourcing inherently provides more flexibility to move production in response to such changes than does internal production. However, it should be noted that such moves can be expensive and even in some cases approach the cost of moving a plant. The use of multiple source plants in different countries provides a mechanism to partially hedge some of the macroeconomic risks.

Another inevitable risk is the political stability in countries where sources are located. Inevitably many third world countries where labor and overhead rates are attractive face uncertain political futures. Many newly developed countries such as Korea, Taiwan, or Hong Kong have substantial political risk which could make a sourcing strategy based on a single country unduly risky.

One of the most obvious risks is the "boomerang effect" where a source develops through the sourcing relationship product and marketing knowledge, and then goes into direct competition with their former customer. The business press has detailed many such examples in recent years. The most familiar examples are in consumer electronics where as discussed earlier many of the Asian competitors originally entered the U.S. market as suppliers for domestic
firms. The auto industry has also seen several examples. Firms need to at the outset plan their sourcing strategy so as to minimize this risk. Some U.S. firms have established joint ventures with far eastern companies where part of the agreement severely limits access to the U.S. market while creating the opportunity to make international sales that otherwise would not have been possible. Closely related to the "boomerang effect" is the use of marketing knowledge or production skills gained by the source to facilitated entry or improve product for other customer firms. Even with excellent advance planning firms need to closely monitor supplier moves in this direction and have in place contingency plans for legal moves, new sources, or increased internal production, and market counterattack.

The initiation of a sourcing program for items that were previously manufactured in-house can have serious workforce implications. The loss of jobs because of "outsourcing" can provoke a serious response from unionized employees. Some local unions have made the reduction or elimination of outsourcing a priority item in contract negotiations. Non-union workforces also can experience lowered morale and productivity. Furthermore, professional employees in areas like engineering may be negatively impacted and the firm may find it difficult to hire into these areas. These are obvious risks that need to be assessed and managed.

One of the most insidious risks in sourcing is de-skilling. By de-skilling we mean the loss of skills and capabilities that are important to the long-run success of the business. This often occurs because sourcing is approached as a means of "getting rid" of the difficult or messy tasks. Interestingly, the fact that a particular task is difficult suggests that it may be a source of sustainable competitive advantage and that improved capability for that task relative to the competition should be a strategic agenda item. In
the more general case, even in a strategic context, broad based sourcing may cause general skills such as tool and die-making, and product design to decline. Such skills and capabilities although perhaps not crucial to current success may be important capabilities in the future as the industry evolves in ways that cannot be foreseen. At any rate the maintenance of an acceptable level of skills and capabilities that could be important to the future development of the industry seems a logical constraint on any sourcing strategy.
Exhibit 1

Routes to Sustainable Competitive Advantage

Cost refers to the ability of a firm to realize total costs lower than their competitors. Cost advantages are often driven by economies of scale, the learning or experience curve, and capacity utilization.6 Texas Instruments originally sought to establish a cost advantage in calculators through an experience based strategy. They lowered prices to generate additional demand, added capacity on anticipation of this demand, and reduced their costs through scale and experience effects. DuPont in titanium dioxide (the whiten-er in paint) followed a similar cost based strategy in which they priced to provide adequate short run returns but so that competitors would not find it attractive to add any additional capacity.

Differentiation refers to the ability of a firm to create a product having some perceived uniqueness for which customers will pay a premium. In calculators, Hewlett Packard offered a differentiated product based on a quality, image, and features. While Texas Instruments strove for a calculator with four functions and a percent key selling for under ten dollars, Hewlett Packard developed highly featured specialized calculators for financial analysts and engineers selling for hundreds of dollars.

Technology can be the basis of competitive advantage by offering increased product performance as, for example, Cray in supercomputers. Alternatively, technology may be used to achieve lower costs, for example, FANUC's electronic controllers for numerical control machines. Although the impact of technology is usually to increase performance or reduce cost, we treat it as separate source of competitive advantage because it is often a precursor to future changes in competitive advantage.
Distribution can provide competitive advantage by making the product readily available to many customers, by achieving distributional economies of scale, and by pre-empting competitors from achieving cost effective distribution. 3M dominates many product segments, for example, general trades coated abrasives (sand paper) business, by providing the most effective distribution system.

Market access refers to the ability of a firm to achieve privileged access to a specific market, usually a national market. Host governments often grant preferential or exclusive access in return for concessions such as local partners and plants (for a full discussion and examples, see Hamel and Prahalad.) US jet engine manufacturers have gained access to international markets through the creative use of counter-trade. In telecommunications, the selling of equipment like central office switches depends entirely on government approval.

Flexibility usually refers to three related sources of competitive advantage: (1) the ability to respond quickly to fluctuations in demand, (2) the ability to respond quickly to changes in market needs, and (3) the ability to expand the scope by offering a complete product line. Allan Bradley sourced low-end programmable controllers from Japanese suppliers to fill out their product line and rapidly get products into the low-end market segment. With uncertainty as to how the market would evolve, this provided a rapid entry as well as an ability to quickly adjust to changes in the market.

These sources of sustainable competitive advantage are not isolated from one another or static. They interact with one another and they change over time. For instance, the technology of radial tire design gave Michelin a highly differentiated position in the US market for many years. However, when the US manufacturers did develop quality radial tires the basis of competitive advantage turned increasingly to cost. In semi-conductor memory chips (e.g.,
256K RAM) the basis of competition early in the life cycle was product technology and availability. However, as the product matures, competition increasingly hinges on cost which is often dependent on process technology and distribution. Compounding this change are the short product life cycle of memory chips which increasingly are measured in months instead of years. Because of this firms must often be very flexible in terms of volume and response time.

It should also be pointed out that there will often be more than one route to a sustainable competitive advantage in an industry. We have already mentioned TI's cost strategy and Hewlett Packard's differentiation strategy in calculators. Another example, in heavy duty trucks Paccar has competed for years on the basis of a highly differentiated quality image while other manufacturers such as Ford have emphasized cost. Paccar essentially sources everything and only assembles the final product while Ford sources some components and subsystems where the economies of scale are in the supplier industries.
# VERTICAL CHAIN

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# Sourcing Balance Sheet

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