The Boyd Cycle and Business Strategy

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On May 2, 1670, Charles II of Great Britain granted a royal charter to a firm called the Governor & Company of Adventurers of England Trading into Hudson's Bay, giving it the exclusive right to trade in most of what is today Canada, an area larger than ten Japans. Now known as the Hudson's Bay Company, this firm is the world's oldest commercial entity [1].

It almost didn't survive. In the early 1800s it was completely beaten by its rival, the NorthWest Company. The NorthWest Company was successful despite an overwhelming disadvantage—it was in violation of the law. Concealing its trespasses against the royal franchise forced it to operate through Montreal rather than by the shorter route to London through Hudson's Bay. This increased both NorthWest Company's transportation costs and its working capital requirements—the Hudson's Bay Company could sell its furs within six months of buying the goods it traded for them; the NorthWest Company faced a lag of 18 to 24 months. As a result, its logistical costs were nearly double those of the Hudson's Bay Company.

Organization was a key ingredient of the NorthWest Company's success. Not only did it locate its trading posts closer to its customers,

it adopted a structure that motivated its members to serve the interests of the firm. The NorthWest Company was a partnership with two classes of partners who shared in the profits of the organization. The senior, Montreal-based partners were responsible for financing, acquiring trade goods, and selling furs at the London auction. The wintering partners ran the trade in the field. The two groups met annually to exchange information and set policy, but operating decisions were left to the individual wintering partners on site, who were motivated by their partnership shares to respond to circumstances with effort and imagination. Other employees were chosen for their ability to adapt to the entrepreneurial organizational culture of the NorthWest Company. They too were given real responsibility and paid for performance. Outstanding performance eventually led to a full partnership and a share of the firm's profits.

In contrast, the Hudson's Bay Company was a rigid bureaucracy.

> Rules and controls from distant London circumscribed every action and decision of its employees in the field, leaving little responsibility for flexibly responding to emerging conditions. Innovation was discouraged or even punished, and performance was rewarded only by the possibility of someday gaining a promotion to the next rung of the bureaucratic ladder. Employees were chosen for their ability to withstand the excruciating boredom of their service on the frozen bay and for their willingness to work cheaply and follow orders. They were disciplined by floggings for breaking the company's myriad regulations.

A new set of owners acquired the Hudson's Bay Company in 1809. They responded to the NorthWest Company's challenge by mimicking their rival. They moved the Hudson's Bay Company's trading posts inland to compete directly with the NorthWesters, decentralized authority within the organization, instituted a performance-based profit sharing plan, and recruited a new class of employees who would fit with the aggressive, entrepreneurial organization they were trying to build.

Ten years later the NorthWest Company was beaten. In 1820 the two companies merged under terms that gave control to the Hudson's Bay Company.

The case can be used to illustrate a number of points: the importance of staffing, of measuring and rewarding performance, the significance of getting close to the market, and, perhaps most decisively, the value of decentralization. However, I want to make a more general point—that business competition is like war. It is a struggle for dominance and survival and, like war, it takes place in *time* [2]. The aim of this presentation is to show that success in business, as in any real-time competitive rivalry, depends upon the ability to perform a series of steps or a cycle faster than one's opponent [3].

The first of these steps is *observation*. Rivals start by observing their positions, the environment, and their opponents. Next, on the basis of observation, each *orients* itself to the situation and then *decides* on a course of action. Finally, each puts the decision into effect; that is, it *acts.* It checks to see if its action has changed the situation, and the series of steps or cycle starts anew (see Figure 1).

If one of the rivals can consistently go through this cycle faster than the other, it gains a tremendous advantage. By the time the slower side acts, the faster is doing something different from what it had observed or anticipated, and, while it may benefit from a lucky or inspired guess, more often its actions will be inappropriate to the situation. With each cycle, the slower side's actions will tend to become less apt. Even though the slower side strives to do something that will work, each of its actions is less efficacious than its predecessor and the slower side falls farther and farther behind. Frequently, it panics. Ultimately—and often suddenly—it breaks down.

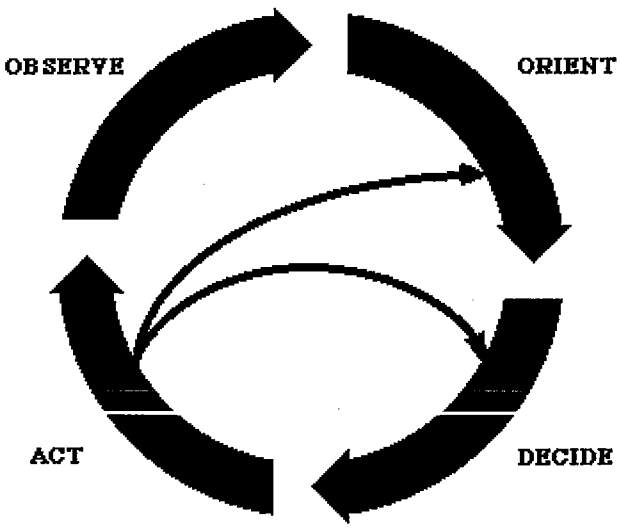
That is precisely what happened in this case. Initially the NorthWest Company's organizational design gave it a huge advantage in cycle time. Its wintering partners could promptly respond to new conditions and situations. The Hudson's Bay Company made its operating decisions in London. Communication between Hudson's Bay and London was extremely slow. The lag between the reporting of

information about the situation in the field and receipt of a response from the management in London was frequently as long as 15 months. Not surprisingly its responses were increasingly inappropriate to the situation. In the end, its owners panicked and unloaded the Hudson's Bay Company at a price of twenty cents on the dollar.

Once the aggressive new owner-managers and their allies purged the Hudson's Bay Company of its organizational handicap, it quickly overtook its rival. Its inherent logistical edge meant that it could go through the Observation-Orientation-Decision-Action (OODA) cycle faster than the NorthWest Company. The ten years that followed witnessed fierce and even bloody competition between the two rivals, but the advantage lay with the Hudson's Bay Company, and the ultimate outcome of the struggle was never really in doubt.

FIGURE 1:

THE OBSERVATION, ORIENTATION, DECISION, ACTION CY(BOYD LOOP)



THEORETICAL DEVELOPMENT

The significance of the Observation-Orientation-Decision-Action cycle was first noted during the mid 1970s by John Boyd, a young captain in the United States Air Force assigned to study air-to-air combat during the Korean conflict [4]. American aviators were especially successful in Korea, achieving a ten-to-one kill ratio against their opponents. Why?

The first possibility John Boyd considered is that the Americans simply had better planes. But, as it turned out, by most measures of aircraft quality, the American F-86 was inferior to its Korean War opponent, the MiG-15. The MiG-15 could climb and accelerate faster and turn quicker than the F-86. Nevertheless, the the F-86 had two advantages over the MiG-15. First, its pilot could see out better. Second, it had quick, high-powered hydraulic *controls*, and the MiG did not. This meant that, although the MiG could perform many individual maneuver activities—turning, climbing, accelerating—better than the F-86, the F-86 could switch from one activity to another much more quickly than the MiG.

Using these two advantages, American pilots developed tactics that forced the MiG into a series of maneuvers. Because the pilot of the F-86 could see how the situation had changed and could switch faster to another activity, at each maneuver the F-86 gained a beat on its opponent. With each switch, therefore, the MiG's responses were less appropriate to the situation, until they were so inappropriate that the MiG was exposed to destruction. Often it appeared that the MiG pilot realized what was happening to him and panicked, which made the American pilot's job all the easier.

John Boyd then turned to ground combat to see if circumstances paralleled those of the air war over Korea. He found a similar pattern. One side presented the other with a sudden, unexpected challenge or series of challenges to which the other side could not adjust in a timely manner. As a result, the side with the slower response was defeated, and it was often defeated at a small cost to the victor. Moreover, the losing side was frequently materially stronger than the winner and, in many cases, the same sort of panic and paralysis the MiG pilots had shown in Korea seemed to occur.

What do the winners in these cases have in common? John Boyd's answer is that they consistently went through the OODA loop, sometimes called the Boyd cycle, faster than their opponent and thereby gained a tremendous advantage. By the time their opponent acted, they were doing something different. With each cycle, the slower side's actions were less apt and it fell farther and farther

behind. This is what happened in many of history's most decisive battles. Hannibal went through the OODA loop faster than the Romans at Cannae and won one of history's greatest tactical victories. The Germans beat the French in 1940 and the Japanese beat the British in Malaya in 1942 because they went through the OODA loop faster than their opponents. In some of these cases, a single, sudden action was enough. In others, a series of Boyd cycles was required. But in every case, the critical competition was in time and the faster side won.

Most athletes, amateur as well as professional, know from experience that this ability is often the key to victory. When I play tennis, for example, I know that if I can observe my opponent's shot and orient myself to the situation faster than he can, if I can quickly determine whether his shot is to my forehand or to my backhand, whether it is short or deep, I can prepare my racquet to hit a shot that will be difficult for him to return. Sometimes he nevertheless replies with an unusually good shot or miss-hits the ball, surprising us both. But, more often than not, he hits a weak return that I can put away for a winner.

To say that the Boyd cycle is important is not to say that it is everything. In some real-time competitions, material factors predominate. In sports, the ability to out hit, outrun, and outlast your opponent usually trumps observing and orienting skills. In tennis, for example, strong young players consistently whip lard-assed old geezers like me. Advantages similar to strength, foot speed, and stamina are provided in wartime by a nation's personnel pool and its industrial, technological, and logistical base. As Napoleon Bonaparte observed, "God is on the side of the big battalions." Or, as Damon Runyon's character Nathan Detroit explained with greater precision: "The race is not always to the swift or the battle to the strong, but that's the way the smart money bets."

I would also add that in many real-time competitions, frame of mind is extremely important. Winners have grit. In battle, grit means physical, moral, and intellectual courage. In sports, it means the will to win. Again, as Napoleon observed: "In war, the morale is to the material as the ratio of six to one." (Obviously, Napoleon was fond of

hyperbole.)

THE BOYD CYCLE: MORE IMPORTANT IN BUSINESS THAN IN WAR OR SPORT

Grit is important to business competition, as are various material considerations. But the ability to perform Boyd cycles faster and more appropriately than your competitors is the crux of success in business competition—by success I mean earning supranormal profits. In the remainder of this essay I will explain what Boyd cycles mean in terms of business competition. I will show why the ability to perform Boyd cycles faster and more appropriately than your competitors is of paramount importance to profitability. Finally, I will show how to organize the firm to speed up Boyd cycles.

Businesses participate in two kinds of competitions: games against nature and games against rivals (games of strategy) [5]. Golf, for example, is primarily a game against nature; tennis is partially a game of strategy. In games against nature, material and morale factors predominate. Paradoxically, under the economist's competitive ideal—where there are many perfectly informed buyers, many perfectly informed sellers, a standard product, and competition is simply a matter of price—inter-firm rivalry resolves to a game against nature. The key to success in this game lies in improving operating processes faster than your rivals [6]. However, *the material inputs used by firms in a competitive industry, the equipment and technology, the functional skills and organizational designs that are available to one tend to be equally available to all.* Consequently, the search for a lasting competitive advantage through process improvement or cost reduction is usually futile. In a 'perfectly' competitive industry each of the participants must strive constantly to improve operating processes and to reduce costs just to survive.

Another way of putting this point is to say that competition tends to drive the rate of return on invested capital to "normal" levels, which is approximately the same as the yield on long-term government securities adjusted to take into account the risk of capital loss. Investors will not accept less than the normal return and firms that

fail to earn this rate eventually go out of business. If perfect competition were the rule, all the firms in a given industry would face identical capital costs. That is rarely the case. There are many obstacles to the free movement of capital—including information asymmetries and, in some cases, national borders, although these barriers have tended to atrophy in recent decades. More importantly, some firms are simply more profitable than their competitors and expand at their expense. Investors like supranormal returns and capital tends to flow to industries and firms earning supranormal returns.

What, aside from good luck or truly exceptional incompetence on the part of their competitors, permits some firms to dominate their competitors and thereby earn supranormal profits? Industrial organization theorists tell us that the answer is market power, which is secured through monopoly or quasi-monopoly in the marketplace. Among the means by which a firm can become or remain a monopolist are the following:

1. **Collusion** with the other members of the industry to restrict output and raise prices above perfectly competitive levels;

2. **Special knowledge** about the product or production techniques that enables the monopolist to make a better product that other firms cannot imitate or to make it at a lower cost;

3. **Government protection**, the easiest way to keep a monopoly where products or techniques can be easily imitated by others, as is usually the case—patents are one kind of government protection, the Hudson's Bay Company's royal franchise is another;

4. **Sound product-market strategies and tactics.**

We are concerned here primarily with the elaboration and implementation of sound product-market strategies and tactics. It is generally agreed that, where governments do not protect monopolies

and where legal institutions make it harder to collude than to compete, creating and defending a monopoly is by no means easy. Unfortunately for the monopolist (although not for the rest of us) competitors are attracted to supranormal returns like moths to a flame.

GETTING THERE FIRST WITH THE MOST

In war, one of the most effective strategies combines offensive operations with defensive tactics. By this I mean taking a defensive position that threatens the base of your opponents, thereby forcing them to attack a prepared position or to withdraw ignominiously. If your opponents attack, they often expose themselves to destruction in the form of a well-timed counter attack. Getting to the market first with a superior product is the competitive analog of taking the high ground. It forces the competition either to withdraw or to attack the incumbent with similar or improved products. As in war, it is easier to defend a given position than to attack it successfully [7].

Entrenched products have several competitive advantages. First, they are familiar to customers. Later entrants must overcome consumer awareness and product reputation if they are to capture market share. Lacking a superior product or a significant cost advantage, this is hard to do. Early entrants also have production experience; they are therefore likely to have moved farther down the learning curve and to have lower costs than later entrants [8]. In some cases, the initial entrant grows large before potential competitors can act. Because it has already spread its fixed costs over many units of output, its per-unit cost is lower than that which any follower could hope to soon achieve. Moreover, getting to the market first often means that the early entrant can make mutually advantageous arrangements with suppliers, giving it preferential access to parts and raw materials. Similar arrangements are possible with wholesalers and retailers. These arrangements can be substantial barriers to entry on the part of potential competitors, even where the initial entrant is earning substantial monopoly profits.

Knowledge of the early entrant's competitive advantages is often

enough to deter potential competitors. As Michael Porter explains:

> Good defense is creating a situation in which competitors, after [considering the factors] described above or actually attempting a move, will conclude that a move is unwise. As with offensive moves, defense can be achieved by forcing competitors to back down after a battle. However the most effective defense is to prevent the battle altogether.

The very fact that the initial entrant has made the first move gives it a major advantage. It has already taken a position, made investments, and acquired product-specific assets (that is, sunk costs) that make it unlikely that it will exit the industry without a fight. Moreover, this commitment gives the entrenched firm an incentive to spend more money to defend its position than potential competitors are willing to spend to take it away from them.

Should competitors nevertheless attack an entrenched firm, it can counterattack employing a variety of maneuvers involving price, product, promotion, and place. The following example illustrates some alternative price maneuvers, not because they are more important than those involving product, promotion, or place, but because I understand them better due to my own background and training.

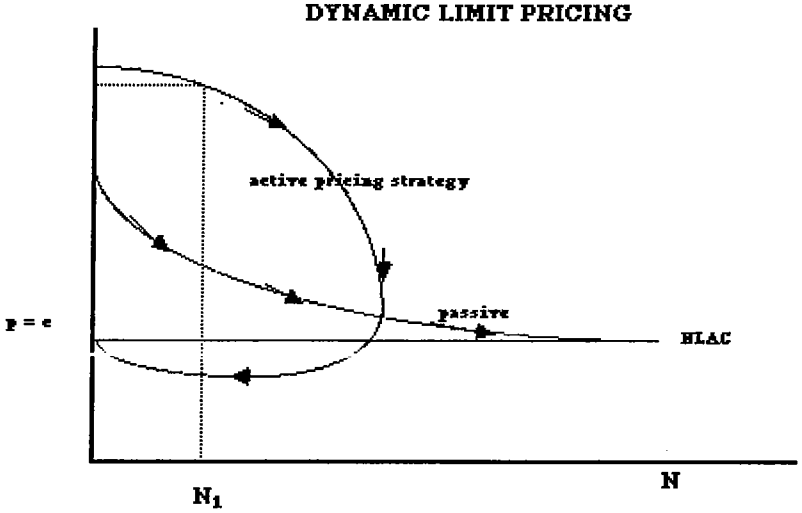
PRICE MANEUVERS [9]

It takes time to develop products, order components, acquire plant and equipment, train personnel, inform customers, and so on. Owing to adjustment costs, other things being equal, the more quickly followers try to enter a market, the higher their costs [10]. This means that the entrenched firm has the option of following a passive pricing policy, treating its hard-won monopoly as a cash cow and milking it. In which case, it will start by charging a high price for its product. Ultimately, subsequent entrants will erode the entrenched firm's market share and gradually force it to lower its price to the competitive level. The speed of this process will depend upon its head start, the height of the barriers facing potential entrants, and the initial price.

Presumably, the entrenched firm will set a lower price than if it ignored the future. Nevertheless, profits today are worth more than future profits (assuming positive interest rates) and its owners could "take the money and run." This tactic is illustrated by the price schedule labeled "Passive" in Figure 2, where the schedules show the per unit price asked by the initial entrant over time, the vertical axis shows price, the horizontal axis shows the number of firms in the industry, and the line labeled "p = c" and also "NLAC" shows the nth firm's long-run average cost schedule—the competitive price level, where for illustrative convenience constant average and marginal costs are assumed. Note that under this tactic, price eventually falls to the competitive level and "n" firms comprise the industry—approximating the case of perfect competition, although if the early entrant has a long-term competitive advantage, it will continue to earn supranormal profits and to be the dominant firm in the industry for some time.

Figure 2

DYNAMIC LIMIT PRICING



This is essentially the tactic that IBM followed when it entered the personal computer market. To take revenue from what was then a tiny but growing market, IBM launched the PC in 1981. Subsequently thousands of small software companies wrote application software for the PC, causing PC sales to skyrocket. IBM initially set the price of the PC fairly high to supplement its mainframe computer business. High prices invited competition, however. And, IBM's reputation aside, the PC had no real advantage over its competition, since it was assembled

from off-the-shelf items made by other firms. Consequently, its competitors could easily copy the PC and the processes by which it was assembled and distributed. Eventually many did, and the price of a PC fell to the competitive level.

Today the only firms in this segment of the computer industry earning supranormal profits are those that have acquired a real competitive advantage. Dell, for example, grew from nothing in 1992 to $2 billion in sales in 1992 because it invented a new, lower-cost way of distributing personal computers: mail order sales backed by telephone hotlines offering technical advice. As was true of IBM, however, Dell has little or no real market power, and a host of imitators are already nipping at its heels.

Alternatively, through the creation of advantages that are not easily copied, an early leader can try to preempt potential competitors. IBM, for example, could have exploited its early lead in the personal computer business to arrange exclusive deals with its suppliers, especially Intel and Microsoft, who supplied the most important components of the PC, the microprocessor and the operating system software. In that case, IBM could have initially asked a very high price for its PC (which it would have shared with Intel and Microsoft). By dropping the asking price for the PC below p=c, IBM could have easily defeated subsequent entrants. Then, once tangible threats to its market power had been defeated, it could have raised its price to p=c, thereby deterring future entrants (again, this presumes the cooperation of Intel and Microsoft). This more aggressive approach is illustrated by the price schedule labeled "Aggressive" in Figure 2, which shows the per unit price asked by the initial entrant over time [11].

MANAGING THE BOYD CYCLE

The business strategy literature is bursting with advice about what to observe (see Michael Porter, 1980, pp. 1-87, 126-190. 361-382), how to orient your firm and its products with respect both to the market and the competition so as to exploit fully your strengths and mask your weaknesses (pp. 88-125, 191-298), and how to choose a course

of action (pp. 299-357). Much of the rest of management literature is concerned with the effective implementation of these actions. This is certainly the basic thrust of my academic area of particular concern, managerial control. Unfortunately, this literature has almost nothing to say about the importance of OODA cycle time, at least not explicitly, let alone about how to speed it up.

Fortunately, however, there is nothing arcane about the means by which an organization reduces OODA cycle time. According to John Boyd, the secret of moving faster than your opponent lies in reducing friction through simple, reliable administrative structures and the use of flexible tools that can be adapted rapidly in response to changing tactics. Many managerial innovations are justified in terms of the contribution they make to organizational reliability and adaptability, including decentralization, employee empowerment, principle-centered leadership, flexible manufacturing, cycle-time burdening, and transaction cost accounting. Most students of management believe, for example, that the effectiveness of large, complex organizations improves when authority is delegated down into the organization. Decisions are then made by those with the most pertinent knowledge of the situation and with the highest stake in outcomes. What is novel is justifying the adoption of innovations such as decentralization in terms of their contribution to reducing the Boyd cycle and, therefore, their direct contribution to business strategy.

Decentralization

We have already seen in the Hudson's Bay case how centralization is inimical to a fast Boyd cycle [12]. Under centralization, subordinates must do what they are told to do. If they observe that the situation has somehow changed, they must report the changed situation up through the chain of command and wait for new instructions. Often, by the time they arrive, the situation has again changed, and the instructions are useless. Decentralization and employee empowerment permits those who are best situated to observe a new situation to act upon it.

There is also evidence to suggest that decentralizing along project

(product or program) rather than functional lines can increase organizational speed and flexibility, especially in the process of developing new products. According to Hirotaka Takeuchi and Ikujiro Nonaka:

> ... emphasis on speed and flexibility calls for a different approach for managing new product development. Under the old approach, a product development process moved like a relay race, with one group of functional specialists passing the baton to the next group. The project went sequentially from phase to phase: concept development, feasibility testing, product design, process development, pilot production, and final production. ...
>
> Under the [new] approach, the project development process emerges from the constant interaction of a hand-picked multidisciplinary team whose members work together from start to finish. Rather than moving in highly structured stages, the process is born out of the team members' interplay. ... The shift from a linear to an integrated approach encourages trial and error and challenges the status quo. It stimulates new kinds of learning and thinking within the organization at different levels and functions.

Organizational Culture and Values

Principle-centered leadership can have a similar effect. By getting employees at every level of an organization to adopt the organization's external goals and purposes as their personal goals and values, principle-centered leadership helps employees to orient themselves to new situations and decide on a course of action that will serve the interests of the organization, thereby, insuring that empowerment leads to actions that are consistent with its overall objectives. How does it work? In many Japanese firms, goals and purposes are inculcated by everything the organization does—from starting the workday by singing the company song, through wearing uniforms, sharing onerous tasks between workers and management alike, and dispensing rewards and incentives. On a day-to-day basis

Japanese firms try to get their employees to evaluate everything they do to in terms of the overall goals and purposes of the firm. Their employees still have individual jobs, but they are expected to use their intelligence and initiative to work within and beyond those jobs to serve the organization's interests.

Tom Peters and Robert Waterman tell a story that shows how this process is supposed to work. In their fable an American bank that was acquired by a Japanese bank. The Japanese bank sent over a new management team who explained the parent company's values and goals to its new employees. At first, the Americans were mystified. They expected detailed, specific instructions, not pep talks. Morale dropped and their productivity plummeted. But the Japanese were patient. They kept on explaining the company goals and values and continued trying to get the employees to understand that they, not management, were supposed to figure out how to accomplish those goals. Finally, some of the bolder employees took the initiative to act on behalf the company's interests. Their tentative initiatives were recognized and applauded (even when they weren't always successful). Ultimately, everyone caught on and the bank's performance soared.

What this fable omits is that the bank's employees were highly skilled professionals. In most cases, it is necessary to do more than explain the company's values and goals to its employees. A high degree of training is also needed to teach employees what to do and how to do it. It is also worth mentioning that personnel stability helps organizations react to and anticipate change. Training won't pay off for the organization if the employees that are trained leave (or even worse, if management moves them willy-nilly around the organization). Moreover, strangers don't work well together; sometimes they don't work at all. If people do not know each other, they won't trust each other. They won't count on each other for support, and they may not even care what others think about them, in which case they are unlikely to contribute their intelligence and their initiative to the organization.

Flexible Manufacturing

Flexible manufacturing is usually justified in terms of enhanced productivity and product quality, but it too can help to speed up the Boyd cycle. The U.S. Office of Technology Assessment defines flexible manufacturing as a system:

> ... capable of producing a range of discrete products with a minimum of manual intervention. It consists of production equipment workstations (machine tools or other equipment for fabrication, assembly or treatment) linked by a materials handling system to move parts from one work station to another, and it operates as an integrated system under full programmable control.

Implementation of such a system can obviously produce a range of benefits for an organization, including increased machine utilization, reduced inventories, labor costs, and space-driven overheads, and higher product quality.

For our purposes, however, the greatest advantage of flexible manufacturing is that it reduces both the time it takes to move a product from concept to market and the cost penalty associated with hastening the date of first delivery [13]. It thereby increases the likelihood that an attack or a counterattack will succeed. Flexible manufacturing also tends to reduce if not eliminate the competitive advantage that accrues to manufacturing scale, one of the main advantages possessed by entrenched firms [14].

For example, during the 1950s and 1960s, General Motors was the dominant firm in the American automobile industry. Lower per-unit costs were the principal source of GM's market power. GM's production volume allowed it to use less labor per-unit of output than either of its domestic rivals, Ford and Chrysler. Furthermore, GM could profitably accommodate union demands for higher wages, because, under the CIO's system of pattern bargaining, wage increases granted by one of the big three auto makers had to be met by the rest of the industry, and, since higher wages increased GM's unit costs less than those of its rivals, they actually served to reinforce its cost advantage—the main source of its market power. U.S. Steel was

evidently similarly situated during that period. In both industries, tacit collusion between the dominant firm and the union evidently led to far higher wage and benefit levels than in other American manufacturing industries. According to the logic of international comparative advantage, this is one reason why the automobile and steel industries were especially vulnerable to foreign competition. It wasn't until Ford and Chrysler found ways to lower their break-even levels, in part by following the precepts of flexible manufacturing, that they were able to get out from under the dominance of GM, and in the case of Ford, surpass it [15]. Approximately the same thing happened in the steel industry—highly flexible mini-mills have thrived where giants have collapsed.

Activity Accounting

Building state-of-the-art flexible manufacturing facilities, in which economies of scope replace economies of scale, reduces labor's direct role in the manufacturing process. This means that controlling overhead costs, including procurement costs, product development cost, and setup and rework, is now more important than ever before to business survival and success. Consequently, many firms have modified their managerial cost accounting systems to focus the attention of responsibility center managers, marketing and manufacturing teams, and especially product designers and engineers on controlling overheads. Two concepts have been critical to this effort. These are cycle-time burdening and the recognition of transaction costs, including the costs of holding materials, parts, and finished goods inventories. Adoption to these concepts also speeds up the ability of manufacturing firms to perform the Boyd cycle by increasing flexibility and reducing product complexity and in some cases directly by reducing processing time designed into the product. Consequently, systems that are intended to affect the internal strategy of the firm can also play a critical role in its external product-market strategy.

Robin Cooper and Peter Turney describe how activity-based cost systems were designed to motivate improvements in the speed and flexibility in the manufacturing processes of three firms: the Portable

Instruments Division at Techtronix, Hewlett-Packard's Network Division, and Zytec. The goal of the system at Techtronix was to reduce the number of unique components in their products, thereby reducing parts inventories and ordering costs as well as simplifying the manufacturing process. Hewlett-Packard took a similar approach with respect to procurement costs. It split these overheads into two pools: one related to the number of assemblies and the other to the number of parts. The costs of production planning, product logistics, product specification, and service scheduling were allocated to individual products based upon the number of assemblies they required; purchasing, storage (including space, heating, and insurance), parts specification, and material planning costs were allocated using the number of parts they required. This information was provided to product designers to influence them to minimize the number of assemblies and parts needed to make the products they designed. At Zytec overheads were pooled and allocated to products based upon the time elapsed from project initiation to shipment of the finished product, providing a direct and unambiguous incentive to reduce the factors that cause cycle time to be long.

THE ART OF BUSINESS STRATEGY

The point of the preceding discussion is that the steps of the Boyd cycle—observing, orienting, deciding, acting—are themselves processes. They are amenable to the standard rules of process improvement.

Does this mean that all of the firms in a given industry are, in theory, equally capable of minimizing cycle time? If so it might be concluded that, aside from windfalls owing to good luck and barring self-imposed handicaps on your competitors, cycle time cannot be a consistent source of competitive advantage or business success. There is some truth to this inference, but its truth is somewhat paradoxical.

Process improvement implies routinization-- standardization of your responses and behavioral repertoire. Routinization is ultimately inimical to successful product-market tactics because routine behavior is predictable behavior. Rigid formulas and recipes can be identified,

anticipated, and defeated. If one cannot surprise your opponents, one cannot present them with difficult situations faster than they can deal with them. Richard T. Pascale reminds us, for example, of the success the Japanese have had in defeating routinized strategies:

> While they do not reject ideas such as the experience curve or portfolio strategy outright they regard them as a stimulus to perception. They have often ferreted out the "formula" of their concept-driven American competitors and exploited their inflexibility ... Yamaha plowed ahead and destroyed Baldwin's dominance [in pianos]. YKK's success against Talon (a Textron subsidiary) and Honda's outflanking of Harley-Davidson (a former AMF subsidiary) in the motorcycle field provide parallel illustrations. All three cases involved American conglomerates wedded to a portfolio concept, that had classified pianos, zippers, and motorcycles as mature businesses to be harvested rather than nourished and defended.

Carl von Clausewitz, the greatest philosopher of war and one of the greatest writers on strategy and tactics that ever lived, reserved his special scorn for thinkers who reduce the reciprocal action of conflicting wills to the clarity and precision of a geometric exercise and for the misguided leaders who have followed their advice into bloody disaster. According to Clauswitz, there is no action—no strategy or tactic—that cannot be undone by prompt counteraction. The problem lies in seeing through "the fog of war" and in overcoming its frictions. Furthermore, given the uncertainty inherent to the clash of human wills, a bold decision made in time for aggressive execution is often better than one that is more elegant but too late.

Business leaders should be equally suspicious of those who reduce product-market strategies and tactics to a set of formulas and who preach rules that guarantee success. That is not my purpose here. Speeding up the OODA cycle will not guarantee success. In the best of circumstances, observation may be inaccurate, orientation faulty, decisions defective, and resultant actions clumsy or ill-timed. Furthermore, increasing the efficiency of the processes of observing,

orienting, deciding, and acting will not defeat an inspired hunch that grasps at a stroke the essential truth of the situation. It is nevertheless pretty good advice—advice that managers ignore at their peril. Besides, adopting an idea before it becomes widespread can bring success for a time, which is all most managers can expect.

NOTES

1. My discussion of the Hudson's Bay Case is based on Milgrom and Roberts (1992) pp. 6-9.

2. In technical language, we would call these dynamic non-cooperative games. By game I merely mean a competition involving one or more participants in which each is trying to outdo the others (Dixit and Nalebuff, 1991. p. ix). By dynamic I mean that the game is played in real time; play is neither static nor strictly iterative. By non-cooperative I mean that, aside from abiding by the rules of engagement, the participants do not cooperate, even where cooperation would be collectively advantageous.

3. The importance of observation and orientation to the development of a sound business strategy is highlighted in a recent survey appearing in The Economist (1993, pp. 14-15), which states:

> ... change is not unique to the computer industry. But its pace, and the fact that it is happening in so many areas at once, may be. So to succeed succeed, or even to survive, computer firms now have to put an inordinate amount of effort into ... watching other firms ... [and] monitoring technology.

Firms must keep a close eye on the actions of others, even those with whom they have no formal alliance or do not compete. Most firms depend upon those in other layers of the industry to succeed. If a firm stumbles in one layer it can deal a mortal blow to firms in other layers.

4. My description of the Observation-Orientation-Decision-Action cycle

and its origins is based on the discussion found in Denny Smith (1985).

5. Non-cooperative games are strategic games, so too are cooperative games. Among the most important of these are divisible prisoner's dilemma games. Collusion on the part of potential competitors to divide markets or fix prices illustrates many of the fundamental characteristics of this game and its solution. So too does the so-called principal-agent problem, which is at the heart of most complex contracting relationships, including that of employer-employee.

6. This is the domain of techniques such as Total Quality Management or the Juran circle.

7. This is not to say that attacking an entrenched product is impossible. Business competition has its analogies to blitzkrieg, in which fast-moving, fast-thinking forces isolate and destroy a stationary opponent. For example, where product competition is dominated by technological advances, by anticipating future developments a fast-moving, fast-thinking firm can surround the dominant product with an impenetrable patent barrier and leave it to wither and die. Obviously, however, the secret of success in such an attack lies in moving much faster than the defender, which requires either an exceptionally complacent opponent, deception that prevents the defender from observing or understanding the attacker's moves (Boyd explains that sending ambiguous or deliberately misleading signals increases the friction faced by your opponent and thereby slows his ability to cycle through the OODA loop), or a significant OODA advantage in the part of the attacker (see Porter, 1980, pp. 95-98; see, however, Fudenburg and Tirole, 1986).

8.The firm is a stock concept &endash; a precisely dimensioned reality at an identifiable point in time. Accountants usually define costs as flows; costs reflect changes in stocks over a fixed temporal interval. In this instance, however, we can avoid combining apples and oranges by adopting Armen Alchian's definition of cost (1959: 23) as:

> ... the change in equity caused by the performance of some specified operation, where ___¨simplicity of exposition, the

> attendant change in income is not included in the computation of equity. ...Because of logical difficulties in converting this present value concept into a satisfactory rate (per unit of time) concept ... we measure costs in units of present value or equity. Hereafter, the unmodified expression "costs" will always mean the present worth, capital value concept of cost.

Alchian proposes (p. 35) that "as the total quantity of units produced increases, the cost of future output declines ... [because production] knowledge increases a result of production .... [This] proposition is known as the 'learning' or 'progress' curve."

9. The analysis presented in this section is based on the discussion of dominant firm behavior found in Carlton and Perloff (1990, pp. 180-202). Information about the personal computer business is from The Economist (1993, p. 6).

10. Alchian (1959)

11. Game theorists often identify the aggressive pricing tactics I have outlined here with a game called "chicken." In chicken two drivers (usually young males) hurl their cars at each other at high speed; the first one to swerve out of the way of the other is the loser or chicken. Game theorists tend to see chicken as a game of threat and counterthreat, bluff and counterbluff, and the emphasize the role that reputation plays in determining a winner.

This analysis can be illustrated by the following homey example. A small business, a dry cleaning establishment lets say, has a local monopoly that generates a net cash flow of $40 thousand per annum over and above the wage the owner could earn in alternative employment and the normal return on her investment. Let us say further that, $20 thousand is due to cost advantages deriving from business experience and customer goodwill and that the other $20 thousand is due to monopoly profit. Finally, let us say that competition would reduce the incumbent's monopoly profit to one thousand dollars and, owing to lost sales, its competitive advantage, to $11 thousand,thereby driving its net cash flow to $12 thousand.

Under these conditions, we can also assume that its new competitor would share in the locational duopoly and generate positive cash flows, over and above normal returns, of one thousand dollars, which would be sufficient to invite entry.

At a discount rate of five percent (a reasonable real rate given the kind of risk involved), it could be worth up to $160 thousand dollars to the incumbent to defend its territory against interlopers (even if the incumbent's locational monopoly were eroding at a rate of five percent a year, protecting, it would still be worth $80 thousand). This means that the incumbent has an interest in dropping its prices below the competitive level whenever its monopoly is threatened. It must, of course, do so before the threat materializes. Otherwise the incumbent will likely involve itself in a protracted price war, which will be damaging in and of itself and which it very well might not win. On the other hand, if the incumbent can convince both its potential competitors and its customers that it will beat the prices of any competitor, it may never be put to the test. Its reputation will be sufficient to deter potential competitors.

How could a small dry-cleaning firm in a single market acquire such a reputation? Frankly, it probably cannot. Potential competitors might be scared off by information about the incumbent firm's stake in its locational monopoly, but publicizing a locational monopoly's value would invite extortionist threats. Besides, even if potential competitors were aware of the incumbent firm's stake in its locational monopoly, they might nevertheless attack if the incumbent firm's customers were dissatisfied or unaware of its commitment to meet or beat competitor's prices. It has taken the largest retailer in America, Walmart, twenty years of consistent price leadership and price cutting to establish such a reputation with both competitors and customers. See Carlton and Perloff (1990, pp. 410-419).

12. Centralized organizations treat people like machines. But as we have seen machines are rarely a source of competitive advantage, since the material inputs used by firms in a competitive industry, the equipment and technology, the functional skills and organizational designs that are available to one tend to be equally available to all.

People are a source of competitive advantage only where they contribute their intelligence and initiative to the organization. i.e., where they are treated like people.

13. See cost.

14. Equations (3) and (4) in cost.

15. It has also been alleged that GM made a fundamental error of observation not shared by Ford or Chrysler. GM continued to view its domestic rivals as its chief competitors; Ford and Chrysler more quickly recognized that they were participants in a worldwide market and that the benchmark competitors in the auto business were Toyota and Honda, not GM.

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