
Discovery-Driven Planning

by Rita Gunther McGrath and Ian C. MacMillan



Harvard Business Review

Reprint 95406

Harvard Business Review



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Harvard Business Review

JULY-AUGUST 1995

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ADAM M. BRANDENBURGER AND BARRY J. NALEBUFF	THE RIGHT GAME: USE GAME THEORY TO SHAPE STRATEGY	95402
DAVID M. UPTON	WHAT REALLY MAKES FACTORIES FLEXIBLE?	95410
REGIS McKENNA	REAL-TIME MARKETING	95407
GORDON DONALDSON	A NEW TOOL FOR BOARDS: THE STRATEGIC AUDIT	95404
HAROLD J. LEAVITT AND JEAN LIPMAN-BLUMEN	HOT GROUPS	95405
DAVID J. COLLIS AND CYNTHIA A. MONTGOMERY	COMPETING ON RESOURCES: STRATEGY IN THE 1990s	95403
GORDON ADLER	HBR CASE STUDY THE CASE OF THE FLOUNDERING EXPATRIATE	95401
RITA GUNTHER McGRATH AND IAN C. MacMILLAN	MANAGER'S TOOL KIT DISCOVERY-DRIVEN PLANNING	95406
JOSEPH A. NESS AND THOMAS G. CUCUZZA	IDEAS AT WORK TAPPING THE FULL POTENTIAL OF ABC	95408
HOWARD H. STEVENSON AND MIHNEA C. MOLDOVEANU	THINKING ABOUT... THE POWER OF PREDICTABILITY	95409

New ventures require a new way to plan.

DISCOVERY-DRIVEN Planning

by Rita Gunther McGrath and Ian C. MacMillan

Business lore is full of stories about smart companies that incur huge losses when they enter unknown territory—new alliances, new markets, new products, new technologies. The Walt Disney Company's 1992 foray into Europe with its theme park had accumulated losses of more than \$1 billion by 1994. Zapmail, a fax product, cost Federal Express Corporation \$600 million before it was dropped. Polaroid lost \$200 million when it ventured into instant movies. Why do such efforts often defeat even experienced, smart companies? One obvious answer is that strategic ventures are inherent-

difference between planning for a new venture and planning for a more conventional line of business. Conventional planning operates on the premise that managers can extrapolate future results from a well-understood and predictable platform of past experience. One expects predictions to be accurate because they are based on solid knowledge rather than on assumptions. In platform-based planning, a venture's deviations from plan are a bad thing.

The platform-based approach may make sense for ongoing businesses, but it is sheer folly when applied to new ventures. By definition, new ventures call for a company to envision what is unknown, uncertain, and not yet obvious to the competition. The safe, reliable, predictable knowledge of the well-understood business has not yet emerged. Instead, managers must make do with

assumptions about the possible futures on which new businesses are based. New ventures are undertaken with a high ratio of assumption to knowledge. With ongoing businesses, one expects the ratio to be the exact opposite. Because assumptions about the unknown generally turn out to be wrong, new ventures in-

evitably experience deviations—often huge ones—from their original planned targets. Indeed, new ventures frequently require fundamental redirection.

Rather than trying to force startups into the planning methodologies for existing predictable and well-understood businesses, discovery-driven planning acknowledges that at the start of a new venture, little is known and much is assumed. When platform-based planning is used, assumptions underlying a plan are treated as facts—givens to be baked into the plan—rather than as best-guess estimates to be tested and questioned. Companies then forge ahead on the basis of those buried assumptions. In contrast, discovery-driven planning systematically converts assumptions into knowledge as a strategic venture unfolds. When new data are uncovered, they are incorporated into the evolving plan.

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Discovery-driven planning recognizes that planning for a new venture involves envisioning the unknown.

ly risky: The probability of failure simply comes with the territory. But many failures could be prevented or their cost contained if senior managers approached innovative ventures with the right planning and control tools.

Discovery-driven planning is a practical tool that acknowledges the

The real potential of the venture is discovered as it develops—hence the term discovery-driven planning. The approach imposes disciplines different from, but no less precise than, the disciplines used in conventional planning.

Euro Disney and the Platform-Based Approach

Even the best companies can run into serious trouble if they don't recognize the assumptions buried in their plans. The Walt Disney Company, a 49% owner of Euro Disney (now called Disneyland Paris), is known as an astute manager of theme parks. Its success has not been confined to the United States: Tokyo Disneyland has been a financial and public relations success almost from its opening in 1983. Euro Disney is another story, however. By 1993, attendance approached 1 million visitors each month, making the park Europe's most popular paid tourist destination. Then why did it lose so much money?

In planning Euro Disney in 1986, Disney made projections that drew on its experience from its other parks. The company expected half of the revenue to come from admissions, the other half from hotels, food, and merchandise. Although by 1993, Euro Disney had succeeded in reaching its target of 11 million admissions, to do so it had been forced to drop adult ticket prices drastically. The average spending per visit was far below plan and added to the red ink.

The point is not to play Monday-morning quarterback with Disney's experience but to demonstrate an approach that could have revealed flawed assumptions and mitigated the resulting losses. The discipline of systematically identifying key assumptions would have highlighted the business plan's vulnerabilities. Let us look at each source of revenue in turn.

Admissions Price. In Japan and the United States, Disney found its price by raising it over time, letting early

visitors go back home and talk up the park to their neighbors. But the planners of Euro Disney assumed that they could hit their target number of visitors even if they started out with an admission price of more than \$40 per adult. A major recession in Europe and the determination of the French government to keep the franc strong exacerbated the problem and led to low attendance. Although companies cannot control macroeconomic events, they can highlight and test their pricing assumptions. Euro Disney's prices were very high compared with those of other theme attractions in Europe, such as the aqua palaces, which charged low entry fees and allowed visitors to build their own menus by paying for each attraction individually. By 1993, Euro Disney not only had been forced to make a sharp price reduction to secure its target visitors, it had also lost the benefits of early-stage word of mouth. The talking-up phenomenon is especially important in Europe, as

Some Dangerous Implicit Assumptions

1. Customers will buy our product because we think it's a good product.
2. Customers will buy our product because it's technically superior.
3. Customers will agree with our perception that the product is "great."
4. Customers run no risk in buying from us instead of continuing to buy from their past suppliers.
5. The product will sell itself.
6. Distributors are desperate to stock and service the product.
7. We can develop the product on time and on budget.
8. We will have no trouble attracting the right staff.
9. Competitors will respond rationally.
10. We can insulate our product from competition.
11. We will be able to hold down prices while gaining share rapidly.
12. The rest of our company will gladly support our strategy and provide help as needed.

Disney could have gauged from the way word of mouth had benefited Club Med.

Hotel Accommodations. Based on its experience in other markets, Disney assumed that people would stay an average of four days in the park's five hotels. The average stay in 1993 was only two days. Had the assumption been highlighted, it might have been challenged: Since Euro Disney opened with only 15 rides, compared with 45 at Disney World, people could do them all in a single day.

Food. Park visitors in the United States and Japan "graze" all day. At Euro Disney, the buried assumption was that Europeans would do the same. Euro Disney's restaurants, therefore, were designed for all-day streams of grazers. When floods of visitors tried to follow the European

repeatedly observed that the following four planning errors are characteristic of this approach:

□ *Companies don't have hard data but, once a few key decisions are made, proceed as though their assumptions were facts.* Euro Disney's implicit assumptions regarding the way visitors would use hotels and restaurants are good examples.

□ *Companies have all the hard data they need to check assumptions but fail to see the implications.* After making assumptions based on a subset of the available data, they proceed without ever testing those assumptions. Federal Express based Zapmail on the assumption that there would be a substantial demand for four-hour delivery of documents faxed from FedEx center to FedEx center. What went unchal-

lenged was the implicit assumption that customers would not be able to afford their own fax machines before long. If that assumption had been unearthed, FedEx would have been more likely to

take into account the plunging prices and increasing sales of fax machines for the office and, later, for the home.

□ *Companies possess all the data necessary to determine that a real opportunity exists but make implicit and inappropriate assumptions about their ability to implement their plan.* Exxon lost \$200 million on its office automation business by implicitly assuming that it could build a direct sales and service

support capability to compete head-to-head with IBM and Xerox.

□ *Companies start off with the right data, but they implicitly assume a static environment and thus fail to notice until too late that a key variable has changed.* Polaroid lost \$200 million from Polavision instant movies by assuming that a three minute cassette costing \$7 would compete effectively against a half-hour videotape costing \$20. Polaroid implicitly assumed that the high

cost of equipment for videotaping and playback would remain prohibitive for most consumers. Meanwhile, companies pursuing those technologies steadily drove down costs. (See the exhibit "Some Dangerous Implicit Assumptions.")

Discovery-Driven Planning: An Illustrative Case

Discovery-driven planning offers a systematic way to uncover the dangerous implicit assumptions that would otherwise slip unnoticed and thus unchallenged into the plan. The process imposes a strict discipline that is captured in four related documents: a *reverse income statement*, which models the basic economics of the business; *pro forma operations specs*, which lay out the operations needed to run the business; a *key assumptions checklist*, which is used to ensure that assumptions are checked; and a *milestone planning chart*, which specifies the assumptions to be tested at each project milestone. As the venture unfolds and new data are uncovered, each of the documents is updated.

To demonstrate how this tool works, we will apply it retrospectively to Kao Corporation's highly successful entry into the floppy disk business in 1988. We deliberately draw on no inside information about Kao or its planning process but in-

Euro Disney assumed that Europeans would "graze" all day, like visitors to other Disney parks.

stead use the kind of limited public knowledge that often is all that any company would have at the start of a new venture.

The Company. Japan's Kao Corporation was a successful supplier of surfactants to the magnetic-media (floppy disk) industry. In 1981, the company began to study the potential for becoming a player in floppy disks by leveraging the surfactant technology it had developed in its core businesses, soap and cosmetics.

Companies can learn to spot when they're making unconscious assumptions.

custom of dining at noon, Disney was unable to seat them. Angry visitors left the park to eat, and they conveyed their anger to their friends and neighbors back home.

Merchandise. Although Disney did forecast lower sales per visitor in Europe than in the United States and Japan, the company assumed that Europeans would buy a similar mix of cloth goods and print items. Instead, Euro Disney fell short of plan when visitors bought a far smaller proportion of high-margin items such as T-shirts and hats than expected. Disney could have tested the buried assumption before forecasting sales: Disney's retail stores in European cities sell many fewer of the high-margin cloth items and far more of the low-margin print items.

Disney is not alone. Other companies have paid a significant price for pursuing platform-based ventures built on implicit assumptions that turn out to be faulty. Such ventures are usually undertaken without careful up-front identification and validation of those assumptions, which often are unconscious. We have

Kao's managers realized that they had learned enough process knowledge from their floppy disk customers to supplement their own skills in surface chemistry. They believed they could produce floppy disks at a much lower cost and higher quality than other companies offered at that time. Kao's surfactant competencies were particularly valuable because the quality of the floppy disk's surface is crucial for its reliability. For a company in a mature industry, the opportunity to move current product into a growth industry was highly attractive.

The Market. By the end of 1986, the demand for floppy disks was 500 million in the United States, 100 million in Europe, and 50 million in Japan, with growth estimated at 40% per year, compounded. This meant that by 1993, the global market would be approaching 3 billion disks, of which about a third would be in the original equipment manufacturer (OEM) market, namely such big-volume purchasers of disks as IBM, Apple, and Microsoft, which use disks to distribute their software. OEM industry prices were expected to be about 180 yen per disk by 1993. Quality and reliability have always been important product characteristics for OEMs such as software houses because defective disks have a devastating impact on customers' perceptions of the company's overall quality.

The Reverse Income Statement. Discovery-driven planning starts with the bottom line. For Kao, back when it began to consider its options, the question was whether the floppy disk venture had the potential to enhance the company's competitive position and financial performance significantly. If not, why should Kao incur the risk and uncertainty of a major strategic venture?

Here, we impose the first discipline, which is to plan the venture using a reverse income statement, which runs from the bottom line up. (See the exhibit "First, Start with a Reverse Income Statement.") Instead of starting with estimates of revenues and working down the income statement to derive profits, we start with *required profits*. We then

work our way up the profit and loss to determine how much revenue it will take to deliver the level of profits we require and how much cost can be allowed. The underlying philosophy is to impose revenue and cost disciplines by baking profitability into the plan at the outset: Required profits equal necessary revenues minus allowable costs.

At Kao in 1988, management might have started with these figures: net sales, about 500 billion yen; income before taxes, about 40 billion yen; and return on sales (ROS), 7.5%. Given such figures, how big must the floppy disk opportunity be to justify Kao's attention? Every company will set its own hurdles. We believe that a strategic venture should have the potential to enhance total profits by at least 10%. Moreover, to compensate for the increased risk, it should deliver greater profitability than reinvesting in the existing businesses would. Again, for purposes of illustration, assume that Kao demands a risk premium of 33% greater profitability. Since Kao's return on sales is 7.5%, it will require 10%.

If we use the Kao data, we find that the required profit for the floppy disk venture would be 4 billion yen (10% \times 40 billion). To deliver 4 billion yen in profit with a 10% return on sales implies a business with 40 billion yen in sales.

Assuming that, despite its superior quality, Kao will have to price competitively to gain share as a new entrant, it should set a target price of 160 yen per disk. That translates into unit sales of 250 million disks (40 billion yen in sales divided by 160 yen per disk). By imposing these simple performance measures at the start (1988), we quickly establish both the scale and scope of the venture: Kao would need to capture 25% of the total world OEM market (25% of 1 billion disks) by 1993. Given what is known about the size of the market, Kao clearly must be prepared to compete globally from the outset, making major commit-

ments not only to manufacturing but also to selling.

Continuing up the profit and loss, we next calculate allowable costs: If Kao is to capture 10% margin on a price of 160 yen per disk, the total cost to manufacture, sell, and distribute the disks worldwide cannot exceed 144 yen per disk. The reverse income statement makes clear immediately that the challenge for the floppy disk venture will be to keep a lid on expenses.

The Pro Forma Operations Specs and the Assumptions Checklist. The second discipline in the process is to construct pro forma operations specs laying out the activities required to produce, sell, service, and deliver the product or service to the

Retrospectively applying discovery-driven planning to Kao's successful 1988 floppy disk venture shows how the tool can work.

customer. Together, those activities comprise the venture's allowable costs. At first, the operations specs can be modeled on a simple spreadsheet without investing in more than a few telephone calls or on-line searches to get basic data. If an idea holds together, it is possible to identify and test underlying assumptions, constantly fleshing out and correcting the model in light of new information. When a company uses this cumulative approach, major flaws in the business concept soon become obvious, and poor concepts can be abandoned long before significant investments are made.

We believe it is essential to use industry standards for building a realistic picture of what the business has to look like to be competitive. Every industry has its own pressures – which determine normal rates of return in that industry – as well as standard performance measures such as asset-to-sales ratios, industry profit margins, plant utilization, and so on. In a globally competitive environment, no sane

First, Start with a Reverse Income Statement

Total Figures

Required profits to add 10% to total profits = 4 billion yen
 Necessary revenues to deliver 10% sales margin = 40 billion yen
 Allowable costs to deliver 10% sales margin = 36 billion yen

Per Unit Figures

Required unit sales at 160 yen per unit = 250 million units
 Necessary percentage of world market share of OEM unit sales = 25%
 Allowable costs per unit for 10% sales margin = 144 yen

The goal here is to determine the value of success quickly. If the venture can't deliver significant returns, it may not be worth the risk.

Second, Lay Out All the Activities Needed to Run the Venture

Pro Forma Operations Specs

1. Sales

Required disk sales = 250 million disks
 Average order size (Assumption 8) = 10,000 disks
 Orders required (250 million/10,000) = 25,000

Number of calls to make a sale (Assumption 9) = 4
 Sales calls required (4 x 25,000) = 100,000 per year

Calls per day per salesperson (Assumption 10) = 2
 Annual salesperson days (100,000/2) = 50,000
 Sales force for 250 days per year (Assumption 11)
 50,000 salesperson days/250 = 200 people

Salary per salesperson = 10 million yen (Assumption 12)
 Total sales-force salary cost (10 million yen x 200) = 2 billion yen

2. Manufacturing

Quality specification of disk surface: 50% fewer flaws than best competitor (Assumption 15)

Annual production capacity per line = 25 per minute
 x 1440 minutes per day x 348 days (Assumption 16)
 = 12.5 million disks

Production lines needed (250 million disks/12.5 million disks per line) = 20 lines

Production staffing (30 per line [Assumption 17]
 x 20 lines) = 600 workers

Salary per worker = 5 million yen (Assumption 18)
 Total production salaries (600 x 5 million yen) = 3 billion yen

Materials costs per disk = 20 yen (Assumption 19)
 Total materials cost (20 x 250 million disks) = 5 billion yen

Packaging per 10 disks = 40 yen (Assumption 20)
 Total packaging costs (40 x 25 million packages) = 1 billion yen

3. Shipping

Containers needed per order of 10,000 disks = 1 (Assumption 13)

Shipping cost per container = 100,000 yen (Assumption 14)

Total shipping costs (25,000 orders x 100,000 yen) = 2.5 billion yen

4. Equipment and Depreciation

Fixed asset investment to sales = 1:1 (Assumption 5)
 = 40 billion yen

Equipment life = 3 years (Assumption 7)

Annual depreciation (40 billion yen/3 years) = 13.3 billion yen

Keeping a checklist is an important discipline to ensure that each assumption is flagged and tested as a venture unfolds.

Now, with better data, one can see if the entire business proposition hangs together.

Third, Track All Assumptions

Assumption	Measurement
1. Profit margin	10% of sales
2. Revenues	40 billion yen
3. Unit selling price	160 yen
4. 1993 world OEM market	1 billion disks
5. Fixed asset investment to sales	1:1
6. Effective production capacity per line	25 disks per minute
7. Effective life of equipment	3 years
8. Average OEM order size	10,000 disks
9. Sales calls per OEM order	4 calls per order
10. Sales calls per salesperson per day	2 calls per day
11. Selling days per year	250 days
12. Annual salesperson's salary	10 million yen
13. Containers required per order	1 container
14. Shipping cost per container	100,000 yen
15. Quality level needed to get customers to switch: % fewer flaws per disk than top competitor	50%
16. Production days per year	348 days
17. Workers per production line per day (10 per line for 3 shifts)	30 per line
18. Annual manufacturing worker's salary	5 million yen
19. Materials costs per disk	20 yen
20. Packaging costs per 10 disks	40 yen
21. Allowable administration costs (See revised reverse income statement, below)	9.2 billion yen

Fourth, Revise the Reverse Income Statement

Required margin	10% return on sales
Required profit	4 billion yen
Necessary revenues	40 billion yen
Allowable costs	36 billion yen
Sales-force salaries	2.0 billion yen
Manufacturing salaries	3.0 billion yen
Disk materials	5.0 billion yen
Packaging	1.0 billion yen
Shipping	2.5 billion yen
Depreciation	13.3 billion yen
Allowable administration and overhead costs	9.2 billion yen (Assumption 21)
Per-unit figures	
Selling price	160 yen
Total costs	144 yen
Disk materials costs	20 yen



Continued

Finally, Plan to Test Assumptions at Milestones

Milestone event—namely, the completion of:

1. Initial data search and preliminary feasibility analysis
2. Prototype batches produced
3. Technical testing by customers
4. Subcontracted production
5. Sales of subcontracted production
6. Purchase of an existing plant
7. Pilot production at purchased plant
8. Competitor reaction
9. Product redesign
10. Major repricing analysis
11. Plant redesign

Assumptions to be tested

- 4: 1993 world OEM market
- 8: Average OEM order size
- 9: Sales calls per OEM order
- 10: Sales calls per salesperson per day
- 11: Salespeople needed for 250 selling days per year
- 12: Annual salesperson's salary
- 13: Containers required per order
- 14: Shipping cost per container
- 16: Production days per year
- 18: Annual manufacturing worker's salary
- 15: Quality to get customers to switch
- 19: Materials costs per disk
- 3: Unit selling price
- 15: Quality to get customers to switch
- 19: Materials costs per disk
- 1: Profit margin
- 2: Revenues
- 3: Unit selling price
- 8: Average OEM order size
- 9: Sales calls per OEM order
- 10: Sales calls per salesperson per day
- 12: Annual salesperson's salary
- 15: Quality to get customers to switch
- 5: Fixed asset investment to sales
- 7: Effective life of equipment
- 6: Effective production capacity per line
- 16: Production days per year
- 17: Workers per production line per day
- 18: Annual manufacturing worker's salary
- 19: Materials costs per disk
- 20: Packaging costs per 10 disks
- 1: Profit margin
- 2: Revenues
- 3: Unit selling price
- 19: Materials costs per disk
- 20: Packaging costs per 10 disks
- 1: Profit margin
- 2: Revenues
- 3: Unit selling price
- 4: 1993 world OEM market
- 5: Fixed asset investment to sales
- 6: Effective production capacity per line
- 19: Materials costs per disk

manager should expect to escape the competitive discipline that is captured and measured in industry standards. These standards are readily available from investment analysts and business information services. In countries with information sources that are less well developed than those in the United States, key industry parameters are still used by investment bankers and, more specifically, by those commercial bankers who specialize in loans to the particular industry. For those getting into a new industry, the best approach is to adapt standards from similar industries.

Note that we do not begin with an elaborate analysis of product or service attributes or an in-depth market study. That comes later. Initially, we are simply trying to capture the venture's embedded assumptions. The basic discipline is to spell out clearly and realistically where the venture will have to match existing industry standards and in what one or two places managers expect to excel and how they expect to do so.

Kao's managers in 1988 might have considered performance standards for the floppy disk industry. Because there would be no reason to believe that Kao could use standard production equipment any better than established competitors could, it would want to plan to match industry performance on measures re-

lating to equipment use. Kao would ascertain, for example, that the effective production capacity per line was 25 disks per minute in the industry; and the effective life of production equipment was three years. Kao's advantage was in surface chemistry and surface physics, which could improve quality and reduce the cost of materials, thus improving margins. When Kao planned

its materials cost, it would want to turn that advantage into a specific challenge for manufacturing: Beat the industry standard for materials cost by 25%. The formal framing of operational challenges is an important step in discovery-driven planning. In our experience, people who are good in design and operations can be galvanized by clearly articulated challenges. That was the case at Canon, for example, when Keizo Yamaji challenged the engineers to develop a personal copier that required minimal service and cost less than \$1,000, and the Canon engineers rose to the occasion.

A company can test the initial assumptions against experience with similar situations, the advice of experts in the industry, or published information sources. The point is not to demand the highest degree of accuracy but to build a reasonable model of the economics and logistics of the venture and to assess the order of magnitude of the challenges. Later, the company can analyze where the plan is most sensitive to wrong assumptions and do more formal checks. Consultants to the industry—bankers, suppliers, potential customers, and distributors—often can provide low-cost and surprisingly accurate information.

The company must build a picture of the activities that are needed to carry out the business and the costs. Hence in the pro forma operations specs, we ask how many orders are needed to deliver 250 million units in sales; then how many sales calls it will take to secure those orders; then how many salespeople it will take to make the sales calls, given the fact that

they are selling to a global OEM market; then how much it will cost in sales-force compensation. (See the exhibit "Second, Lay Out All the Activities Needed to Run the Venture.") Each assumption can be checked, at first somewhat roughly and then with increasing precision. Readers might disagree with our first-cut estimates. That is fine—so might Kao Corporation. Reasonable

disagreement triggers discussion and, perhaps, adjustments to the spreadsheet. The evolving document is doing its job if it becomes the catalyst for such discussion.

The third discipline of discovery-driven planning is to compile an assumption checklist to ensure that each assumption is flagged, discussed, and checked as the venture unfolds. (See the exhibit "Third, Track All Assumptions.")

The entire process is looped back into a revised reverse income statement, in which one can see if the entire business proposition hangs together. (See the exhibit, "Fourth, Revise the Reverse Income Statement.") If it doesn't, the process must be repeated until the performance requirements and industry standards can be met; otherwise, the venture should be scrapped.

Milestone Planning. Conventional planning approaches tend to focus managers on meeting plan, usually an impossible goal for a venture rife with assumptions. It is also counterproductive—insistence on meeting plan actually prevents learning. Managers can formally plan to learn by using milestone events to test assumptions.

Milestone planning is by now a familiar technique for monitoring the progress of new ventures. The basic idea, as described by Zenas Block and Ian C. MacMillan in the book *Corporate Venturing* (Harvard Business School Press, 1993), is to postpone major commitments of resources until the evidence from the previous milestone event signals that the risk of taking the next step is justified. What we are proposing here is an expanded use of the tool to support the discipline of transforming assumptions into knowledge.

Going back to what Kao might have been thinking in 1988, recall that the floppy disk venture would require a 40-billion-yen investment in fixed assets alone. Before investing such a large sum, Kao would certainly have wanted to find ways to test the most critical assumptions underlying the three major challenges of the venture:

- capturing 25% global market share with a 20-yen-per-disk discount and superior quality;

Unearthing implicit assumptions permits a company to test their validity before committing irreversibly to a venture.

- maintaining at least the same asset productivity as the average competitor and producing a floppy disk at 90% of the estimated total costs of existing competitors; and
- using superior raw materials and applied surface technology to produce superior-quality disks for 20 yen per unit instead of the industry standard of 27 yen per unit.

For serious challenges like those, it may be worth spending resources to create specific milestone events to test the assumptions before launching a 40-billion-yen venture. For instance, Kao might subcontract prototype production so that sophisticated OEM customers could conduct technical tests on the proposed disk. If the prototypes survive the tests, then, rather than rest on the assumption that it can capture significant business at the target price, Kao might subcontract production of a large batch of floppy disks for resale to customers. It could thus test the appetite of the OEM market for price discounting from a newcomer.

Similarly, for testing its ability to cope with the second and third chal-

lenges once the Kao prototype has been developed, it might be worthwhile to buy out a small existing floppy disk manufacturer and apply the technology in an established plant rather than try to start up a greenfield operation. Once Kao can demonstrate its ability to produce disks at the required quality and cost in the small plant, it can move ahead with its own full-scale plants.

Deliberate assumption-testing milestones are depicted in the exhibit "Finally, Plan to Test Assumptions at Milestones," which also shows some of the other typical milestones that occur in most major ventures. The assumptions that should be tested at each milestone are listed with appropriate numbers from the assumption checklist.

In practice, it is wise to designate a *keeper of the assumptions*—someone whose formal task is to ensure that assumptions are checked and updated as each milestone is reached and that the revised assumptions are incorporated into successive iterations of the four discovery-driven

planning documents. Without a specific person dedicated to following up, it is highly unlikely that individuals, up to their armpits in project pressures, will be able to coordinate the updating independently.

Discovery-driven planning is a powerful tool for any significant strategic undertaking that is fraught with uncertainty—new-product or market ventures, technology development, joint ventures, strategic alliances, even major systems redevelopment. Unlike platform-based planning, in which much is known, discovery-driven planning forces managers to articulate what they don't know, and it forces a discipline for learning. As a planning tool, it thus raises the visibility of the make-or-break uncertainties common to new ventures and helps managers address them at the lowest possible cost.

The authors wish to thank Shiuchi Matsuda of Waseda University's Entrepreneurial Research Unit for providing case material on Kao's floppy disk venture.

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