

Core-Technology-Based Management: The Next Japanese Challenge

Atsuro Kokubo

Intensifying competition – driven in part by the worldwide economic slowdown – is forcing Japanese companies to abandon their „copycat“ or „me-too“ strategies and adopt new Western-style strategies based on proprietary technologies. In the past, Japanese competitive advantage arose from superb interdepartmental cooperation, which allowed Japanese firms to continuously reduce manufacturing costs and improve business processes from R&D to production. Today, however, Japanese companies recognize that to survive in increasingly competitive markets they need more powerful measures. Japanese managers now generally agree that the winners in global competition will be those companies that exploit technology to maintain an edge in product innovation and product quality, an advantage in productivity, and the ability to respond quickly to market needs.

To achieve these goals, Japanese firms are adopting a new approach: core-technology-based management. Leading Japanese companies are busy identifying their core technologies and then exploiting them for product differentiation. For example, in the food industry, which has tended to be conservative in its use of new technology, advertising and promotion costs have risen to suicidally high levels. Japanese food companies now realize that product differentiation based on appropriate technology, rather than advertising, is essential for survival. For example, Nichirei's texture-improved frozen fried chicken has achieved a leading market share without much advertisement. Competitors failed to identify the potential impact of the texture-improvement technology in time to prevent loss of market share. Similarly, Ajinomoto developed a machine that arranges tiny shrimp beautifully on packaged frozen Chinese food, enabling the company to sell the attractive product at a low price. It quickly gained major market share and established a national brand.

Companies that succeed in fully exploiting their own technologies for competitive advantage will be in a position to lead promising high-tech industries, dominate already established markets, or create new markets. Conversely, companies that fail to exploit their technologies appropriately can find themselves in serious competitive difficulty. Matsushita Graphic Communication Systems, a leading manufacturer of fax equipment, which had long enjoyed the number-one market position in Japan thanks to its reputation among professional users for superior communication technologies, recently suffered dramatic erosion of market share. The fax market had been shifting from professional to home-based users, including consumers. As a result, user-friendly design at a competitive price had become a key success factor. Although Matsushita Graphic Communication Systems is an affiliate of Matsushita Electric Industrial, the consumer electronics giant, which has excellent technologies in these areas, these competitive technologies were never transferred to the affiliate. Meanwhile, Kyushu Matsushita Electric, another affiliate, identified the appropriate technologies, started to manufacture fax equipment, and immediately gained a reasonable market share. The formerly leading firm smashed its own golden egg through poor technology management.

Identifying Core Technologies

Many Japanese companies have nurtured too many technologies for too long. Now, Japanese management has to take the lead in defining which among a firm's proprietary technologies are „superior,“ i.e., which are the core technologies that merit major development efforts. Assuming this leadership responsibility presents a major challenge for Japanese managers, who are unaccustomed to top-down decision-making, with the exceptions of a few highly charismatic leaders, such as the late Soichiro Honda of Honda Motor and Kazuo Inamori of Kyocera.

Recognizing this difficulty, most large companies in Japan have formulated „2000 Vision“ projects, designed to identify core business areas defined by core technologies, core customers, and core functions of products. These projects have met with varying degrees of success. Some definitions have been far too vague, while others have been wildly overambitious. Furthermore, few firms have any effective methodologies for converting their visions into reality.

Even where they have been less than successful, however, 2000 Vision projects have spread and reinforced the realization that core technologies cannot be defined independently, but must be understood in the context of current and potential markets. Toward that end, successful Japanese R&D programs have grown increasingly market-driven. Significantly, the proprietary technologies they focus on are not necessarily high-tech. Often, companies achieve superior product innovation by combining existing proprietary technologies and functions in new ways. For example, the mature bath product market was suddenly rejuvenated when Kao, a leading manufacturer of household products such as soap, shampoo, cosmetics, detergents, and paper diapers, introduced a new type of bathtub product that generates minute bubbles of carbon dioxide gas, providing a healthy, stimulating warmth. Kao combined formulation technology with its core skin care technology to create a winning product.

Like markets, core technologies shift over time. Copier manufacturers are wondering which of their various proprietary technologies to select as core (Exhibit 1). The choice they make will both anticipate and help drive the evolution of the copier business from fine printing machines to complex office products. For the former product, the key technology is the chemistry of photosensitive and toner materials; for the latter, it is the software to link various kinds of office equipment.

Managing Core Technologies

A company may choose to focus on only a few core technologies or on many of them. NEC, for example, has identified 30, while Canon has selected 21. The challenge in managing this array of development efforts is to balance the strategic benefits of companywide control of R&D with the local benefits of business unit control. In the past, when Japan's GDP was growing rapidly and cash flow was abundant, executives of Japanese companies emphasized growth through entrepreneurial venturing. To foster the venture spirit, they put most R&D activities (except long-range research) under the control of business units rather than under central control. Now, however, management has discovered the disadvantages of such business unit control: because of organizational „walls“ between units, core technologies are not well communicated, shared, or exploited.

Exhibit 1

Copier Components and Core Technologies

<i>Components</i>	<i>Core Technology Areas</i>
Photosensitive materials	Specialty chemicals
Aluminium die-cast drum	Precision metal parts
Photo-drum	Coating
Optical parts	Optics products
Engine	Xerography
Paper handling	Precision machine
Electronic circuit	Electronics equipment
Microcomputer	Semiconductor
Design of operation	Software
Equipment	Assembly mass production
Carrier	Ceramics
Binder	Resin
Toner	Plastic compound

The solution is to increase the flow of information among business units – in effect, to breach the organizational walls – by creating a companywide committee for each core technology. Such core technology committees change the organization from a pyramidal bureaucracy (Exhibit 2) to a network of professionals without redundant staff activities (Exhibit 3).

Although few Japanese companies have introduced core technology committees, many are planning to do so. Such committees permit people in many parts of the company, from research to marketing, to easily identify information relevant to the core areas and deliver it to the appropriate persons, dramatically enhancing R&D.

Under the core technology committee approach, human resources in R&D remain under corporate control companywide, while each core technology committee has a number of functions:

- It formulates a plan for long-range R&D, including basic research.
- It proposes infrastructure improvements and communications activities to facilitate R&D, including competitive intelligence, technology forecasts, exhibitions, and conferences.
- It conducts training for researchers and engineers.
- It focuses on core business areas in which the core technology is employed to gain competitive advantage. The committee asks representatives of core business areas, business managers, or product-concept creators to join it in its work in this area.

Exhibit 2

Technology Information Flow in the Old Structure

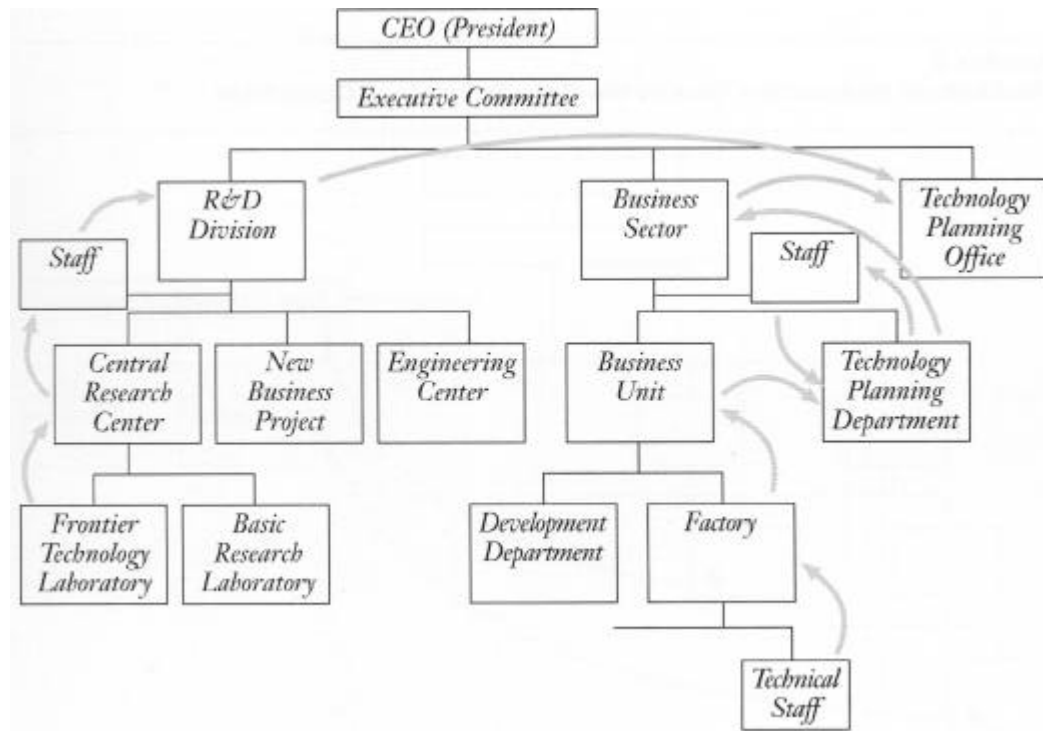
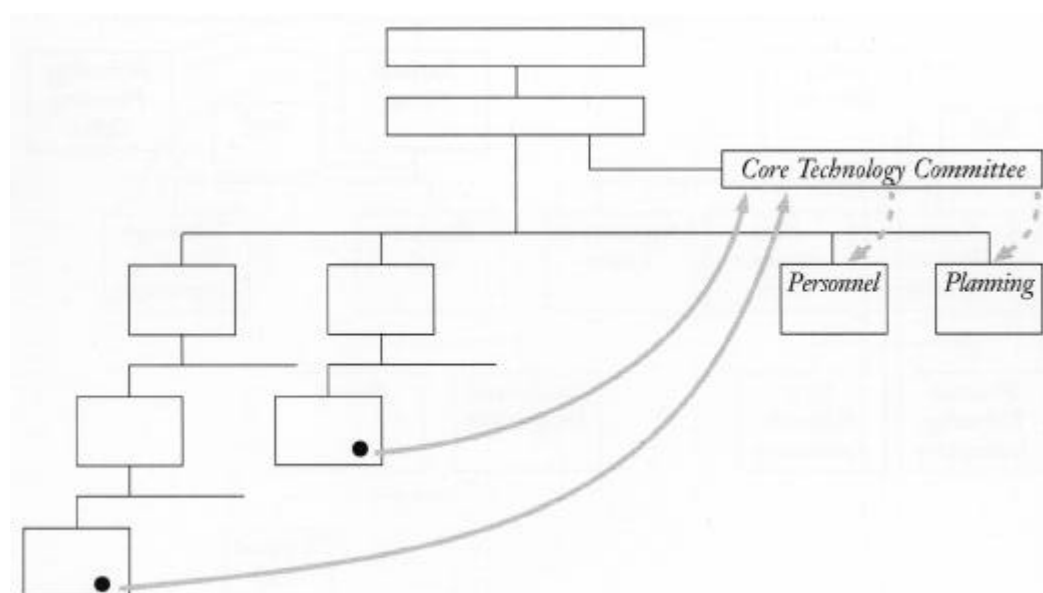


Exhibit 3

Technology Information Flow to the Core Technology Committee



In effect, this approach to technology management is a particular instance of the general movement toward the information-based organization (IBO) – a movement in which Japanese companies, with their tradition of „bottom-up“ synchronization of activities, have a distinct advantage (Exhibit 4).

For each core function of every product, the firm carefully monitors new technologies and substitutes. The R&D staff in charge of product development propose a product launch plan, taking into consideration the product’s life cycle. To expand the business with its core customers, the marketing staff identifies users’ unmet needs and refers them to R&D as the basis for new functions or products.

Exhibit 4

Four Organizational Cultures

		Relationship to Management	
		Proactive	Reactive
Attitude to Information Flow	Sharing	<i>Network of professionals (IBO)</i>	<i>Strategically functional organization</i>
	Self-focused	<i>Entrepreneurship venture</i>	<i>Pyramidal bureaucracy</i>

While strategic business areas change frequently, reflecting changing markets, core technologies change much less frequently. The accumulation of knowledge and skill in each core technology should be seen as one of the organization’s most precious assets.

The core technology committee’s key role is to form a bridge between technology development strategy and 2000 Vision. For example, in the Japanese pharmaceuticals industry, where relationships with doctors are a key success factor, core customers are defined by medical department. Surgeons are the leading buyers of pharmaceuticals in Japan, purchasing 22 percent of all pharmaceuticals and 60 percent of antibiotics, a huge market. Accordingly, antibiotics manufacturers should pursue drug research aimed specifically at surgeons, such as anticancer drugs, rather than research in seemingly growing areas such as cardiovascular drugs, for which the market is intensely competitive.

However, it takes a long time to launch a new anti-cancer drug, even if a company has proprietary core technologies in this area. While such drugs are in development, the company should introduce other products that require less development time. These products can maintain the firm’s good relationships with surgeons, whose support will extend the product life of existing antibiotics and speed the development of anticancer drugs. In one case, Shionogi, a leading antibiotics supplier, launched a slow-release anesthetic that was enthusiastically received in an otherwise static market segment. Shionogi’s competitive advantage arose from its ability to detect the unmet needs of the core customer.

Knowledge of the core customer plays a key role in strategic alliances. If a company happens to invent a drug in an area outside its core market, it can swap the drug in a cross-licensing arrangement to obtain a new product that fits its core market better.

Kao, the home-products manufacturer, also offers an outstanding example of core-technology-based business expansion. The company had identified surfactant technology as its core technology. While maintaining a strong marketing campaign for its core product in supermarkets, it kept an eye out for new business opportunities on the supermarket shelf. Sure enough, it introduced a cooking oil formulated using surfactant technology to reduce the amount of oil actually absorbed into foods – a good fit with the growing consumer interest in cutting fat consumption. In addition, Kao found a significant opportunity in floppy disks, for which surfactant technology enhances recording quality by improving the distribution of magnetic particles.

This new Japanese approach, core-technology-based management, will present a powerful challenge to Japan's overseas competitors.

Atsuro Kokubo is a senior consultant in Arthur D. Little's Asia Pacific Directorate, based in the firm's Tokyo office. He has consulted to numerous U.S. and European companies on strategic approaches to entering Japanese markets and has identified many Japanese candidates for joint venture partnerships, acquisitions, and cooperative R&D.