Innovation among Japanese Telecoms in the Internet Era: A Comparison Based on Analysis of Successful U.S. Companies

by

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ABSTRACT

The worldwide telephone industry is in transition—from traditional telecom service provider to broadband service provider. NTT, Japan’s leading telecom company, must establish a new source of revenue that will compensate for declining income from fixed-phone service. The company needs to implement innovation in the organization in order to create a competitive breakthrough service while it struggles to be more efficient in the existing telecom service.

In the U.S., several companies have successfully implemented innovations. I analyzed IBM, GE, 3M, and Procter & Gamble (P&G), mainly from an organizational perspective. IBM, a multinational computer technology and consulting company, is a good example of a company that successfully changed its business model from a traditional mainframe computer maker to an IT solutions provider. GE, 3M, and P&G also have produced satisfactory financial results by implementing an innovative culture into their large organizations. The key success factors of those three companies should provide some important suggestions for NTT.

I also surveyed successful innovative companies from a process perspective. IDEO is a good example. Taking advantage of the strong leadership of its founder, IDEO produces many innovative designs for products and services. The company has a strong platform and culture that encourages innovation.

After surveying these successful U.S. companies, I discuss how NTT could implement some of the innovative elements of those successful companies. Finally, I discuss several issues that are unique to the telecom industry: among them, regulation, bureaucracy, and restructuring.

It is my hope that this thesis will help those who are in large organizations and struggling to bring innovation to the company.

Thesis Supervisor: Michael A. Cusumano
Title: Sloan Management Review Professor of Management
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I started my NTT career as an engineer and my curiosity has always been how people can work with joy and creativity. It is lucky for me to have studied MIT Sloan courses where prominent professors provide attractive lectures for innovations. Sloan’s study for innovation was so fresh and eye-opening to me that I naturally began to dive deeply into how innovation could change the workplace of NTT.

I would like to thank all the people related to me in this MIT Sloan year and I wish this thesis will be useful who wants to build up vigorous, joyful, and honorable organization.

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Chapter 1

Introduction

With the appearance of the Internet and its associated programs and technologies, the business situation of the telecom industry changed rapidly, and continues to evolve. For most telecom companies, fixed-phone revenue is declining and broadband is now becoming the wave of the future. In order to increase revenue from broadband, successful companies must identify what technologies will be mainstream and then develop and launch new business models that use the most recent technologies. I believe that in today’s global world, telecom companies should become much more speedy, flexible, and agile in identifying new trends and developing them into real services.

In this thesis, I will discuss how telecom companies can change their innovation processes in ways that will broaden their business field in today’s Internet age. I will survey several companies to determine how they have introduced an innovative, more entrepreneurial culture into their telecom service development process.

Innovative companies seem to be sensitive and flexible to the changes of the times. They are successful to implement key elements for innovation into their organizations. For instance, IBM changed its business model from mainframe maker to IT service provider. GE consistently grew in scale by changing the primary business axis dynamically. 3M has kept innovation culture to produce tremendous number of attractive products. P&G has maintained the trust from consumers for long time. There are also some entrepreneur companies which have been successful to create an innovation culture. IDEO, a design company, is a typical example to provide a new process for innovation in workplace. I will study these innovation cases from mainly two perspectives: organizational perspective and process analysis in workplace.

Finally, I will discuss how those successful innovation elements can be applied to Japanese telecoms to seek for the growth in today’s Internet age and make recommendations to put the strategy into effect in the actual Japanese industry.
Chapter 2
Organizational Analysis of IBM

In this chapter, I will analyze the success factors and challenges encountered by IBM from an organizational viewpoint. I devote an entire chapter to IBM because its strategies—especially since Louis Gerstner became CEO—seem to have had a major influence on the strategies that Japanese telecoms have adopted. In the early 1990s, IBM faced revenue stagnation, was cumbered with a large and sometimes unwieldy organization, dealt only in a single business (computers), and focused largely on technology. These characteristics are quite similar to NTT today: a large Japanese company that faces stagnation, is encountering challenges that may require transformation, with its strength based largely on technology. As a result of Gerstner’s management, IBM reformed its business model, corporate culture, and technology mission. When Samuel Palmisano took over from Gerstner, he sought to build financial growth and innovative systems that would respond to IBM’s customers.

My analysis provides an in-depth look at how the company was transformed from a large, sometimes cumbersome organization, into the competitive and innovative entity that it is today.

2.1 IBM’s Challenges

IBM is perhaps best known for transforming the business model, organizational structure, and corporate culture of a large company. Once perceived as king of the computer world, today IBM has evolved from a product manufacturer to a solution provider.

In 1992, IBM was a company in stagnation, facing uncertainty and complex competition. Its share of the mainframe computer market, which had been its main product, was declining and inexpensive personal computers began to prevail, knocking off the demand for mainframe servers.

Since that time, however, two memorable CEOs have revitalized the company into one that is innovative and capable of addressing a changing business environment. Neither CEO chose the option of dividing the early giant into smaller, fast-moving companies; both
insisted on retaining a single, integrated entity with dynamic capabilities to competitively leverage its scale and highly recognized brand name. Both CEOs focused on fostering the ability to leverage and reconfigure IBM’s existing competencies and assets in ways that were valuable to customers but difficult for competitors to imitate.

The first was Louis Gerstner, appointed in 1992, who said “strategy is execution” when he recognized that IBM lacked the ability to reallocate its assets or reconfigure its organization. The second, Samuel Palmisano, became CEO in 2003 (and is CEO at this writing), and his focus is “on-demand business,” in which IBM should solve customer problems through an open architecture, integrated process, and self-managing system.

![IBM's Revenue (US$ million)](Fig. 2-1. IBM Revenue)

2.2 Gerstner’s Reforms

2.2.1 Cost Reduction

When Louis Gerstner became CEO, IBM sales were already declining from the 1990 peak of $27 billion, but the company had been unable to achieve effective cost reduction. Gerstner brought the fire under control. In order to recover the company’s share of the mainframe market, he dramatically reduced the price of mainframes by introducing a new technology called CMOS. Prior to that time, CMOS had not been a recognized or established technology, but its adoption by IBM raised the stature of the technology and in the process rescued IBM. This event reinforced for Gerstner the value of disruptive new technologies that could make a major contribution to real business.

IBM also reduced costs by $8.9 billion, including the difficult process of cutting 35,000 employees. Like other companies and CEOs who must reconstruct their company in order to succeed, Gerstner could not avoid reducing the number of employees.

2.2.2 Customer Orientation

Gerstner was surprised to find how far IBM had slipped from its knowledge of customer desires. The IBM culture was pushing its excellent mainframe to customers, but it was not listening to their business target and demand for IT systems. He cultivated an emphasis on customer orientation and strengthened the company’s integrated strategy with the mass media.

- Four important decisions were made:
  1. To keep IBM as one entity
  2. To change the basic revenue model of IBM
  3. To restructure the way business was done.
  4. To sell ineffective assets to obtain cash.

- Five key strategies were adopted:
  1. Recover revenue
  2. Acquire new/more customers
  3. Proceed into the client and server businesses
  4. Become a total solutions provider
  5. Become customer oriented
To encourage action, Gerstner promised (1) to arrange priorities based on the customer’s point of view, and (2) to encourage laboratories to provide open and distributed solutions regarding customers. He believed that IBM lacked the skills to deal well and consistently with customers, and that it was not operating as a united entity or creating new ideas to respond to customer needs. IBM’s customers are spread throughout the world and include many industries; all want a reliable company that listens to them and provides seamless IT solutions. For his part, Gerstner wanted IBM to be a more flexible organization that could deal with its wide range of customers and rapidly changing technologies.

It was unusual for a large established company like IBM not to have an organized marketing function capable of segmenting the market, analyzing competitors and customers, and handling brand management and advertising. However, Gerstner decided not to put together one large marketing division. Instead, he opted to establish a unified marketing function consisting of core managers from each regional department, research lab, and corporate strategy department.

2.2.3 Change to a Total Solutions Provider

Gerstner observed that customers really wanted an IT platform that allowed them to do business any way they wished and a partner company that could support their platform. IBM could play an important role in providing effective solutions by integrating a range of components that could be served by one solution. Gerstner believed the IT business would grow rapidly because companies found it difficult to coordinate various IT components to match their business needs. As IBM considered its customer needs, it decided to begin recommending the products of some of IBM’s competitors, including Microsoft, HP, and Sun if those products were the best solutions for IBM’s customers. The technology and product departments began to see themselves as one option for service among other competitors, thus providing solutions that met the customers’ needs first.

2.2.4 Corporate Culture Penetration

During his first few years as CEO, Gerstner cured the most serious corporate problems. His next step was to create a business that would produce new growth while establishing a strong financial position. This was a difficult task that meant reforming the
corporate culture, which was traditionally internally focused, not market-oriented. They were extremely weak after attacks from the outside world. He took time to talk directly with employees about the seriousness of the crisis and how to get through it. He called on employees to question who they were, to become hungry, curious, and self-established individuals.

The followings are seven principles of corporate culture addressed by Gerstner:

1. Market is driver
2. Technology company who has significant concern about quality
3. Measured by customer satisfaction and stock holder evaluation
4. Entrepreneur company minimizing bureaucracy focusing on productivity
5. Strategic vision
6. Teamwork cooperation
7. Sensitive to local community

2.2.5 Organization Reform

When Gerstner took over as CEO, IBM had many organizational problems. With numerous global branches, each with a local president who dominated the branch, IBM had difficulty providing coordinated services that bridged multiple countries. Also, it was difficult to create or implement strategy changes throughout the entire company. On the other hand, too much decentralization would disturb the corporate alignment and collapse the IBM brand. Breaking up the long-time hierarchical organization was a difficult but necessary task in order to bring about cultural change, including customer orientation and open technology.

Gerstner also reformed IBM’s executive committee from formal decision making to policy alignment on issues between departments. In this respect, centralization was necessary for IBM, with its various business units and need to coordinate issues related to the different units. For instance, all investments were managed by headquarters in order to match each project to a corporate strategy by business portfolio. Gerstner was willing to be involved in decision making and take responsibility for each project.
2.2.6 Technology Focus

**Middleware**

Gradually moving away from a single focus on hardware technology, IBM shifted its focus to software, especially middleware such as databases, system management, and transaction management software, in an effort to become a world leader in the category. At one point IBM attempted to compete head to head with Microsoft’s operating system but it became apparent that even IBM could not overcome the overwhelming marketing power of Microsoft. So Gerstner abandoned the effort because he could see no successful scenario in which to invest.

Gerstner also dropped applications software, where numerous small enterprises had considerable market power. It was in so-called “middleware,” whose function was to provide convenient interfaces between operating systems and application software, where IBM found its niche as a solution provider by enabling customers to choose compatible sets of hardware and software. IBM embarked on the huge and difficult project to make all of IBM’s middleware compatible with the operating systems of other competitors, such as Microsoft, HP, and Sun.

**Network Cloud**

In the early 1990s, when the Internet had just begun to emerge, technology was focused on leveraging the “network cloud”—multiple computers and network systems—to customers such as individuals, enterprises, and governments. For customers, each component of hardware and software no longer mattered as much, but the performance and utility of the network that included those components—i.e., the network cloud—were important. The network cloud had to support the customer’s multiple communications needs, an approach that was consistent with IBM’s strategy as a solution provider. As a result, IBM stopped thousands of research projects and the manufacture of hundreds of products and sold its large business units in order to transfer those resources into new business activities.
2.2.7 Decision to Maintain Research Laboratories

When IBM experienced financial challenges in 1992, one issue was how to deal with its research laboratories. IBM was well known for its research and academic activities, which produced several Nobel Prize medalists. However, the labs also were perceived as expensive organizations, even more so during the company's difficult financial situation.

Gerstner took steps to secure a basic research budget. During an interview with MIT Professor Irving Wladawsky-Berger, formerly an IBM vice president for technological innovation, he said: "Gerstner loved the IBM laboratories when he first visited there. He said only one thing they had to change was to look at IBM customers." Gerstner encouraged the researchers to maintain close contacts with customers in order to solve serious problems. Wladawsky-Berger added: "Researchers had to decide whether to stay in IBM labs and focus on customers or leave IBM labs. In fact, most of researchers shifted to customer-oriented research, and in a few years, it had become part of the IBM culture."

Researchers also began to work more closely with business units to shift the research target from hardware technology (like computers) to service technology (like IT platforms). Most important was that IBM catch each new technology change wave and bring out systems that provided customers with new capabilities.

Sometimes a product department refused to adopt a new invention that came from the labs because the department feared the new product might destroy successful existing products. It required considerable effort to coordinate the interests of the different divisions, including the CEO's commitment, policy alignment at the senior-management and field-manager level. These efforts triggered major transformation in the research labs, which resulted in later successes.

2.2.8 Open Technology

In transforming the research labs, IBM tried to sell technology to its markets. IBM held several of the best-known and most-used technology patents for nine successive years. Gerstner recognized that IBM's labs held even more inventions that had not been utilized efficiently. So he decided to sell IBM's technology and components to the markets, which would help IBM to attain an influential position in deciding market standards and protocols as well as bring financial rewards to the company.
Semiconductors are one example. These components go into a wide range of machines, from Internet routers to gaming machines, and these markets continue to expand. The strategy was to focus on the core technology and then funnel into surrounding new markets and basic infrastructures of various computers.

Next, IBM focused on open architecture. Departing from IBM’s original specifications, its research labs began to support various standardized and open architectures in order to become current with customer needs. IBM customers actually desired more competition when choosing computers, while seeking to avoid its dominant—and expensive—products. IBM’s new approach to open and standardized Internet protocol and computer components helped IBM products become accepted in the overall market of competitive products. In my interview with Wladawsky-Berger, he talked about open architecture:

*At that time, the open standard was inevitable. The marketplace was opened up by the Internet and nobody could resist that trend. One key phrase at that time was “to be in harmony with the market.” In judo, fighters do not always knock up against each other but utilize the opponent’s power to transform it into his own power.*

Third, IBM researchers began to spend more time communicating with outside labs. It was difficult at first for the researchers, whose scope had always been narrowly defined by internal labs, to open their eyes to the outside. However, it was easier for researchers to collaborate and exchange information with outside researchers. They had many colleagues in university and government laboratories. Open technology was inevitable, and researchers realized they could not fight it.

Another successful example of IBM’s decision to adopt open technology was utilizing intellectual properties for collaborative work with the outside community. IBM held many patents pertaining to Linux, so it gave permission for Linux to be used by collaborative members. This explains why IBM was so successful with Linux. By opening its intellectual property to members of its strategic alliance, IBM acquired even more power.
2.3 Palmisano’s Leadership in Innovation

2.3.1 Strategy for Financial Growth

When Louis Gerstner handed over the IBM reins to Samuel Palmisano on March 1, 2002, Palmisano was already a corporate veteran who had managed IBM during the worst technology downturn after the dot-com bubble. Thereafter, Palmisano committed to growing the company’s revenues at least 5% a year, with double-digit profit growth. At the time, he estimated $500 billion per year in potential revenue in IT business market.

Palmisano’s strategy was to leverage IBM technology to provide IT users and the industry with a radically different business model. After ten years of Gerstner’s management, IBM research labs had changed their culture toward customer orientation; they were experienced at collaborating with the marketing, strategy, and product divisions. Palmisano had no doubt that the research labs could contribute to business.

2.3.2 Enhanced IT Service Provider

Palmisano’s definition of IT service was broader and higher than it was in the Gerstner days. He wanted not only to provide data centers but also to serve the entire business by providing finance and accounting services for clients. Note that Palmisano referred to IBM’s “clients,” not “customers,” which reflected his desire to become more integrated into the clients’ businesses and lock them in with attractive IT services from IBM. Palmisano wanted Dell at the bottom of the market, and IBM to stand at the technology top by giving clients sophisticated answers after collaborating with IBM’s research labs. As a result, IT service revenue accounted for nearly 45% of IBM’s $81 billion in annual revenues in 2003.

Palmisano liked being a sales manager as well as CEO. He constantly sought the client’s business outsourcing desires, asking “Give us your toughest problem”. He wanted to increase the number of customers who trusted IBM to make their company’s corporate decisions. He emphasized that IBM’s parts, such as marketing, manufacturing, and research, should work together closely and systematically.
2.3.3 Strengthen Consultant Capabilities

In IBM's $5.1 billion R&D budget, 20% went to service-related research, which continued to grow. Palmisano believed that many of the toughest and most fascinating problems were to be found in service. He wanted IBM research focused more on service and exploring the future needs of the IT marketplace.

One of Palmisano’s first big decisions was the purchase of Price Waterhouse Coopers Consulting (PWCC) for $3.9 billion. The aim was to strengthen IBM’s capability, which had been extremely week, to bring together IBM’s brains, products, and services into one integrated service for clients. IBM was eager to sell the idea of helping companies to reconfigure their organizations, not just provide better IT systems.

Palmisano had always moved quickly to assemble a strong team for any client project, so connecting professional PWCC consultants with sales managers and researchers soon began to bear fruit. Some teams were comprised of PWCC business consultants and software experts from the research labs. For example, one supermarket client wanted to obtain more revenue per shopping cart. IBM successfully put together a team comprised of a designer, manufacturer, researchers, and a marketer. The team produced a sophisticated smart shopping cart with a built-in scanner and LCD screen.

Palmisano was equally adept at pulling additional revenue from clients while meeting their needs effectively. A new scheme, business transformation outsourcing (BTO), hired a client’s employees as IBM employees, then they worked together to improve business efficiency in the client company by experimenting with new IBM technology.

2.3.4 Mission of Research Laboratories

During Palmisano’s management, the positioning of research labs as part of IBM’s corporate strategy seemed to be established. Paul Horn, a senior executive responsible for R&D, told: “The goal of this research organization is to create the future of IBM.” Wladawsky-Berger said: “We are discovering the physics of business. It’s sort of like trying to unravel the business genome.”

Customer orientation was an ongoing focus for the research labs. Palmisano encouraged researchers to maintain close contact with clients, believing that there could be no better way to progress than by working with real customers. Customer contact came in
many forms, from simply dropping by and talking, to actually working on a customer problem. It became natural for researchers to want to go out and see problems that customers were trying to resolve. In turn, IBM found that clients began to enjoy working with IBM's best and brightest researchers. IBM's corporate culture had changed.

The research labs continually emphasized open technology. For example, Palmisano decided to invest one billion dollars in Linux, which signaled IBM's commitment to open technology, and would enable IBM to apply a range of hardware lines and threaten Microsoft.

### 2.3.5 Research to Meet Client's Needs

In striving for innovation, IBM succeeded in bringing out new products that broadened its business and contributed to its organic growth. For instance, one client, the brokerage house Charles Schwab, began to offer a customer retirement portfolio that dramatically improved the performance of its consulting tool (called Forecaster) from hours to 20 seconds using IBM's software solution. To respond to Schwab's need, IBM pulled together a team of experts from software and services, which developed the idea of organizing all of Schwab's computers into a grid that effectively gathers the resources of several computers connected to the network. Schwab was pleased with the result, and commented: "They are looking into their bags of tricks, they understand us and our priorities, and they brought it all together."

IBM entered into biotech computing and developed a new unit that generated one billion dollars in annual sales in four years. The Mayo Clinic, the world's leading patient data analysis company, hired IBM to help assemble all the clinic information into a single searchable database called "Design Link." Mayo's doctors were then able to prescribe medicines that best fit individual patients because Design Link handled huge amounts of patient data. Design Link originally began as the idea of one engineer in the lab, but her manager soon spotted the technology and applied it to pharmaceutical data.

IBM research became a good communicator with the outside world. The research director at Nanotech, and a professor at New York State University, dreamed of changing the university campus into a center of semiconductor research. It took 10 years and $4.2 billion, but the concept was realized. Today the Albany Nanotech lab has a staff of 1,800 university
and corporate scientists, which gives IBM and its partners access to the latest chip-making equipment and design processes.

2.4 IBM's Innovation System

As a result of the management accomplishments of Louis Gerstner and Sam Palmisano, IBM established a series of mechanisms that activated and transformed innovation into real business. Senior management continually monitored outside changes, made timely strategic decisions, and allocated resources during conditions of uncertainty. These mechanisms were strongly supported by both CEOs and prevailed widely in the company, from seniors to field managers, and from the corporate strategy division to business units and research labs.

One key feature was that the mechanism emphasized the involvement of both the CEO and the line managers at the same place. Strategy came from business units and research labs, not from corporate strategy divisions. The corporate strategy division had the power to coordinate issues that bridged several business units.

In order to put the innovation system into motion, senior managers who managed the field and also thought about corporate strategy, had to take a key role. According to Wladawsky-Berger:

Senior managers were an essential part of strategy execution. They have to think of and apply corporate strategy to their workplaces by gathering colleagues. There were many occasions for top and senior managers to share the set of goals that IBM would pursue. The best people in the company could deal with both developing corporate strategy and managing their group.

IBM developed the innovation mechanism to align major functions in organic relationships. This process reflects the realities and complexities of actual business by sensing the environment and seizing opportunities. A central part of this discipline is keeping strategy making at the business unit level with those who know the local marketplace well. Twenty-five thousand general managers are involved in forming and executing strategy; two-thirds of the strategy organization is composed of general managers who join the team for 18 to 30 months.
The functions of the organization are divided into two categories: strategic insight and strategic execution.

2.4.1 Strategic Insight

Strategic insight is designed to systematically identify opportunities. It consists of four interrelated disciplines: strategic intent, market insight, innovation focus, and business design.

1. **Strategic Intent** sets the overall direction and goal for the organization.
2. **Market Insight** focuses on understanding customer needs, competitor moves, and market economies.
3. **Innovation Focus** challenges general managers to experiment and expand their thinking in the design and implementation of strategy.
4. **Business Design** answers the question, “How will we compete?” and specifies how the business will fit in the market.

In order to realize those four interrelated disciplines, IBM created a new organizational unit called Dynamic Capabilities, which includes four teams focused on strategic insights.

1. **Technology Team**: meets monthly, by expertise of IBM Fellows and Distinguished engineers.
2. **Strategy Team**: meets monthly, by cross section of general managers, strategy executives.
3. **Integrated and Value Team**: company-wide integration by 300 key leaders selected annually by CEO.
4. **Deep Dive**: detailed analytical and fact-based discussion by each operating unit and strategy group.

2.4.2 Strategic Execution

Strategic execution is designed to seize opportunities by appropriately allocating resources into each strategic initiative. It consists of four key organizational elements:

1. **Critical Tasks and Processes**: the concrete tasks and interdependencies that add value
to the customer's perspective.

2. *Formal Organizations*: the explicit structures needed to direct, control, and motivate individuals and groups.

3. *People and Skills*: the human resource characteristics, capabilities, and competencies needed to execute the critical tasks.

4. *Culture*: expectations about how people need to behave.

In order to seize opportunities, IBM created three powerful mechanisms to reallocate resources and reconfigure the organization.

1. *Emerging Business Opportunities (EBO)*: an integrated set of processes that identify new growth opportunities and establish new organizations. It is strongly supported by senior management. EBO handles issues that could create new sources of revenue but do not show clearly defined business and require cross-organizational integration to execute.

2. *Strategic Leadership Forum (SLFs)*: 3.5-day, team-based workshops that analyze specific performance or opportunity gaps and develop an action plan. SLFs give line managers opportunities to discuss fundamental problems with all relevant responsible people and strategy teams in a disciplined way.

3. *Corporate Investment Fund*: a way of funding new initiatives identified by EBOs or the Integration and Value team. It is protected from the normal annual budget decision process.

### 2.5 Summary

**Corporate strategy**

For a large traditional company like IBM to transform its corporate strategy so dramatically and successfully is an amazing feat. Louis Gerstner emphasized how to do business in every sector by satisfying customer needs. He redefined the core business and revenue model to deal with the corporate evolution from computer manufacturer to IT service provider. He also established highly structured processes for decision making that involved all employees. This systematic approach was effective for making timely decisions
and executing strategies for dealing with changing markets and technologies. He exhibited strong leadership and involved all the employees in the company's transformation.

Sam Palmisano, on the other hand, emphasized IBM's annual growth. That was the driving force that promoted organic growth by utilizing the company's research laboratories. Palmisano positioned IBM as a technologically sophisticated solution provider, different from manufacturers that deal with products.

The cornerstone of Palmisano's business vision is locking in customers by providing solutions. His strategy to leverage IBM's technological assets for the company's organic growth have clarified the mission of its research labs and realized enhanced system building corporate strategy.

Research

It was fortunate for the research labs and IBM itself that Louis Gerstner decided to keep the research labs. As a result of that decision, conditions improved, and research labs now contribute to customers and business units. The labs' research mission is to analyze technological change and provide new opportunities for business.

Key success factors included a strong connection between the research labs and the customers, forcing the labs to become more open to outside trends and enabling IBM's technology to prevail in the market. In particular, open technology was effective in enabling the company to adapt to changing markets and technologies, and also to establishing the connection with Linux, which became a competitor to rival companies. A successful EBO project often comes from adapting IBM's existing technology into different and unfamiliar markets, such as grid computing, brokerage, and searchable databases in biotech.

In the Palmisano era, research laboratories have become more responsible for building corporate strategy to explore the future business of the company. Wladawsky-Berger told me: "The importance of laboratories has increased. As the world gets more complicated, laboratories will be essential for enabling IBM to create and sustain differentiated products and services."
Organization Flexibility

With strong leadership from two important CEOs, the IBM organization is amazingly flexible, matching its corporate strategy. For instance, the CEO could restructure the organization of research labs by cutting the number of projects and reallocating resources. Palmisano was quick to formulate effective teams of consultant, sales personnel, and researchers who could respond to customers’ problems. IBM maintains spontaneity in its business units and research labs. But in order to realize its strategy as an integrated entity and to allocate limited resources, central division is necessary. For example, only the central division can judge when to invest billions in acquiring a business consulting company so the company can be competitive in the IT service market. A central strategy division also ensures that IBM is well balanced between centralization and decentralization.
Chapter 3

An Organizational Analysis of Innovative Companies:
General Electric, 3M, and Procter & Gamble

In this chapter, I will analyze the key success factors and challenges encountered by three well-known and highly successful American companies: General Electric (GE), 3M, and Procter & Gamble (P&G). Each is discussed in detail in the sections that follow.

3.1 GE: Reforms and Innovation

GE, a multinational technology and service conglomerate, is one of the largest companies in the world. GE’s strategy is to grow the business by investing based on its established portfolio management. Its business is diversified, from aircraft engines, to health care, to financing so its business model is quite different from that of NTT. GE’s reforms, led by its CEO Jack Welch, including restructuring and organizational culture change, will be a useful reference for NTT as it seeks to build its corporate strength. Welch’s basic strategy—to retreat from a stagnating business and put its surplus resources into new growing a business—is one of GE’s key success factors.

3.1.1 Jack Welch’s Strategies

Jack Welch, who was CEO of GE for 20 years (1981-2001), transformed GE into a growth company that generated enormous shareholder value. Welch threw out unattractive businesses and grew the company’s finance service as a competitive business worldwide. He established a corporate strategy based on a portfolio developed with BCG & Co. The concept of GE’s portfolio was to provide direction as to where the company should invest in order to grow by acquiring other firms that would be consistent with GE’s corporate strategy. During Welch’s management, GE grew by acquiring companies and
selling unattractive business units. Specifically, GE’s revenue increased from $90 billion to $125 billion, and profit grew $4 billion to $14 billion during the last five years of Welch’s tenure (see Figures 3-1 and 3-2).

**GE’s Revenue (US$ Billion)**

![Graph showing GE's revenue from 1993 to 2000, with categories for Business Segments, Capital Services, and Total Revenue.](http://www.ge.com/investors/financial_reporting/annual_reports.html) Adapted by author

Fig. 3-1. GE Revenues

Source: GE, <http://www.ge.com/investors/financial_reporting/annual_reports.html>, Adapted by author
(1)  **Welch’s Vision to be Number One**

Welch wanted GE to be perceived as a unique, high-spirited, entrepreneurial enterprise, a company known for its unmatched level of excellence throughout the world. He also set the goal for GE to be number one or number two in every business in which it was engaged. He changed resource allocations in terms of how much revenue and profit the business would accrue. For example, in the 1980s GE poured money into aerospace and
aircraft engines because the Reagan administration was putting enormous amounts of money into this sector.

However, in the late 1980s, government policy changed and GE was forced to change its business focus to other business sectors with promise. GE then put money into financial services, plastics, and medical. Those three businesses grew to represent 40% of GE's revenue in the late 1980s and were expected to grow between 15% and 25% over three years. Welch believed GE should not spend money on stagnating markets because the company might miss other, more promising businesses.

In the early 1980s, Welch restructured the GE's traditional business of power transformers, housewares, and air conditioning. He positioned each business into three strategic categories such as Core, High Technology, or Service (see Figure 3-3). Among all of the GE businesses, only 15 were involved in these three areas. For businesses in the Core area, the company would invest for improved productivity and quality. In the High Technology area, it would stay at the leading edge through acquisition and R&D. In the Service area, it would add outstanding people who could create new ventures and make other relevant acquisitions.

Fig. 3-3  Welch's rough sketch of three strategic categories
Source: HBS, "General Electric, 1984", 1993
(2) **Downsizing for Renewal**

Welch believed that downsizing was inevitable in order to keep a corporate entity profitable, and that philosophy was an essential part of GE's success. When he started as CEO, there were 411,000 employees, but by the mid-1980s that number had been reduced to 276,000, and he had acquired the dubious nickname "Neutron Jack." In the process, there were about 246,150 reductions and 111,150 acquisitions. Welch's idea was to kick-start a process of renewal. He did not like being called "Neutron Jack," and he strove to reduce headcount in "soft landing" way with as much dignity as possible. He worked out details so that employees who were let go were treated fairly.

(3) **Changing the Culture to “Simple, Speedy, and Self-Confidence”**

Welch strove to change GE's corporate culture fundamentally, calling the change "Going for the Leap." He required GE to change in order to deal with the outside world in areas such as market needs and new technologies. He did not seek change based on internal situations, stressing that GE should be moving faster and better against the external world.

Welch emphasized the importance of simplicity in running a large organization like GE. He summarized that simplicity in three key concepts: "Simple," "Speedy," and "Self-Confident." In a large organization like GE, it was essential for all employees to share the company's values and the target it sought to achieve. He realized it was difficult to express complex corporate activities in a simple way, but he required every manager to use simple communications and workflows.

Welch also recognized that simplicity essential in order to be speedy. If the company was not speedy, it would fail in business.

He tried to get rid of bureaucracy, which he believed would upset the employees' self-confidence. Especially in large organizations, every employee needs to think confidently and behave boldly in order to meet customer requirements smoothly. Simplicity, Speed, and Self-Confidence were tightly connected with each other and essential for enabling GE to behave like a small, flexible, entrepreneurial company.

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1 These numbers are derived from HBS "GE – Preparing for the 1990’s", 1990
Fostering Visionary and Challenging Leaders

Welch recognized the importance of leadership at the top, including CEOs and directors, for changing the corporate culture. He also clarified and shared the requirement of leadership with employees. In discussing leadership, he stated:

Good business leaders create a vision, articulate the vision, passionately own the vision, and relentlessly drive it to completion. Above all else, though, good leaders are open. They go up, down, and around their organization to reach people. They don’t stick to the established channels. They are informal. They are straight with people. They never get bored telling their story. ²

He emphasized that leaders should make an effort to communicate directly with people and to listen rather than talk. He said: "Real communication takes countless hours of eyeball to eyeball, back and forth"

He also suggested how leaders should see the world: they should face reality, and see the world as it is rather than as they wished it to be. People often tend to be afraid of change, but Welch encouraged employees to welcome change. He said: "Change in the marketplace isn’t something to fear; it’s an enormous opportunity to shuffle the deck to play the game. Leaders should not get paralyzed about the fragility of the organization".

Welch set up a forum called Work-Out to bring about dramatic cultural change. In Work-Out, a group of 40 to 100 people from all ranks in different businesses, who were chosen by management, gathered to discuss how their business or work could be more efficient. Attendees were divided into small groups and spent three days talking, then made a presentation to their bosses and senior management. The Work-Out sometimes continued as an innovative activity for several months, and related people were brought in to put the Work-Out proposal into effect. Work-Out was important because it actually improved the workplace by getting rid of accumulated bad habits. It was also effective for helping people to become self-responsible and conscious about overall corporate strategy. Furthermore, it as a great opportunity for bosses and senior management to feel directly what was happening on the front line, and the opinions, feelings, emotions, and resentments of line managers.

² Welch stated these comments about leadership in his Harvard Business Review interview, which is shown in HBS “Jack Welch: General Electric’s Revolutionary”, 1994 P.6
(5) Eliminating Communication Filters in Organization

Welch wanted to simplify and flatten the organization structure. He reduced the number of layers from nine to four, and put the CEO in direct contact with the business units. He also reduced the corporate staff by eliminating the functions questioning and checking work. Welch defined the role of staff as the people who added value to the workplace and made people on the line more effective and competitive. By eliminating these “communication filters,” the CEO could open direct channels to the leaders of all 14 businesses and shorten the decision-making time.

Welch also recognized that the 14 business unit leaders did not receive the same information. He established a Corporate Executive Council (CEC) where the 14 businesses could meet and share information. The CEC creates a sense of mutual trust, personal familiarity, and obligation.

Welch also tried to simplify the number of documents to be shared among different businesses. For example, he devised a simple presentation format that included five primary questions, such as global market dynamics, competitors, actions in the last three years, competitor threats, and effective actions to be taken. By sharing the same review book among the 14 different businesses, the CEO and business leaders could communicate directly about corporate strategy.

(6) Reward System for Encouraging Challenges

In order to implement his corporate cultural change, he created some important modifications in the GE reward system. He regarded the reward system as a key tool to motivate people, so he gave more recognition to individual contributors and higher rewards to those who produced superior results. For instance, widespread 10% to 15% bonuses at the top levels were more replaced by 30% and 40% bonuses to fewer managers. More managers received no bonus at all. Also, superstars who had accomplished astonishing business results received larger rewards. Employees who took up challenges were encouraged via the reward system, and the company never punished an employee who dared to undertake a challenge but ultimately failed.

Many managers were against these radical reward system changes. However, Welch spoke to those managers about the need for change. He changed the definition of loyalty to
the company. Before, loyalty meant how people gave their time to the corporate entity and were in turn shielded and protected from the outside world. However, he wanted people to look at the competitive outside world and recognize the workplace was not safe unless the company kept winning. Loyalty became an affinity among people who want to grapple with outside and win.

(7) Learning Best Practice from Outside
Welch wanted to introduce case studies of excellent outside companies. He sent GE people to the customer front of those companies and asked them to learn their best management ideas. These were give-and take-relationships between GE and the other companies GE visited. GE learned from them, and then passed new internal management methods to them. In terms of best practice, GE asked what the secret of their success was and then focused on learning how it was accomplished.

For example, the GE appliance division visited a Canadian subsidiary to learn about an innovative way to manufacture to order. The Canadian company had successfully introducing this style, which was adapted by a small New Zealand appliance maker. By introducing the manufacture-to-order style at GE, the appliance division was able to cut the production cycle by half while increasing the production rate. This best practice, which was intended to introduce the superiority of another company’s system, became common within GE and resulted in improved productivity.

(8) Boundary-Less Integration in Internal and External Resources
Welch wanted to make GE boundary-less internally and externally. Internally, his challenge was to link GE’s 14 businesses in order to leverage the ability to transfer the best ideas, knowledge, and people freely and easily across the different businesses with no boundaries to hamper that movement.

External customers were part of GE’s marketing functions, meeting outside needs, and suppliers were partners in the overall business process. Welch’s organization concept was to get rid of all bottlenecks and make simple and effective resource flows the primary system. This proved to be difficult to implement, but he challenged people to realize the concept in their workplaces, and GE’s productivity improved as a result.
3.1.2 The Immelt Era: Challenges for Organic Growth

In September 2001, Jeffery Immelt took over the reins of GE from Jack Welch—six days before the tragedy of September 11th. It portended an adverse beginning for Immelt, but he got through the effects of 9/11, and soon announced his commitment to 8% annual growth—which was viewed as totally unrealistic by analysts at that time. His strategy was to leverage the company's size and diversity as a source of strength and drive GE's growth by investing in places that others could not easily follow.

Immelt believed it was necessary to focus on organic growth, as well as M&As, in order to maintain the company's annual growth rate. In a media interview, he stated: "We have to change the company—to become more innovation driven—in order to deal with this new environment"³. Immelt developed six processes for organic growth:

1. Customer focus: GE promotes growth by satisfying customers' desires.
2. Innovation, which generates new ideas and turns the ideas into actual products.
3. Excellent technology, which creates excellent products, content, and services.
4. Commercial excellence, which fosters human resources in the company's global business.
5. Globalization, which seeks business opportunities worldwide.
6. Global leader, one who promote GE's growth by supporting its customers

(1) A Focus on Growing the Business

Immelt was a portfolio manager who assessed every business and concentrated resources only on businesses that were expected to produce high profits and growth and that cut out unattractive businesses at the same time.

GE's 2006 portfolio included six major business units. GE is a very diversified company that has integrated completely different business categories.

1. Health care ($15 billion revenue, $3 billion profit)
2. NBC Universal ($15 billion, $3 billion)

3. Infrastructure ($42 billion, $8 billion)
4. Industry ($33 billion, $3 billion)
5. Commercial finance ($21 billion, $4 billion)
6. Consumer finance ($20 billion, $3 billion)

(2) Imagination Breakthrough

Immelt wanted an innovation mechanism in which dramatic innovation could emerge systematically by leveraging GE’s huge technology and human resources bases. “Imagination Breakthrough” (IB) was the mechanism for identifying opportunities for organic growth. Each project in Imagination Breakthrough was discussed from four perspectives:

1. a technology innovation
2. an idea that provides value to GE and customers
3. an opportunity to enlarge a market
4. a project that produces an excellent product idea

Immelt’s plan was to invest $5 billion in Imagination Breakthrough for four years beginning in 2004 and eventually produce revenue of $25 billion. He challenged marketing directors to develop five proposals for new growth businesses. He closely monitored 35 green-light projects out of 50 IB proposals.

(3) Returning to a Technology Company

Innovation was more important for Immelt than it was in Welch’s era because economic growth in developed countries was no longer robust, and GE needed to find new ways to boost growth. Immelt’s strategy focused on technology and can be summarized as follows:

1. *Return to a technology company but on a global scale.* Immelt believed that technology was important because it was the only thing that could produce highly profitable products that would enable GE to win the competition and create new markets. During Immelt’s management, long-term research was encouraged over short-term targets.
2. **Promote globalization.** Immelt wanted to leverage global human resources. He opened R&D labs in China and India to use the excellent talent there, survey those growing market needs, and construct sales branches in the huge potential market.

3. **Bet on three promising businesses.** Immelt bet on health care, show business, and infrastructure. Those three business segments have grown to $15 billion in revenue ($3 billion profit), $15 billion ($3 billion), and $42 billion ($8 billion), respectively.4

(4) **Reforming Research Laboratories**

The 2002 budget for research labs was $2.6 billion (up from $2.3 billion in 2001) with 2,300 global research staff.5 The research labs' mission was to create business. Immelt said that if inventions in the labs did not end up going to market with a GE sticker, the research labs would be considered to have failed.

He forced the research labs to transform themselves into more effective organizations. First, he stimulated the labs by bringing in creative people from outside, such as IDEO (design consultants). The labs also invited the CEOs of each GE division to the laboratories to participate in highly strategic discussions.

Second, GE expanded its network of research labs outside the U.S. to locations such as India and China in order to reduce cost and have access to talented human resources in those areas. India has excellent researchers in organic chemistry, physics, and mechanical engineering, while China has strong material scientists.

Third, Immelt ordered the research labs to slash the number of projects in each lab from more than 1,000 to around 100 that were highly focused. By doing this, the R&D budget could be concentrated on strategic projects with high potential.

(5) **Fostering Leadership for Organic Growth**

Both Immelt and Welch made considerable efforts to develop human resources and to motivate managers. For instance, one-third of Immelt’s work hours were spent on human resource affairs, and he spent the month of April assessing 600 managers. In Innovation

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4 Rothschild, William E. analyzes the three focuses in detail in his “GE Sekai-ichi tsuyoi kaisha no himitsu [The Secret To GE’s Success]". 2007

5 The numbers are derived from Business Week “How GE is Reinventing Invention”, http://www.businessweek.com/magazine/content, October 2003
Breakthrough, Immelt challenged business leaders to identify new growth platforms that would generate one billion dollars. He also selected 20 leaders for a “Commercial Council” and met with them once a month. Every manager was required to develop his/her own strategy to increase GE’s organic growth rate from 4% to 8%.

Immelt defined five leadership behaviors that would drive GE’s organic growth:

1. An extended focus
2. An ability to think clearly
3. Imagination and courage
4. Inclusiveness and connection with people
5. In-depth expertise

3.1.3 Summary

Restructuring

During Welch’s management, GE made dynamic changes in the business field, moving from traditional businesses such as power transformers, housewares, air conditioning, and aerospace to plastics, medical, and financial services. This transformation required a large-scale restructuring, including the reduction of 10,000 employees. Welch said it was a necessary part of the restructuring, and he made great efforts to soften the blow. The restructuring, which gave the company the ability to deal with changing markets, was an essential part of GE’s success.

Corporate Culture

Welch tried to eliminate internal bureaucracy, which hindered efficient communication between the CEOs and businesses and among different divisions. In order to realize his three objectives of simple, speedy, and self-confident, he had to simplify the organization structure and get rid of bureaucracy.

He also required employees to look at the outside world and to change their culture fundamentally in order to match themselves to market needs. To realize these culture changes in the actual workplace, Welch set up a forum called Work-Out where people from different businesses gathered to discuss how their business or work could be more efficient.
**Organic Growth**

GE was required by its stakeholders to grow continually, and Immelt tried to leverage the company’s internal technological capabilities as well as complement its insufficiencies by acquisition. In order to activate the company’s innovation mechanism, Immelt strengthened the marketing function to lead Innovation Breakthrough projects.

Immelt expected research labs to behave consistently with the company’s marketing strategy. At the same time, the labs were encouraged to become more open to the outside world in order to deal with the changing market.

**Innovation System**

GE has a systematic decision-making system, including a portfolio framework and Innovation Breakthrough. Its portfolio had a long history and was examined thoroughly. It was especially useful when the company had to decide important M&As during Welch’s management tenure.

In order to decide what innovation project to focus on, the Innovation Breakthrough framework was useful it could evaluate a new technology over the long term. The systematic decision framework was necessary for a large diversified company like GE.

**Fostering Leadership**

GE has an excellent corporate culture that nourishes employees from front manager to senior executives. It has a Commercial Council, Innovation Breakthrough proposals, and even a process for selecting the next CEO. Every manager is expected be a leader in driving organic growth, and is required to think deeply about GE’s corporate strategy. A firm belief in the importance of human resource is one of GE management’s strengths.
3.2 3M: Entrepreneurship in a Large Organization

3M, a multinational, technology-based company, is well known for a wide range of products, including Post-it Notes, Scotch Tape, optical materials, sandpapers and electric components. The company’s business model is different from that of NTT in providing those diversified business products. Knowing how this large company (more than 75,000 employees) can keep entrepreneurship in the organization would be valuable for NTT to learn and implement.

3.2.1 William McKnight: Self-Organized Culture

3M began as a self-organized entity where frontline workers developed new products and the entire organization functioned actively. There were 6,000 3M engineers around the world who tried to communicate with each other and exchange ideas autonomously, and as a result numerous new products were developed. 3M's original policy was to be effective in order to maximize the resources of the company and to create new products by joining organically the ideas from many intellectual people.

The self-organized culture went back to William L. McKnight, CEO of 3M from 1949 to 1966, who said: “Those men and women to whom we delegate authority and responsibility would like to do their jobs in their own way if they are good people.” Since its founding in 1902, 3M has maintained a culture that gives researchers and engineers as much freedom as possible. Senior management historically has believed that employees who deal with customers can decide the right course of action and deal correctly with the changing markets just as well as management people.

3.2.2 James McNerney: Seeking Efficiency Through Discipline

James McNerney, CEO from 2001 to 2005, introduced rigid discipline into 3M where an atmosphere of freedom had prevailed for more than 100 years. McNerney cut the workforce by 8,000 people (11% of the total) and brought in GE’s Six Sigma program, a series of management techniques to decrease production defects and increase efficiency.
Investors welcomed McNerney’s approach to boosting earnings by cutting a bloated staff and correcting inefficient workflow.

In 2001, McNerney cut operating expenditures by 22%, but he held R&D funding at the same level from 2001 to 2005 although R&D was rigidly systematized according to Six Sigma procedures. However, his efficiency program seemed to discourage creativity. Only one-quarter of sales came from new products released in the past five years, well below the target of one-third (see Figure 3.4).


3.2.3 George Buckley: Restoring 3M’s Innovation Culture

In 2005, a new CEO named George Buckley came on board, and it has been his task to manage the tension between innovation and efficiency. Buckley loosened somewhat the rule about the researchers’ obligation to Six Sigma; he knew there would be little creativity in an atmosphere of confinement. It has been said that one successful business can only come from going through 5,000 raw ideas. The Six Sigma process, useful for enhancing the quality of a fixed goal, cannot always be applied to all activities.

Buckley’s strategy was to recover 3M’s innovation culture in order to achieve a scenario in which at least one-third of sales came from new products that had been commercialized in the past five years. Buckley raised the R&D budget by 20% to $1.5 billion reallocated to core areas, 45 in all, ranging from nanotechnology to flexible electronics.

3.2.4 Seven Tactics for Innovation

After more than 100 years, 3M still maintains its innovative culture. Larry Wendling, Vice President of Research at 3M, told me that the company’s culture of innovation was passed down from person to person throughout the company’s long history. At 3M, innovation was defined as the coupling of a differentiated technology with a customer need and developing something that had not been invented before. Wendling identified seven tactics that characterize 3M innovation:

- **Top-down commitment**: Everyone at 3M is committed to innovation, from the CEO to the floor sweeper. 3M spent $1.24 billion on R&D in 2005, and one-fifth of that amount was for basic research that would not bring immediate commercial results. The CEO’s strong commitment to innovation is necessary to maintain the innovative environment.

- **Culture of individual freedom**: 3M’s CEO changed every five years, on average, for 40 years. Early on, William McKnight defined the company’s philosophy as an innovative culture, which was given to every new scientist who joined the company. Newcomers learned other philosophies quickly, such as “Hire good people and let them
do their job in their own ways. Tolerate mistakes.” Today, newcomers are impressed when told about famous success stories of 3M innovations like the first audio tapes and Scotchgard, and these experiences formed the basic character of 3M’s researchers.

➢ **Multiple Technologies**: A broad technology base is a strong tool supporting 3M innovation. 3M had 42 technology platforms to which any researcher can take an idea and apply it to his/her own invention. For instance, from the platform of layered plastic lenses, several prominent innovations were born, including reflective highway signs and golf gloves, which helped golfers tighten their grip without squeezing as hard.

➢ **Networking**: 3M encourages its researchers to develop an informal network among other researchers. The Technical Forum, where all of 3M’s 9,700 researchers gather once a year, is the best place to broaden their informal network. In the symposium, every researcher knows what everyone else is engaged in, and new network contacts often prove helpful for researchers who might need advice and help with pulling together a team for some project.

➢ **Reward and Recognition**: 3M rewards employees for their outstanding work. What motivates a researcher is doing good work and then being recognized by his/her colleagues. 3M set up an honor system where prominent researchers are nominated and selected by their colleagues for their scientific achievements. Colleagues select researchers who do something significant technically that also resulted in good commercialization.

➢ **Quantity Assessment**: 3M evaluates the performance of its researches based on how much 3M revenue comes from products introduced in the past four years. The target is 30%. Using this evaluation standard, management can assess which labs have done well and which labs fell short.

➢ **Tie to Customers**: 3M requires researchers to be tied to their customers. Researchers spend time understanding their customers’ needs, analyzing feedback from their customers, then incorporating their wants and needs into research work. Many innovative 3M products have evolved from discussions between researchers and their customers.
3.2.5 Invisible Innovation Culture Shared in 3M's History

Roger Appledorn was a prominent 3M researcher who had more than 30 patents within the micro-replication technology platform. He was urged to organize his experiences in research and summarize them into clear innovation tips. His successful method of innovation management can be divided into three important facets: Organization Culture, Communication, and Management Style.

(1) Organization Culture

➢ **Heroes:** Heroes challenge difficult problems and achieve success, which is a strong motivation to other researchers.

➢ **Freedom:** Freedom should be strongly encouraged and supported by the company.

➢ **Excitement and Anticipation:** There should be excitement and an air of anticipation about what we were doing.

➢ **Never Give Up:** We should not give up when management rejects our ideas but go back and see if we can find a new way to make it acceptable.

➢ **Value in Failure:** If a project fails, management should not assign blame but recognize the experience as a valuable learning experience.

➢ **Fun:** Researchers enjoy a challenge; it is fun for us.

(2) Communication

➢ **Mentoring:** Nobody assigns a mentor to each researcher in 3M. But it occurs naturally that senior researchers are willing to be a mentor, to teach and guide juniors through one-on-one communication.

➢ **Ambitious Goals:** Target are not incremental but should be ambitious. Mentors help support these challenges.

➢ **Opening Doors:** Mentors strive to open doors for researchers.

➢ **Interface with Customers:** Researchers should have opportunities to interface with customers as well as their own management.

➢ **Rewards:** Researchers like to be rewarded and recognized for their accomplishments.
(3) Management Style

➢ **Personal Involvement:** Management should always be aware of what is being accomplished in research.

➢ **Eliminating Barriers:** Management should help researchers overcome barriers that could hinder their work, such as hiring freezes and budget constraints.

➢ **Breaking Rules:** Management should let researchers break rules if it becomes the right thing to do.

➢ **Trust and Credibility:** The management team and researchers should trust each other and communicate in good times and bad. When a project goes wrong, management should discuss the reasons for failure with the researchers and offer assistance to overcome the situation.

➢ **Risk Taking:** Management should share project risk.

➢ **Champion Recognition:** Management should recognize the accomplishments of researchers and give them credit.

3.2.6 Technology Platform

At 3M, more than 500 kinds of products were produced in a year. The company’s R&D environment leveraged key fundamental technologies owned by 3M to develop various products. 3M called the series of fundamental technologies a “technology platform.” The strategy was to commercialize new products by adding new ideas to the existing fundamental technology. For example, 3M’s microscopic duplicating technology was applied to hundreds of competitive products such as OHP lens, magnetic optical disks, sandpaper, optical reflection material, and so on. Estimated revenue was more than $900 million.

3.2.7 Product Out

The number of R&D staff is 6,500 in 31 labs around the world with a budget of $1.1 billion. 3M’s R&D is very good at interpreting what customers really need. 3M meet frequently with customers to ask what they want next. 3M uses this customer information to understand the market and pinpoint the best innovation. However, 3M’s product development style is “product out” rather than “market in.” This means that researchers and engineers are responsible for listening to customers’ needs.
3M’s basic policy for product development is as follows.

- Develop a strategy by considering non-technical characteristics such as customer communication ability, business launch from a global viewpoint, and partnership with customers in other countries.
- Keep flexible and speedy to deal with changes in the market and competition.
- Boost sales of new products by combining existing products and existing businesses.
- Enter new markets with existing products and reconsider applications of existing products.
- Develop new markets and uses for new products.
- Maintain close relations with customers and capture useful information to connect their needs and our seeds.

3.2.8 Lead User Research

3M introduced a new innovation mechanism called “Lead User Research.” The idea was originally developed at MIT, and 3M sent a researcher, Mary Sonnack, to study the concept. The concept is that certain customers’ experienced needs could be invaluable sources of innovation. Statistically, most big hit products come from users’ ideas rather than manufacturers. Also, most innovative needs come from lead users rather than individuals or companies. Sonnack was impressed with the idea from MIT, and in 1993 proposed that senior management introduce the methodology. Senior management agreed.

Sonnack’s first task was finding breakthrough products for the Medical Markets division in 1996. In this case, the lead users were six people who were prominent specialists in their areas: psychologist, scientist, microbiologist, chemist, marketing manager, and product designer. A workshop was held, and out of it came three recommendations about tools to improve microbial control in surgery, such as economical drapes to high-end devices. Surgical doctors, designers, and chemists held intense discussions about use, safety, cost, and future markets, and they produced an impressive proposal.
3.2.9 Summary

**Corporate Culture**

3M is a self-organized company where people think autonomously, not because of orders from upper management. A culture of innovation has been rooted in 3M since its earliest days and can be found from the CEO to the lowest line managers. Researchers are also self-motivated. When Mary Sonnack introduced Lead User Research, she took great pains to explain the need for it. Finally, a technology platform was established to open up communication and information both inside and outside the company, which helps employees to share information autonomously.

**Product Out**

Although 3M works hard to understand its customers' needs, the company’s original strategy was to bring 3M products out to the markets rather than importing in customer needs. In Lead Users Research, 3M focuses on understanding market needs by qualitative inquiries to lead users. 3M also identifies innovative ideas by communicating with diverse experts. Identifying appropriate Lead Users takes time, but when examined carefully, it can produce truly reliable and innovative ideas.

**Organization**

3M has a historically entrepreneurial corporate culture. The CEO’s strategy is to blend the advantages of a large company with the entrepreneur’s culture. This is difficult but 3M manages to remain flexibility by giving its field managers complete responsibility and freedom. It has been described this way: “The company is gigantic, yet it is as innovative and as full of growth potential as though it were a small venture.”

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6 International directory of the company history describes this entrepreneurial culture.
3.3 P&G: A Connect-&-Develop Strategy With the Outside

P&G, a global manufacturer of consumer goods, is considered one of the world's most successful companies in terms of revenue growth, brand management, and innovation culture. In this section, I focus on P&G's strategy of communicating with sources outside the company and leveraging a sizable number of talented people. P&G's innovative system of communicating with outside sources may be useful to NTT by suggesting some key factors for NTT to generate more innovative mechanisms within its organization.

3.3.1 Challenges Facing P&G

P&G engages in the production of consumer products. It is well known for its long corporate history of successful global and innovative culture that began in 1837. Many of its most well-known products can be found in homes around the world, including Tide laundry detergent (1948) and Pampers disposable diapers (1961), although the company also has an extensive business in health care and cosmetics. In 2002, 13 of P&G's brands ranked in the top 70 companies on the Fortune 500. Current sales are almost $70 billion and growing.

In the late 1990s, P&G faced stagnation in its growth, and senior management recognized that P&G's traditional system of innovation was not sufficient to ensure continued growth. Two of its biggest problems were inefficient R&D and ever-increasing R&D costs. In 1999, P&G announced an aggressive restructuring plan, "Organization 2005," but despite organizational changes that occurred as a result of the plan, the company's revenue and profit continued to stagnate.
3.3.2 Reforms for Organic Growth

In 2000, Alan Lafley became CEO of P&G, and he began to transform the innovation system, seeking first how to maintain sustainable growth. His target was 4-6% growth per year, considering that the market itself was growing at 2-3% per year. In order to increase its market share, P&G tried to penetrate into adjacent related sectors and to create new categories of business.

Lafley was loved by P&G employees for his style, which was soothing and persuasive compared to his predecessor, Durk
Jager. However, Lafley was also decisive in his management style, such as dealing with large acquisitions, replacing more than half of the company’s top 30 officers, cutting 9,600 jobs, and moving more women to senior positions.

Lafley had three mantras:

- The consumer is boss.
- The first moment of truth: how the consumer reacts to the product on the shelf
- The second moment of truth: how the consumer reacts when actually using the products. It was important to identify what produced the “wow factor.”

3.3.3 Open Innovation System to Connect with Outside Resources

Lafley changed the innovation process from a traditional, closed, hierarchical model to an open model. First, he chose eight to ten core technologies with which P&G could lead the world. P&G went through every project in detail and narrowed the list by two-thirds. Then it concentrated only on limited competitive research areas for its R&D investment.

Second, Lafley opened its research to others outside the company in order to obtain new ideas by utilizing millions of excellent researchers worldwide. P&G collaborated with outside sources, especially at the front end of product development because the company had been historically strong in manufacturing phase.

Third, P&G globalized its R&D platform. It built an R&D center in China and then distribution centers in other Asian countries. This not only reduced costs but also gave the company access to high-level human resources and a potentially huge market. Through its global research labs, P&G obtained distinctive inventions.

Lafley focused on nourishing innovative leaders. He developed a highly individualized, inspirational leadership program for prominent managers.

3.3.4 Introducing Designers into R&D

Lafley emphasized design—something P&G had not paid attention to historically. He relied on the designers’ intuition. They worked with R&D staff to conceive new ideas for products and test the ideas using prototypes. He established a new executive position that is responsible for product design, and he quadrupled the number of designers. He also built what is called an “Innovation Gym,” a place that trains managers in design thinking.
In 2003, members of the Design Board (non-P&G designers who provide independent perspectives about products) included a partner from a New York City design firm; a design head from General Motors; a managing director from Fred Segal Studios; the CEO of IDEO; a dean from the College of Design, Architecture, Art & Planning at the University of Cincinnati; among others.

3.3.5 Connect & Develop Strategy (C&D)

Lafley knew that most of the company’s distinctive innovations had emerged as a result of the convergence of ideas from different organizations. He wanted to utilize the millions of prominent researchers in the world by networking with them in the same IT infrastructure in a model he called the “Connect and Develop” (C&D) innovation model. Lafley broke C&D into processes that were consistent and reliable so people could build a portfolio of innovation. As a result, by 2006 P&G had achieved 6% organic growth for the previous five years.

The C&D model enables the company to identify promising ideas anywhere in the world and apply P&G’s resources (R&D, manufacturing, purchasing) to create better and cheaper products. Lafley set a goal that 50% of what P&G commercialized should come from innovations that were partnered from outside the company. In 2006, more than 35% of new products had elements derived from outside P&G, and R&D productivity had improved by 60%.

(1) Search for Innovation

P&G chooses critical technology areas that are consistent with the company’s corporate strategy and customer needs. First, senior management asks all the business units what kind of consumer needs will drive the growth of their brands. Based on the response from the business units, the top ten consumer needs list is created. These needs are broken down into scientific problems and linked to research labs.

(2) Adjacency Maps

Based on the top ten consumer needs, P&G finds new products or concepts that take advantage of P&G’s existing brand or equity. Creating an adjacency map occurs with the
collaboration of internal staff, the marketing manager, researchers, and external “technology entrepreneurs.”

(3) Technology Game Boards

P&G evaluates how newly acquired technology can affect products in other categories. The board simulates which technology will strengthen the company, or if it is one that the company should acquire in order to become superior to its competitors.

The C&D network is divided into two categories: closed proprietary networks and open networks available to any company. Based on the C&D model, researchers systematically look for ideas in government labs, private labs, and academic researches.

> Closed Proprietary Networks

- *Technology Entrepreneurs*

  Lafley chose 70 technology entrepreneurs from around the world. These are P&G executives who are responsible for creating the customer needs list, adjacency maps, and technology game boards based on their technological insight. The entrepreneurs also build external connections with university and industry researchers and actively promote P&G decision makers to use the external connections to learn about new business ideas. Technology entrepreneurs research academic documents and visit international workshops to investigate new ventures and ideas.

- *Suppliers*

  Fifty thousand R&D staff from the company’s top 15 suppliers represent an enormous potential source of innovation. P&G provides a secure IT platform that enables P&G researchers to share technology documents with researchers at the suppliers. The number of innovation projects jointly staffed by P&G and its suppliers increased by 30% after the supplier network was developed.
Open Networks

P&G has built an open network that enables the dynamic exchange of information across national boundaries and encourages researchers inside and outside to create innovative ideas from collaboration.

- **NineSigma**
  
  Nine Sigma is the framework that connects companies that have science and technology problems with other companies, universities, governments, and private labs. Nine Sigma has already distributed technology briefs to 70,000 researchers, and 100 projects have been completed.

- **InnoCentive**
  
  InnoCentive is similar to Nine Sigma but connects companies on more narrowly defined scientific problems.

- **YourEncore**
  
  P&G enlarged the range of intellectual human resources to include even elderly people who once were prominent researchers in the company. Your Encore connects 800 high-performing retired scientists and engineers with clients.

- **Yet2.com**
  
  P&G has built an on-line market for intellectual properties called Yet2.com where technology can be transferred into and out of companies, universities, and government labs.

3.3.6 Summary

**Open Networking**

P&G has brought an enormous amount of external knowledge and technology into the company’s core strategy. P&G defines itself as a network hub where needs and technologies intersect. P&G focuses on technology and globalization. The company assigns 70 technology entrepreneurs for R&D direction and networking, and they have the responsibility to build corporate strategy.

All of these frameworks evolved from the CEO’s decision to invite external technology from outside to compete in changing markets. Currently the open network has been enhanced as P&G’s corporate culture and DNA.
**Designers**

Lafley made an extensive effort to improve the design of P&G products. However, the resulting entities and strategies, such as the Design Board, have had enormous positive results. Customers often purchase a product because of its design, and design can improve the convenience of handling a product. It is observed that design is increasingly becoming a more essential part of innovation in various businesses such as automakers and computers.

**Organization**

P&G’s organization is flexible in order to deal with rapid changes in the world, which is apparent not only in Lafley’s leadership but also in P&G’s historical corporate culture. For many years, P&G has been providing consumer products globally. The company has considerable experience dealing with market changes in other countries and has realized that a flexible organization is absolutely necessary.

Lafley makes every effort to communicate with all employees and people love him. When developing a corporate strategy, such as identifying the top ten customer needs, all the business units are involved. Innovative frameworks, such as the C&D model, are well organized and easy to follow. Culture, leadership, and system—all three elements work positively to make the company flexible.
3.4 Characteristics of Innovative Companies

In this section, I discuss the key success factors of the four companies I surveyed. The process I followed to extract the key elements was:

1. I picked important elements from the analysis of each company.
2. I categorized those elements by combining similar ones into the same group. As a result there were five categories: Strategy, Culture, Organization, Innovation System, Research

I evaluated each company by comparing the four companies. Table 3.1 summarizes the key success factors.

Table 3.1. Characteristics of Innovative Companies (IBM, GE, 3M, P&G)

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Customer Orientation</th>
<th>IBM</th>
<th>GE</th>
<th>3M</th>
<th>P&amp;G</th>
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<td>Gerstner's high priority policy was focusing on customer.</td>
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<td>Organic Growth</td>
<td>Sam committed 5% annual revenue growth.</td>
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<td>Technology Focus</td>
<td>Technology brings high profit margin service.</td>
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<td>Long experience in global business</td>
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<td>Business Model Change</td>
<td>Gerstner shifted from hardware maker to IT service provider.</td>
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<td>Leverage Size &amp; Diversity</td>
<td>Gerstner kept one integrated entity which had dynamic capabilities.</td>
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<td>Portfolio Decisionmaking</td>
<td>GE was the inventor of sophisticated Portfolio management tool.</td>
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Notes:
- △: Important element
- △: Less important element
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<th>Corporate Culture Penetration</th>
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<td>Gerstner talked with employees patiently to share common values.</td>
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<td>Lafley made three mantras.</td>
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<td>(1) Market is driver who has significant concern about quality and stockholder evaluation.</td>
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<td>(1) The consumer is boss.</td>
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<td>(2) Technology company minimizing bureaucracy focusing on productivity.</td>
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<td>(2) The fist moment of truth (how the consumer reacts to the product on the shelf).</td>
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<td>(3) Measured by customer satisfaction and stockholder evaluation.</td>
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<td>(4) Entrepreneur company minimizing bureaucracy focusing on productivity.</td>
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<td>It was important to identify what gave you the &quot;wow&quot;.</td>
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<td>(5) Strategic vision entrepreneur who promotes the growth.</td>
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<td>(7) Teamwork cooperation entrepreneur who promotes the growth.</td>
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<td>(8) Sensitive to local community entrepreneur who promotes the growth.</td>
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<td>Corporate strategy teams coordinates the issues between departments and allocates resources.</td>
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<td>70 Technology entrepreneurs bring creativity from outside the company.</td>
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<td>Portfolio provides the direction in what area GE should invest on.</td>
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<td>Historically, global branches had a dominant power but Gerstner diluted them.</td>
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<td>Central management worked well to change organization flexibly.</td>
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<td>Each different BU has the right and accountability for its business.</td>
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<td>Historically, global branches had been strong but central management were necessary to coordinate.</td>
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<td>Researchers have responsibility for the projects and self-initiative.</td>
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<td>Research is 3M’s main engine to create a core business by differentiating technology.</td>
<td>Boosting the organic growth by connecting different ideas into new categories of business.</td>
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3.4.1 Strategy

All four companies are customer-oriented, with strong back from their CEOs. Gerstner wanted to restructure IBM based on a renewed customer focus; P&G and 3M have historically emphasized marketing; Immelt changed GE’s culture to customer orientation.

Also, all four companies were focused on attaining organic growth. The stock market forced them to continue growing their revenue through M&As or organic growth. Targets were very large (5% to 8% annual revenue growth). Organic growth required innovation.

These are large traditional companies. They make great efforts to leverage their size and diversity. Gerstner kept IBM as a single integrated entity with dynamic capabilities. Lafley believed that P&G’s successful products came from a mixture of different products. 3M’s basic policy was to maximize the resources of their large company and join various ideas organically. Immelt’s strategy was to leverage the size and diversity of IBM.
3.4.2 Culture

The four companies successfully implanted the corporate strategy into their employees. The strategies were clearly stated and easily understood by everyone. When full dissemination was achieved, people made an effort to achieve the company’s targets without consulting with senior management at every turn. It is not easy to share one goal with everyone, but CEOs worked hard to communicate with their employees and ultimately succeeded in changing their corporate culture.

All four companies sought an entrepreneurial culture, but each one implemented it within the company in a different way. In 3M, the entrepreneur culture was a central part of the company for more than 100 years. People at 3M like to say: “The company is gigantic but it is as innovative and as full of growth potential as though it were a small venture.” P&G tried to be entrepreneurial by inviting the seeds of new innovation from outside the company via its Connect & Develop strategy. IBM and GE struggled to implement entrepreneurship by clarifying it in a corporate culture statement and involving creative personalities in corporate strategy decision making.

3.4.3 Organization

Most of the successful companies strove for organizational flexibility in response to outside changes. In general, traditional large companies find it difficult to change the organization structure and allocate the best employees to deal with changing circumstances. However, these companies managed to change themselves flexibly.

At IBM, Palmisano was quick to form a new team to deal with customer needs. Lafley’s leadership at P&G, combined with its lengthy global experience, made that company’s culture flexible. New and powerful decision-making structures, such as Imagination Breakthrough, enabled GE to deal with changing environments.

Cross-Functional Teams were a common part of their innovation. All four companies tried to break down the walls between internal divisions and those between internal and external. Integrating thinking and information from various backgrounds was critical. IBM was quick to form diversified teams consisting of consultants, salespeople, and researchers in order to respond to customers’ requirements. Lafley built diversity by inviting professional
designers to work with researchers. At 3M, Lead User Research brought in various background members.

### 3.4.4 Innovation Systems

All four companies established a systematic mechanism for innovation. The reason for having such systems was different for each company. P&G and 3M intended to invite creative new thought from outside the company, via such programs as Connect and Development Research and Lead Users Research, respectively. IBM and GE sought fruitful projects by leveraging their capabilities and experiences. IBM had several structural decision-making process, including EBO, SLF, and Corporate Fund, and GE had a similar structural research process in its Imagination Breakthrough.

Open Technology was a common feature among all four companies. There seemed to be two main purposes for Open Technology. First, a company might wish to sell its technology to others. This was a tradeoff between throwing off competitors by acquiring a dominant licensing position, or spreading their own technology by giving licenses to others. Today, the latter strategy works well. IBM focused on selling its technologies to markets and on open architecture software like Linux, which was a major threat to Microsoft.

Second, other companies wished to invite new thinking from outside to improve the company's innovative capability. At P&G, Lafley set a target that more than 50% of innovation should come from outside via the Connect and Development research. At 3M, Lead User Research was the way to listen directly to the needs from outside.

### 3.4.5 Research

Among these innovative companies, the mission of research became a major piece of the corporate business strategy. In the past, in general, research had nothing to do with business. However, seeking organic growth and effective use of researchers, the companies made a big effort to connect research laboratories with business output. For IBM, the mission of Research was to analyze large technological change, create a future for IBM, and bring new values to customers. At P&G, research boosted organic growth by connecting different ideas into new categories of business. At 3M, research was the main engine for creating a
core business using differentiating technology. At GE, Immelt said that if an invention did not go to market, the view would be that research had failed.

All four companies concentrate their investment only on major research topics. At P&G, Lafley focuses only on 8 to 10 major products; 3M focuses on 45 core research areas; at GE, Immelt reduced the number of projects from 1,000 to 100 highly focused ones. Research themes were dramatically restructured and made successful.

From the summary table that shows the Characteristics of Innovative Companies (refer back to Table 3.1), I chose 10 factors that are common to all four companies or that are considered to affect the company strongly enough to make it innovative. The ten factors are as follows.

**Strategy**
1. Customer Orientation
2. Leverage Size & Diversity

**Culture**
3. Corporate Culture Penetration
4. Entrepreneur Culture

**Organization**
5. Flexible to Changes
6. Cross-Functional Team

**Innovation System**
7. Systematic Mechanism
8. Open Technology

**Research**
9. Research Mission’s Weight
10. Concentration on Major Topics
In this chapter, I analyze the process issues of innovation rather than the organizational ones. In every workplace, people work to create something valuable—a new service, an efficient operation, a new way to attract customers, etc. These creative activities are dramatically improved if the work process is managed properly. In a successful innovative process, people are motivated, topics are focused, time is well managed, risks are minimized, information is shared, and no bureaucracy prevails.

IDEO, a creative design company, is well known for establishing original innovative processes in the workplace. IDEO’s are examined here and some key elements could be applied to NTT’s workplace in order to transform the culture and behavior of people.

4.1 A Background of Creativity

IDEO was founded in 1991 by the merger of two design companies. David Kelley, a Stanford graduate who specialized in product design and engineering, became CEO. Kelley’s vision for IDEO was to produce aesthetically pleasing products that were also technically competent. Kelley believed that design could be as strong a driving force as function for encouraging customers to adopt a product.

IDEO’s clients can be found in virtually every industry, from computer manufacturers (Apple Computer and NEC) to traditional railway operators (Amtrak). Major products designed by IDEO were the Apple Mouse (1983), Sports wristwatch with altimeter (1994), soft-handled toothbrushes (1996), and a portable defibrillator for emergency treatment of cardiac arrest (1996).

IDEO strove to improve the work environment in order to bring out innovation. Kelley surveyed the workplace interactions through suspended video cameras in order to
optimize office design. He reviewed all completed projects, looking for possible design improvements or innovations. Currently, many established companies are interested in IDEO’s innovation process and environment as well as its highly sophisticated design products.

Kelley explained why creativity is important for any company. He gave examples, such as Apple’s i-Mac and the Volkswagen Beetle. Those designs caught people’s attention, while enhancing the brand image of the respective companies. Kelley considered those products to be valuable innovations. He believed that people sought creative products. Successful companies should build a corporate culture where employees can create products that stimulate people’s imagination. Management should accept bold ideas and risk, and not condemn the occasional failure caused by a challenge.

4.2 IDEO’s Basic Innovation Process

During my research, I heard more than once that people who visit IDEO’s office comment that the atmosphere is so chaotic they cannot understand why so many superstar products had been developed there. However, Tom Kelley, co-founder of IDEO with his brother David, explained the five key steps of innovation at IDEO:

1. **Understanding**: Understand the conditions surrounding the market, clients, technology, and problems.

2. **Observation**: Observe people’s behavior in actual situations and learn why they behave that way.

3. **Visualization**: Draw a completely new concept and a visual presentation of how people will use the product. IDEO often uses figures and computer simulations. However, IDEO also makes a prototype. Other times a story board or a video that shows how to use the product, can be effective.

4. **Assessment and Brush up**: Make a lot of prototypes for a product in short time period, then evaluate and modify the prototypes continuously. Listen to reactions to the prototypes from internal project team members or people in the target market.

5. **Realization**: The commercial product is finally manufactured.
4.3 Process Innovation Tactics

4.3.1 Observation

At IDEO, the first important task is to observe people's behavior. Major IDEO products, such as the toothpaste tube that stand on end, fishing goods kits, a high-tech blood analyzer, and flexible office shelves were designed by observing people. An IDEO team member actually visited people who use similar products and who would be potential users of a new product. They do not ask a research company, or monitor users, in order to survey desirable products. Tom Kelley believes that innovation comes from deep insight that is stimulated by observations of people. He said that observation by eye and ear is the first step to creating and improving a breakthrough product.

He conducts his own observations rather than give that task to other people. He found that customers often hesitate to express their poor impression of a product, even though they feel uncomfortable using the product. Customers often think their bad impression may be caused by their own unfamiliarity with a new product.

One of the fundamental principles at IDEO is that the best product should be compatible with every type of person, regardless of age, culture, height, or body type. For instance, IDEO was once asked to design a computer input device for 3-5 year old kids. As they worked on the assignment, IDEO members abandoned the notion of a mouse and instead created a trackball about the size of a softball. Because children's body size, mental development, and attention span were completely different from adults, rolling a trackball was far easier for kids than clicking a traditional mouse. And while this product was originally designed for young kids, it has been just as popular with adults.

4.3.2 Brainstorming

IDEO considers brainstorming an important part of the innovative process. IDEO has determined a specific structure for its brainstorming process, despite the fact that the company's culture virtually free of any regulations. IDEO brainstorming is different from a regular conference. Nobody takes notes. Members do not express opinions. Sessions last less than 60 minutes because brainstorming requires total concentration physically and mentally. It is not considered to be a job.
Tom Kelley said that brainstorming was the engine for idea generation, an unlimited opportunity to create ideas and solve problems. Good brainstorming brings out excitement and optimism. IDEO has defined seven secrets for good brainstorming:

1. **Narrow the focus:** We get a good start when we limit the scope of the topic and express it as clearly as possible. For instance, it is better to say: “In what way can a bicycle rider drink coffee without spilling it or getting scalded?” rather than, “Cup holder for bicycle.” Topic should be ones that brainstorming members can tackle deeply and solutions have no limitations. Topics should be more focused on the outside world rather than solving internal company problems.

2. **Rule with fun:** Members should not criticize or debate ideas that other people have proposed. This exhausts the members’ energy. We try to write down the rules on a wall: “Quantity rather than quality”; “Propose bold ideas”; and “Express your idea visually.”

3. **Count the ideas:** Counting ideas is useful for stimulating the members to be active during brainstorming. We also evaluate how the brainstorming has worked so far. In our experience, a good brainstorming can produce about 100 ideas per hour.

4. **Accumulation of power and jumping:** A facilitator should monitor the timing for accumulation and jump. According to Tom Kelley, there are three main stages during brainstorming. First it starts slowly to accumulate power, then rapidly climbs up the steep slope, and finally faces flatness. In the accumulation phase, the facilitator can broaden the scope of solutions, by saying, for example: “Are there any other ideas to prevent the bicycle rider from spilling coffee when hitting an obstacle?” In the flattening phase, the facilitator can change gears to ask members to think from a completely different perspective, such as “Are there any solutions whereby a bicycle rider could drink coffee without using his hand?”

5. **Relationship between memory and location:** Good facilitators write down the flow of ideas in a common place where members can share. Members can choose the best idea or go back to the beginning by chasing idea flows on the common board. It helps to put a big Post-it on the wall or spread white paper on the table.

6. **Stretch the mental muscle:** It is effective to stretch the mind before getting into brainstorming. Members are busy with their daily work, and unfamiliar members
often join the brainstorming. To pull their thinking away from daily troubles to the outside world and generate a friendly atmosphere is a prerequisite to starting a brainstorming session. It is also effective to spend thirty minutes visiting shops where the products related to the brainstorming topic are displayed.

7. **Visualization:** Good brainstorming is always visual. It is helpful to gather useful materials to make the product concepts more impressive visually. A competitor’s product, an excellent solution in other areas, or a technology that seems to be applicable to the target product—all would be helpful. Sometimes, members do “body storming,” where they express differences between the present use and future use.

### 4.3.3 Teamwork

Tom Kelley pointed out that teamwork is at the heart of IDEO’s methodology. He believes teamwork is the engine of innovation and business. A team is not a periodic conference that is held periodically. A “hot project” team should have a clear target and deadline, and after completing one mission the team should be dissolved and members given another target to wrestle. Kelley listed his requirement for a hot project team:

1. Members devote all their energy to the project with a strong belief in success.
2. Members battle boldly against unreasonable deadlines and difficulties.
3. The group is relaxed; there is no bureaucracy; there are jokes and funny actions regardless of a tight deadline.
4. The group is well organized, with diverse members who are chosen for their ability to contribute to the project, not by their age or political power.
5. The workspace is open and flexible with high ceilings and no walls.
6. Members are willing to go out anywhere to understand customer behavior.

IDEO developed a system of building a new team promptly to handle each project. Tom Kelley said they imitated a Hollywood film-making production: a film company picks up one script, gathers together actors and a director, a producer, and countless related individuals and companies. They all give their best efforts to build a strong team, then move
into high gear to finish the project by the deadline. IDEO’s hot project group is similar, and it is one of the most competitive characteristics of the company.

IDEO’s group members are highly motivated. One reason is that they can choose their own project leader. For example, a father of three children who cared deeply about making a better child safety seat was able to join the team developing a new child seat. He had a strong personal motivation, which undoubtedly helped him make a substantial contribution to the project.

4.3.4 Prototypes

IDEO emphasizes the importance of prototypes as an effective way to solve problems. Prototyping is at the center of IDEO’s innovation culture. IDEO defines it as a kind of “language” that expresses an idea visually. One project leader in IDEO insisted that he could not meet with a client without taking along a prototype. He prepared for the meeting as if it was a small show. Prototypes make a strong impact on clients as to what can be designed and created by IDEO.

Tom Kelley believes drawing pictures and modeling prototypes helps to come up with new ideas. He told the story of James Watson, 1962 Nobel Prize winner, who discovered the physical structure of DNA in a three-dimensional model. Watson said that he had to play around with the molecule model for a week before he could confirm that his theory was correct.

Prototypes can surprise people, impress them, and help them accept IDEO’s proposals. On the other hand, they help people make judgments as to whether to add or delete a function that may require a certain cost to implement. At IDEO, it is said that a high-quality prototype is equal to 100 pictures.

There are many ways to prototype. In some cases, project team members try to express a new service image by making a short movie. In another instance, members became actors in a short skit that expressed their ideas for a project.
4.4 Summary

Culture

A creative culture is a key part of the company. IDEO tries to create an atmosphere that is relaxed and encourages people to think more broadly. Failures caused by taking on a challenge are not condemned. IDEO takes risks, but it is more important for the company to nourish the creative culture. Management also strives to motivate people by enabling them to choose a project and its leader. I found it surprising that David Kelley himself wore a strange costume at the company festival and behaved as a funny character.

Innovation System

IDEO has developed a strong system that brings out creative products. Brainstorming is a good example. IDEO has considerable experience with successful brainstorming and uses it to narrow a project focus, count ideas, stretch mentally, visualize, etc.

In IDEO’s innovation process, observation is the first basic step, and team members are required to visit the location where the product will actually be used. Teamwork is at the heart of IDEO’s innovation and there are several key factors that go into making a good team, including dedication of all members, no bureaucracy, diverse members, open working space, and so on.

Customer Orientation

IDEO is good at communicating with customers. Prototyping is a strong tool. Customers can watch, feel, and imagine the product and situation in which people use the product. They can make decisions to modify specifications or even stop a project by examining the prototype long before the actual manufacturing takes place. IDEO members visit customer place to observe the situation, requirements, and problems. Close contact with customers builds trust between IDEO and its customers.
In this chapter, I will review the Japanese telecom industry, in which the market is changing, competition is becoming fierce, the growth rate is stagnating, new technologies are emerging, and deregulation offers the potential for new business opportunities. In order to survive, it is necessary for NTT to understand the dynamics of the business situation and then develop a competitive strategy.

5.1 Challenges Facing Japanese Telecoms

Currently, the Japanese telecom industry faces a big challenge. Revenue from fixed-line telephones has for years been the core source of revenue for the major telecoms, but today this source is declining rapidly, while the increase of Internet access revenue has not yet compensated for the decline. In addition, competition in the mobile market has become fierce, which has had a negative impact on the growth of each company’s mobile phone revenues. Under these circumstances, Japanese telecoms are now seeking new sources of revenue. In order to establish a new business, a new innovation based on some technology is a strong driving force.

5.2 Telecom Companies in Japan

There are three major telecom players in Japan. NTT is the largest, with one-third of its stock owned by the Japanese government. NTT was founded more than 100 years ago and has traditionally dominated the fixed-line phone sector, held about 55% of the mobile phone sector, and about 60% in the FTTH (Fiber To The Home) sector.

In 1999, the Japanese government forced NTT to split into different companies: NTT (a holding company), NTT-East (a local phone in the eastern region of Japan), NTT-West (a local phone in the western region), NTT-Communications (long distance and global services), NTT-DoCoMo (mobile phone service, separated out of NTT in 1992), and NTT-Data (IT
solutions provider, separated out of NTT in 1988). Figure 5.1 shows NTT's revenue and profits.

Fig. 5.1 NTT revenue and profit

KDDI is the second-largest telecom, established as a result of the merger of KDD (international phone service) and DDI (NTT's competitor in long-distance phone service). KDDI's greatest strength is in the mobile phone business.

Softbank is the third-largest telecom, established as a result of the merger of Vodafone Japan (mobile phone service provider) and Nippon Telecom (NTT's competitor in the fixed-line phone sector).
5.3 Current Topics

Today telecoms are involved in construct New Generation Networks (NGN) to provide broadband infrastructure that can provide higher and more secure communications. NGN is expected to be the breakthrough that will expand broadband markets. However, it is still unclear what kind of service will attract customers, who are needed in order to boost the market.

Mobile markets have developed dramatically in the past ten years and have actually reached the mature phase. Fierce competition has resulted in lower prices, and revenue is stagnating. Mobile phone service also needs a new source of revenue.

Various communication styles have emerged, such as Web2.0 and Second Life, where Internet users become the main player and information provider instead of an existing internet service provider.

Telecommunications and broadcasting will be bundled together as regulations are relaxed. As these market changes occur, there would be many opportunities for telecoms to expand their businesses.

5.3.1 NGN: A Huge Broadband Project

NGN has two main purposes. One is cost reduction, the other is new service creation. In the Japanese telecom market, broadband users are increasing rapidly, almost to the mature stage, with about 30 million customers using DSL, FTTH, and cable. Bandwidth per customer is also increasing, which will require more network capacity and represent a huge investment cost. Cost reduction is a major concern, and one solution is to integrate TCP-IP networks with traditional telecommunication networks. This is a role NGN would take.

NGN has also the potential to create new services and new businesses on broadband networks by leveraging high speed and security.

Currently NTT has made it a priority to introduce NGNs, while KDDI and Softbank are following. NTT has already executed a one-year field experiment to test the performance and use of NGNs, and in March 2008 it began NGN commercial service.

KDDI also began to construct an NGN, and it is focused on integrating its mobile network and fixed network. KDDI, which can provide any kind of bundled service because
of poor regulations, intends to use its NGN to attract customers by offering one-stop service for mobile, fixed, and broadband.

Softbank's strategy is to build a simple network and provide cost-effective service with an NGN. In 2008, Softbank began to integrate networks in a logical layer that will be completed in 2011.

NTT recently announced various applications of NGN services. They are upgraded services compared to existing broadband services. However, some members of the media are critical, saying that the services are not new but just better substitutes for existing services. NTT is facing the challenge of how to propose more attractive services that people really want and are willing to pay more for.

NGN services are categorized into home user services and enterprise user services.

- **Home user**
  - Sophisticated communication via a high-quality picture phone
  - High-definition TV distribution of movies, animation, and music
  - Multicast broadcasting of terrestrial digital media by Internet protocol
  - High-speed downloading of large-capacity software for game clients
  - More comfortable use of high quality and large capacity network

- **Enterprise user**
  - High-definition TV conference that creates direct and detailed communication
  - Robust security system that combines several technologies for customer identification
  - Web-based TV conference with management of members and documents
  - One-stop service for network and application software such as IP-VPN and SaaS
  - Several convenient working environments

### 5.3.2 Fierce Competition in the Mobile Industry

Currently, the number of mobile customers in Japan has reached 100 million, and the mobile phone has become an indispensable part of the infrastructure of Japanese society. Competition in the mobile industry is fierce after Mobile Number Portability (MNP) was
introduced in October 2006. MNP allowed customers to switch from one mobile company to another without needing to change their personal phone number.

Taking advantage of this opportunity, Softbank acquired Vodafone Japan in April 2006, and quickly began to take customers away from NTT-DoCoMo. After MNP was introduced, NTT is the only company losing market share, as Softbank and KDDI continue to expand their market shares.

Each company has its own strength. Softbank offers an extremely low price to attract new customers and provides attractive content in collaboration with Yahoo Japan, an affiliate company of Softbank and the largest Internet service provider in Japan. KDD attracts people because of its music download function which utilizes a 3G high-speed network.

5.3.3 New Service Competition on Mobile Terminal

A few years ago, two key competitive factors were (1) 3G feasibility, which allowed large-capacity content download, and (2) a variety of terminals in shapes, colors, and functions. However, those situations are changing. 3G has now spread to all three companies, and Internet use has improved to the same level as personal computers.

People now use their mobile phones not only for voice communication but also for Internet, music download, e-commerce, and broadcast Now. People are eager for sophisticated Internet functions on their mobile phones; Second Life on the Web, blogs, and SNS are also going to mobile terminals from PC use.

These days, the 3G network and the high function of mobile phones have accelerated the content business, especially in the area of entertainment. KDDI has developed a more convenient music download service by collaborating with PC software vendors. KDDI is focused on providing a platform that enables customers to enjoy real-time Internet battle games on their mobile handsets. On the other hand, NTT has made its terminals compatible with Napster's monthly fixed-price service for music downloading. NTT also competes in terminal development, which provides large memory capacity for gaming software downloads.
5.3.4 Mobile Companies’ Strategy for Wireless Broadband

Currently, each mobile company is developing its next-generation technology, which will allow even more network transmission capabilities. There are two main systems. 3.9G is the upgraded 3G system, which allows downstreaming at 100 Mbit/s. This technology is now in the experimental stage and will become available around 2010.

The other system, called Mobile WiMAX, has already proved its feasibility by allowing downstreaming at 46 Mbit/s. In Japan, the central government takes a major role in providing licenses to mobile companies. For WiMAX, the government allowed only KDDI and one PHS entrepreneur company to do business, in order to control the competitive balance of power. As a result, NTT and Softbank have no choice except to use 3.9G for wireless broadband.

5.4 New Service Trends in Japanese Telecoms

There are several macro trends in society and business that have some possibility of affecting the telecom market.

5.4.1 New Internet Uses

A new style of internet service is emerging, one that is shifting from supplier-oriented services to customer-oriented services. For instance, it is estimated there will be an estimated 18 million blog users, and 50 million SNS users in 2011. People enjoys exchanging their own content on YouTube and purchasing virtual estate on Second Life.

5.4.2 The Convergence of Broadcast and Telecom

Discussions about the convergence of broadcast and telecom have been going on for years. However, the legal environment has gradually improved in a way that finally supports convergence. First, the Japanese government is preparing to transfer all broadcasting to terrestrial digital broadcast from analog by 2010, which is pushing forward convergence because telecom’s high-speed network can become part of the broadcast infrastructure. In particular, NGN can provide a TCP-IP multicasting system, which is used for terrestrial broadcasting.
There are some worries that both business sides will lose money if convergence goes forward. However, convergence will produce a new business model that creates a new source of revenue for broadcast and telecom companies.

5.4.3 On-line Payment Platform

Today, a new concept of value, which includes more than monetary exchange, is spreading. For instance, points can be used for payment in shops that join the affiliated network. Also, mobile terminals can support credit payments. The target is small payment regions where many young people are likely to become customers.

There are still challenges to address, such as profit performance, number of customers, and a technology standard. Alliances among mobile telecoms, banks, credit card companies, and transportation companies, are required. However there is a huge potential to change the way for consumers to purchase.

5.5 Summary

The telecom industry in Japan is facing changes in its markets, in competition, technology, regulation, and lifestyles, among others. Companies need to take action to transform themselves to deal with the changes as well as to explore their position in the changing environment. Innovation will be a key issue in order to realign their resources, and adjust to the industry and to outside requirements.

Telecoms need to change their business model from that of a traditional telephone company to one that includes broadband communication as well. They need new sources of revenue and greater cost reductions. Telecoms should focus on organic growth and focus more strongly on meeting customers’ interests and needs. New emerging activities are shifting from the lower layer such as transportation, to the upper layer such as music, broadcasting, community, entertainment, purchasing, and so on. It is clear that just constructing NGN is not enough.

Whether NTT can propose upper-layer services that will be attractive people is the main issue. NTT is now commercializing its NGN service but still struggling to generate solutions that appeal to convenience and comfort of customers. For example, it should
reexamine the use of videophones and whether they are meeting a real customer need, by asking outside designers and actual customers.

Telecom companies should be more open to resources outside the company. New business opportunities are generally related to other industries. For instance, broadcast and telecom convergence requires negotiations about roles and revenues between two industries. An on-line payment platform business would require coordination between banks, retailers, and system providers.

NTT’s relationship with the government is critical because telecom companies cannot start any business if it runs counter to government policy. Open communication with outside parties, such as customers, partners, other industries, and the government will be mandatory if NTT hopes to launch a new business that expands out from the traditional network business.
Chapter 6

Introducing the Elements of Innovation into Japanese Telecoms

In this chapter, I will study how to apply the innovative elements I have identified in my analysis of innovative companies to Japanese telecoms, taking NTT as a typical example. I will present a scenario that introduces those elements from the five categories I abstracted in Chapter 3: Strategy, Culture, Organization, Innovation System, and Research.

6.1 Strategy
6.1.1 Customer Orientation

- Redefining NTT Business

Recently NTT faced a challenging period of transition in its business model—from traditional telephone service provider to a company that provides other profitable and growing businesses. In NTT's announcement of its new strategy, the new businesses will be broadband service, Fixed Mobile Convergence (FMC), and integration of telecom and broadcast. NTT needs to redefine its business model because the company may not survive if it continues to stick with its current shrinking business base.

In the case of IBM, Gerstner redefined the company's core business as IT solution provider when its market changed from mainframe computers to personal computers. It was a fundamental change of business model for IBM, which found that what customers sought was not merely a high-performance computer but a well-coordinated supporter that would be responsible for end-to-end IT solutions. Gerstner showed this future scenario to IBM employees, discussed how to change the organization, and motivated people to transform the company.

The same scenario can be applied to NTT. Business customers want an IT service provider who will back up each customer's business growth. Individual customers want one-stop shopping that includes Internet, mobile, cash transactions, and TV—all at a lower price. Customers are concerned about being flooded with too many choices of services and
products, and often cannot (or will not) decide what product from which provider will be best for them.

In terms of NTT’s new business, NTT should observe customer’s real needs and determine how to integrate NTT’s diverse human resources into a competitive business model. NTT should consider whether it can provide services and functions that people really want. This new service should be appropriately priced, and the service should sufficiently attractive so as to exceed customer expectations.

➢ Consistent Workflow

Customer wants one responsible person who will coordinate multiple services into one solution. However, a salesperson sometimes may be unwilling to deal with services that come from another division. This internal structure can result in a situation that is not satisfactory for customers. The salesperson should be able and willing to contact other divisions and then provide the customer with an integrated set of services.

Before Gerstner became CEO, IBM had difficulty providing coordinated service between regions. Each regional manager’s authority was autonomous, so they did not respond to customers as a single global company. This resulted in huge frustrations for customers. Gerstner changed the culture of regional branches and instilled his way of thinking into IBM employees.

NTT faces the challenge that, according to government policy, different companies must provide different services. Mobile is provided by NTT-DoCoMo; local phone services by NTT-East and NTT-West; long distance and international service by NTT-Communications. And the government is very serious about these regulations. At one point the government issued an administrative guidance to NTT to stop NTT-East from recommending the services of NTT-DoCoMo to customers. However, customers have indicated that they prefer one-stop shopping. While front-desk service employees cannot sell integrated services, they should at least understand another company’s services in order to respond to each customer’s needs for integration. NTT should seek legal clarification of what is acceptable and provide that information to employees who are then better prepared to recommend the best set of services within the legal boundaries.
6.1.2 Leverage Size & Diversity

➢ IT platform for new ideas

IBM and GE had strategies that leveraged their size and diversity. They could allocate financial and human resources based on their corporate strategies. It was easier to start a new business by utilizing existing tangible assets and turning them into new business opportunities. Technologies and skills are also intangible assets that can be utilized effectively in a large organization, while the company’s IT platform is an important tool for enabling employees to share knowledge.

NTT has 200,000 employees. It is likely that creative ideas would be born if employees could communicate with each other more frequently. 3M uses its IT platform to enable researchers to exchange ideas and sustain their creative culture. The Internet has created a user-oriented culture and people have more opportunities and options for expressing their ideas to others on the web.

An IT platform that included all the NTT group companies would be effective for exploiting NTT’s huge knowledge base. For instance, engineers in NTT-East and those in NTT-DoCoMo could exchange ideas through the IT platform about technical possibilities for new FMC services. If a sales manager has trouble with technical details, a specialist in the research labs could respond to him quickly via the IT platform. Research laboratories will have more opportunities to contact front-line customer personnel and to understand market needs by making use of the platform. This community site would bridge different NTT companies. One caveat: it should be checked to ensure that such a system will be legally permitted.

➢ Core technology applied to a different market

3M established its technology platform to leverage key technologies, which 3M owned, into various products. 3M’s strategy is to commercialize new products by adding new idea to an existing fundamental technology. 3M’s microscopic duplicating technology was applied to hundreds of competitive products, including OHP lenses, magnetic optical disks, sandpaper, and optical reflection material.

Currently, NTT’s research laboratories are independent, with each evolving its own research based on existing research achievements in a closed society. However, they would
be more creative if they communicated with each other across the borders of research laboratories. Researchers could also put their accomplishments into different markets if they translated their research activities into plain words and showed them to business unit personnel. NTT's IT platform would be an effective way to share R&D information with sources inside and outside the company. By establishing an IT platform with outside resources like Nine Sigma at P&G, NTT researchers could bring in new ideas from researchers in universities, government laboratories, and other IT-related companies.

6.2 Culture

6.2.1 Penetrating Corporate Culture

NTT should take several innovative actions, such as customer orientation, organizational flexibility, and leveraging its size and diversity. However, those actions require a corporate culture change that will be not easy. To change the corporate culture, the CEO's role would be especially important. The CEO should write NTT's shared values in plain words and communicate these with employees to show his seriousness and to encourage change.

NTT's CEOs have repeatedly stated: "Customers are our first priority." However, such words are nothing new to employees. Instead, the CEO should demonstrate how people have to change the way they do business. For instance, should they change the business model in response to market changes? The CEO has to be decisive and explain specifically how actual work processes should be changed.

At present the CEO's policy seems to be dependent on the company's financial condition. During worse financial times, the CEO should emphasize restructuring of the company. After recovery, the CEO should seek new growth for the company. At IBM, when the mainframe business was losing its competitiveness, Gerstner asked all employees to realign their resources to customers, which meant restructuring.

NTT's current condition seems similar. Therefore, NTT should reduce the cost of FTTH and NGN, which would involve restructuring. Thereafter, NTT might change its business model to IT service provider by leveraging its scalability and variety of resources.
6.2.2 Entrepreneur Culture

3M places great emphasis on maintaining an entrepreneur culture in the company. 3M’s CEO’s say: “The company is gigantic, yet it is as innovative and as full of growth potential as though it were a small venture,” which I find impressive. Historically, the company’s autonomous culture and its technology platform to mix people’s ideas, were key factors. 3M also has set a target to realize at least one-third of its sales from products developed in past five years.

For NTT, a similar entrepreneur culture should be mandatory, especially in places where people study and develop new services. For instance, introducing an IT platform to share ideas would undoubtedly trigger changes in researchers’ behavior. A revamped evaluation and reward system should be put in place to assess employees who have done something new—even if they made mistakes while seeking radical change.

Changing the work environment is another effective tool. In divisions such as NTT research labs, many of IDEO’s mechanism can be applied, including team building from various backgrounds, specific brainstorming, providing workspace in close proximity to encourage communication, visiting customers directly, experimenting with usage, and building prototypes.

6.3 Organization
6.3.1 Flexibility for Change

In large organizations, it is difficult for the CEO to keep abreast of critical changes in the market if he sits far away from customers. Instead it is necessary for the CEO to keep in touch regularly with customers. Successful innovative companies have systematic mechanisms for dealing with change, such as EBO (Emerging Business Opportunities) at IBM, and Imagination Breakthrough at GE. These mechanisms help the CEO to catch changes that are being reported from the business units.

In today’s changing market, NTT cannot avoid changing/updating its business model for the core business. The company has to make decisions, change the organization, and choose people who are flexible project leaders.

NTT should establish a mechanism for innovation similar to those at IBM or GE so that the CEO can decide how to allocate resources to deal with changes. In order to rearrange
human resources, the company should implement rules for moving people from business units to research laboratories so they can cooperate with new innovation projects that have been authorized by the CEO.

Another tactic is to compile a human resource database that identifies each employee's skills and experiences in an orderly manner. Then the leader of a new innovation project could access the database and negotiate with a target person who has the precise skills that are needed for that project. Such a database would expand the likelihood of finding the best person to fit a specific project.

6.3.2 Cross-Functional Teams

In most innovation projects in successful companies, cross-functional teams are organized. Several triggers might require the need for a cross-functional team: starting a project that responds to corporate strategy; responding to requirements from important customers; and inevitable market changes. Cross-functional teams should include a field manager, a researcher, and a corporate strategist, and should encourage creative ideas coming out of this diversified team.

At IBM, CEO Palmisano was quick to arrange cross-functional teams in order to respond to client's needs. The CEO should take responsibility for picking appropriate people to set up cross-functional teams. In addition, a human resource database should be maintained for the CEO so he/she knows the key people who can lead a cross-functional team.

6.4 Innovation System

6.4.1 Systematic Mechanism

All four of the innovative companies in this study had a systematic mechanism in place to create an innovation system. Currently, NTT has a formal decision-making conference that includes the heads of research laboratories, senior management of the business units, and the CEO. However, it is often an approval process for a proposed research theme and budget for the next year. There is little discussion about starting an innovation project in order to create a new business opportunity.
Like EBO at IBM and Innovation Breakthrough at GE, NTT should establish a systematic mechanism for creating innovation, in which a new technological project is born, directed, and supported by the CEO, marketing heads, researchers, and corporate strategy department.

In an EBO-like mechanism at NTT, research laboratory resources should be poured into more concentrated major topics, especially customer-oriented themes. Senior members should take time to think about what kinds of technology will differentiate NTT from its competitors in the long term; what business might become a source of profit and attract new customers; and how they should organize innovation teams to execute their strategy. Like all four innovative companies, NTT’s new systematic mechanism should involve both the CEO and line managers at the same location. Workshops that take time to listen to customer opinions would also be effective during the prototype stage.

### 6.4.2 Open Technology

Currently NTT research laboratories are a closed society where researchers focus on their projects with little or no communication with different areas, although they might personally communicate with other academic institutions. Such communications with outside resources are very limited compared to the contacts encouraged and maintained by researchers at IBM and P&G.

IBM sells its products to computer and software manufacturers and makes strong contributions to the Linux community. Those actions stem from corporate strategy that seeks to put IBM’s technology into the marketplace rather than dominating the technology and kicking others out.

In fact, the NTT Law requires that NTT must provide any of its developed intellectual property to other companies, including competitors, when they are asked to provide it. This means there is no opportunity for NTT to dominate technology. There is no question that NTT should be more systematically open to outside world.

NTT could introduce P&G’s Connect & Develop mechanism into certain parts of the NTT innovation process. NTT can focus on absorbing outside ideas and invite outside designers to add attractive components to NTT products, especially as it relates to the use of people. P&G’s open community platform, where inside and outside researchers exchange
ideas, is also applicable to NTT’s research laboratories, and would broaden the window of new ideas.

6.5 Research

6.5.1 Connection with Customers

NTT has research laboratories with 3,000 researchers and a multi-billion dollar budget. Its research laboratories fall into three categories: Cyber Communications Labs, Information Sharing Labs, and Science and Core Technology Labs. The Cyber Communications Labs conduct research about content and service platform technology. The Information Sharing Labs undertake research about network architecture, network services, access line services, and environmental energy. The Science and Core Technology Labs do research into the creation of new principles and concepts that might become new businesses in the long term.

NTT has made several attempts to take its research output and transform it into a real business. NTT established a Service Integration laboratory within its Information Sharing Labs group in order to produce an integrated service that would bridge different research areas by coordinating multiple laboratories. This Service Integration laboratory has functioned well and bridges between the research laboratories and business units.

NTT also chooses the business manager and a counterpart researcher for major research projects. For instance, the counterpart researcher for a medical treatment IT system is responsible for communicating with business personnel in NTT-East and NTT-Communications and listening to their requirements for a new medical system. This counterpart allocation works well to narrow the distance between researchers and business units.

NTT research laboratories have monthly conferences with representatives from NTT group companies who are financial supporters of the NTT research laboratories. In those conferences, researchers make presentations of each project, from start to finish, in order to keep the researcher’s direction focused on the business perspectives.

NTT’s research management system seems to be working quite well. However, researchers are frustrated that no major research output has been produced and introduced to
the marketplace. Could not Japan’s leading telecom research laboratories contribute to producing more innovative services? One reason could be insufficient customer orientation.

When NTT research laboratories are compared to IBM, P&G, 3M, and GE, they are still behind when it comes to direct contact with customers and to narrowing research projects in terms of the customer viewpoint. Researchers should be encouraged to go out of their laboratories to meet customers in order to ascertain their needs directly and to understand the implied requirements for NTT services that may not be precisely verbalized. By coordinating resources and reducing the number of research projects, attention could be concentrated on the projects that have the greatest possibility of becoming cutting-edge technology.

6.5.2 The Importance of Research’s Mission

If NTT keeps its research laboratories sustainable, the labs could contribute more to corporate strategy. The research laboratories should create new business opportunities by differentiating technology rather than just commercializing the services that business units require. Instead, the research laboratories should input fundamental technology changes that might influence the core business in terms of key management elements, such as business model, growth forecast, time into the market, and development cost.

Researchers should contact customers and business units more often to determine their technological needs and seek feedback into their research projects. NTT research laboratories should forget that all four successful companies are equally targeting to bring their technology into the market and instead strive to differentiate NTT from its competitors. NTT labs should have a systematic review system that removes less-promising projects as early as possible. An assessment of R&D themes should be undertaken in terms of market value and actual impact on the business. IBM research created the company’s new business model to bring major technological changes to IBM that provided new value to its customers. At GE Immelt insisted that research would be considered to have failed if inventions did not get into the market.
6.5.3 Concentration on Major Topics

All four innovative companies concentrate their limited budgets only on major topics for corporate strategy. This fact seems to imply that R&D is more successful when there are fewer, well-thought R&D themes. By concentrating on a few major topics, the company can strengthen its strategic projects with more budget and human resources.

NTT's research laboratories have been often criticized that there seems to be little focus of research direction because their strategy of stretching an R&D theme is hard to understand. It would be important to reduce the number of research projects and support a few projects carefully chosen by the CEO and the business units in order to create new differentiated business. Reorganization of the R&D laboratories to reallocate human resources into concentrated projects would be necessary.

6.5.4 Innovative Process

The innovative process established at IDEO is applicable to NTT's workplace, especially for its own research laboratories. IDEO starts a series of innovation steps by forming a diversified team, observing the behavior of people, brainstorming systematically, and finally experimenting by prototype.

Diversified teams would be effective for increasing NTT research's creativity. In the current research labs, a team is generally comprised of five or so researchers at the bottom of a hierarchical chart in the laboratory. In this case, team members have basically the same skills and are not diversified. Research labs also form projects team that include people with different backgrounds who gather and work together toward one target. However, those members are not totally involved in the project, instead spending only a certain part of their time on the project. Their main activities remain focused on their own research, not that of the project team. Tom Kelley of IDEO insists that team members devote all their energy and time to the project team. In the same way, NTT research needs to change how it allocates researchers to projects if it intends to apply IDEO's diversified team system. However, it may be possible to achieve this by modifying NTT's current human resource management system.

Another IDEO tactic—visiting customers who will use the new service to observe how they use it—is effective for helping researchers to feel the desire of users directly and
then translate that into service concepts. Currently, researchers generally listen to the requirements of business units for developing a new telecom service. But researchers and business units should visit the real customers to observe their behavior in order to bring out a competitive service derived from the insight gained by observation.

Brainstorming is another strong tool that triggers flexible and wide-ranging ideas. IDEO’s seven secrets of brainstorming—Narrow the focus, Rule with fun, Count the number of ideas, Accumulation of power and jumping, Relationship between memory and location, Stretch the mental muscle, and Visualization—would be applicable not only to research labs but also to any other division where people are starting something new and trying to find a solution.

The purpose of prototyping at IDEO is different from the prototypes done in NTT research labs. IDEO’s prototypes are modified iteratively before all the team members are confident that the last prototype will be the “blockbuster.” These iterative enhancements in the form of prototypes would be helpful for hedging the risk of a failed product. Currently, NTT uses prototypes mainly to evaluate a new functionality, such as extremely high speed transmission, before it actually develops a commercial product. So it is verifying the functional capability rather than enhancing the attractiveness to customers. It would be useful for NTT’s researchers and service development divisions to experiment with enhancing the attractiveness of service iteratively before bringing a new invention directly into commercialization.
Chapter 7
Issues to Consider

In this chapter, I will address issues that are unique in the Japanese telecom industry, and may add a level of complexity. They are Regulation, Bureaucracy, and Restructuring. These are important issues that may weigh heavily on attempts to develop innovation at NTT. And each must be mitigated carefully because they are what the Japanese refer to as “Eternal Issues” that are not easily discarded or resolved. I will clarify these problems precisely and suggest several approaches to deal with each issue.

7.1 Regulation

The telecom industry is regulated by the Japanese government in many respects, which prevents NTT from simply launching new services whenever it is ready to do so. As part of the Japanese Telecommunications Business Law, all telecom companies are required to get permission from the government before launching any new service. Historically, telecom service has been an important infrastructure for Japanese people, so the government believes it is necessary to check whether a telecom company has the ability to provide reliable and safe services. Because of this close oversight, telecom companies are fundamentally inflexible, compared to other industries, when it comes to starting and/or changing their business.

In addition to the Telecommunications Business Law, the government also implemented a specific NTT Law at the time of NTT’s privatization in 1985. That NTT Law was intended to define in great detail the business area of local telecoms (NTT-East and NTT-West), made no allowance for NTT local telecoms to provide long distance call, and so on. Because of the NTT law, there are many restrictions on business. NTT local telecoms cannot provide any combination of fixed and mobile phone services, even though it would be desirable for customers if such a combination service was less expensive than contracting two services separately.
This dominant regulation still provokes hot debate among NTT, its competitors, and the Japanese government. The government imposes strong restrictions on telecom companies that have more than a 50% share of the business market. Those so-called “dominant” companies must then provide network connectivity to other competitors at a regulated price, not a competitive market price. Currently, there is fierce discussion whether NTT local telecoms can set the market price on FTTH connectivity for its competitors. FTTH is expected to be the core service of the NTT local telecoms, and NTT’s market share is almost 70%. However, NTT made a huge investment in FTTH, at large risk, so NTT insists it is reasonable as a private company to realize a reasonable return by setting a competitive market price.

To deal with all the regulations, NTT has to take several measures. First, the company should communicate more with Japanese government to express its ideas, such as a future IT society in Japan which NTT can provide; the financial situation with local telecoms; NTT’s efforts for cost reduction; how NTT can create a win-win relationship with competitors and customers, and so on. Mutual understanding would be the first step to making the Japanese government more willing to listen to NTT’s requests.

Second, NTT should help all employees to understand what the company can do and what it cannot do with respect to current regulations. The regulations are so detailed and complex that it is difficult for employees to understand any discussions about them. Therefore it could be effective to distill the regulations in a simplified manner when discussing NTT’s new service and the regulatory conditions around it. Regulation cannot be avoided, so NTT should face that fact and seek ways to think of innovations that will work under regulation. Any new innovation should be conceived from the basis of why the regulation is in place, what service the innovation would provide, what the government regulates, and in what negotiation stage NTT is at the moment.

### 7.2 Bureaucracy

In its current organization structure, NTT is much more bureaucratic than innovative compared to IBM, P&G, 3M, and GE. Bureaucracy tends to result in stagnant communications from the CEO to line managers and between different divisions. There are several reasons why bureaucracy exists in NTT. Historically, NTT was a public institution
before it was privatized in 1985. The company seems to have retained that old bureaucratic culture.

Second, NTT is one of the largest companies in the world with 200,000 employees. Top-down instruction to all employees is sometimes necessary in order to direct such a large body.

Third, the current holding company structure, in the form of NTT Group, seems to foster hierarchical decision making, which leads to further bureaucracy.

To deal with today's changing environment, it would be necessary to eliminate some of all of the culture of bureaucracy in order to communicate quickly, understand the actual situations on the front line, and reflect outside changes in NTT's corporate strategy. In the current hierarchical structure, the CEO sits far removed from the front line with customers, which makes it is extremely difficult for the CEO to grasp the actual thinking of front-line managers. Furthermore, it is frustrating for line managers not to be able to confirm whether the CEO really understands the front-line situation.

Invisible walls between divisions are also a problem. In a bureaucratic structure, each division tends to do what is good for the division instead of considering the company. By focusing on internal survival rather than responding to outside customer voices, NTT may be losing precious opportunities to provide an attractive service that can be realized by leveraging NTT's large size and diversity. At IBM, Gerstner's focus on keeping IBM as a single entity was done to provide competitive service by integrating IBM's dynamic capabilities.

To eliminating the culture of bureaucracy and make NTT a more flexible entity that can respond to customers quickly, there are several approaches. First, the CEO should announce a policy to dispose of organizational bottlenecks. To do this, the CEO can use weekly TV news on the company, a website, or visit front-line branches to express his intention. The CEO can also assemble short-term projects that identify the ineffective barriers that exist both vertically and horizontally in NTT. The projects should include people from a wide range of backgrounds, including staff, sales, operations and R&D, and have them brainstorm and propose ideas to senior executives.

Another approach to resolving organizational inefficiency would be to change the NTT group structure fundamentally. In fact, the Japanese government plans to reconsider
NTT's organization in 2010. NTT's current structure, including local telecoms, long distance telecoms, and mobile service is out of date. The local telecoms, NTT-East and NTT-West, sometimes cannot agree with each other about network architecture although they want to provide the same Internet access service. Also, it is difficult to provide FMC (Fixed and Mobile Convergence) service by coordinating the corporate strategy of NTT-DoCoMo and NTT local telecoms. NTT cannot afford to fail when designing the next-generation organizational structure.

7.3 Restructuring

NTT's financial situation as a whole is stagnating. Fixed-line phone revenue is continues to decrease every year, but rapidly increasing broadband revenue is not enough to make up for the decline in fixed phone revenues. On the other hand, in the mobile market, competition has become extremely fierce, and NTT-DoCoMo's share is being reduced by its competitors. In this situation, there are mainly two tasks for the CEO and the board of directors. One is cost reduction, the other is creation of new revenue. As in the IBM case in the early 1990s, Gerstner took two steps. First, he tried to extinguish the fire and then redefine the fundamental business model.

In NTT's case, in 2002 NTT-East and NTT-West introduced an extensive restructuring plan where employees over 50 years old had to choose whether to remain with their current working situation with lower wages, or to work in challenging new jobs that had a competitive wage system. It was a painful restructuring plan for most NTT employees because, like most general Japanese corporations, it had adopted lifetime employment as a traditional (and expected) policy. Employees never expected to see their salary reduced when they grew older.

Also, NTT reduced its general expenses every year by setting a target, such as 5% reduction per year. However this restructuring was merely a reduction of salary. A more feasible option might be to execute a bold restructuring similar to that implemented by Jack Welch at GE. Welch chose several core business areas and dismissed their employees, then added employees for new businesses. It is difficult to do that kind of restructuring, especially given the Japanese culture of lifetime employment, but I believe the time may come when CEOs will have to make these tough judgments.
In recent years, depreciation cost has been increasing owing to large investments for new services such as FTTH in NTT local companies and 3G in NTT-DoCoMo. In addition to those expenses, NGN (Next Generation Network) investment will be a burden on NTT’s income statement in the near future. There are several ways to suppress those depreciation cost. Regarding FTTH investment, efficiency in installing optical fiber network has improved dramatically by consistent review meetings between NTT and the construction companies. Also, the price of optical cable is decreasing with the rapid increase of FTTH demands. Recently, FTTH entered the mainstream around the world when Verizon in the U.S. decided to concentrate on FTTH service. This world tendency enables optical cable manufacturers to obtain economies of scale. Seeing this phenomenon, the cost of FTTH may be reduced dramatically in the future.

As I have shown, NTT can make more efforts to restructure and reduce costs and prepare for creating new sources of revenue.
Chapter 8

Conclusion

Today, it is not too much to say that the Internet has become a fundamental infrastructure for people, just like water, electricity, and transportation. With the appearance of VoIP (Voice over Internet Protocol) and Skype service, telephones are now only one part of the Internet. However, the world’s traditional telephone companies, including NTT, still depend on telephone revenue where the fixed-line phone market is already declining and the mobile phone market is reaching maturity. It is clearly time for NTT to transform itself, and begin to develop new business opportunities.

But what new business can guarantee the steady income for this giant company of 200,000 people? The answer is actually very simple: there is no eternally sustainable business that will guarantee the long life of NTT. Rather, what NTT should focus on are consistent efforts to meet customer needs with enhanced services supported by sophisticated technologies.

After analyzing the successful companies presented in this analysis, I believe it is possible for NTT to regain its powerful position in the telecom industry by transforming itself into an innovative company that is capable of dealing with today’s changing environment. Of course, such a transformation requires organizational and process change. And the change may cause pain to employees who have become accustomed to the orderly hierarchical work style and feel comfortable within the lifetime employment system. Those mental issues must be dealt with carefully but I believe the transformation is inevitable.

IBM has much experience with transforming its gigantic organization from a shrinking mainframe manufacturer to a profitable IT service provider. IBM aligned the company’s resources based on its customer needs, reexamined the corporate strategy to leverage its size and diversity, changed its employees’ mindset through consistent communication with the CEO, and established an innovation system to deal with the changing outside market. Gerstner’s and Palmisano’s leadership and senior management’s
serious efforts were indispensable for implementing these dynamic organizational changes. IBM’s transformation scenario would be highly applicable to NTT.

GE offered a good case study about how strategy is formed based on a consistent clear vision, combined with retreating from stagnating business and entering into a new growing business. Retreat requires painful restructuring of employees, and seizing new business opportunities needs transparency of information from top to bottom. Welch made great efforts to create a simple organization by eliminating bureaucracy wherever possible. NTT can learn much from Welch’s steadiness in holding corporate strategy including restructuring and his patience while changing its culture to a simple and transparent organization.

3M provided evidence that even in a large organization with 75,000 employees it is possible to have a culture of entrepreneurship and a system that evolves successfully from generation to generation. The corporate target to derive one-third of revenues from products developed less than five years ago is a typical message of embracing entrepreneurship in the company. Several of 3M’s tactics to leverage technological resources in the company could be applied to NTT’s research labs, such as an IT platform to share technical information among employees.

P&G’s new approach to innovation was to connect with outside resources, especially in today’s internet society where people all over the world can communicate and collaborate with each other instantly. P&G’s efficiency of R&D and revenue growth in recent years prove that the company’s innovation mechanism is really working well. NTT is currently not accustomed to using outside talents, but P&G’s success with its C&D strategy suggests that an open network to communicate to outside resources will generate more innovations in the organization.

Finally, I analyzed the process issues of innovation by studying IDEO, whose established innovation mechanisms include teamwork, observation, brainstorming, and prototyping—each of which would be applicable to most workplaces in NTT, especially R&D, marketing, and operations. This bottom-up approach to innovation would be useful for changing people’s mindsets step by step, and over the long run to put in place an innovative corporate culture.
As stated first in Chapter 6 and summarized above, I have raised a series of plans to implement key innovation elements into NTT, categorized into five areas: Strategy, Culture, Organization, Innovation System, and Research. We should be careful to put these plans into effect in terms of how to execute and when to trigger their implementation.

➢ First, it is mandatory to involve senior management in order to make changes in corporate strategy and culture. The leadership of NTT’s CEO would be necessary, just as it was in the case of Gerstner at IBM, Welch at GE, and Lafley at P&G.

➢ Second, we should examine the procedures for executing these innovative elements. For example, simulations could help determine which is better: (1) to implement an innovation system after the financial situation becomes stable by restructuring, or (2) to build an innovation system and restructure the organization simultaneously.

➢ Third, there are several issues to consider when implementing successful innovation factors, such as regulation, bureaucracy, and restructuring. Innovation will not work well without dealing properly with these heavy issues.

It is clear that NTT needs a drastic change in its business model, and that will require everyone from the CEO to the lowest employee to change their traditional ways of thinking and behavior. The CEO’s leadership, senior management’s responsibility, and the self-organization of employees will be necessary. It will not be easy, but I believe that NTT can stand in a competitive position once again—and I am even more convinced as a result of my own interactions with the successful U.S. companies I surveyed. With patience and cooperation, each company achieved a transformation and gained (or regained) competent capabilities.

It is my hope that this thesis will be a trigger for NTT’s innovation. I firmly believe that NTT will overcome this period of difficulty and seize a new opportunity to take the role of a leading company that brings prosperous human living to the world.
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