

HISTORICAL REVIEW OF SONY'S INNOVATIONS AND FUTURE STEPS

by

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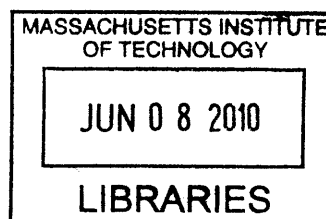
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Historical Review of Sony Innovations and Future Steps

by
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ABSTRACT

This thesis reviews Sony's successes and failures in product innovations from the 1950s into the 2000s. It analyzes key success factors in Sony's significant sales and profit growth in each decade.

Sony's first business success—the transistor radio and TV business in the 1950s and 1960s—was based on a process that combined new technologies to improve affordability and create new markets. During the video product development of the 1970s, Sony created three core competences: a knowledge-sharing culture, a knowledge management system for tuning technology, and a “waterfall” strategy, which increased market value and maximized opportunities for Sony and its partners. As a result, Sony became competitive in new businesses and technology idea generation, resource utilization, and cost reduction and premium pricing. This contributed to rapid revenue and profit growth during the 1970s and the 1980s.

The turning point was the 1990s when Sony's knowledge-sharing culture disintegrated, and the R&D organization structure became a divisional self-supporting system. As a result, Sony lost its key advantages and subsequently delayed development of its core hardware and PC software—the keys to maintaining competitive advantage in the digital consumer electronics industry. Thus, from the mid-1990s, Sony began to lose market share even in areas where it had held a dominant position since the 1980s.

By analyzing these successes and failures, I determined six key factors of success: (1) value capturing (cost) advantage, (2) strong leadership, (3) strong technology advantage, (4) efficient use of HR, internal/external know-how, (5) a rich flow of business/ technology ideas, and (6) incentives for suppliers. These factors meant the difference between success and failure, and they are now what Sony should focus on in order to succeed in the future.

Finally, I propose two solutions that will enable Sony to fulfill the six success factors and regain its knowledge-sharing culture. These solutions are: (1) unification of the microprocessor platform, and (2) development of an open application aggregation platform. Both are practical and strong solutions, which Sony should aggressively adopt in order to revive its corporate culture and R&D structure of the Golden Decades.

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Masanori Hachiya

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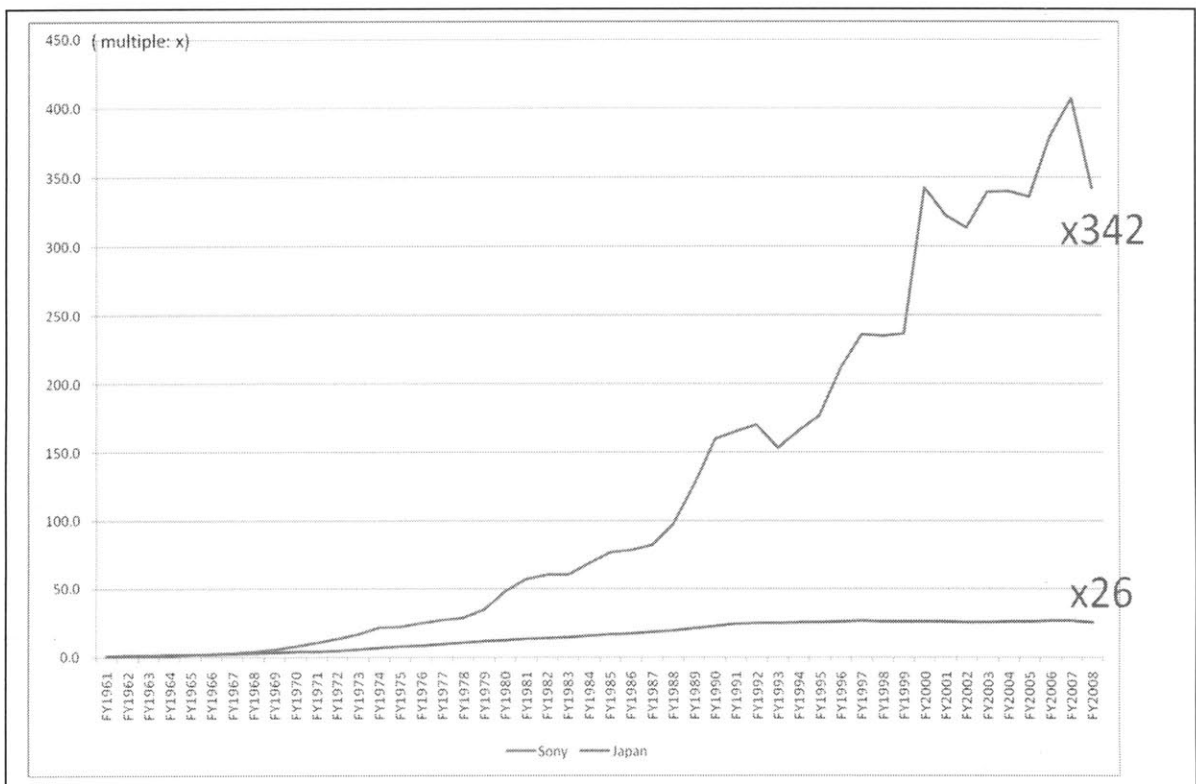
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CHAPTER 1

INTRODUCTION

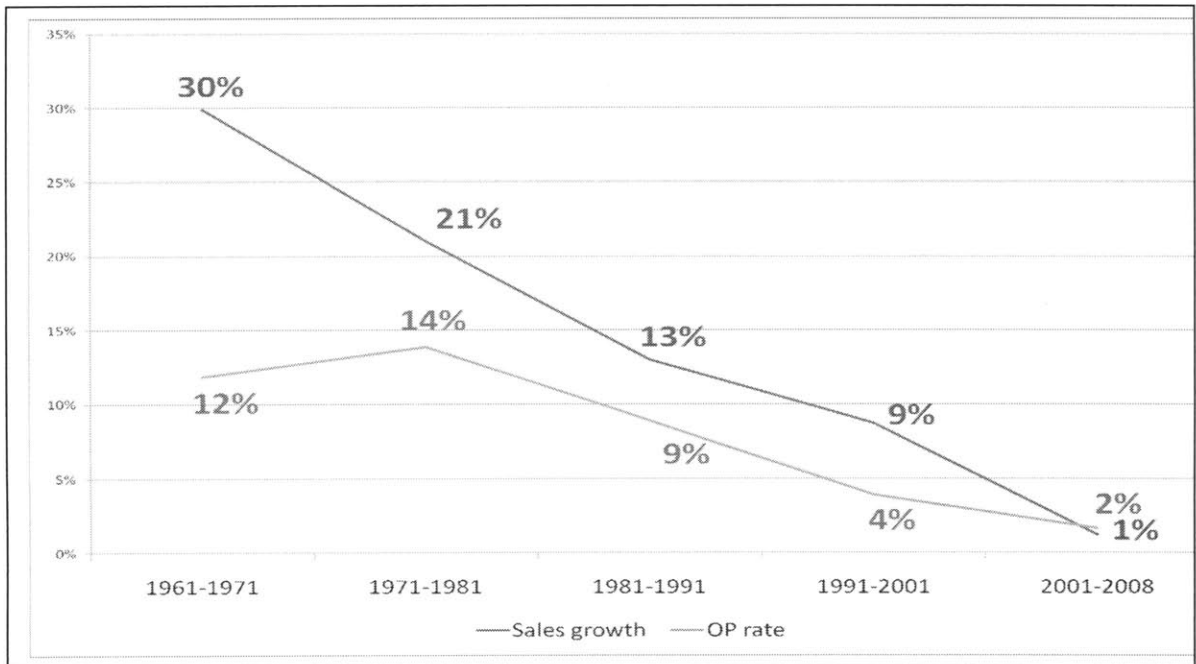
Since its establishment in 1946, Sony has been an innovator in the consumer electronics market. According to *The Innovator's Solution* (Christensen 2003), over 13 disruptive innovations were created by this company from the 1950s to the 1970s, and the company's revenue saw a dramatic increase. Looking at the company's financial history, the CAGR of sales averages 14% and 2008 revenue is 416 times higher than 1961 revenues (see Figure 1-1). Compared with the GDP growth of Japan (CAGR average 8%, 2008/1961 GDP x26), it is clear that Sony was one of the most successful companies, even in Japan's high economic growth era.



Sources: Sony Japan, IR information, and METI.

Fig. 1-1. Sony sales compared with Japanese GDP growth, 1961-2008

Looking at historical sales growth and operations profit (OP) by decade, average CAGR decreased sharply and operations profit rate peaks in the 1980s. In particular, from the early 2000s, average CAGR decreased to only 1% and OP rate was 2% (see Figure 1-2). Clearly, company was facing a serious challenge to its future growth.



Source: Sony Japan IR Information

Fig. 1-2. Sony's sales growth and average operational profit rate per decade

In this thesis, I will review the history of Sony's innovations by focusing on the important events in each decade (or two). I analyze the following:

- The factors that resulted in Sony's successes and failures
- The competitive advantage Sony accumulated in each decade(s)
- The key lessons Sony learned and how they can be applied for the company's future growth.

Using this approach, my aim is to determine what drove the engine of tremendous growth during the 1950s to the 1980s. With the turning point that occurred in the 1990s, I will analyze changes in the R&D and organizational structure at Sony. Based on these analyses, I will make several recommendations as to how Sony can revive its future business in order to survive in the current business environment of the consumer electronics industry.

CHAPTER 2

DISRUPTIONS CAUSED BY TRANSISTOR TECHNOLOGY (1950s & 1960s)

Sony was founded in 1946, but its start as an audio-visual company began with the establishment of the tape recorder in 1950. Masaru Ibuka and Akio Morita, the company's two founders, were keen to develop new innovations in the consumer electronics industry. Based on transistor technology they licensed from Western Electronics in the 1950s, Sony entered the radio and TV markets.

In this chapter, I review the development of products that led Sony to a disruptive innovation based on the transistor technology, and why Sony became so successful in the radio and TV markets.

2-1 HISTORICAL REVIEW¹

2-1-1 Tape Recorder

In the late 1940s, Morita and Ibuka were seeking an attractive technology to jumpstart their entrance into the consumer electronics industry. Their first contact with the tape recorder came as part of their megaphone business with the General Headquarters (GHQ) of the Allied Forces following World War II. At GHQ, they found a paper tape recorder used for radio transmissions and cipher communications. Ibuka was attracted to the potential of the technology and began to learn the technical basics from GHQ engineering officers. Soon he could see a future for this technology if it were applied to radio and music recordings, and he realized it could give Sony an entrance into the audio-visual recording industry.

With Morita's agreement, Ibuka began to hire Japanese engineers who had been maintaining the transmission equipment at GHQ, and together they formed an internal research team. To make magnetic tape into a viable consumer electronics product, Ibuka's

¹ Information for this historical review came from "Genryu: The History of Sony.", Sony PR Department, 1996; Sony Japan website; Sony alumni interviews.

focused on reducing the size of the tape and the recorder. The research team read research papers on magnetic tape, and physically reverse engineered trashed equipment they had been given by GHQ. Four years later, Sony launched its first compact magnetic tape recorder, known as the “G-type,” to the market.

This innovation from a domestic venture company surprised the Japanese electronics manufacturing industry. The product sold well to the government and the court system. However, its high price and relatively large size meant it was generally not accepted by consumers.

2-1-2 Transistor Radio

At the same time Sony was developing the “G-type” tape recorder, it also became interested in the transistor technology being developed by Bell Labs. In 1953, on a research trip to the U.S., Morita encountered the technology for the first time, and he believed it had strong potential for new innovations in radio receivers.

However, taking a clue from the lessons learned in the launch of the tape recorder, Morita recognized that just reducing the size of the radio would not be sufficient to attract consumers. He would also need to make the product affordable enough so even ordinary consumers would purchase it. Morita was convinced that transistors would enable a manufacturer to make smaller radios, with low power consumption, and cheap enough that consumers would buy them.

In 1953, Morita was granted a license from Western Electronics Corporation, the company holding the patent for the transistor. Morita sent Kazuo Iwama, Sony’s chief technologist, to study possible uses of the transistor technology for radio products. At the time, most radios used vacuum tubes developed by RCA, and radios were large and expensive. And because vacuum tubes required large amounts of energy for amplification, it was difficult to develop a portable radio.

Transistors had not been used in radios mainly because of poor amplification performance compared with vacuum tubes. RCA and others recognized that transistor technology could be applied to small radios, but thought the poor sound quality would impede attempts to develop an attractive product for the consumer market. Also, at that time, transistors were not mature enough for mass production, so developing a transistor radio was not cheap. There was simply no incentive to shift from vacuum tubes to transistors.

Based on Iwama’s early research at Western Electronics, Sony knew the transistor technology could significantly reduce the size of the radio, and the company believed it

could also overcome the problem of sound quality. Iwama's mission was to determine how to increase the transistor's yield, which would bring the price into a lower range that would be acceptable to consumers. Iwama formed an R&D team to experiment with increasing the yield of transistors. Leo Esaki, chief technologist for transistor R&D, soon identified the problem: a bottleneck between the raw materials and the generation process, which made the transistor yield too low.² This invention enabled Sony to increase the transistor yield drastically from its former low of >10%. With this breakthrough, Sony began to develop its small, low price radio. The price was approximately \$20 to \$25, and the radio was small enough to fit in a jacket pocket.

Sony also developed a new marketing strategy focused on teens and middle to low-income consumers in the U.S. as its target customers. Sony marketing people believed that the quality of their radio would be not enough to compete with the tube radio in the mainstream market; however, the price and size would attract customers who could not afford to buy a vacuum tube radio. To access these customers, Sony created a new sales channel focused on chain stores and discount stores in the U.S., including F.W. Woolworth, Corvett, and K-Mart. At that time, radio receivers were sold primarily through appliance stores, and the main profit source for these stores was the service fee to repair burned-out vacuum tubes. Consequently, Sony's new radio with no vacuum tubes did not fit the business models of appliance stores. However, discount stores and chain stores seized the opportunity to sell this new product, and many discount stores put Sony's new transistor radio on their shelves. This marketing strategy worked well, and Sony quickly developed a new customer base in the U.S. radio market.

In comparison, the U.S. price of \$20 to \$25 was about 1.4 times the average monthly income in Japan,³ so few transistor radios were purchased in Japan. However, Sony enjoyed major profits from the success of this innovation in the U.S., which enabled Sony to continue technology enhancements to its tape recorder business. Soon Sony tape recorders were being purchased by the broadcasting and education markets in the U.S. As a result, Sony established both its transistor radio and tape recorder segments as its two core business in the 1950s.

² This research became the basis of the Esaki diode, which brought Esaki the Nobel Prize in Physics in 1973.

³ Japanese Ministry of Economy, Trade and Industry.

2-1-3 Transistor TV

Watching Sony's success, numerous competitors began to develop transistor radios, and transistors for radios, and soon the business became much more competitive for Sony. The newcomers were traditional consumer electronics companies, which had established brand names, rich funding sources, and in-depth R&D resources. However, anticipating that this competition would arise, Sony began its own internal R&D to use the transistor technology for other AV products. Esaki's invention enabled Sony not only to increase the yield of the transistor but also to make the transistors available for use in other products that required fast switching, high-frequency oscillation, and amplification. This foresight and response allowed Sony to utilize its technology in new TV products.

At 1960, Sony launched its first transistor-based TV—a low-price, small TV compared to the mainstream products in the market. But this first TV did not sell well because it was still too big to call it a “compact” TV, and the quality were poor compared to the other TVs on the market.

As they did with the first release of the tape recorder years earlier, Sony board members pondered what direction to take with development of a transistor TV. On one hand, they could pursue the non-consumer market; on the other hand they could focus on developing a smaller size and then create a new market as they did for the transistor radio. Ibuka's and Morita's vision was clear, and Ibuka stated to the board members: “The transistor radio made the industry recognize our company as a unique innovator in the consumer electronics market. Consequently, continuing with new innovations is the only way for Sony to maintain its reputation as a major brand.”⁴ Ibuka's vision unified the board members, and convinced them to pursue development of a smaller size TV.

After two years of R&D, in 1962 Sony successfully developed a 5-inch micro TV. As the founders expected, its dramatically smaller size, low power consumption, and low price opened a new market within the TV market. Again, Sony targeted the middle to low income segment of the U.S. market, and many people bought a Sony TV as their first home TV. The TV also sold well to the middle and high-income segment, who purchased Sony TVs as a second home TV or a portable TV for trips. As a result of Sony's success in creating these unique new electronic products and cultivating new markets, Sony began to be recognized as a real innovator in the consumer electronics market.

⁴ Quote taken from an audio tape in Sony's PR department, which was a recording of Ibuka's historic speech at the annual meeting.

With these successes well established, Ibuka and Morita recognized the next challenge facing the company: low cost, innovative products can create a new customer segment and new demand in the market, but they will not attract customers to the mainstream home market. In 1963, Ibuka stated to all employees at the annual meeting: “From the success of the transistor radio and TV, our company is recognized as a pioneer that creates new markets in the consumer electronics industry with unique products at a reasonable price. Now it’s the time for us to add ‘best quality’ to our reputation.”⁵ Soon thereafter, Sony shifted its R&D focus from TV development to creating a new product that would realize “unique,” “low cost,” and “advanced quality.”

2-1-4 Trinitron Color TV

In the early 1960s, Sony accelerated its research into a new color display technology called “Chromatron,” which had been introduced at the Institute of Radio Engineers (IRE) show in 1961 by E. O. Lawrence. Chromatron had the potential to dramatically enhance the brightness and sharpness of color TV compared to the Shadow Mask vacuum tube, which was currently the mainstream technology for color TV.

As mentioned earlier, at this stage, “uniqueness” and “reasonable price” were hallmarks of consumer expectations for Sony products. In order to realize Sony’s next stated challenge of adding “advanced quality,” to its brand perception, Chromatron technology seemed to be the best option for developing a new flagship product. Sony was attracted to Chromatron not only because of its potential to improve quality but also to reduce size, lessen the complexity of electronic circuit boards, and ultimately produce a smaller size, lower power consumption product at a reasonable price. However, enhancing the Chromatron technology to a mass production level was difficult, and Sony struggled for almost four years to develop a mass-produced, high-quality product.⁶

In 1965, Sony successfully introduced a small, high-quality TV called “Trinitron” to the consumer electronics market. Because of the unexpectedly high cost of R&D, Sony was unable to set the price low enough to appeal to the middle to low-income consumer segment which Trinitron first became available. However, the product sold well in the high-end consumer market, and professional institutions such as airports, governments, and hospitals

⁵ Quote taken from an audio tape in Sony’s PR department, which was a recording of Ibuka’s historic speech at the 1963 annual meeting.

⁶ The issue of licensing and R&D in details has not been researched yet.

quickly bought this new television. The company succeeded in raising its reputation and recognition as a company that could develop “advanced quality products.”

2-2 ANALYSIS

This brief historical review illustrates that Sony built its core technical competence based on transistor technology, which enabled the company to rapidly grow its sales and share in the consumer electronics market during the 1950 and 1960s.

The following sections analyze why Sony was able to create a technology disruption in the radio and TV markets, based on four aspects of business.

2-2-1 Value Creation Opportunities

Because Sony was a venture company with limited funds and a little-known reputation in the market, it had difficulty competing with electronic manufacturing giants like GE and RCA in the mainstream customer home use segment. Consequently, Sony had to identify and develop a new customer segment and market opportunity in order to compete. Foreseeing the technical potential of the transistor technology, Sony targeted the middle to low end market and the portable market.

At this stage, the price range for vacuum tube products was above the “willingness to pay” of middle to low-income consumers. Also, the vacuum tube was an energy-consuming technology that did not lend itself well to developing portable products. Sony was confident that transistor technology would resolve these issues and allow the company to find new customers and new uses (see Figures 2.1 and 2.2), which the existing electronic giants had passed over.



Fig 2.1 Potential to create new customer segment

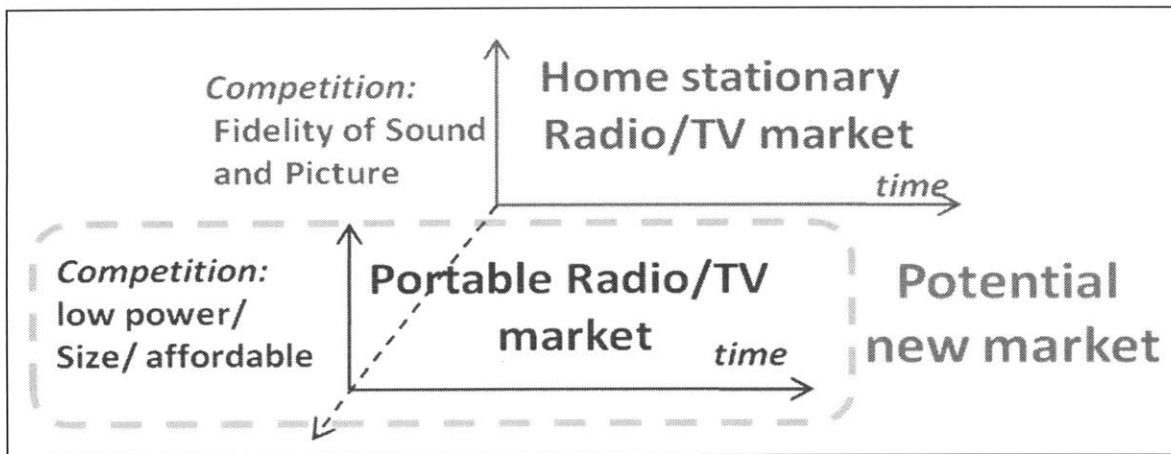


Fig. 2-2. Potential to create new market (portable consumer electronics market)

2-2-2 Resource and Process Opportunity

The transistor technology also enabled Sony to build its competence with a lower budget. At the time Sony began to develop the transistor radio, the fundamental R&D of transistor technology had been largely conducted by Bell Labs and Western Electronics (see Figure 2-3). This meant Sony could skip spending on the most time-consuming and money-consuming R&D processes, which in turn meant greatly reduced budgets for human resources and R&D. Also, because Western Electronics licensed its patents without requiring any up-front payment, Sony could focus their limited R&D resources on applied technology development, which allowed them to differentiate their products (i.e., high yield, mass production technology and high amplification technology).

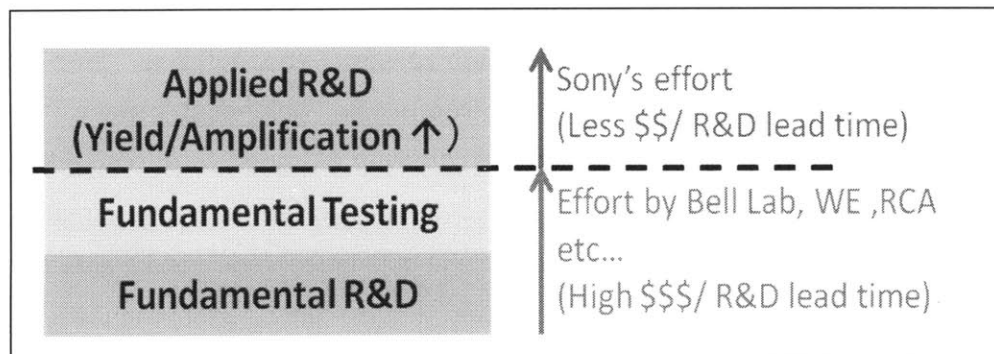


Fig. 2-3. Resource and process opportunity with the transistor technology

2-2-3 Value Capturing Profit Model

To maximize its value capture profit model, Sony used its domestic advantage to manufacture products. In the 1950s and 1960s, Japan was still a developing country, and labor costs were very low compared to the U.S. (e.g., average monthly household income in late 1950s: US=\$5,000, Japan=\$200). Also, imports greatly exceeded exports, which made the value of U.S. dollar earnings much higher than the nominal value in the U.S. By using this economic gap, Sony maximized its profit compared to its U.S. competitors (see Figure 2-4). Meanwhile, Sony's Japanese competitors focused largely on the Japanese market, while Sony focused its marketing on the U.S. market.

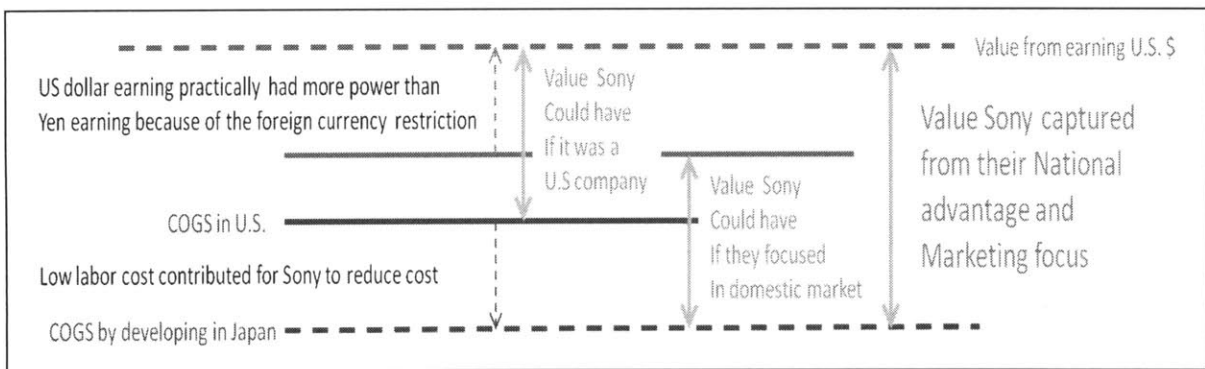


Fig. 2-4. Maximizing the value capture profit model by using economic gap

2-2-4 Value Network Creation

The beauty of Sony's strategy was their success in making a win-win value network for all of their partners in the value chain. For fundamental technology holders Sony created a new opportunity to earn licensing fees from the new market; retailers developed a new business opportunity to increase their revenue; end customers were offered a new product they could afford to purchase within their limited budgets (see Figure 2-5).

This win-win model created a strong relationship between Sony and its partners. When RCA, GE, and other competitors recognized the effectiveness of this new value chain, they had to pay high licensing fees to patent holders and high margins to secure shelf space at retail stores, compared with Sony.

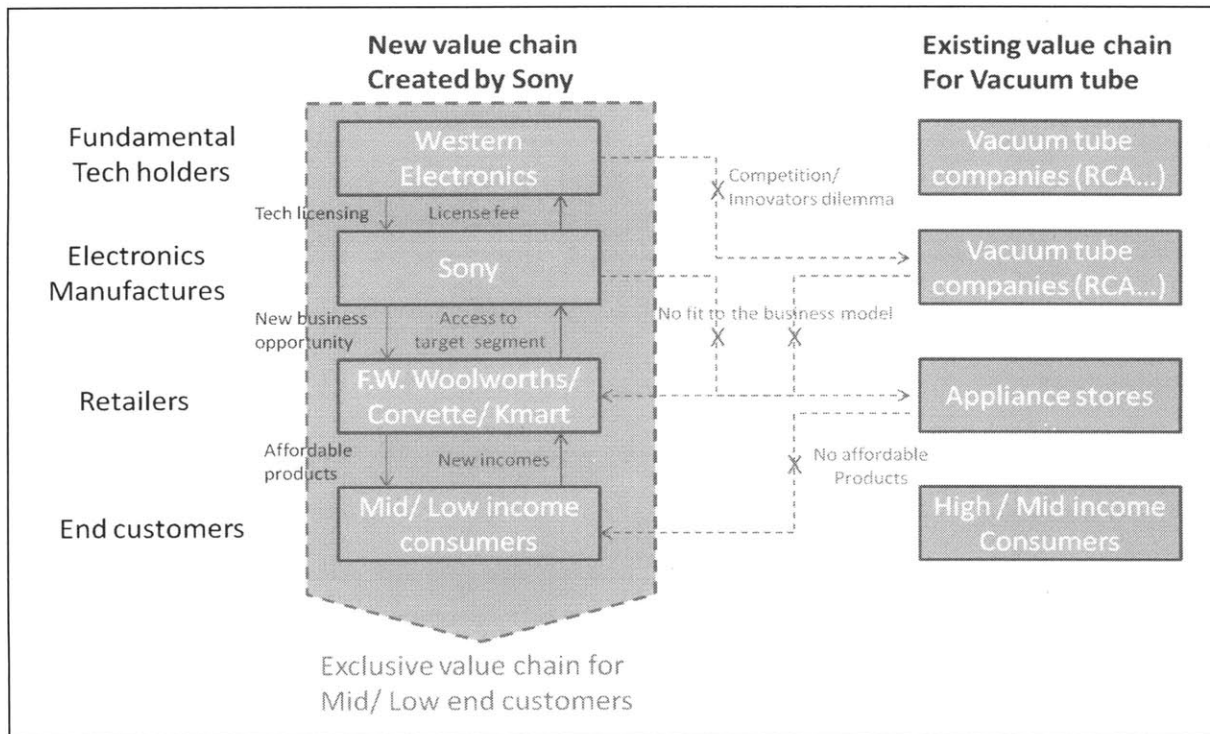


Fig. 2-5. New value chain created by Sony

2-3 SUMMARY

Sony's success in creating major technology disruptions in the 1950 and 1960s was not based on pure technology innovation but more on process developments that combined new technologies and users to improve the affordability of the technology and to create new markets.

The transistor technology was the disruptive technology that allowed Sony to produce disruptive new products based on those originally developed by other companies. Sony's achievements with fundamental technology development were relatively minor. However, Sony took those developments and created new products that in turn produced new customers and new uses that maximized the new technology innovation. Furthermore, Sony connected the technology and customers by improving affordability of the technology (improving yield) and creating a new value chain that maximizes the value for all players in the chain.

From Sony's successes with transistor radios and television, we see that invention of a new disruptive technology itself is just one piece, and that building a bridge between the new technology and customers is the truly important requirement for making a successful innovation in the business market. Also, we can learn that Sony succeeded in the "Transistor" TV and Radio business by building this bridge on the way to maximize the 4 aspects of business for themselves and value chain partners and it is always important to have a strategic view to develop a win-win relationship among the value chain partners to make the business successful.

CHAPTER 3

BUILDING CORE COMPETENCE FROM THE VIDEO BUSINESS (1970s)

Many Sony alumni refer to the 1970s as the “First Golden Decade” for Sony. During this time, the company strengthened its competitiveness in the analog consumer electronics industry, based on the company’s three core competences: (1) rich know-how built on its earlier experience with analog; (2) its knowledge sharing culture; and (3) its so-called “waterfall strategy.” These three competences enabled Sony to lead its competitors based on product quality, cost efficiency, and idea generation, and brought Sony tremendous sales and profit growth until the end of the 1980s.

In this chapter, I will review key events of the decade, and analyze how Sony was able to create these competences from lessons learned from each event.

3-1 HISTORICAL REVIEW⁷

3-1-1 Video Tape Recorder

As Masaru Ibuka watched the future of audio-visual communications shift from radio to color TV, he requested that Sony’s magnetic tape and tape recorder development teams focus on technology development by downsizing and reducing the cost of video tape recorders (VTRs) and the tapes themselves, to make them more widely available to the consumer market. Ibuka foresaw that enabling consumers to record TV programs and give them flexibility to timeshift their TV viewing (i.e., record programs at the time of broadcast but play them back at a later time) would be the next “uniqueness” that Sony could provide to consumers as a new way to enjoy the product.

However, development of the needed technology was full of hurdles. First, to record color broadcast content, magnetic tapes had to have several times higher density. Second, the magnetic head needed high-speed recording capability in order to record the high compound data of video streaming. Third, to make this product affordable for consumers,

⁷ Information for this historical review came from “Genryu: The History of Sony.”, Sony PR Department, 1996; Sony Japan website; Sony alumni interviews.

video recorder engineers first had to reduce the complexity of the electronic circuits. Fourth, to make magnetic tape affordable to consumers, the tape engineers had to find new materials.

To resolve these issues simultaneously, Sony first separated the development teams by function, such as media, heads, and electronic circuits, but that did not work well. If one team found a solution, that solution usually caused a new issue for the other development team. To solve this issue Nobutoshi Kihara, chief R&D manager for hardware development, proposed a new cross-functional R&D team which could monitor the R&D process of each technology development and cross-manage the fine-tuning needed between the heads, media, and electronic circuits, to identify the most optimal solution. From his past experience with developing a compact audio recorder and cassettes, Kihara recognized the importance of having an organization that could centralize the technology development of different R&D categories in order to generate the best solution for the product's total system. Kihara also asked the founders to let key engineers from the color TV R&D team join this new cross-functional team so they could make use of their technology know-how.

This new R&D organization was called the Kihara School, and it gave engineers in different categories the opportunity to learn about technology challenges of other categories and how to share their technology expertise to solve the issues facing each group. In 1969 this group was finally able to optimize the tuning between the media, head, and electronic circuit to develop a paperback-size video cassette and VTR called the "U-matic system," which became the basis of Sony's Beta-Max system and 8mm video system—the next-generation "cash cows" for the company.

3-1-2 Format Wars: Beta versus VHS

Five years after the U-matic system was developed, Sony released Beta-Max in 1975. As soon as it was launched, it became popular, and Sony owned almost 100% of the market within the year. To make their format the *de facto* industry standard, Sony offered free licensing to the other electronics manufacturers in 1974. Sony expected that the manufacturers would back a single format for the good of all. But JVC in particular decided to go with its own VHS format, thus beginning the format war.

At the beginning of this standardization war, Sony was confident that it would win the war because of the technical advantages of Beta, such as picture quality and size, compared to VHS. Beta represented 10 years of technology development and Sony was confident of their advantage with this technology.

However, JVC took a different approach, making the system design of its electronic circuits more cost effective and simple, so that other manufacturers could easily develop their product at a reasonable cost. Also JVC chose not to compete with the size of the media and/or the recorder, making the VHS tape bigger in order to record more hours than Beta. This appealed to other electronics manufacturers, including Sony's biggest partner Panasonic, which ultimately decided to join forces with the VHS format group.

By 1981, U.S. Beta sales had fallen to only 25% of all sales. As movie and video studios turned away from Beta, the combination of low market share and few titles strengthened VHS's hand, until finally in 1988, Sony began to develop VHS VTRs.⁸

However, the failure to make Beta the standard in the consumer market, had no effect on Sony's continuing success with its small, high-quality video format for the professional broadcasting and movie markets. VHS was a reasonable solution for the consumer market in terms of balancing cost efficiency and picture quality, but for professional use, Beta had a huge quality advantage.

Absorbing lessons from the failure in the format wars, Sony treated its customers with rich support, providing 24-hour system support and maintenance service to meet customer needs and to enhance their product and system quality. Sony sent several of its engineers to the technology development labs of key broadcasting companies and movie studios as exclusive support staff. This combination of technology advantage and rich support made Sony appreciated by many broadcasting companies and movie studios, so Sony's share of those professional markets grew rapidly in the mid-1970s.

This professional business also contributed to helping Sony increase its technical advantage in the video system market. As Sony's presence grew in the professional industry, several customers began to request customization and co-development. By meeting those customers' tough requirements, Sony strengthened its technical advantage in know-how, electronic devices, and reducing the size of its products and media.

By the end of the 1970s, Sony had created a major barrier to entry into the market based on its product quality and technical support, and Sony's video recording system became the standard in the professional video system used in the broadcasting industry and movie studios. This domination continued until the 1990s and professional broadcasting (including movie cameras and video systems) became one of Sony's core businesses.

⁸ The issue of licensing in details has not been researched yet.

3-2 ANALYSIS

What are the key lessons Sony gained from the historical events in the VTR development? How did Sony apply the lessons from its R&D strategy to differentiate itself from others?

3-2-1 Development of Core Competence Based on Tuning Optimization

The most important lesson taken from the VTR development saga was Sony's recognition of a crucial factor: what differentiates its product quality from others depends not only on the performance of each electronic device, but also on the tuning optimization of the total system. This recognition was critical because it triggered the development of an exclusive technical advantage known as "tuning" and "noise reduction."

When Sony began to recognize the importance of tuning optimization after the U-matic system development, it began to accumulate all the test data from the development of each product, seeking to learn how to obtain the best output frequency from several patterns of input frequency, and how to reduce noise on the circuit design. This work was undertaken by Center Lab, Sony's in-house research institute. Center Lab analyzed common patterns with successful tuning and developed a "Tuning and Optimization Manual," which teaches techniques on developing optimized solutions for a variety of input patterns and noise. Based on their research on tuning, Center Lab developed soon held most of the industry's best knowledge on noise reduction technologies, and developed a noise reduction system that was widely used in Sony's audio and video product lines.

These advantages made it possible for Sony to solve the problems of cost and technical difficulty, which had hampered the consumer electronics industry because of immature analog semiconductor technology. In 1970s and 1980s, analog semiconductor technology was immature and the output frequency characteristics of analog devices were not stable. In order to maintain production quality, electronic manufacturers had to have a severe screening process for each semiconductor device, which reduced the yield and added to the device cost. Noise issues often occurred, especially when manufacturers tried to shrink the size of the electronic circuit.

However, by consulting the "Tuning and Optimization Manual," engineers were able to understand how to make qualified output frequency even if they still had a bottleneck in an independent electronic device. For instance, say a product consists of three parts: devices A, B, and C. To keep maintain the same production quality, all devices had to meet certain standards in a specified range. By using the knowledge conveyed in the Manual,

even if device A did not meet the standards, engineers could solve the problem by optimizing the system using devices B and C. This made Sony able maintain the same quality in production. Also, the noise reduction technology made them able to shrink the electronic circuit faster than other companies

Once this system began to work dependably, the quality of each product increased, and the product development divisions began to challenge the high-level product design. Data from these designs were accumulated in the Center Lab database, and Center Lab continued to create sophisticated tuning and noise reduction methodologies. This reinforcing loop (see Figure 3-1) took Sony's advantage to a level that no other competitors could attain, giving Sony a huge competitive advantage throughout the 1980s and into the early 1990s.

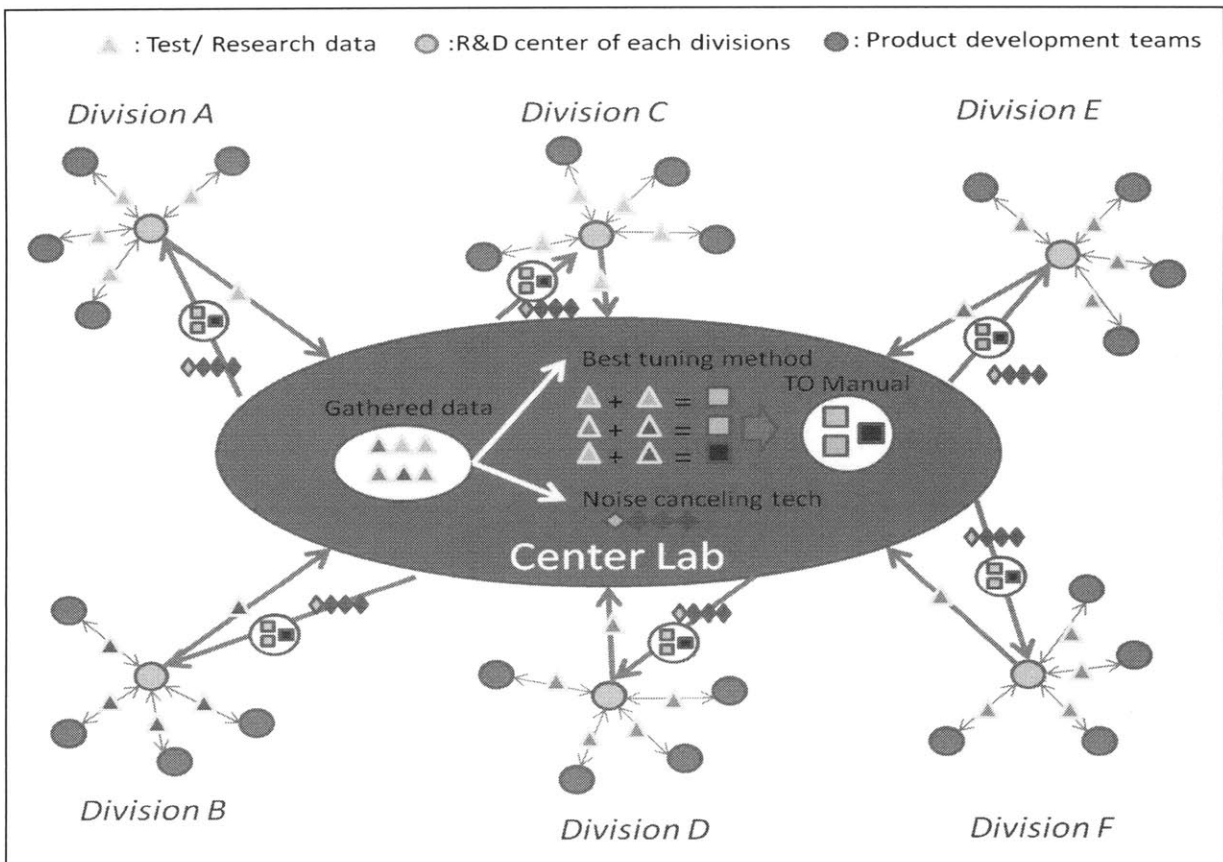


Fig. 3-1. Knowledge Management of Center Lab

3-2-2 Knowledge Sharing Culture

Another lesson Sony learned from the development of U-matic was the importance of knowledge sharing among engineers. Early in the development of VTR, each engineering team shared little information because of the time pressures of development. Another factor was Sony's corporate culture at the time. When the transistor radio was being developed, Ibuka encouraged engineers to be more competitive than collaborative, and it was common in Sony to have several engineering teams competing on the development of each product. Ibuka believed the best way to train engineers and create the best product in a timely manner was to encourage competition among the engineers.

During the U-matic development, however, Ibuka began to realize the power of collaboration and knowledge sharing among the engineers. This cultural change was at first not appreciated by the engineers, but with Ibuka's strong leadership and new approaches such as job rotation, technology open houses, and the establishment of Center Lab, Ibuka coaxed the engineers into recognizing the power of knowledge sharing and then embedded this culture into the company (see Figure 3-2 and 3-3).

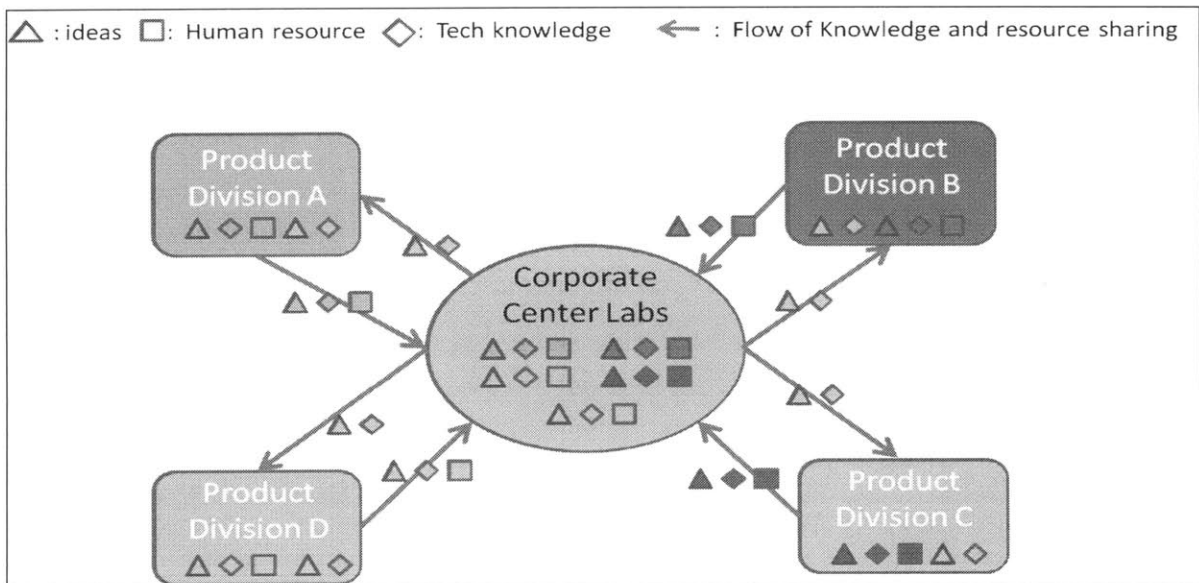


Fig. 3-2. Early stage of Sony's knowledge sharing system (early 1970s)

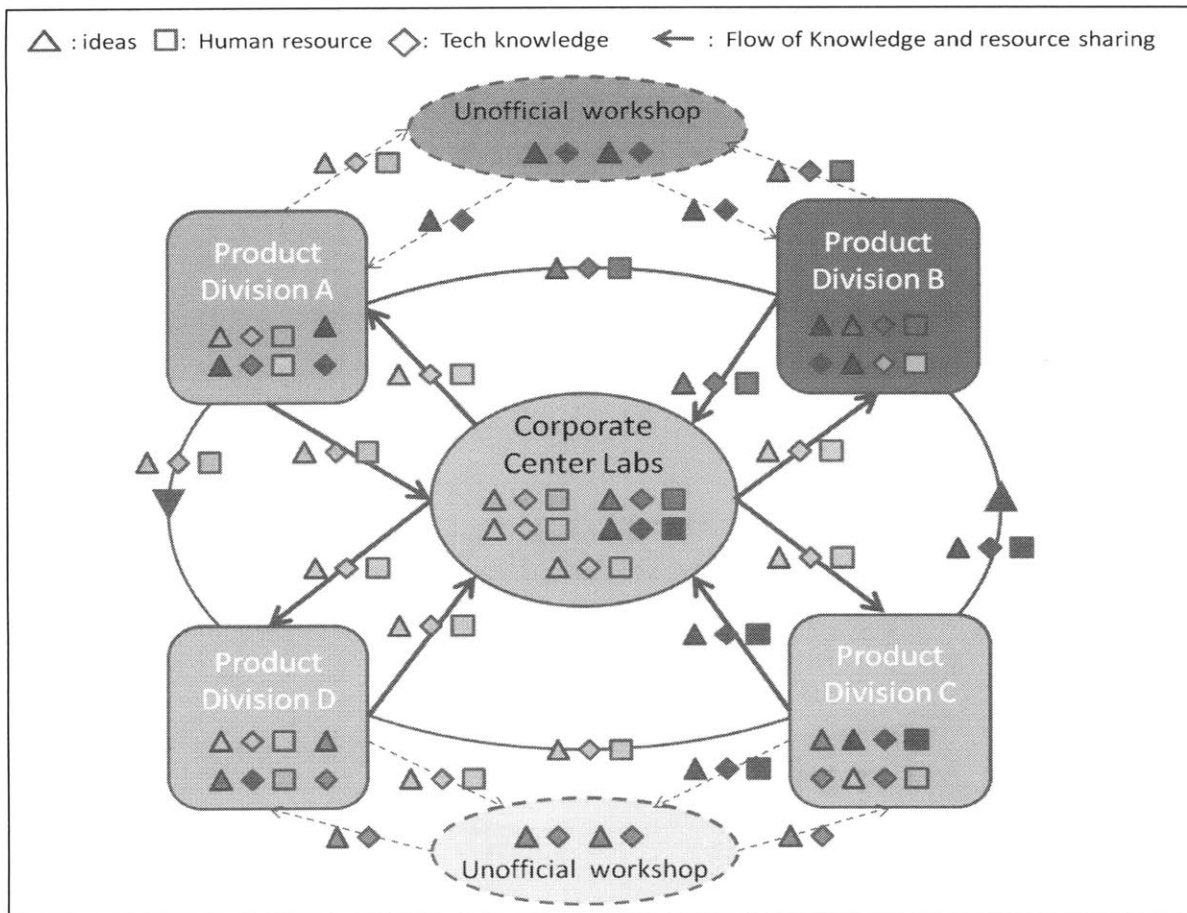


Fig. 3-3. Mature stage of Sony's knowledge sharing system (late 1970s)

3-2-3 Waterfall Strategy

Sony's experience with Beta-Max in the VTR format wars is recognized as a historic failure for Sony, and the name Beta-Max is synonymous with that failure. However, the Beta-Max business was in fact another of the company's great successes, not just because of successes in the professional broadcasting and movie industry, but also because of side effects that had a tremendous effect on the company's R&D and business.

Co-development of the next-generation broadcasting system, in conjunction with several key customers, enabled Sony to recognize early the next-generation technical requirements for the audio-visual industry. Core technologies, such as the 8mm VTR architecture, the CCD (Charge Coupled Device) technology, and digital videotapes were all developed based on demand from the professional broadcasting industry. Such product development experience helped professionally trained engineers to become key next-

generation personnel who made major contributions to the development of hit consumer products like the 8mm video camera, digital still camera, and CD audio system. Continuing to meet the needs of professional users led Sony to correct the R&D costs for its core technology development, allowing the company to set reasonable prices for products focused on the consumer electronics market.

This strategy is known as the “waterfall strategy,” i.e., taking products and technology from the very high end (professional uses) to the low end (consumer use), and it made major contributions to the company’s sales growth and prosperity for a long period of time.

3-3 SUMMARY

From the three core competences that Sony built in the 1970s, Sony was able to maximize the four aspects of business, both for themselves and for its value chain partners by improving their ability to create greater value in the market, while maximizing their resource efficiency and value-capturing opportunity for themselves and their value chain partners.

The knowledge sharing culture generated a rich flow of ideas and knowledge of technology and business, and increased Sony’s ability to create new value in the market (value creation), maximize the efficiency of R&D by sharing knowledge and results between different organizations and utilizing it on the development of other products (resource and process opportunity), while the use of R&D results reduced their R&D costs significantly (value capturing).

The knowledge management system for tuning technology also allowed Sony to obtain efficiencies in R&D (resource and process opportunity) and to accumulate rich knowledge of tuning, thus becoming driving the company to increase the quality and size of its products, which in turn allowed the company to put a premium on pricing and reduce COGS (value capturing). Sony’s advanced tuning technology allowed the company to use semiconductors, which failed to screen competitors and made semiconductor manufacturers create greater cost efficiency (value network creation).

The Waterfall strategy gave Sony the ability to capture the rich knowledge and idea flows from content holders and by combining them in the knowledge sharing system, create new values in the market (value creation). Also with highly educated engineers and a rich R&D budget for professional customers, Sony was able to create new technologies quickly

and efficiently and minimize its R&D costs for fundamental technology development of consumer products (resource and process opportunity/value capturing).

Thus, the three competences and the mutual reinforcing loop (see Figure 3-4) made Sony highly competitive in new business/technology idea generation (value creation), resource utilization (resource and process opportunity), and cost reduction and premium pricing (value capturing). Also the new concept products produced by this loop made retailers and end customers excited because of new business opportunities for retailers, and new usability and lifestyle for end customers (value network).

By building this strong eco system to reinforce the company's competitiveness in the 1970s, Sony was able to maximize the value of the four aspects of business in many sectors of the analog consumer electronics industry, and to achieve major revenue and profit growth during the 1970s.

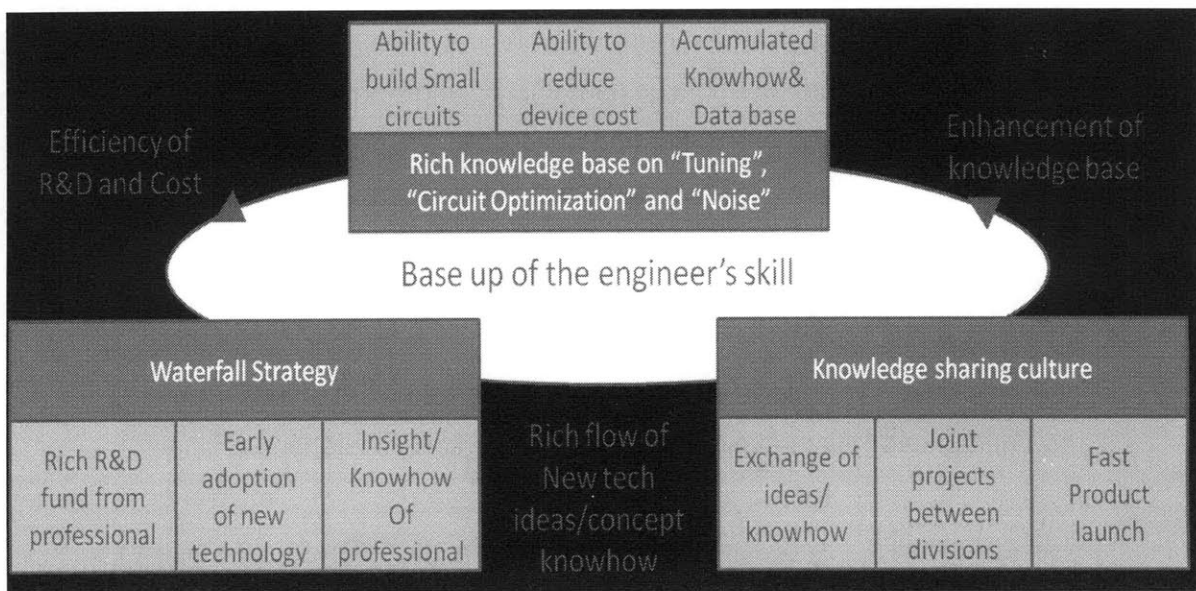
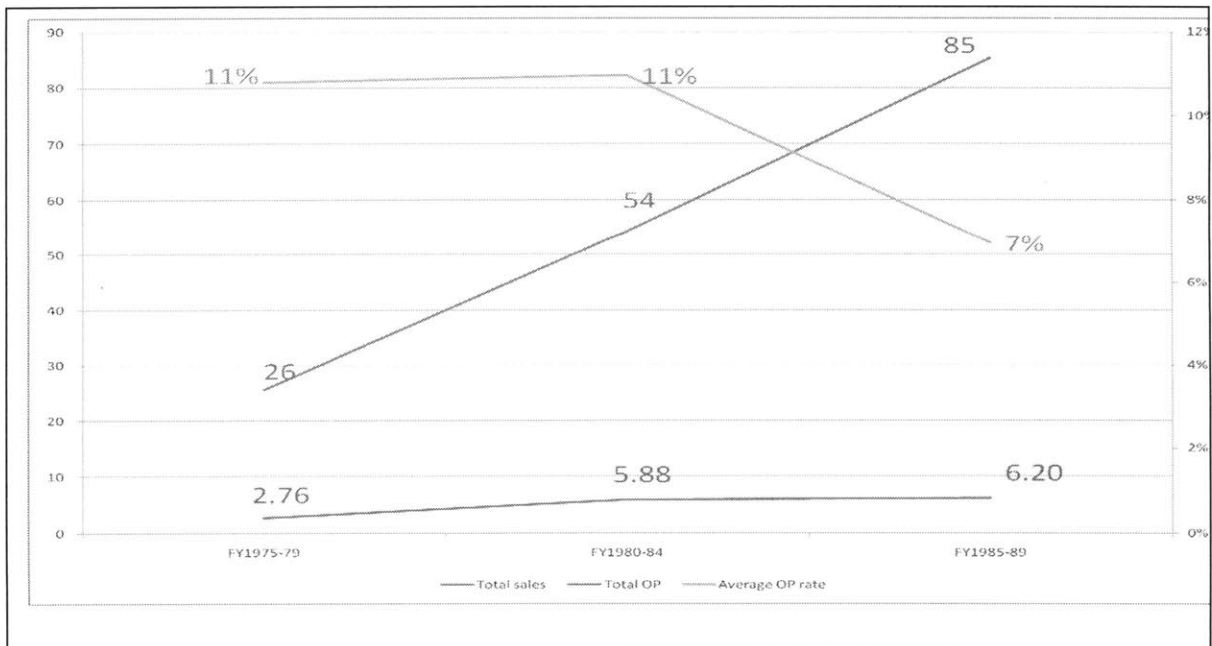


Fig 3-4. Reinforcing loop of competitiveness by three competences

CHAPTER 4

THE SECOND GOLDEN DECADE (1980s)

Through the decade of the 1980s, Sony continued to launch unique new concept products. The Sony Walkman, and an 8mm video camera, were megahits that made major contributions to Sony's sales and profit growth. These products also increased the company's brand image as a "cool" innovator, especially among young people. Sony also retained a strong share of the TV and broadcasting markets. The product quality advantage, which comes from accumulated internal technology (sophisticated key devices, system integration, and analog signal tuning optimization know-how) put Sony far ahead of its competitors in the audio-visual industry. These advantages and the company's premium brand name allowed Sony products to enjoy premium pricing compared to other competitors, and the company's revenue and profit kept growing until Sony rivaled Panasonic as one of the largest audio-visual companies in the world, generating over \$100 billion in revenue and \$10 billion in operating profit.



Source: SONY JAPAN, IR information, <http://www.sony.co.jp/SonyInfo/IR/>

Fig. 4-1. Sales and Profit Growth, FY1975-1989

1980s was also the decade Sony started their innovation in “Digital technology” the next generation technology domain for consumer electronics industry. In this chapter, I will describe how Sony utilized its three core competences to create a strong product base in the analog consumer electronics industry, and explore why Sony decided to shift to digital technology even though they still enjoyed tremendous prosperity based on their technical advantage with analog tuning.

4-1 HISTORICAL REVIEW⁹

4-1-1 Prosperity Based on Competitive Advantage Created in the 1970s

During the 1980s, Sony harvested strong revenues and profits from the three core competences they had developed in the 1970s. The technology development for imaging devices, and the evolution of magnetic video and audio cassette tapes were originally undertaken for the broadcasting companies, so Sony could utilize these R&D results in its consumer electronics product line such as the 8mm video camera, Mavica (DSC), and the digital video camera, all of which were megahits for the company in the 1980s.

The most popular audio product, the Walkman, was also launched in this decade, with more than 32 major models between 1979 and 1989. The Walkman was always ahead of its competitors based on product size, sound quality, and functionality. All these differences stemmed from Sony’s ability launch products quickly, with scaled-down electronic circuits, and excellent tuning based on its knowledge sharing culture and tuning know-how management system.

By utilizing its three core competences, Sony increased its products line up, while annual sales and profit both tripled during the decade (sales: \$6.4B (1979) to \$23.3B (1989); OP: \$0.7B (1979) to \$2.4B (1989)).¹⁰

4-1-2 CD Media Format Innovation

Sony’s biggest innovation in this decade was the compact disc. Working with the broadcasting and movie industries, Sony realized that the next-generation media format would almost certainly be a digital format that would not deteriorate, and would create opportunities for electronic manufacturers to reduce cost and size of their products

⁹ Information for this historical review came from “Genryu: The History of Sony.”, Sony PR Department, 1996; Sony Japan website; Sony alumni interviews.

¹⁰ SONY JAPAN, IR information, <http://www.sony.co.jp/SonyInfo/IR/>.

because of the simplicity of signal capturing, ease of tuning, and fit with the CMOS-semiconductor technology, which showed great potential for circuit integration compared with the bipolar-semiconductor.

Sony selected Philips as its partner for developing the technology. Philips was already ahead with R&D on optical media and had the basic technology to develop compact disks, combining Philip's strength in optical media technology with Sony's strength in signal processing. Also, both Sony and Philips had strong music label subsidiaries (CBS Sony and Polygram, respectively). By combining the assets of both companies, Philips and Sony were confident they could develop their new media format in the music industry standard.

During decision making for the basic specifications of their new media format, Sony invited many people from the music industry to give input about important specifications of the media format. For instance, the size (12cm) was chosen so as to allow Beethoven's "Ninth Symphony" (the longest musical piece at the time) to be recorded on one disc; the bit length (16bit) was decided based on auditions with famous conductors, pianists, and pop artists. Sony sought a balance with its electronic circuits—not such high quality that it would hamper economic efficiencies for mass production by the electronic manufacturers. These were all lessons learned from the Beta failure, and Sony worked hard not to repeat that failure. Finally, in 1982, the first CD player was launched by Sony, and by 1986 total CD production has reversed the dominance of LP records to become the *de facto* standard format in the music industry.

4-2 ANALYSIS

4-2-1 Creating Strong Product Lines

Sony's competitive advantage as a result of the Walkman product line development is a good example of how Sony utilized its core competences to develop strong product lines. Sony's competitive advantages in the portable headphone industry are (1) fast product launch, (2) product size, (3) sound quality, and (4) functionality. These differences came from the Sony's three core competences: rich knowledge based on tuning/circuit optimization/noise canceling, its knowledge-sharing culture, and its waterfall strategy.

The advantages of fast product launch and rich functionality came from Sony's knowledge-sharing culture and the waterfall strategy. Key hardware components, such as mechatronic decks, magnetic heads, wireless controller, and battery often arose out of collaborative research between the portable audio, home audio, and personal video

divisions, as engineers from these three divisions continued to improve the size, speed, and signal capturing/writing quality of these components. Many unique concepts were integrated into the Walkman: auto-reverse, wireless controllers, waterproof, small rechargeable battery, and solar battery were all innovations coming from this collaborative research, and half of them came from ideas from the research group of other divisions. Also, R&D on behalf of the professional broadcasting and music companies contributed to giving them ideas for how to develop optimized headphones and tuning controls for different sound sources (orchestra, pops, rock, etc.) and listening occasions (city, woodland, car, subway, etc.). This resulted in new, specialized models for each sound source and listener occasion, and was greatly appreciated by the consumer market.

The advantage of product size came primarily from Sony's rich tuning know-how and knowledge-sharing culture. One mission of the collaborative research team for hardware components was to reduce the size of the mechatronic deck and batteries—the two largest space-consuming components. Every year the collaborative research team further scaled down the mechatronic deck, they also created a smaller size rechargeable battery based of collaborative research with the battery research group at Center Lab. Also, because new tuning techniques evolved every year using the knowledge management system for tuning, the Portable Audio Group was able to reduce unnecessary electric blocks, narrow the pitch between blocks, and integrate several functions into one semiconductor, which reduced the overall size of electric circuits. For these reasons, the Walkman continually advanced in product size.

Sony's sound quality advantage was the result of ongoing enhancements of its tuning know-how and R&D demanded by the professional broadcasting and music companies, which gave Sony ideas for how to develop optimized headphones and tuning control software and hardware. From the Walkman, Sony utilized its three competences to develop major competitive advantages against their competitors.

4-2-2 Foreseeing the Digital Industry

The compact disc was Sony's first innovation to shift into the digital technology of the next-generation technology domain for consumer electronics. Sony foresaw the coming domain shift from analog to digital in the development of digital tape for the broadcasting companies, so it moved into consumer CD format and digital video development during the early stage to take the first mover's advantage. Sony foresaw several benefits and opportunities in the simplicity and stability of the digital signal and its applied technology.

■ **Value creation: opportunity to create new markets**

1. The simplicity of digital data had the potential to develop small-size media and devices or extend the recording capacity with the same size media.
2. It also had the potential to process different applications in one device.
3. The stability of digital data had the potential to develop recording media with no deterioration.

From these benefits Sony foresaw the potential in digital technology to create new markets in the consumer electronics industry (see Figure 4-2).

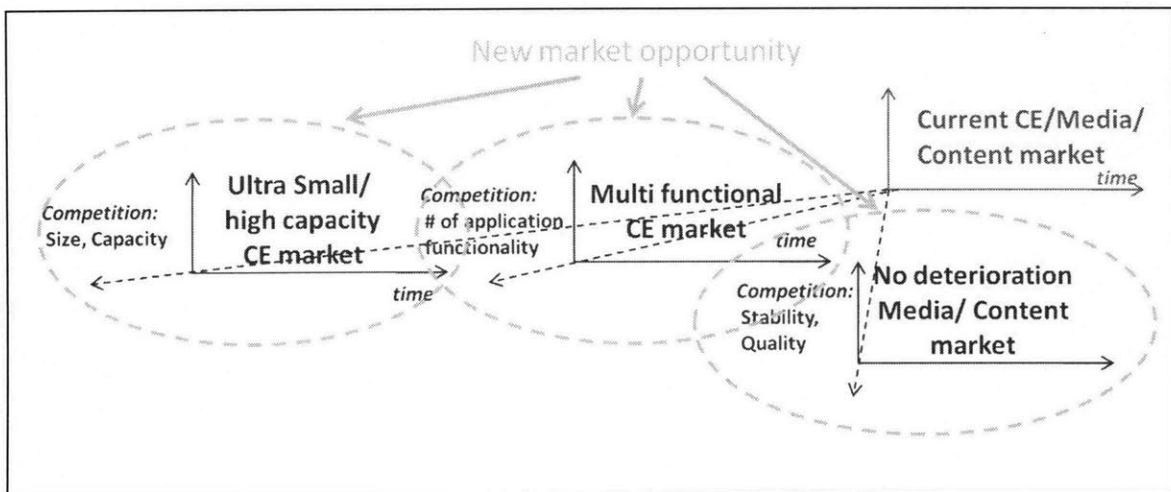


Fig. 4-2. Value creation: opportunity to create new markets

■ Resource and process opportunity

Regarding resource and process opportunities, Sony reused and recycled its R&D for electronic blocks and semiconductor logic among the internal business groups (see Figure 4-3). At this stage, Sony already had some ability to reuse past R&D because of its “Tuning and Optimization Manual” and noise reduction technology. However, in many cases Sony had to modify the blocks to make the best optimization of the electronic circuit. Digital technology had the potential to solve those problems and improve resource and process efficiency for Sony.

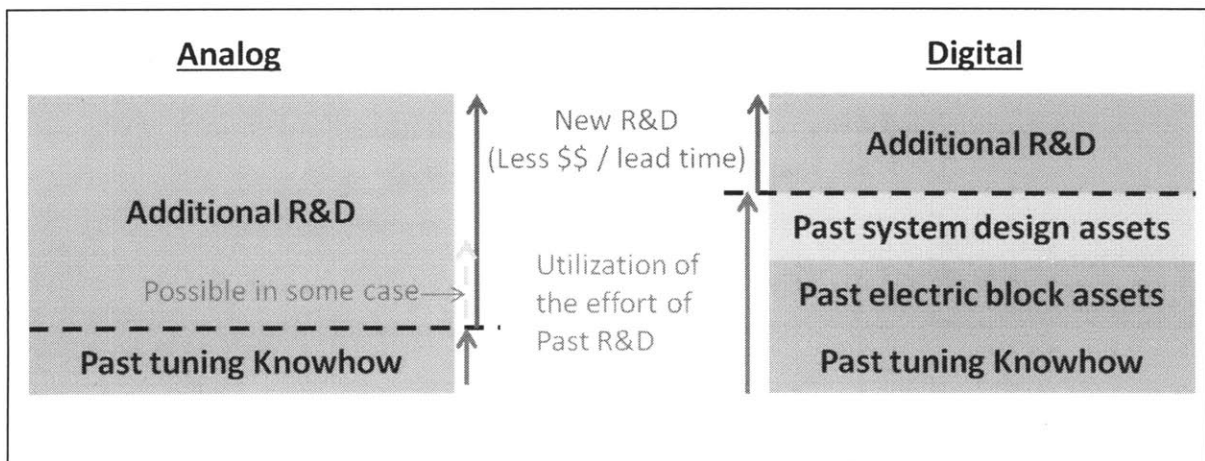


Fig. 4-3. Resource and process opportunities with digital technology

■ Value capturing opportunity

Sony was not only looking at resource and process efficiency, but at ease of tuning because of the simplicity of digital signals. Ease of tuning was expected to reduce R&D cost and lead time spent for tuning optimization, as well as increase semiconductor yield because of the simple design.

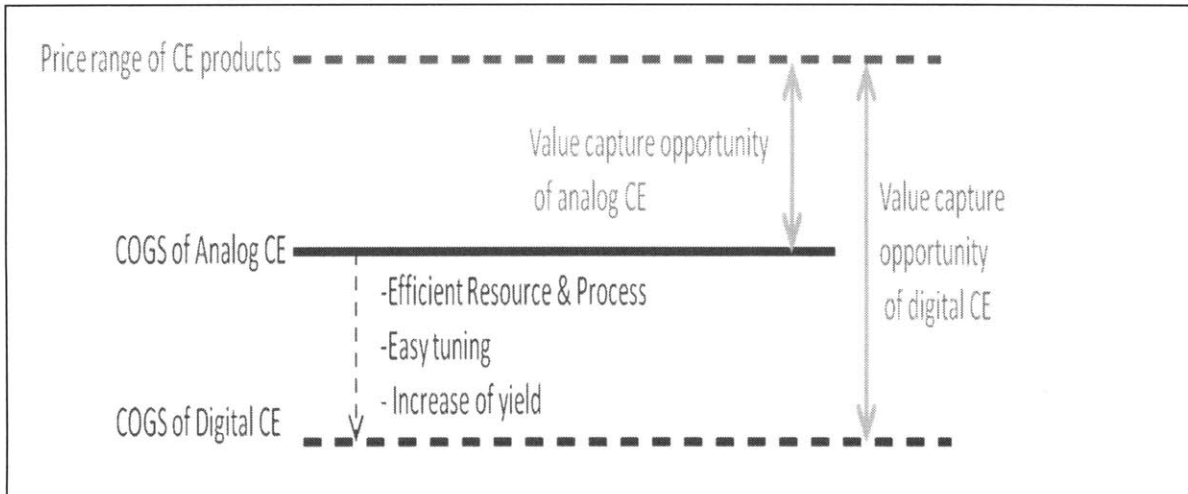


Fig. 4-4. Value capturing opportunity with digital technology

■ Value network incentives

Regarding incentives for their partners in the value network, Sony recognized there would be many benefits for each player. For content holders, Sony could provide media that would not deteriorate and cost efficiencies on media pressing. For semiconductor manufacturers, Sony could provide an opportunity to increase product yields. For recording media developers they could provide efficient material costs. And for electronics manufacturers, Sony could provide similar benefit as what Sony itself enjoyed.

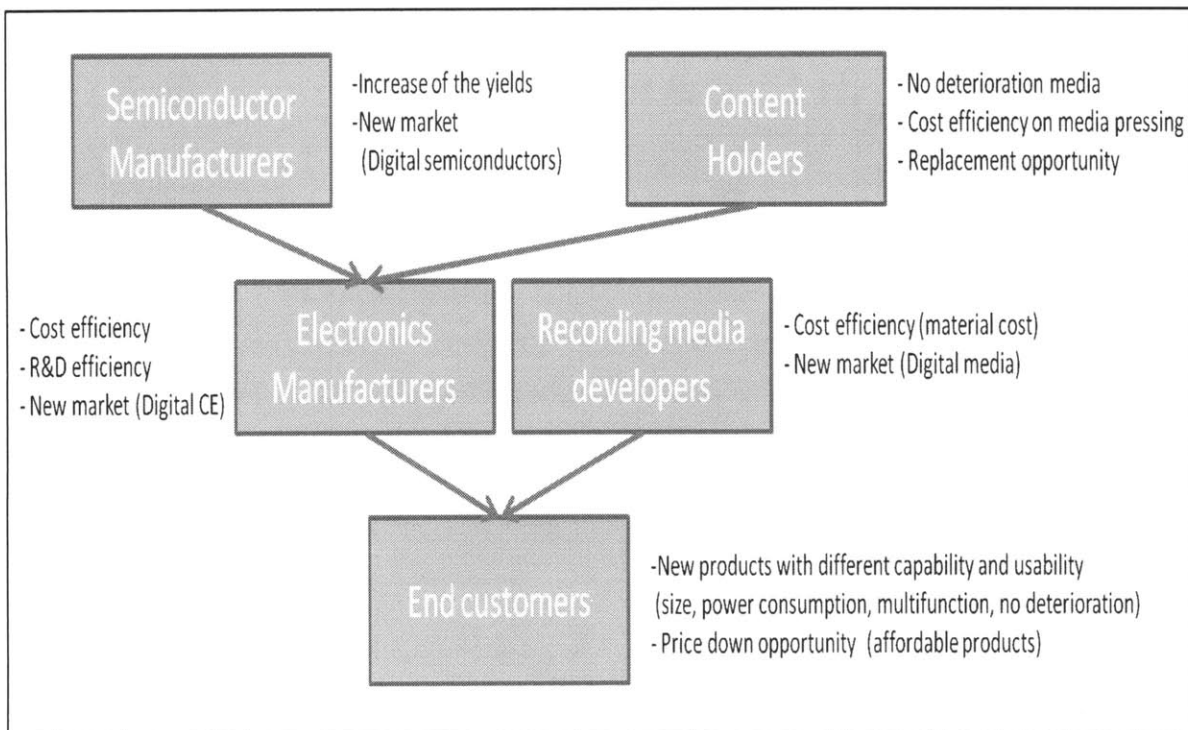


Figure 4-5. Incentives for players in the value network by shifting to digital technology

4-3 SUMMARY

Even foreseeing the future risks that could damage the essence of their business success in the 1980s, Sony's founders still chose to shift to the new technology. For them, digital technology was the new technology that would maximize the four critical aspects of the consumer electronic business and help Sony to avoid the pitfall of the "Innovator's dilemma." So they moved forward aggressively to take advantage of this domain shift. In fact, in the 1980s, Sony maximized its value by strong competitiveness in the analog consumer electronics industry, which came from the three competences they developed in the 1970s.

The decision to shift to the digital domain, which was a new technology for Sony, held some potential risk of decreasing Sony's competitiveness in the consumer analog electronics market. Digitalization was a big risk for Sony, as it could destroy Sony's biggest competitive advantage—its rich tuning know-how. Also, the digital technology had the potential to lead the consumer electronics industry to a modular business model and increase the power of horizontal competitors in the industry.

Sony's two founders recognized these potential risks of digitalization, but their decision was to pursue digitalization in the consumer electronics industry. In their minds were four strong beliefs:

- Digitalization will come anyway, and if Sony did not make the first move, somebody else would have the benefit of the first mover's advantage.
- Even in the digital CE industry, knowledge sharing and collaborative R&D would give Sony a strong competitive advantage.
- Sony's knowledge management system would be the key differentiator, which would give it a huge advantage.
- Sony was well ahead in business diversification compared to its competitors, so it could reap major benefits from the shift to digital technology.

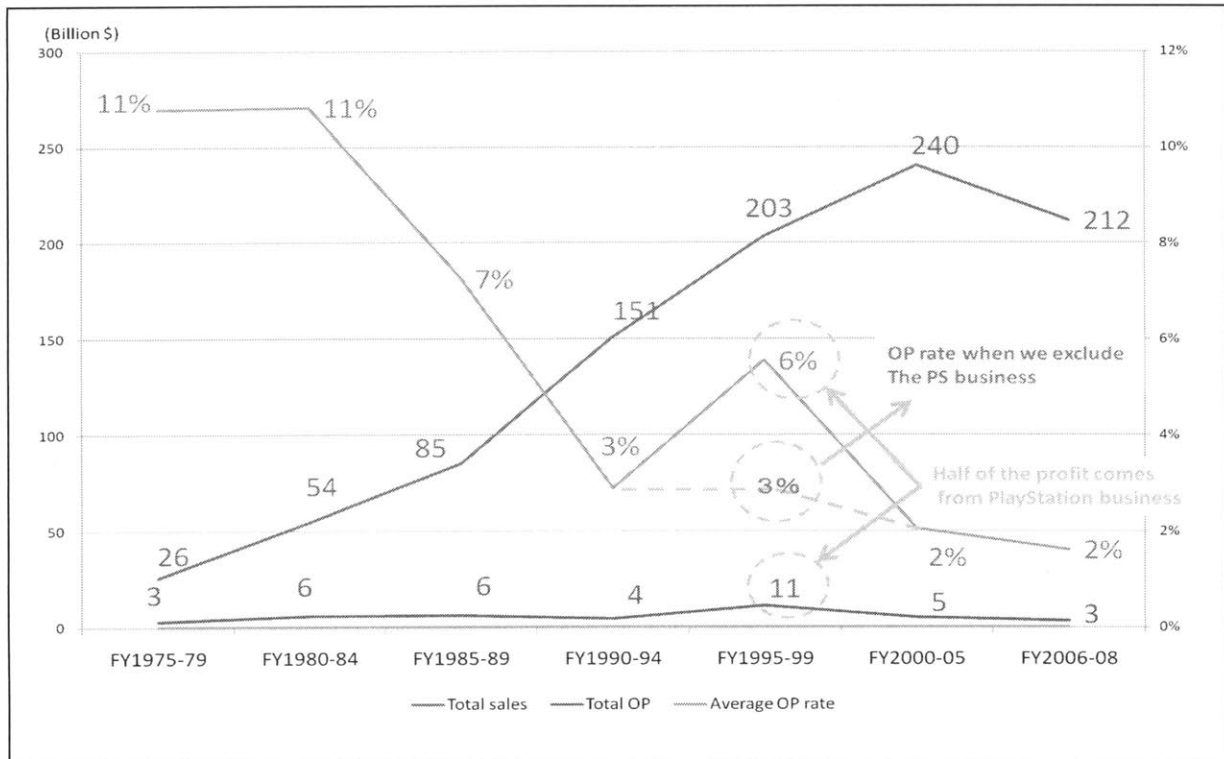
CHAPTER 5

THE TURNING POINT (1990s)

From the early 1990s, the board steering Sony's business management gradually shifted from two founders to one: Norio Oga, who was elected CEO in 1989. Continuing with the founders' vision, Oga accelerated diversification in the consumer electronics industry as Sony continued to aggressively enter new markets, such as digital still cameras, cellphones, consumer PCs, and games. Oga was also active in importing Western-style business management methodologies in order to make Sony's management style global.

By looking at sales and operating profit (OP) growth over every five-year segment from FY1975 (see Figure 5-1), we can see that aggressive business diversification contributed greatly increasing sales growth above 1970s levels. However, OP had almost no growth except in the second half of the 1990s when Sony once again enjoyed rapid sales and business growth as a result of its PlayStation business. However, if that business is excluded, the profit rate continues to decline rapidly in the 1990s.

In this chapter, I will describe Sony R&D, as well as its business and organizational structure, to determine the cause of the rapid profit decrease. I will also analyze in detail the development and evolution of the PlayStation business, specifically the key success factors and what was done differently from other business groups to produce this huge success in the gaming industry.



Source: SONY JAPAN, IR information, <http://www.sony.co.jp/SonyInfo/IR/>

Fig. 5-1. Sales and profit growth, FY1985-2008

5-1 REVIEW OF R&D, BUSINESS, AND ORGANIZATION STRUCTURE¹¹

5-1-1 Decline of Knowledge Sharing and Collaborative Culture

In the late 1970s, Akio Morita began to consider diversifying Sony's core business into three business segments, consumer, professional and key component segment. At this time, Sony recognized its advantage in electronic devices such as semiconductors for audio-video products, laser pickups for CD systems, and the lithium ion battery. Morita believed the next opportunity to grow sales and profit would be in the component business. After four years of internal consideration and organizational realignment, Sony started its key component business to external consumer electronics manufacturers in 1983. This diversification worked well and sales of Sony electronics components rose from ¥130 billion in 1983 to ¥619 billion in 1990.¹²

¹¹ Information for this historical review came from Sony PR Department, 1996; Sony Japan website; Sony history from <http://www.sony.co.jp/SonyInfo/CorporateInfo/History/index.html>; and SONY alumni interviews.

¹² SONY JAPAN, IR information, <http://www.sony.co.jp/SonyInfo/IR/>.

Despite this success, however, the component business caused some difficulty for the end product divisions. To empower sales growth for the component business, Sony's board decided to allocate key designers and analog tuning engineers from the end product divisions to the component business division. Consequently, the end product divisions lost many key engineering resources, and discontent began to grow. Also, in order to accelerate business, the component division began selling not only core devices and electronic circuit boards but also offering tuning optimization and technical support to direct competitors of the End Products Group. This meant that the accumulated know-how of tuning optimization was leaked to competitors, causing serious concern and frustration for the end product divisions.

From 1993, when a new company system for divisional self-supporting accounting and governance was implemented, the end product divisions began hiding their internally developed R&D results, including new tuning and noise reduction know-how, from the Center Labs. At the same time, the end product divisions also started to use external device manufacturers for their key device development.

These were all the result of accumulated frustrations to the key Component Group, and the dissension started to seriously damage Sony's competitive advantage and business strategy. The long-standing knowledge sharing and collaborative R&D culture among the various divisions gradually disappeared, and Sony started losing its biggest competitive advantage. Also, the divisional self-supporting R&D culture caused inefficiencies, not only for each division's R&D expenditures, but also for procurement costs, because every division began to purchase similar types of device from different manufacturers, and Sony lost its bargaining power.

5-1-2 Software Compatibility Issues

In the late 1990s, when PCs and the Internet became common, and many consumer electronic products could be connected to PCs, every Sony division began developing its own proprietary PC application software, optimized for its product line. This software had different user interface designs, used different types of codec and DRMs, and has less compatibility or connectivity with application software from other divisions or other popular applications in the market. This caused inefficiencies in each division's product development and created considerable inconvenience for end users. Every time users purchased a new Sony product, they had to install new software and learn how to use it. Also, because of less unification of supporting codec or DRM and less compatibility of software applications, the

content and database were not transferable between software applications developed by different product divisions. These inconvenience frustrated the end users, and even loyal Sony customers began to buy products with greater flexibility from Sony competitors.

Seeking to rectify this situation, Sony headquarters management tried to persuade every division to use a standard software platform created by HQ's software center, so the product development divisions complied. However, with less contribution from product development engineers, the platform created by software center was inferior compared to the proprietary software developed by each product development division. Soon the product development divisions reverted to developing their proprietary software, and new products contained several supporting software applications. This added to the confusion for users, and because the interface and supporting codec and DRM were not aligned between the standard software and proprietary software, it further increased the compatibility issues. As a result, users perceived Sony's products as less user-friendly and savvy competitors quickly developed sophisticated platforms with a more user-friendly interface, and the ability to support several devices with one platform. A wide variety of supporting applications (such as iPod) began taking away market share from Sony.

5-1-3 Hardware Technology Development

The divided, self-supporting R&D culture also weakened Sony's encore hardware technology development. For instance, for next-generation flat-panel TV development, the TV division, HQ Lab, and Key Component Business division all had differing opinions on the future of flat-panel. Consequently, each group began investing in different technologies, such as OLED, SXRD (Ultra high definition projection TV), MEMS mirror display; also the R&D budget and HR resources for next-generation research were spread to each. This fact delayed the development of each technology and allowed LCD panel developers such as Sharp and Samsung, or plasma panel developers such as Panasonic and Pioneer, take launch their products sooner.

Much the same happened with the development of microprocessors for visual products (TV, video). Because the TV, Video, and Semiconductor divisions each had different ideas about the future, every division started their product development with different core engine developers (Arm, Toshiba, and NEC) that used different core architecture and developing toolkits. This made each division's engineers use to a different programming language and core architecture, which created a strong bond between the core developers and each division. Even when the engineers recognized the technical

benefit of a solution that was developed by another division, it was impossible to switch to the other solution because they had not used the core architecture and programming language of the solution.

For these reasons, Sony was unable to consolidate its internal R&D resources for the core microprocessor and chip solution development, and soon Sony found itself further behind Panasonic, which was concentrating all its R&D resource on TV, video, and semiconductors to create a single, sophisticated semiconductor platform that not only was compatible with their DTV, DVD, and HDD recorders, but could also be utilized by their DSC, Digital Video camera.

For these reasons, Sony lost its competitive edge on hardware core development, and in the early 2000s, most of the hardware core of Sony's digital products came from third-party producers.

5-1-4 Summarizing the Lack of Competitiveness

Summing up the issues facing Sony in the 1990s, it is clear that the decline of knowledge sharing was one factor making Sony's competitiveness decrease. Up to the late 1980s, the Key Component Group only sold Sony electronic devices and provided limited technical support to its customers. Nevertheless, end product manufacturers were excited to buy sophisticated Sony components. Sony's End Product Group still maintained its competitive advantage because competitors did not have Sony's sophisticated tuning mechanisms and the electronic circuit layouts. In another words, the keys to Sony's competitive advantage remained tightly held inside the company at this stage.

However, with the radical growth of the business in the late 1980s, the Key Component Group began to feel pressure from headquarters to grow more quickly, and customers were clamoring for stronger support. The self-supporting accounting and governance systems accelerated pressure on the Key Component Group until they finally decided to strengthen their business by offering support to outside customers by leaking the tuning mechanism and electronic circuit layout, which resulted in increased sales for the Key Components Group for a while. But then the End Products Division began encountering more competition in their market because of the lost competitive advantage, so it had less incentive to share technical knowledge with the Key Component Group. Also because of fear that hard-won knowledge would be leaked by Center Lab or other end product divisions, the culture of knowledge sharing and cooperative development gradually declined within Sony.

However, it was that lack of knowledge sharing that accelerated the loss of competitiveness for the end product divisions. Because the end product divisions had to self-support every R&D process with little input from other organizations, the end product divisions began to suffer from:

- a lack of new concepts and ideas (i.e., new product features, the next R&D focus, and new business strategies);
- fewer technical advantages (tuning, devices, software);
- lost R&D efficiency (longer engineering lead time, increased HR and R&D costs for each product development);
- less procurement efficiency;
- no unification of hardware core strategy (displays, digital semiconductor platform);
- no unification in user interfaces, such as PC software applications. This made the cost structure and ability to create unique and attractive products weaker for the end product divisions, and their profitability dropped dramatically.

The lack of knowledge sharing also caused Sony to delay platform development of its core hardware and PC software, which had been the backbone of its competitive advantage in the digital consumer electronics industry. In the 1970 and 1980s, because Sony's end product divisions shared their R&D efforts and business ideas, the natural outcome was a similarity of core technologies used and some unification of the technology platform. Consequently, the lack of knowledge sharing made the end product divisions develop different technologies and business roadmaps without any input from the other divisions, and the divisional unity disappeared. In turn, Sony was forced to spread its R&D resources across a number of division, and soon each division was making less-sophisticated hardware and software platforms compared to Sony's competitors who developed their platforms based on corporate-wide shared technology, collaborative R&D, and a concentration of resources and budget. As a result, the platforms developed by competitors were far ahead on quality, modularity, and cost efficiency, and Sony began to lose market share even in areas that Sony dominated in the 1980s.

As the two founders anticipated, knowledge sharing, collaborative R&D, and a unified management system were crucial to winning the competition in the digital consumer electronics industry. And ironically, Sony lost the competition because it lost the competitive advantages they originally held.

5-2 THE SUCCESS AND FAILURE OF PLAYSTATION¹³

5-2-1 The Nintendo Wars

In 1993, Sony established Sony Computer Entertainment (SCE) to gain a foothold in the home electronic gaming industry, which had been dominated by Nintendo. Development of the original PlayStation was undertaken jointly with Nintendo, whose aim was to develop a next-generation game console as a “super family computer.” However, only after a year, Nintendo suddenly and unexpectedly announced an alliance with Philips, and Sony was excluded from the Nintendo project. This angered Ken Kutaragi, who had led the development project, and CEO Norio Oga, but it triggered Sony’s move into its own project, which became the basis of SCE.

The project was established with the aim of developing a “killer business” that would include a wide range of Sony’s internal resources and incorporate its cutting-edge technologies, which other companies did not have. Sony put its best resources into this project. Developers from Central Lab were gathered to develop hardware, and developers from Kihara Institute, which specializes in research on software-related image processing technology, were added to the project. For future business development, Sony Music Entertainment (SME) and the Recording Media Division were assigned to put their knowledge of the CD business into practice. Figure 5-2 illustrates the wide-ranging collaboration that went into production of Sony Playstation.

¹³ Sources: SONY alumni interviews; Asakura 2000; Asakura 2003; SCEI HP <http://www.scei.co.jp/>; SONY JAPAN.

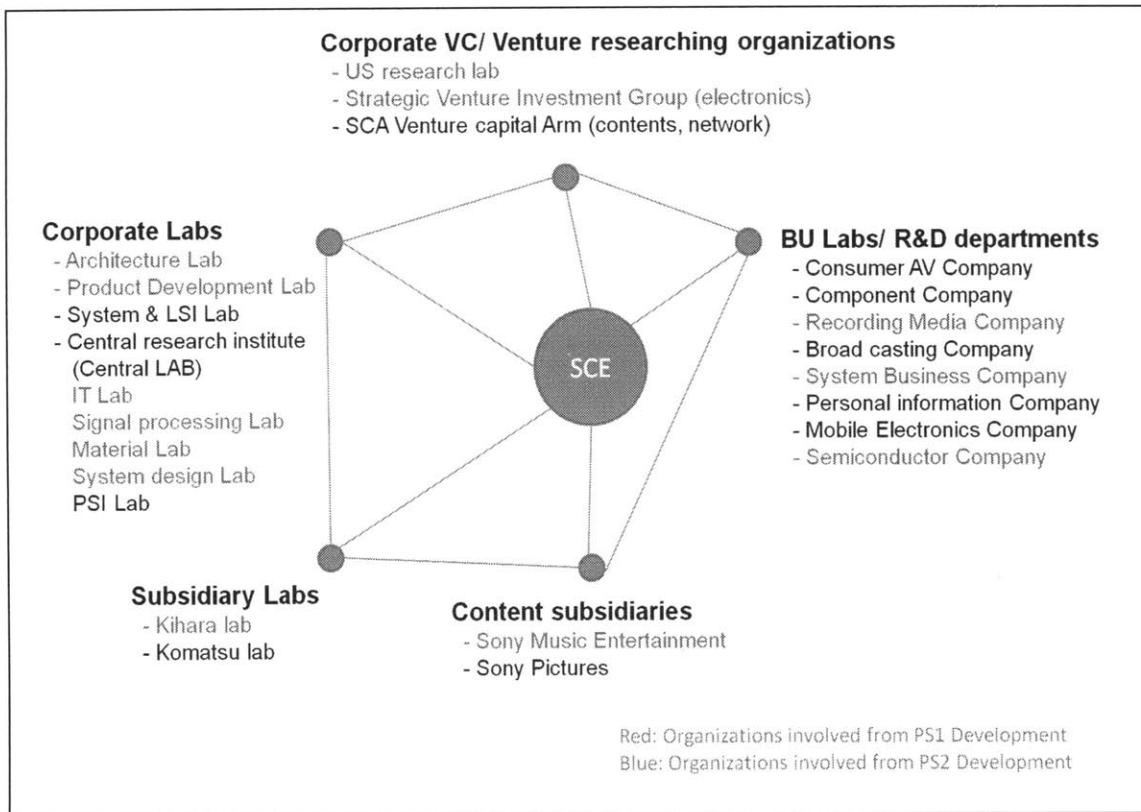


Fig 5-2. Collaborative R&D and business development for Playstation

5-2-2 Playstation's Advantage

SCE selected the CD-ROM as the format for its Playstation game console, which offered several advantages over Nintendo's traditional cassettes. For example, CD-ROMs cost less to manufacture (cassettes= \$20-\$40 each; CD-ROM= \$7-9 each), and manufacturing required shorter lead times (cassette= 2 month vs. CD-ROM = 10 days).

In creating its software development and distribution strategies, the business development team did initial due diligence on Nintendo's existing system, searching for a methodology that would take advantage of Nintendo's bottlenecks, such as long delivery or manufacturing lead times, or high initial investment cost that caused inconvenience and business risks for the software developers. For its distribution channel, SCE strategically chose to utilize a direct sales channel instead of the wholesaler channels traditionally used by Nintendo. Direct channels offered a substantial advantage in terms of shorter lead-time in

taking orders and responding to additional orders from retailers. This supply-chain advantage worked in tandem with the benefits of CD-ROM, which had a significantly shorter lead-time for manufacturing (less than 10 days for CD-ROM compared <2 months for Nintendo's cassettes).

The choice of CD-ROM gave SCE unique advantages because it could leverage the existing resources of SME. First, SCE could use SME's existing and very comprehensive retail distribution channel instead of building its own or relying on third parties. Existing music retailers could sell games packaged in CD-ROMs just as they did other music CDs. And SME's affiliate JARED had 6,000 existing retail stores across Japan. Second, SCE also utilized SME's existing CD manufacturing capabilities, which gave SCE economies of scale for cost and required less initial investment in an in-house factory or outsourcing to third parties at less favorable terms. Third, because Sony was an inventor and strong license-holder of CD, SCE did not have to pay licensing fees to use the technology.

As a result, while all competing 32-bit game consoles used the identical CD-ROM as a format for their software games, SCE enjoyed distinct advantages in terms of cost and responsiveness within its supply chain network by collaborating with SME and Sony.

5-2-3 Strategies to Attract Third-Party Software Developers

To overtake Nintendo's majority market share, SCE had to develop a system that would attract many third-party software developers to create attractive games for its game console and create a reinforcing loop with its hardware sales.

To attract software developers already licensed by Nintendo, SCE offered incentives that Nintendo did not provide:

- SCE eliminated the commission agent between the end retailer and the developer, which Nintendo had in its supply chain system. This reduced inventory risk for the software developers, who were allowed to have direct access with the end retailers in Sony's system. This gave the developers a more accurate forecast for market demand; with a manufacturing lead time of only 10 days, if demand softened, the developers could order in smaller lots.
- SCE subsidized the price of the software development toolkit which developers had to purchase in order to create games for SCE's game console. The price of SCE's toolkits was one-tenth that of Nintendo's, which meant that even one person with considerable creativity could develop software games for SCE.

- SCE developed indirect knowledge-sharing mechanisms among the software developers by offering software development support to third parties. Because SCE supported the programming of many software vendors, the knowledge acquired by efficient and low-cost development was accumulated in the SCE support team. SCE utilized this know-how in other vendor's software development, which created indirect knowledge sharing among software developers. It also meant lower costs, increased development speed, and higher quality, especially for small software houses.

Utilizing these strategies, SCE developed a low-risk, low entry barrier, and an efficient and supportive environment for software developers (see Figure 5-3). This not only caused Nintendo software developers to switch to PlayStation but also encouraged start-ups to enter the gaming software market.

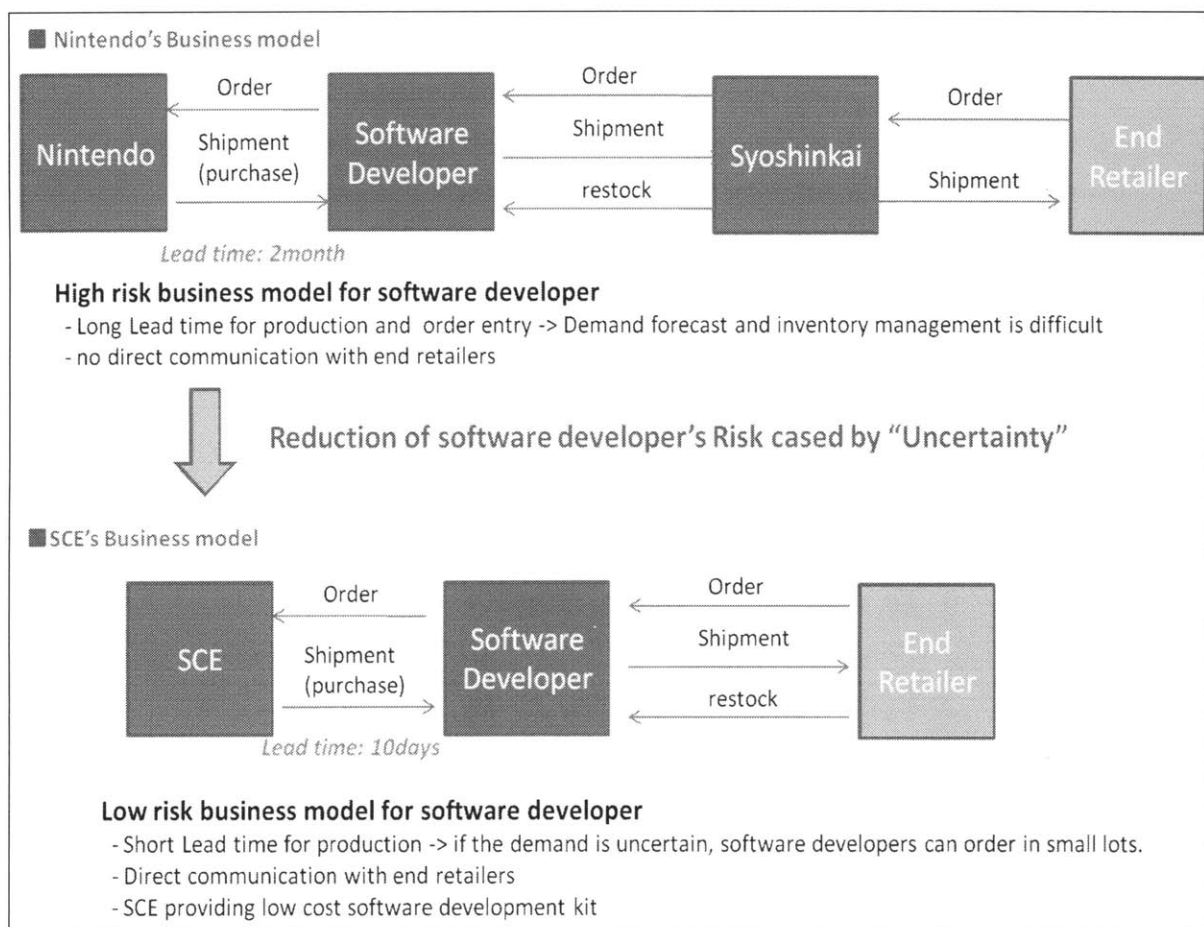


Fig. 5-3. Decreasing entry barrier for software developers

5-2-4 PlayStation2

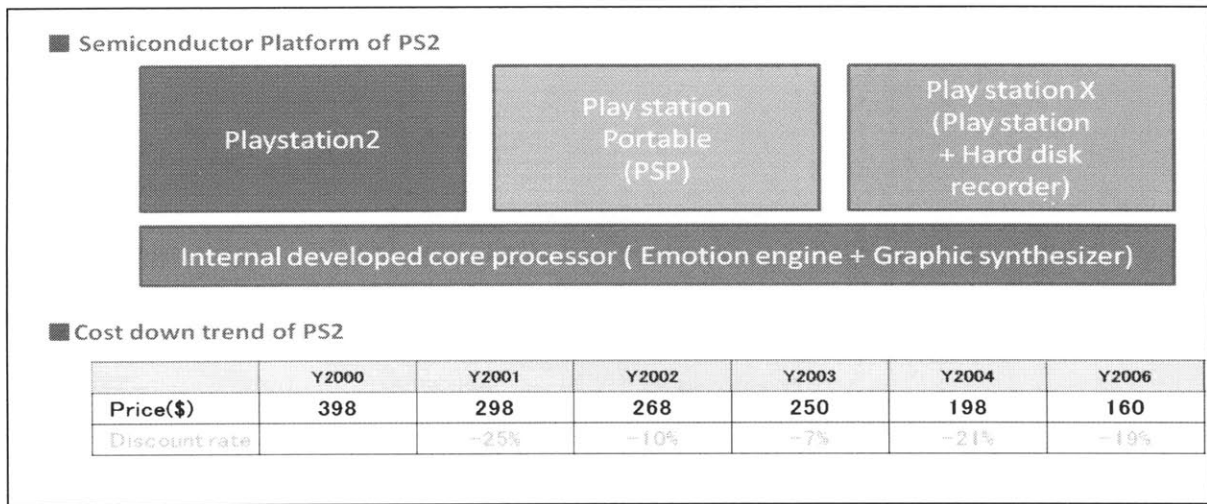
PlayStation succeeded in differentiating and competing with Nintendo in software development and delivery. However, from a hardware perspective, the technological and strategic competitiveness of first PlayStation (PS1) was not so high. This changed with the development of PlayStation2 (PS2) which appeared in 2000.

By embedding cutting-edge technologies of the time, such as DVD media, an ultra-high-speed core engine (EE + GS), and ultra-high-speed memory system architecture (co-developed with Rambus), SCE significantly enhanced the hardware performance for PS2. At the time of product release, the technology was so advanced that the International Trade Committee (ITC) raised its ranking of risk for diversion into weapons and, in fact, at one point the technology was subject to export controls.

SCE also started internal development and production of the core semiconductors (EE&GS), thinking that internal production would make it easier to control procurement, availability of inventory, and the overall cost of production. However, because of its luxury specification and relatively high initial (fixed) cost incurred by the self-developed core LSIs, SCE suffered a loss during the initial stage.

The break-even price for PS2 was estimated at around \$500 per unit, which was much higher than the \$160 price of PS1. SCE reluctantly settled the price of the first PS2 at \$398, which is typically the upper limit of the price range for Christmas gifts. However, even this high price proved to be too low to cover SCE's huge fixed cost. The market response to this pricing was positive, however. At that time the price of a DVD player was about the same, and people purchased PS2 as an alternative DVD player which also functioned for gaming. For these reasons, sales of PS2 increased dramatically, and SCE quickly turned the PS2 business from red to black in its second year. Eventually, by shrinking the chip size of EE and GS to 1/6 of the initial size, the cost of the core LSIs was decreased drastically.

Through these ongoing effort to improve performance and cost efficiency, SCE ultimately reduced PS2's price into the same range as PS1. In addition, the Core LSIs were used in other SCE products. PlayStation Portable and PlayStation X (PS + hard disk recorder) benefited from these technologies and could be sold at a significantly lower price despite their luxury functions (see Figure 5-4).



Source: SCE corporate data <http://www.scei.co.jp/corporate/data/about.html>

Fig. 5-4. Internal semiconductor platform development for PS2

5-2-5 PlayStation 3

With the success of PlayStation 1 and 2, Kutaragi established gaming as Sony's most profitable business by locking-in software vendors and creating a market monopoly with its platform strategy. He was soon promoted to chief executive of Sony's Electronic Business and said to be the most likely candidate for the next president of Sony.

Kutaragi's next goal was to introduce the strategy behind PlayStation 2 more widely throughout Sony. With PlayStation 3 coming out with embedded full HD quality for 3D gaming, Kutaragi intended to first develop the highest processing technology for PS3's core processor and then implement it in all Sony products. He was convinced this would make Sony a strong rival of Intel in the processor industry, and eventually differentiating Sony's products from other competitors.

Kutaragi was aggressive. He invested more than \$3 billion in the development of a new core processor called "Cell", then tried to integrate Cell into all of Sony's flagship home products, such as the hard disk recorder or television. However, this move was controversial within Sony's other divisions, especially in the TV and video divisions, because the Cell processor had many more specifications than needed for a hard disk recorder or TV at the

time, and the TV and video divisions had substitutes that were much less costly. Because Kutaragi had considerable authority and political power, he overcame the opposition and launched modifications of Sony's business plan, including internal reorganization, stopping other R&D projects, and shifting most R&D resources to focus on consumer electronics that utilized Cell.

Six months later, a year of delays in the Cell development was revealed, and the TV and video business suffered serious consequences. Since most of the R&D had focused on Cell development, Sony had little in the way of new technologies for the next year's new product line-up. Eventually Sony released comparatively old technology products that year, and experienced a significant drop in market share. Kutaragi lost his influence within Sony, the adoption of Cell to TV and video was postponed and eventually abandoned.

The PS3 business was affected as well. Cell shipments had declined significantly, and SCE had to raise the price of PS3 due to cost increases. The PS3 game console was priced at a very high \$600 per unit, while its main competitor, the Nintendo Wii, was priced at \$250. From a software development perspective, Sony made a costly mistake. Development of HD 3D software incurred significant initial development costs for software developers, so the number of titles was very limited. This negative cycle made PS3 lose significant market share, and the market viewed it as one of Sony's biggest failures during the 2000s.

5-2-6 Summary: Successes and Failures of the Playstation Business

From this review, it is apparent that the success of PS1 came primarily from Sony's strategic format selection, value network design, and the software development platform design. The decision to use the CD-ROM format gave SCE strong competitive advantages on cost and lead time for software manufacturing, as well as the ability to build a controllable new value network by utilizing resources that Sony and SME had from the beginning. SCE utilized the CD-ROM format to lower uncertainty and risk for software developers by eliminating the commission agent between the end retailer and the software developer. Combined with strong support and an inexpensive development toolkit that SCE provided to software developers, SCE again lowered the uncertainty and risk related to game software development, so that many developers were encouraged to develop new software games for Sony's game console.

These business ideas were developed based on Sony's rich knowledge of the CD business, while the hardware design for PS1 was created by sharing all of Sony's

intelligence and information resources. PS2 succeeded because of its internal development and production of the semiconductor for its core technology, which enabled SCE to achieve both high performance and lower cost. With these two successes, Sony dominated the game industry.

Nevertheless, there were risks associated with this strategy because it required significant investment in capital expenditure, as well as scalability and synergy. In the case of PS2, the benefits outweighed the drawbacks. Success was obvious in its record sales of software for PS2, which shipped more than 14 billion units compared to 9 billion for PlayStation.

To sum up, the key success factors of PS1 and PS2 were:

- Successful evolution and utilization of all Sony's resources as a source of intelligence and information. This meant building a value network that could maximize the resource and process opportunities and value-capturing opportunity by sharing internal knowledge
- Successful encouragement and migration of software vendors by removing entry barriers, i.e., maximizing the value of the new value network for key players in the network
- Successfully designing a semiconductor platform, which meant taking risks to maximize the value capturing opportunity.

However, in the case of PS3, Kutaragi and SCE failed for these reasons:

- A single leader aggressively decided a strategy without seeking input or feedback from other experts (i.e., a lack of knowledge sharing)
- Raising the entry barrier for software developers due to higher technological requirements for software development (i.e., decreasing the value of the new value network for key players in the network)
- A singular focus on Cell development without recognizing the risk to Sony's platform strategy (i.e., taking a risk to maximize the value capturing opportunity).

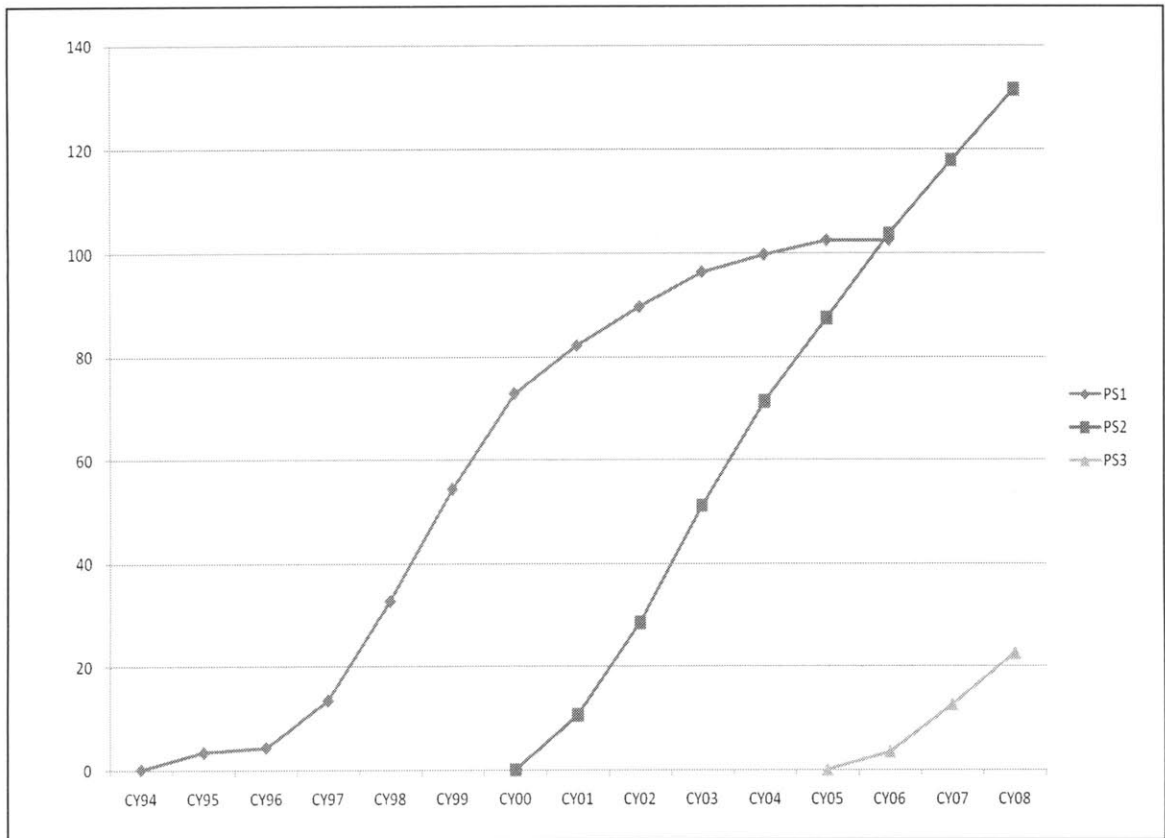
PS3 was developed based on the successes of PS1 and PS2, but ironically PS3 failed because it was unable to implement all the critical success factors of the previous versions.

Figures 5-5, 5-6, 5-7, and 5-8 illustrate the business success and historical profit rates of SCE.

	Asia	America	Europe	World wide
PS1	4,944	1,335	1,639	7,918
PS2	5,135	1,740	3,365	10,240
PS3	394	307	345	1,046

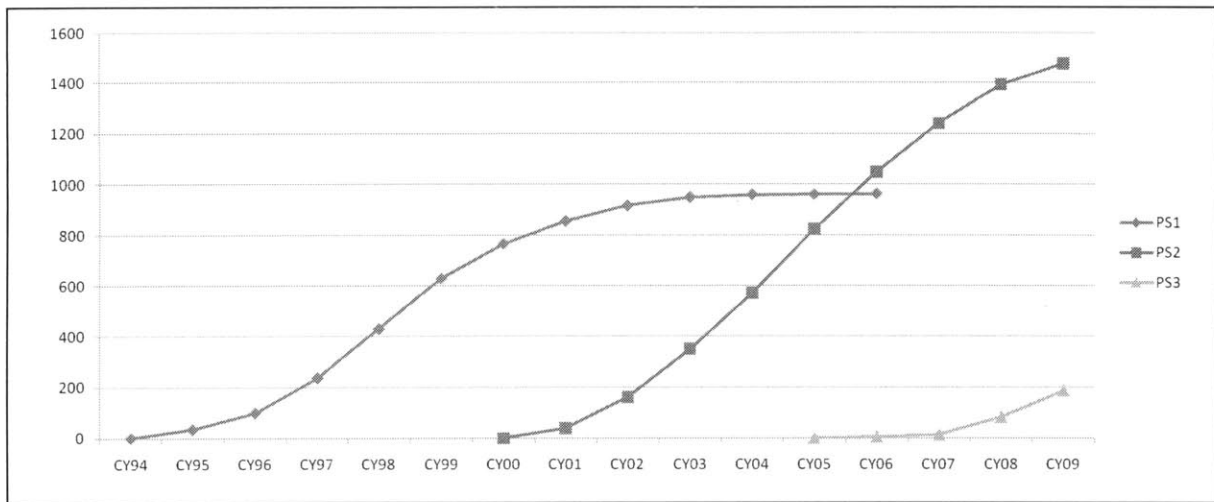
Source: SCE corporate data <http://www.scei.co.jp/corporate/data/about.html>; and SONY JAPAN, IR information, <http://www.sony.co.jp/SonyInfo/IR/>.

Fig. 5-5. Total number of released game titles



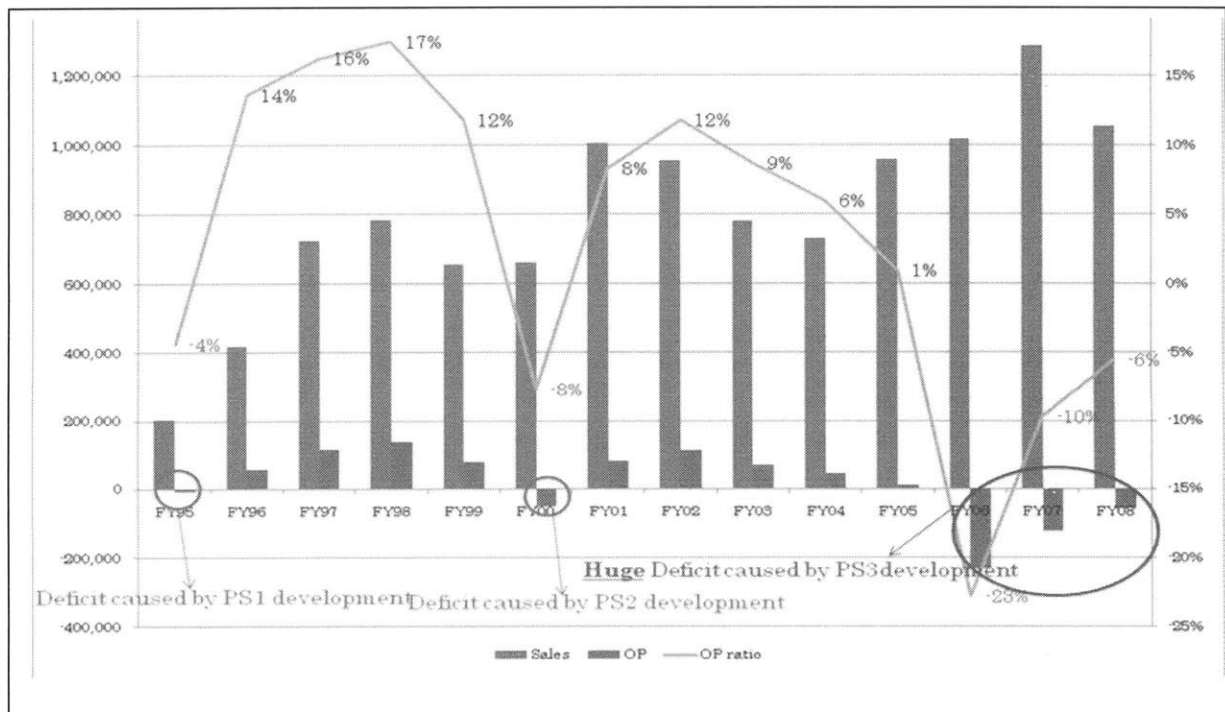
Source: SCE corporate data <http://www.scei.co.jp/corporate/data/about.html>; and SONY JAPAN, IR information, <http://www.sony.co.jp/SonyInfo/IR/>.

Fig. 5-6. Total shipments of each hardware (per million units)



Source: SCE corporate data <http://www.scei.co.jp/corporate/data/about.html>; and SONY JAPAN, IR information, <http://www.sony.co.jp/SonyInfo/IR/>.

Fig. 5-7. Total number of sold software



Source: SCE corporate data <http://www.scei.co.jp/corporate/data/about.html>; and SONY JAPAN, IR information, <http://www.sony.co.jp/SonyInfo/IR/>.

Fig. 5-8. Revenue and profit trend for SCE

CHAPTER 6

ANALYSIS OF KEY SUCCESS FACTORS AND RECOMMENDATIONS FOR THE FUTURE

As a result of the historical reviews of various Sony functions discussed in the thesis, I have identified a number of similarities that led to the company's success: Most successful businesses incorporate some form of these success factors, and unsuccessful businesses lack these factors. However, there are exceptions, such as the Beta-Max case, which actually had most of these success factors, but still became a very public business failure for Sony in the 2000s. It seems clear that there is some interdependence between these factors that make a successful.

In this final chapter, I will analyze this interdependence and possible correlations between these factors to identify patterns that led Sony to its past successes and failures. Thereafter, I will make recommendations for future steps for Sony's R&D and organizational structure based on the analysis on key factors of success and the current business environment at Sony and the larger markets in which it operates.

6-1 ANALYSIS OF KEY SUCCESS FACTORS

To organize the success factor, I have created a matrix and positioned the various factors on it. The common success factors are:

1. Value creation opportunity
 - Capability to create new customers
 - Capability to create different uses of a technology or product
2. Resource and process opportunity
 - Efficient use of human resources
 - Efficient use of internal and external know-how
 - Rich flows of business and technology ideas
 - Strong leadership
 - Strong technology core
3. Value capturing opportunity
 - Premium price
 - National advantage

- Efficient R&D cost
- Efficient manufacturing cost
- Efficient procurement cost

4. Value network

- Incentives for Suppliers (patent holders, device manufacturers, content developers)
- Incentives for horizontal partners
- Incentives for retailers

The business cases to which I have applied these success factors are:

- Transistor Radio & TV
- Walkman, 8mm video
- Video (Beta-max)
- Video (Professional)
- End products divisions (current)
- PlayStation 1
- PlayStation 2
- PlayStation 3

Figure 6-1 shows the matrix illustrating the successes and failures.

		Success					Failure		
		Transistor Radio & TV	Walkman/ 8mm video	Video (Pro)	PS 1	PS 2	Video (Beta)	End products divisions (Current)	PS3
Value creation	Capability to create new customers	○	○			○	○	○	○
	Capability to create different usability of the technology or product	○	○	○		○	○		○
Resource and Process	Efficient use of Human resource		○	○	○		○		
	Efficient use of internal and external Knowhow	○	○	○	○		○		
	Rich flows of business and technology ideas		○	○	○		○		
	Strong leadership of the business leaders	○	○	○	○	○	○	○	○
	Strong technology core or advantage	○	○	○	○	○	○	○	○
Value capturing	Price premium		○					○	
	National advantage	○							
	Efficiency in R&D cost	○	○	○	○				
	Efficiency in manufacturing cost	○	○	○	○	○		○	
	Efficiency in procurement cost		○	○					
Value network	Incentives for the Suppliers	○	○	○	○	○			
	Incentives for the horizontal partners								
	Incentives for the retailers	○	○	○	○	○	○	○	○

Figure 6-1. Success/Failure matrix

The matrix shows that successful cases have almost all of the key success factors, while the failed business cases have fewer success factors.

For an in-depth analysis, I have divided the current End Products Divisions into specific business products, such as:

- DSC business
- Camcorder business
- CRT-TV business (in the 1990s)
- HDD/DVD Recorder business
- LCD-TV business

- PC (Vaio) business

In addition, I have divided the PS hardware and software businesses. This produces a new matrix as shown in Figure 6-2.

		Success/Profitable									Failure/Unprofitable					
		Transis tor Radio & TV	Walkman/ 8mm video	Video (Pro)	PS Soft	PS 1	PS 2	DSC	CAMC ODER	CRT- TV	Video (Beta)	PS3	HDD RECO RDER	DVD RECO RDER	LCD- TV	VAIO
Value creation	Capability to create new customers	○	○				○				○	○				
	Capability to create different usability of the technology or product	○	○	○			○				○	○				○
Resource and Process	Efficient use of Human resource		○	○	○	○					○					
	Efficient use of internal and external Knowhow	○	○	○	○	○					○					
	Rich flows of business and technology ideas		○	○	○	○					○					
	Strong leadership of the business leaders	○	○	○	○	○	○	○	○	○	○	○			○	
	Strong technology core or advantage	○	○	○	○		○	○	○	○	○	○				
Value capturing	Price premium		○					○	○	○						○
	National advantage	○														
	Efficiency in R&D cost	○	○	○	○	○					○					
	Efficiency in manufacturing cost	○	○	○	○		○	○	○	○						
	Efficiency in procurement cost		○	○		○										
Value network	Incentives for the Suppliers	○	○	○	○											
	Incentives for the horizontal partners															
	Incentives for the retailers	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Fig. 6-2. Expanded success/failure matrix

Based on the results shown in Figure 6-2, the success factors can be reduced to the following:

- To achieve success in business, having the advantage of value capturing (cost) is mandatory.
- Strong leadership is necessary for success, but does not always lead to success.
- A strong technology core or advantage is necessary for success, but does not always lead to success.
- If a product is new, there will be some incentives for retailers.

Considering the matrix in Figure 6-2 by product lines, some interesting points appear:

- Looking at all current profitable businesses, the successes of DSC, camcorder, and CRT-TV are based on same success factors.
- Looking at PlayStation 2 & 3, both have virtually the same success factors in common; the only difference is “Efficiency in manufacturing cost.”
- Looking at Beta-Max, most of the success factors are there, but the business itself was not successful.

Digging deeper, I identified several further insights. For example, the Cost and R&D Efficiency of the DSC, Camcorder, and CRT-TV businesses all evolved out of the knowledge-sharing culture of the 1980s. In today’s environment for these business, their manufacturing cost advantage comes primarily from strong core devices, such as CCD and the Trinitron display—core technologies that were created before the 1990s. The technology development and technical enhancements were accomplished as the result of co-research and co-development among the TV division, Video division, Camera division, Key Components division, and Central Lab in the 1970 and 1980s.

For the PS2 and PS3 businesses, the main factors in their failures were:

- Kutaragi’s aggressive decision to make the risky investment in the CELL processor without seeking input or feedback from experts in the TV and video divisions. In other words, the lack of feedback from experts raised the risk level for the huge investment in CELL causing PS3 to have less efficiency in its manufacturing cost.
- Losing software developers by raising their technological requirements.

- PS2 still achieved huge benefits from the software development and distribution platform, which was designed by gathering ideas from all the resource within Sony Group, and attracted many software developers to provide content to the PlayStation platform.

In the case of Beta-Max, the product itself was successful, but cost efficiency for horizontal partners and incentives for suppliers (content holders) were weak compared to the VHS format, and Beta lost the format wars.

If we put these factors into the chart, the new result is Figure 6-3.

		Success/Profitable									Failure/Unprofitable					
		Transis tor Radio & TV	Walkman/ 8mm video	Video (Pro)	PS Soft	PS 1	PS 2	DSC	CAMC ODER	CRT- TV	Video (Beta)	PS3	HDD RECO RDER	DVD RECO RDER	LCD- TV	VAIO
Value creation	Capability to create new customers	○	○				○				○	○				
	Capability to create different usability of the technology or product	○	○	○			○				○	○				○
Resource and Process	Efficient use of Human resource		○	○	○	○	○	○	○	○	○					
	Efficient use of internal and external Knowhow	○	○	○	○	○	○	○	○	○	○					
	Rich flows of business and technology ideas		○	○	○	○	○	○	○	○	○					
	Strong leadership of the business leaders	○	○	○	○	○	○	○	○	○	○	○			○	
	Strong technology core or advantage	○	○	○	○	○	○	○	○	○	○	○				
Value capturing	Price premium		○					○	○	○						○
	National advantage	○														
	Efficiency in R&D cost	○	○	○	○	○	○				○					
	Efficiency in manufacturing cost	○	○	○	○	○	○	○	○	○						
	Efficiency in procurement cost		○	○		○										
Value network	Incentives for the Suppliers	○	○	○	○	○	○									
	Incentives for the horizontal partners															
	Incentives for the retailers	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Fig. 6-3. Matrix expanded to include further success/failure factors

Based on this new result and analysis, the following points become apparent:

- To succeed in business, efficient use of HR, internal/external know-how, and a rich flow of business and technology ideas are necessary.
- Incentives for suppliers are critical for businesses with strong content providers (Games, Video, Audio).

Combining these points with those made earlier, the key success factors can be summarized in the following points.

- Advantage in value capturing (cost)
- Strong leadership
- Strong technology core or advantage
- Efficient use of HR and internal/external know-how
- Rich flow of business/ technology ideas
- Incentives for suppliers necessary for businesses with strong content providers

6-2 RECOMMENDATIONS FOR SONY

Based on the results of my analysis, I can recommend two actions for Sony to consider taking:

- Unification of the microprocessor platform
- Development of an open application aggregation platform.

These actions include all six key success factors, and will strengthen the company's R&D structure and business condition. They are discussed in greater detail below.

6-2-1 Recommendation: Unification of the Microprocessor Platform¹⁴

The basic concept for this idea comes from a successful business project undertaken by one task force of Audio Business Group (ABG) which received the President's Award of the Business group in 2007. I use this case to describe the benefits to Sony of unifying its microprocessor platform.

The project began in 2005, at a time when ABG was suffering from declining revenues and profits because of tough competition with Apple, coupled with the new generation recording media change (CD-R to hard disk and flash memory). To improve

¹⁴ Information obtained from the general manager of Sony's Audio division, who was involved with this project from 2005-2007.

ABG's business condition, a corporate development staff person was asked to conduct research to identify the critical bottleneck in Sony's audio business. After three months of intense research, he identified the following issues in Sony's audio business:

Audio Business Issues

1) Too many product lines

Over 200 products released every year

2) Too long lead time for engineering

Development for most products took more than 9 months.

3) Too many customized components

Most of the audio products used several custom semiconductors

Outcomes from these issues

1) High R&D cost

Long lead time x large # of product lines x 2 model releases per year

2) High procurement cost

Purchase volume for one product was not high → low bargaining power (no volume discount)

3) High inventory management cost

Especially high for custom semiconductors and devices

Based on these research results, the business development staff person proposed changes to the procurement structure of the microprocessor. Microprocessors are the "brain" of most consumer electronics products (like the CPU of a PC). Every end product was equipped with a microprocessor which was customized for each product. Also, because it was a semiconductor hardware device, it required a long lead time for development.

Microprocessor Issues

1) Microprocessors have to be customized for each product.

- Requires at least one engineer for each product (high R&D cost)
- Added cost for customization (high R&D and procurement costs)
- Low order volume for each product (high procurement cost)
- High inventory management cost, dead stock (high inventory management cost)

2) Long lead time for development

- 6-9 months for development
- 1.5 -2 months for sample assessment
- 2-3 sample stages before mass production

The staff person proposed implementing a rewritable microprocessor platform using a flash memory-based rewritable microprocessor that was just introduced to the market at that time. By using rewritable microprocessors, the audio divisions could reduce the number and types of microprocessors they were purchasing from subcontractors, and then customize them by modifying the program software.

Benefits of using rewritable microprocessors

1) Reduction of procurement cost and inventory management cost

- Purchase volume per product increased, enabling Sony to use mass procurement bargaining power.
- Inventory management became simple

2) Efficient use of R&D funds and engineers

- Program bugs were easily fixed at the sample engineering stage, which reduced engineering lead time for development

3) Knowledge sharing within the Business Group

- All engineers used a common programming language
- Allowed product engineers to share their knowledge, especially of software programs

4) Built a strong technology asset and knowledge management system

- Sequential changes improved program quality, which was a strong asset for the Audio Group

Figures 6-4 and 6-5 illustrates these benefits.

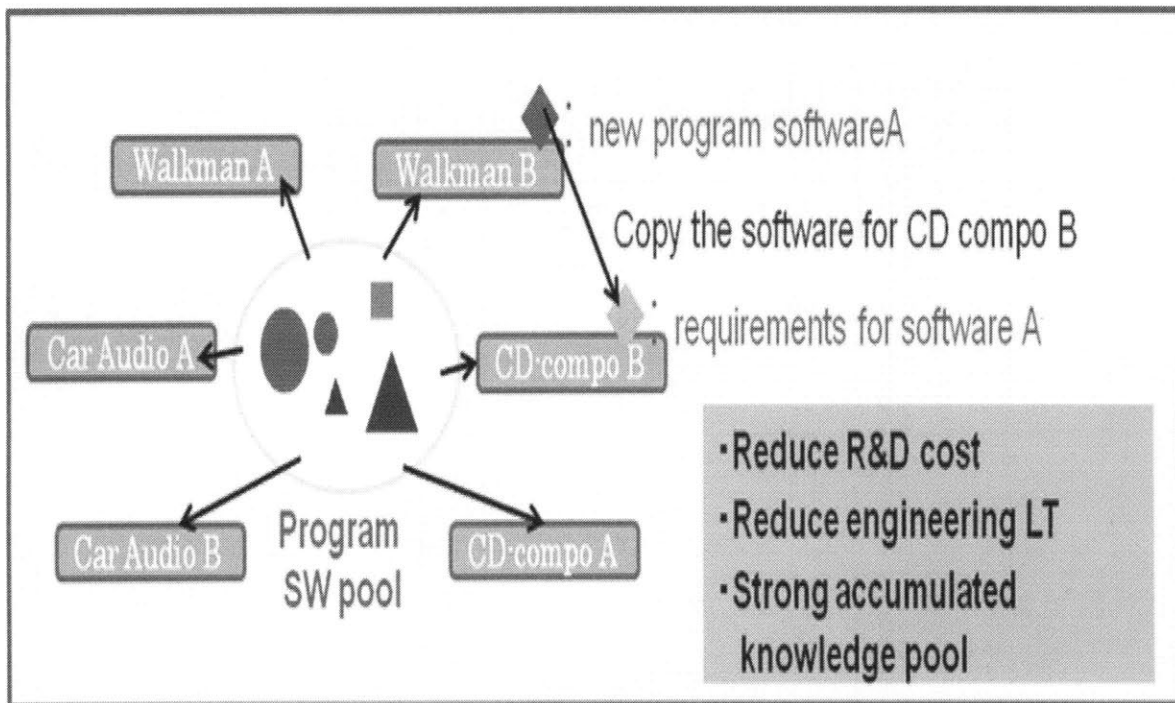


Fig 6-4. Knowledge sharing and technology asset accumulation

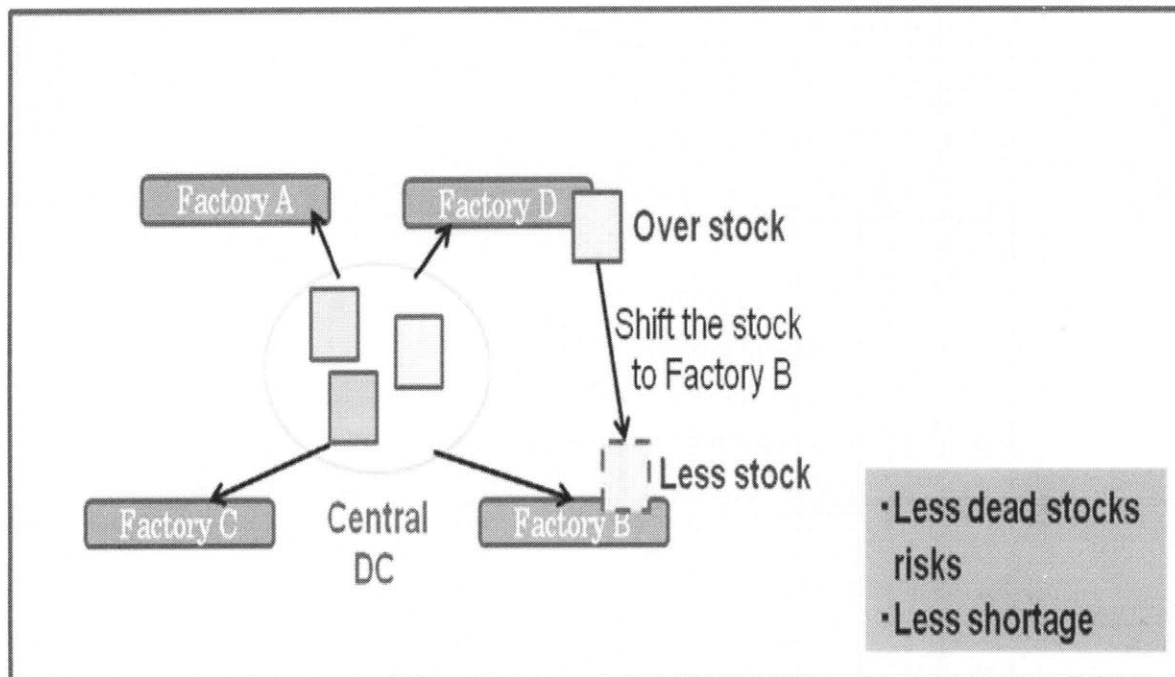


Fig. 6-5. Inventory sharing

By implementing delayed customization (see Figure 6-6), it would not only reduce production costs, but also dramatically accelerate the Audio Division's product development speed and increase its technical advantage by developing a knowledge-sharing platform.

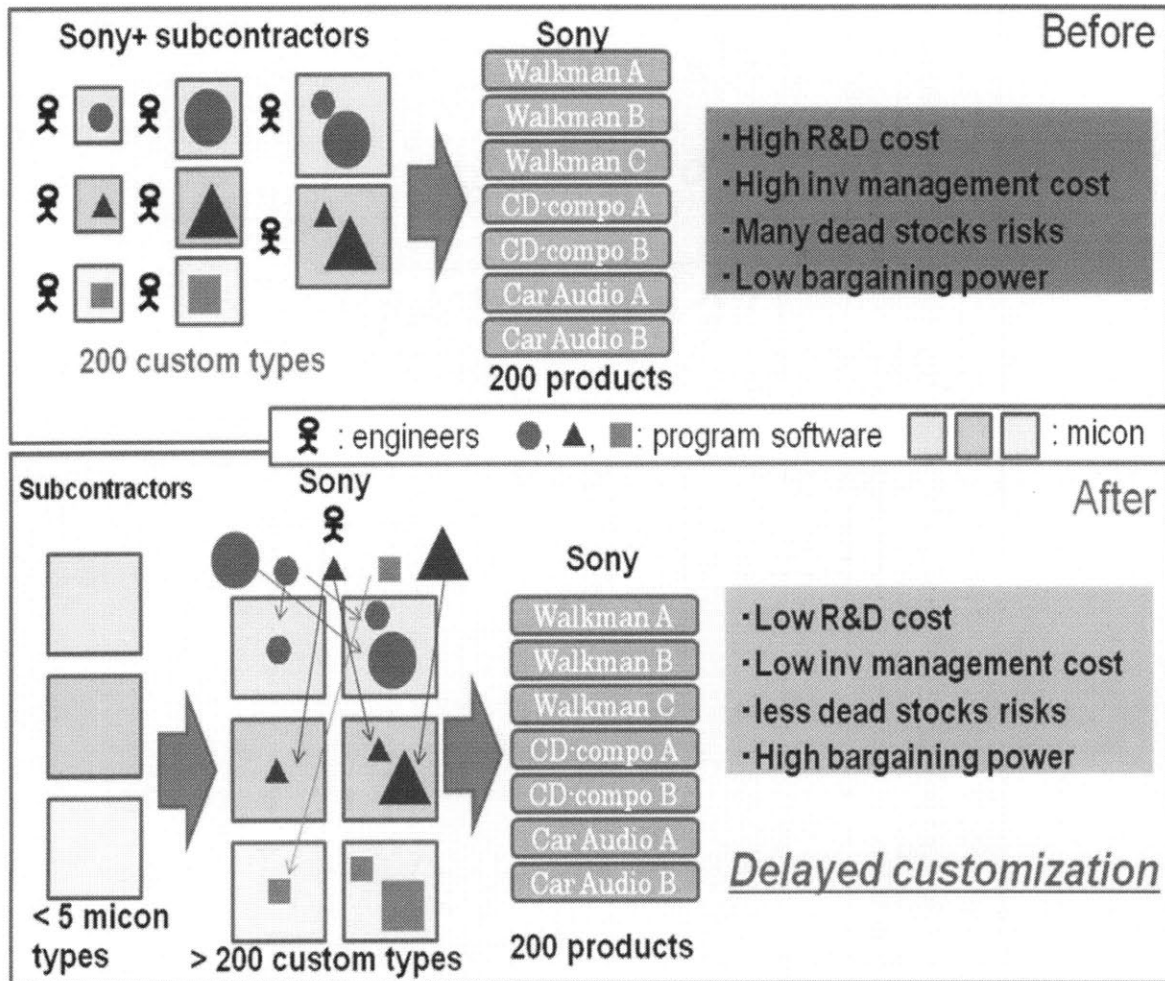


Fig. 6-6. Effects of delayed customization

After the basic planning was finished, the plan was presented to Sony's CTO and the operating director of Audio Business Group. Both were impressed by this revolutionary proposal and they requested that a task force be formed to implement the ideas.

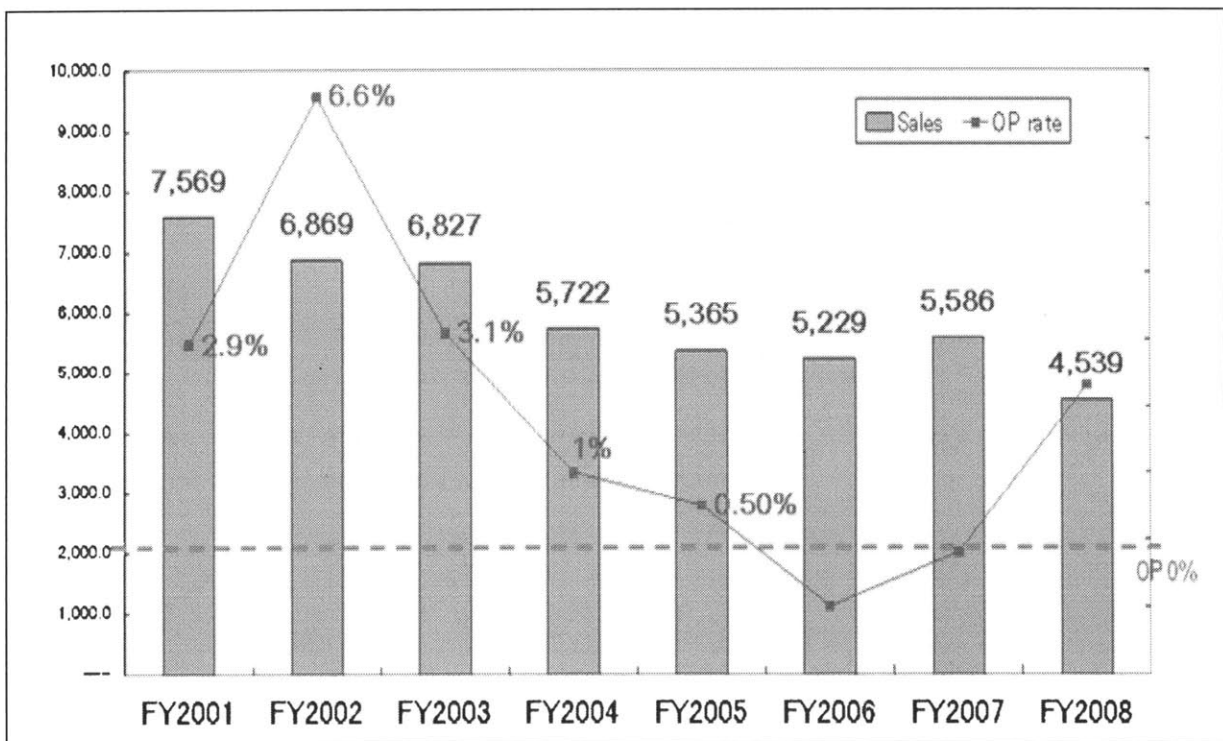
The implementation process was tough. As with most change efforts, resistance cropped up immediately from many engineers and front-line managers. And with this drastic change, the engineers would lose their ability to select their favorite microprocessor, and

some subcontractors would lose orders. Moreover, some engineers were anxious about losing their jobs because of reductions in the microprocessor development process.

The staff from business development eliminated most of this anxiety and worked hard to maintain high motivation among all the engineers by organizing talks with every leader of the various engineering sections. The staff also made a commitment to each engineer that all solutions would be considered, and that top management would take proper care of any difficulties caused by the new platform integration.

Soon a fast-moving team was in place, and ultimately the Audio division succeeded in:

- Eliminating more than 80% of all microprocessors used by the Audio division (FY'08 base)
- Successfully embedded microprocessors into more than half of audio products
- Reduced the engineering lead time for product line (FY08 base)
- Reduced operating costs of the Audio Business Group (FY08 base)
- Audio Division profits returned to surplus (see Figure 6-7)



Source: SONY JAPAN, IR information, <http://www.sony.co.jp/SonyInfo/IR/>

Fig. 6-7. Sales and profit trends, Audio division

Finally, after implementing this microprocessor platform, communication between the engineers of the various departments was activated, and currently there are several official and unofficial workshops held in the Audio Division.

Project Study Summary

The success of the Audio Division's project to unify the microprocessor platform gave the division more advantages in value capturing, more efficient use of human resources, and increased internal and external know-how. A rich flow of business and technology ideas were necessary, as they helped to develop a strong accumulated base of technology assets that could not be easily copied by competitors.

In addition, by concentrating Sony's purchasing power, the device manufacturing partners were benefited because sales volumes increased which contributed to stable fixed costs. This created a strong bond between the manufacturers and made Sony more important to them.

Further, unifying the technology platform increased the sense of teamwork and unity among the division members, and let business leaders more easily and effectively lead the division.

Based on these points, I believe unification of the microprocessor platform will be an effective solution for Sony in order to regain its knowledge-sharing culture and fulfill the six key success factors.

6-2-2 Recommendation: Develop an open application aggregation platform

My second recommendation for Sony is to create an open application aggregation platform. Today, the Internet is a key resource for people seeking information, or to enjoy content and communicate with one another. Also, the Internet gives people an easy way to distribute personal work, content, and knowledge to friends, and many business services and applications have been established to service this growing demand. For instance, people spend more time on social network sites (SNSs), and sites such as Facebook, Twitter, and LinkedIn add new service or functions every day in order to gather more users to their services. Within the past five years, many content distribution channels have appeared in the market (e.g., YouTube, Netflix, Veoh, Dailymotion), providing alternate ways to enjoy movie content; the increasing number of uploads and page views are actually becoming a threat to professional broadcasting companies.

Today even one person can create a new application that will attract many people. The Internet provides easy ways for small companies to create their own content, service, or application and distribute them to the wider viewing public. Among the new applications, the number that relate to improving usability or adding new functions to PCs and smartphones is increasing. It is inevitable that this trend will soon appear in the consumer electronics industry, where it is estimated that the Internet will become a gold mine of new ideas and applications for consumer electronics in the near future.

It will become impossible for Sony to compete with this new idea flow even if the company has revived its knowledge-sharing culture and maximized its idea flow. Therefore it is crucial for Sony to develop an open aggregation platform for new applications, services, and software that will add unique new concept applications or services.

Example: iPhone App Store

The closest example of this idea in the current market is the “App Store” behind Apple’s iPhone. The App Store, which opened in July 2008, is a service created by Apple, which allows users to browse and download applications from the iTunes Store that were developed for the iPhone SDK and published through Apple. Depending on the application, they are either free or have a nominal cost. Applications can be downloaded directly to the target device or downloaded to a computer via iTunes. While Apple has stated that they do not expect to profit from the App Store, it has been predicted (Piper Jaffrey, 2008) that the App Store could create a profitable marketplace with revenue exceeding US\$1 billion annually for the company. Apple allows 70% of revenues from the store to go instantly to the seller of the app, while 30% goes to Apple¹⁵. Within two years, the App Store had at least 185,000 third-party applications officially available on the App Store, with over 4 billion downloads (see Figure 6-8).

¹⁵ Wikipedia website. “APP STORE.” Available from: http://ja.wikipedia.org/wiki/App_Store.

Date	Available apps	Downloads to date
11-Jul-08	500	0
14-Jul-08	800	10,000,000
9-Sep-08	3,000	100,000,000
22-Oct-08	7,500	200,000,000
5-Dec-08	10,000	300,000,000
16-Jan-09	15,000	500,000,000
17-Mar-09	25,000	800,000,000
23-Apr-09	35,000	1,000,000,000
8-Jun-09	50,000	1,000,000,000+
11-Jul-09	55,000	1,000,000,000+
14-Jul-09	65,000	1,500,000,000
9-Sep-09	75,000	1,800,000,000
28-Sep-09	85,000	2,000,000,000
4-Nov-09	100,000	2,000,000,000+
5-Jan-10	100,000+	3,000,000,000+
20-Mar-10	150,000+	3,000,000,000+
8-Apr-10	185,000+	4,000,000,000+

Source: APPLE INC. IR information, <http://phx.corporate-ir.net/phoenix.zhtml?c=107357&p=irol-index>

Fig 6-8. Number of applications launched and total downloads from the App Store

How should Sony compete?

With the extraordinary popularity of the App Store, competitors are now developing their own aggregation platform such as:

- Palm Inc. application store (Palm)
- Android Market (Google)
- Windows Marketplace for Mobile (Microsoft)
- Ovi Store (Nokia)
- BlackBerry App World (RIM)
- DSi Shop (Nintendo)
- PlayStation Store (SCE)

And competition is already heating up in this area. The most common question is, “How can Sony compete in this area” and “How can Sony make profit?”

I believe Sony does not need to compete with others in this area, or even think of generating revenue from it. The more important point is not missing the opportunity to capture the rich flow of new usable ideas from the gold mine of new ideas and applications. Equally important is to develop an aggregated platform in such a way that Sony can capture user behaviors and create user profiles that form a database of information about possible new services or product ideas, or perhaps customized services for users.

If these two points are fulfilled, Sony can decide whether to develop an aggregated platform on its own or in partnership with another player. The key is not the business itself, but how fast Sony can develop such a platform, which will give its rich flows of business ideas from the market and allow it to co-develop unique new services or products for consumers.

Benefits to application providers and platform partners

For content providers or platform partners, the incentive to partner with Sony is huge. Sony consolidated sales of its main products (camcorders, DSC, Blue-ray recorder/players, DVD players, PCs, Walkman, PlayStation2&3, PlayStation portable) is over 100 million units (FY2008)¹⁶, which is well above the consolidated sales of Apple PC, iPod, and iPhone—actually, one-third of worldwide sales of PCs. Including sales of cellphones by Sony Ericsson, the number doubles, so such a huge number will surely attract application providers.

Also, because of Sony's wide variety of products, there are many ways to create beneficial applications. For instance, by combining Google maps and Wikipedia with the DSC's GPS, wireless, and image recognition system, DSC could become a portable guidebook. By creating applications that customize the TV or PC remote controller to support YouTube or other streaming content distribution channels, the usability of the channel increases dramatically. These ideas can be realized easily because of the rich variety of products Sony has, and there will be many business opportunities for application providers.

¹⁶ SONY JAPAN, IR information, <http://www.sony.co.jp/SonyInfo/IR/>.

Summary

From the success of the App store, and the many designers entering the application aggregation platform business for the PC and Smartphone industry, this business is becoming a major influence in those markets, and this trend will inevitably move into the consumer electronics industry soon. If Sony misses the opportunity to capture the flow of new ideas and potential uses from the new ideas and applications, it will be impossible for Sony to compete with this new idea flow even if they revive their knowledge-sharing culture and maximize idea flows in the company. Sony should act now to develop an open aggregation platform that will provide business opportunities for these new applications, services, and software providers who can add new unique concept application or services to the products. An open application aggregation platform will create a win-win business model between Sony and the content providers and enable Sony to fulfill the two key factors of success.

6-3 CHALLENGES FOR IMPLEMENTATION

As often happens when major changes are possible, there are challenges to implementing those ideas.

The first expected challenge is Profit and Loss (P/L) management. As Sony is currently implementing a divisional self-supporting P/L management system, each division's first priority is on increasing its sales and profit, and the divisions have less interest in another division's performance. This means that in the current management system, unified platform development will be a lower priority than the independent work of each division. To encourage division managers to motivate their engineers to contribute to the platform development, Sony headquarters will need to take strong leadership initiative for building a system that monitors and measures each division's contribution to building the platform, followed by giving the right incentives to each division.

Another expected challenge is resistance to the implementation from frontline managers and engineers. As mentioned in the example of the Audio division project, a unified engineering platform usually weakens each engineer's authority on product development. And because the unified platform brings efficient work sharing and reduces current workload on engineers, some might become anxious about losing their jobs. Managers have to be careful about these negative side effects, and should consider some tentative compensation or job security plans, especially in the initial stage of implementation,

in order to avoid substantial resistance from engineers and to accelerate implementation of the plan. One possibility is to give engineers incentives linked with the number and quality of programs they develop using the new microprocessor platform, or alternatively, to share some of the revenue Sony will earn from cost reduction owing to implementation of the unified microprocessor platform.

There may be other challenges to implementing ideas into current Sony operations. However, to realize these ideas, Sony needs an accurate system for monitoring and measuring each division's or employee's contribution to the platform development and an award system that links contributions to incentives.

6-4 CONCLUSION

By reviewing Sony's history of successes and failures with product and R&D innovations from the 1950s to the 2000s, and analyzing the facts that brought success in each period, I was able to identify key success factors that enabled Sony to achieve significant sales and profit growth through from the 1950s into the 1980s in the analog consumer electronics industry.

Sony's first big business success, the transistor radio and TV during the 1950s and 1960s, was not based on pure technology innovation but on process development that combined new technologies and users by improving the affordability of the technology and creating new markets. Sony successfully built this bridge on the way to maximizing the four aspects of business for itself and its value chain partners, while achieving rapid growth during this innovation period.

During the video product development of the 1970s, Sony created three core competences: a knowledge-sharing culture, a knowledge management system for tuning technologies, and its so-called "waterfall" strategy. These three competences maximized the four aspects of business for Sony and its users by improving the company's ability to create more value in the market, and maximize its resource efficiency and value capturing opportunity for itself and its value chain partners.

With the three competences and the mutual reinforcing loop, Sony became highly competitive in new business and technology idea generation (value creation), resource utilization (resource and process opportunity), and cost reduction and premium pricing (value capturing). This competitiveness contributed a great deal to the rapid revenue and profit growth of Sony's two "Golden Decades" (970s and 1980s).

However, a major turning point appeared in the 1990s, when actions by the key component business destroyed Sony's knowledge-sharing culture, which had been the central success factor of a strong reinforcing loop. At the same time, R&D and organization structure changes took place as divisions moved to a self-supporting R&D and governance system. As a result, Sony lost all the key advantages it had built during the Golden Decades, forcing Sony to delay platform development of a hardware core and PC software, which were the keys to competitive advantage in the digital consumer electronics industry. Consequently, from the mid-1990s, Sony began to lose market share even in areas where it had always enjoyed a dominant position throughout the 1980s.

By analyzing these success and failures, I identified six key factors of success:

1. Advantage in value capturing (cost)
2. Strong leadership
3. Strong technology core or advantage
4. Efficient use of HR, internal/ external know-how
5. Rich flow of business/ technology ideas are necessary
6. Incentives for suppliers (for businesses with strong content providers).

These were the common factors that made the difference between success and failure, and they are what Sony should continue to focus on in order to fulfill its future business.

Finally, I proposed two solutions to help Sony fulfill the six common success factors and regain its knowledge-sharing culture. These are:

- Unification of the microprocessor platform,
- Development of an open application aggregation platform.

These two are not the only solutions for Sony to help it revive a bright future, but they are definitely practical and strong solutions.

Sony should aggressively take up the challenge of implementing these solutions and revive the corporate culture and R&D structure of its Golden Decades.

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