Testing a Contingency Model of Market Entry: Japanese Penetration into the United States' PC Market

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This paper proposes a contingency model—The Cycle of Excellence—of how and when to enter a hi-tech assembled products market. Windows of opportunity, due to shifts in the market and technology, open up in every industry at different times of the product life cycle. The model identifies these shifts in the product life cycle and helps firms to target the right market segments and to use the appropriate strategic weapons—product excellence, operations excellence, and service excellence—to increase the probability of a successful market entry. We then use the Japanese penetration into the US PC market to illustrate the model.

INTRODUCTION

In the mid-1990s five Japanese firms—Sony, Hitachi, Fujitsu, NEC, Toshiba—launched major initiatives to penetrate the US PC market, which was then firmly in the control of US companies. Five years later, US firms had thwarted this Japanese attack and continued to dominate the market. The failure of the Japanese firms stands in marked contrast to the experience of other industries where Japanese invasions succeeded. Except for one notable niche success (Sony), the PC invasion amounted to little more than a skirmish, ending in several rapid withdrawals and overall defeat.

Why did NEC, Hitachi, Fujitsu and Toshiba fail in their efforts to penetrate the US PC market? What was wrong with their entry and penetration strategies? Why and how was Sony successful in gaining a foothold in the US PC market while its compatriots failed?

In looking for answers, we delved into the marketing as well as the technology and innovation literatures. Each stream of literature provided partial answers to these questions. There was not one overarching predictive model that could explain the failure of some firms and the success of others in their market entry attempts. Hence, we propose a contingency model—The Cycle of Excellence—that brings together these well documented but heretofore separate streams of theories and findings of how and when to enter a market.

The Cycle of Excellence states that in the introductory and early growth stages of a hi-tech assembled product's life cycle, firms with product excellence targeting niche markets get an opportunity to enter and excel in the market. After a "dominant design" emerges in the growth stage of the product life cycle, firms with operations excellence targeting the mass markets get an opportunity to enter and excel in the market place. In the late growth and mature stages of the product life cycle, firms with service excellence targeting niche markets

get an opportunity to enter and excel in the market. Finally, when a new technology makes the previous one completely obsolete, the product, operations and service excellence cycle re-starts (see Figure 1).

Section 2 of this paper discusses two streams of literature: marketing and technology and innovation. Section 3 integrates the theories and findings of these two streams and introduces "The Cycle of Excellence;" a contingency model of market entry for technology based assembled goods. Section 4 brings this contingency model to life by discussing the case of the mid-1990s Japanese firms' attempt to enter and penetrate the US PC market. Section 5 concludes this paper.

The results of this paper suggest the following conclusions. Other than Sony, the Japanese firms—NEC, Toshiba, Hitachi and Fujitsu—violated the Cycle of Excellence prescriptions for late market entry strategies. Unfortunately, NEC, Toshiba, Hitachi and Fujitsu all remained fixated on hardware and focused on product excellence aimed at the wrong target market when they should have focused on service excellence and going after niche markets to get a foothold. Moreover, in a highly competitive, maturing, fast-paced environment, firms cannot stumble in operations execution—introduction of products, logistics, mergers and re-organizations. NEC, Toshiba, Hitachi and Fujitsu fared poorly in after-sales service and had several costly operational lapses. On the other hand, Sony achieved a successful late entry into the US PC market by focusing on service excellence. It clearly identified one underserved segment of the market that was looking for attractive PCs and delivered reliable after-sales service.

THEORETICAL BACKGROUND

Market entry strategies have been explored by several research groups: economics, strategy, marketing, and technology and innovation. The basic premise of each of these groups is that the market entry strategy of a firm—timing of entry, amount of investment, prior experience, product quality, product breadth, distribution decisions—will affect the long term performance of the firm in the market. Further, firms make their market entry decisions based on the competitive environment, barriers erected by existing firms, changes in consumer preferences and the evolution of the industry.

In trying to answer the question of success and failure of Japanese firms in their attempt to penetrate the US PC market, the bulk of the guidance can be primarily found in the marketing and technology and innovation literatures. These streams seem to have developed somewhat independently and hence have slightly different foci. The focus of the marketing literature has primarily been in doing empirical studies that relate the timing of market entry—the stage of the product life cycle—and the subsequent performance of the firm. It also provides good guidance in understanding consumers' needs and shifts in the market place. On the other hand, the technology and innovation literature has focused on the product and process characteristics, the evolution of technology and the role of innovation in market success. However, common to both these streams is the generic product life cycle—introduction, growth, maturity and decline—as a core model to understand a firm's market entry strategy and its subsequent success.

We will first delineate the findings of the marketing and technology and innovation literatures and then propose a contingency model—The Cycle of Excellence—that brings together and makes complete these well documented—some complimentary and some supplementary—findings of when and how to enter a market.

Marketing Literature

Empirical studies (Robinson & Fornell, 1985; Schnaars, 1986; Golder & Tellis, 1993) demonstrate that firms enter the market at all stages of the product life cycle and that no single timing strategy proves best in all cases. In one extensive study Robinson et al. (1992) concluded that their results supported Abell's (1978) observation that "strategic windows" for market entry tend to open at different times of the product life cycle and entrants exploit these opportunities differently. Depending upon the industry, product, technology and level of competition, the size of the "strategic window" varies considerably, from wide open to narrow, a factor that influences firms' market entry decisions.

Capon (1978) summarized the findings of the then marketing literature (Levitt, 1965; Cox, 1967) and proposed the segmentation of firms into four categories based on their market entry timing strategies: "pioneers" in the introduction stage, "follow-the-leader" in early-growth, "segmenter" in late-growth, and "me too" in maturity. He suggested that each strategy could lead to success in the market, but all required different capabilities. Pioneers must invest heavily in R&D, and they must be willing to launch products that are not perfect to gain a jump on the competition. Followers must invest in both product and market development and must posses capabilities to circumvent pioneers' patents and develop products quickly. Segmenters must invest in market research and product design to address the needs of niche, un-served markets, but they must also be attentive to costs. Me-toos should be strong marketers, able to promote and price products aggressively against entrenched competitors. Their designs should be based on cost considerations, and their organizations should operate lean with minimal overhead.

More recently, Moore (1995) articulated Capon's concepts in terms of product leadership, operational excellence and customer intimacy. Moore suggested that the generic strategies for success evolve to match the demands of shifting markets and classes of customers. In the introductory phase, production leadership—a strategy of striving to produce a continuous stream of state-of-the-art products, with innovative features and technical functionality—is the primary key to success. In the early-growth phase, customer intimacy—a strategy of continually tailoring products to fit an increasingly narrow definitions of target markets—joins product leadership as the twin mandates to gain competitive advantage. In the late-growth phase the imperatives of success shift to operational excellence—a strategy of using production and delivery methods to produce large volumes at low cost and lead the industry in price—and product leadership, now redefined as the ability to rapidly integrate standard technology rather than to create innovative features. Finally, conservative buyers of the mature market require a re-emphasis on customer intimacy, combined with the cost benefits of operational excellence.

Technology and Innovation Literature

Utterback's (1996) seminal work on the "dominant design model" suggests that all assembled products (PCs, watches, cars) progress towards a "dominant design" or standard (e.g., the QWERTY keyboard, the all steel closed-body automobile, the 3½" disk drive, the Wintel based IBM PC). This standardization occurs as product characteristics become commonly accepted and expected. Prior to standardization, a vendor's strategy and market success revolves around expensive proprietary technology sold to niche markets—techies and hobbyists—through product excellence and technical innovation.

Emergence of a dominant design radically changes the dynamics of an industry. As product features and design become standardized, the rate of product innovation slows as the emphasis gradually shifts to process innovation. The need to bring standardized products to market efficiently leads to creation of modular designs for easier assembly and efficient management of the value network, which includes suppliers, manufacturers, assemblers, distributors and retailers. Simultaneously, firms are quickly trying to acquire the most lucrative segments—early adopters—of the market and these consumers expect certain degree of product excellence but expect lower prices. This shift provides a strategic window that favors existing and new firms, both large and small, that are adept in procurement, manufacturing, assembly and distribution skills.

Intense process innovation enables lower costs of production and delivery, which leads to lower prices for the end consumer. Lower prices in turn invite a wave of price-sensitive, first-time buyers, a hallmark of the late growth phase of an industry, where products are commodity like and undifferentiated. Firms focusing on operational excellence are richly rewarded. Finally, in the very late growth and mature stages of the product life cycle conservative users are entering the market and growth rates are flat or declining. The most lucrative segments of the market are already taken. Existing distribution networks and rampant price wars form huge barriers to entry. Here, firms want to attract and retain their customers by providing convenience, customization and good after-sales service while maintaining a certain level of operations excellence.

Christensen's (1997) "disruptive technology model" explains why technology focused firms stumble when there are such major shifts in consumers' preferences. Firms almost always innovate faster than their customers' behaviors can change to utilize the new innovations. In the late growth and mature stages of the product life cycle, the less savvy and techno-phobic masses do not need all the technical capabilities a product has to offer. When a firm "overshoots" the technical needs (e.g. functionality) of these mainstream customers, it creates the opportunity for innovative companies to enter the market with cheaper, simpler, more convenient products, and better after-sales-service.

Based on extensive studies of Digital Equipment Corporation and the works of Utterback (1994) and Schein (1999), Kampas (2003) suggested that five categories of innovation—base product, human factors, styling and packaging, marketing and base process—contribute to customer value over the lifetime of a technology. The relative importance the customer places on each of these categories shifts over the product life cycle. While Kampas extensively discusses the role of base-product innovation and base-process innovation (similar to

Utterback's definitions of product and process) he does not explain the role of human factors, marketing and styling and packaging innovations. However, his framework for illustrating the relative importance of each innovation category at each stage of the product life cycle and the incorporation of the dominant design concept are important advances over Moore's (1995) ideas.

A CONTINGENCY MODEL OF MARKET ENTRY: THE CYCLE OF EXCELLENCE

Based on the discussion of these two streams of literature, we now introduce a contingency model of market entry that is widely applicable to hi-tech assembled goods, e.g., watches, cars, PCs, cell phones, PDAs. We call this "The Cycle of Excellence" model, as illustrated below.

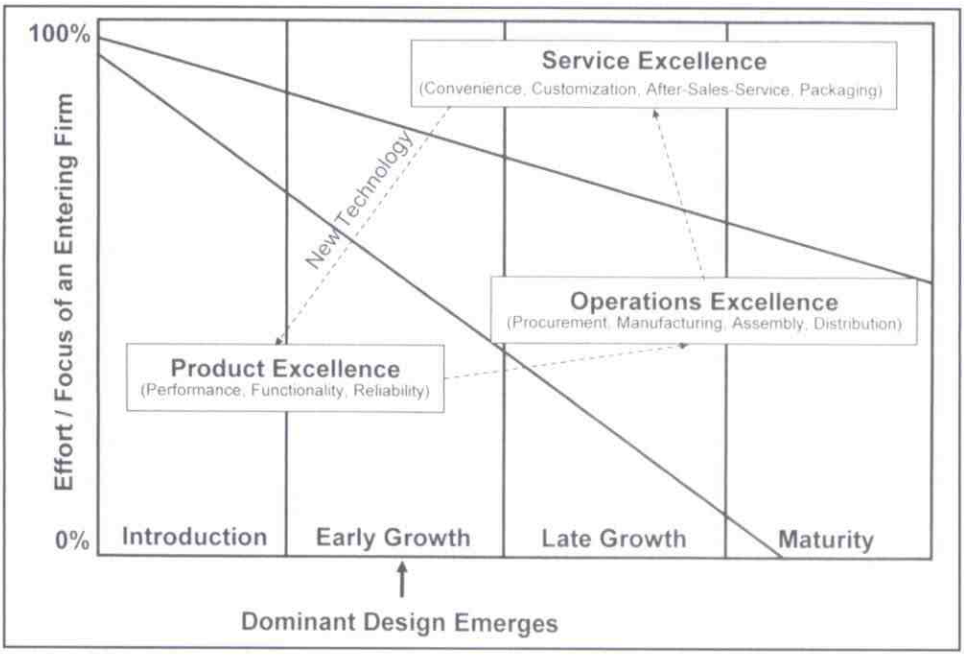

Figure 1: Cycle of excellence.

The Cycle of Excellence states that in the introductory and early growth stages of a hi-tech assembled product's life cycle, firms with product excellence—performance, functionality, reliability—and which target niche markets such as techies and pioneers, get an opportunity to enter and succeed in the market. After a dominant design emerges in the growth stage of the product life cycle, firms with operations excellence—procurement, manufacturing, assembly, distribution—and which target the growing markets of early adopters get an opportunity to enter and succeed in the market. At this stage a certain level of product excellence is assumed by the market. In the late growth and mature stages of the product life cycle, firms with service excellence which target niche markets—late adopters, techno-phobic masses—get an opportunity to enter and succeed in the market. At this stage a certain level of product and operations excellence is assumed by the market. Finally, when a new technology

makes the previous one completely obsolete, the product, operations and service excellence cycle re-starts.

Certain assembled products do not require after-sales-services, e.g., cheap throw-away watches, shaving razor blades, diapers. In such cases, the opportunities for market entry may come in the form of styling, design and packaging innovations.

In order to bring this contingency model to life, we will now describe the market entry strategies of 5 Japanese electronic firms: NEC, Toshiba, Hitachi, Fujitsu and Sony. All these firms made a concerted effort in the mid-1990s to enter and penetrate the US PC market. But, by early 2002, only Sony had achieved a notable level of success. The remaining four failed in their new initiatives, and both Toshiba and NEC lost substantial ground in the segments where they had formerly been successful. The Cycle of Excellence model provides answers as to why Sony succeeded while its compatriots failed. We now briefly describe the evolution of the PC industry in the US and the environment into which the Japanese stepped in.

US PC MARKET IN THE MID-1990S: JAPANESE FIRMS' PENETRATION EFFORTS

A Brief History, 1975-1995

In the early stages of the PC industry (1975-1981), as technology was rapidly evolving, several dozen firms (MITS, Imsai, Southwest Tech, Sol-First, Apple, Radioshack, Atari, Commodore, TI, Heath, Morrow, etc.) vied to create and capture the market. During this period of intense technological innovation, firms focused on product excellence in an effort to have to their technology adopted as the market standard. When IBM launched its PC in 1981, its open architecture—Microsoft DOS and Inter processor—as well as the sheer size and reputation of the company forced the market toward its adoption (dominant design). Following this, in 1982 and 1983, 18 new companies introduced 125 distinguishable new PCs each year, and in 1983 PC sales grew 50%. Numerous early contenders, such as Commodore, Atari, TI, Timex-Sinclair, Osborne, Coleco, and Mattel, failed to make the transition to the dominant standard and faded from sight.

Low-barriers to entry, simplicity of the assembly process and the availability of standardized components, enabled a host of IBM clones to enter the market in the mid-1980s. Although most of these competed by offering lesser quality products at lower prices, Compaq, initially targeting the portable (luggable) market, quickly gained a reputation for high quality and joined IBM in the top ranks. Although incremental improvement of product features (processor speed, storage capacity and software features) continued through out the 1980's, the rapid evolution of product innovations slowed and competition shifted from product excellence to operations excellence by the end of the decade. Real and perceived differences in product quality between the leaders—IBM and Compaq—and the low-end clones declined significantly, and clone makers such as Dell, Packard Bell, Samsung, AST began to threaten the high-end leaders.

Global sourcing, purchasing, logistics, efficient assembly and distribution became the keys of successful competition. Compaq, after suffering a drop in sales in 1991, adjusted quickly

to the new paradigm, revamping its product design, manufacturing process and supply chain. Drastic reduction in the number of parts, standardization of components, snap-together assemblies, global sourcing, efficient logistics and a well-established distribution network helped it to introduce its first sub-$1000 PC in 1992 and enabled it to compete with Dell and other clones at the low end. IBM was less agile in making this transition from product excellence to process excellence, and in 1994, after more than a decade of leadership IBM lost its top position in the US PC market to Compaq (see Table 1).

TABLE 1
PC Market Share, 1980-2001 (IDC)

	Market Share				
PC	1980	1984	1989	1994	2001
Apple	18.19%	49.00%	14.00%	12.80%	27.80%
Tandy	15.77%	13.00%	10.70%	12.20%	15.30%
HP	12.54%	6.00%	4.80%	10.80%	9.89%
IBM	8.27%	4.00%	3.80%	10.20%	8.18%
Tektronix	3.99%	3.06%	3.70%	5.10%	6.31%

Competitive Environment in 1995-1996

By the mid-1990's, in any given price range, virtually all brands of PCs offered similar functionality in terms of microprocessor speed, memory, storage, audio-video features, and software bundles. Continuous product performance improvements, falling component prices, coupled with advances in assembly and logistics contributed to PC prices falling from about an average of $2500 in 1991 to $1500 in 1995. This had forced many PC firms out of business in the early 1990's. Of the dozens of US companies that entered the decade with measurable market share, only five major players remained by 1996: Compaq, Dell, Gateway, HP and IBM. Packard Bell, which was also a major player in the consumer PC market, was acquired by NEC in 1996. These survivors found themselves in a high volume-low margin business that required management of a worldwide procurement and logistics system. Large inventory levels, either internally or in the channel, created huge liabilities. Excess inventory was worthless and failure to introduce the latest processors quickly led to market share loss. Operations excellence was the key to survival and success.

Market Segments

In 1995, the $53 billion US PC market could be segmented by market—commercial, small business and consumer—and by product type—server, desktop and portable. The commercial market was big businesses purchasing large quantities of machines and typically standardizing purchase of servers, desktops and laptops from a single vendor to enhance integration and facilitate service. Compaq, IBM, HP and Dell were the principal players in the commercial PC desktop and server segments. In commercial laptops, Toshiba was the leader. Many commercial accounts were supplied and serviced through national distributors and Value Added Resellers (VARs), and also secured services directly from vendors. The Small

Business segment, often called SOHO (Small Office Home Office) was more akin to the consumer market.

The consumer segment exploded in 1994, accounting for 40% of the total market. By 1995, 35 million homes had a PC, and another 30 million homes were expected to be first-time buyers by 1998. Both the SOHO and home segments purchased from national retailers and/or direct from vendors—Gateway and Dell. Packard Bell was the leader in the $17 billion home desktop market. The home portable market was not considered to have major growth prospects.

Distribution

By 1995, there were two primary distribution models. Companies using the "direct" model sold PCs directly to end-users employing a direct sales force and/or taking phone orders. The "indirect" model involved one or more intermediaries, including Value Added Resellers (VARs), System Integrators (SIs), distributors and retail stores (Figure 2). Dell and Gateway were the only two major competitors who were solely direct. Dell had an outside sales force that courted the large and mid-size businesses, its primary markets. All consumer and small business sales were handled by internal phone sales and also, after 1995, the Internet. Gateway focused primarily on consumers and small businesses and did most of its sales by phone and through its "country" stores.

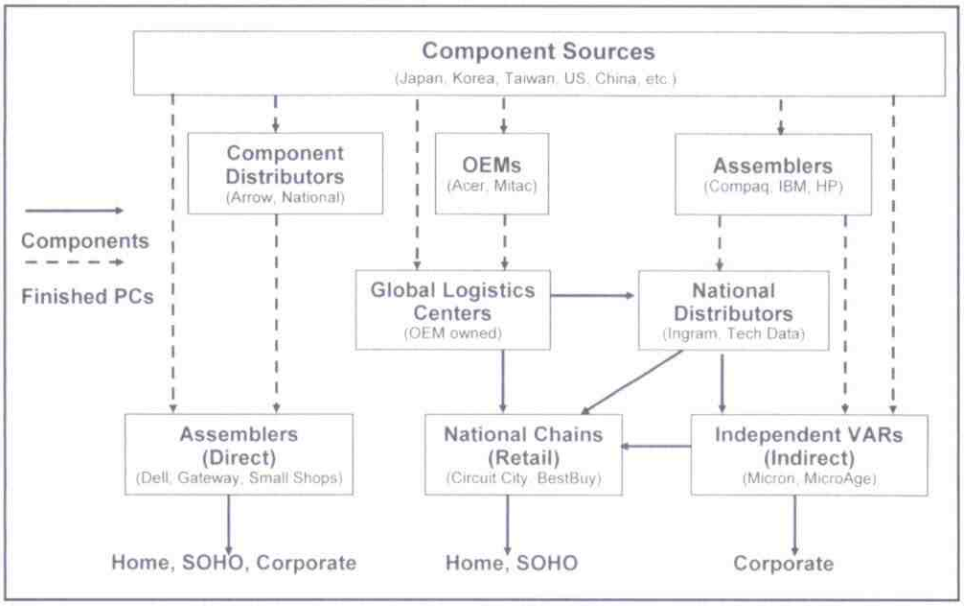

Figure 2: US PC value chain.

The indirect channel consisted of several different categories: traditional mass PC assemblers (Compaq, IBM, and HP), Original Equipment Manufacturers (OEMs), national distributors and VARs. In addition to doing their own assembly, mass assemblers also used OEMs such as Acer and Mitac to do complete assembly for them. The OEMs sold their own brand PCs as well. VARs had direct relationships with businesses and offered an array of services—product customization, software installation, system integration, etc. The direct model offered

the most efficient approach to handling time-sensitive inventory and it was putting increasing pressure on the indirect model, which involved 3 or 4 additional steps. Channel markups, inventory buybacks, product obsolescence, market maturation all contributed to higher costs for indirect competitors.

Significant events, 1996 – 2001

At the end of 1996, Compaq and Packard Bell introduced sub-$1000 PCs capable of handling all popular software programs. This brought in several million first-time buyers. Overcapacity in DRAMs and hard drives, AMD and Cyrix's offering of cheap microprocessors, the reduced speed and power requirements of the new "killer" application, the Internet browser, and the reluctance of businesses and consumers to upgrade machines all contributed to lower prices in this period. By April 1999, sub-$1000 PCs accounted for 68% of all retail PC purchases, with sub-$600 category growing quickly. As the Internet boom accelerated, new firms entered the market with a business model that virtually gave away PCs in return for Internet-connection contracts; signaling a shift in the basis of competition away from product and process and towards service.

The second half of the 1990's witnessed the triumph of the direct model. Dell pursued the direct model with extreme efficiency to displace Compaq as the number one PC vendor in 2001. In that year, Dell was selling more than $50 million per day through its website (more than 50% of its $31 billion per year) and delivering more than 50% of technical support over the web. Dell held just 5 days worth of inventory. It received payment from customers before it paid its suppliers, providing a negative cash conversion cycle of 8 days and helping to give it a 12% cost advantage over rivals. Simultaneously, Dell pushed for service excellence, using the information it captured through the direct model to segment its customer base and closely align its technical resources, support and service to those segments. Since 1999 Dell has held the number one rank in customer satisfaction.

Dell's products were not technically superior to those of its competitors and not significantly less expensive. Most importantly Dell fully took advantage of the shift in consumers' preference away from product performance and towards price, speed, convenience, customization and service. This shift in leadership also indicated that the market now took product excellence and operations excellence for granted—i.e., PCs had become a commodity, and competition had moved into in the arena of service excellence—speed, convenience, customization, and after-sales-service. Operations excellence and service excellence overlap in areas such as customization and convenience. In fact, operations excellence enables service excellence.

By 2000, PCs had penetrated into more than 60% of the US households and more than 50% were connected to the Internet. After 3 years of brisk growth, the industry saw its first pull back in 2000, and sales fell off precipitously in 2001. Figure 3 gives the revenues for each of the 5 market segments for the years 1995-2001. It was into this environment that several leading Japanese PC vendors had attempted to enter or intensify their efforts in the US PC market.

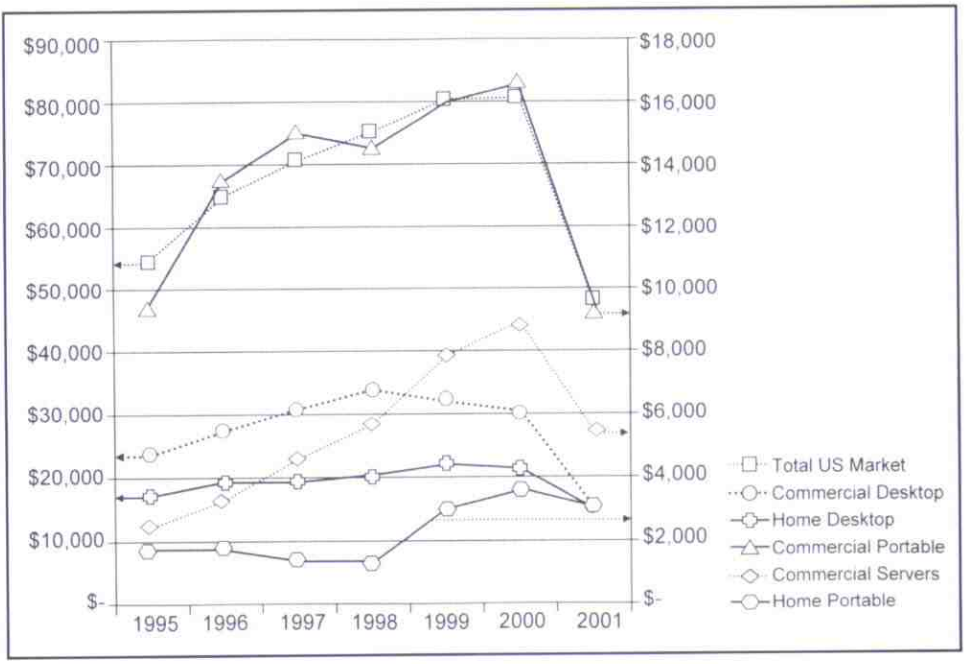

Figure 3: US PC market revenues 1995 – 2001 (in millions).

Japanese firms in the US PC market and their 1995-1996 market entry efforts

US companies enabled the birth of the PC industry, promoted its growth and now dominate in its maturity. This domination of the US PC market confounded oft-repeated predictions of invasion and victory by Japanese PC firms, whose national brethren had been so successful in numerous US markets, from automobiles and television sets to all manner of electronic devices (Table 2). Several times in the late 1980s and early 1990s, Japanese companies such as Canon, Epson, Matshushita, NEC and Sanyo rolled out new PCs and fresh campaigns to the trumpeting of the business press that warned of the slaughter to follow. Yet, other than Toshiba in the laptop segment these campaigns had failed.

Pundits offered multiple reasons for the failure of these large firms to penetrate the US PC arena prior to 1995: (1) reliance on proprietary architectures rather than Wintel standard (i.e., they ignored dominant design and hence failed in product excellence); (2) complexity of US PC distribution channels—distributors, VARs and SIs—compared to channels for retail electronics (lack of operations excellence); (3) inability of Japanese firms to turn over the reins to senior-level US managers; (4) distraction resulting from fierce competition in the Japanese domestic market and (5) contentment with good profits in the US peripheral and component markets.

After two years of rapid expansion (43% in 1994 and 20% in 1995), US PC sales slowed in 1996, as the market entered its late growth stage. That year, five Japanese firms—Sony, Hitachi, Fujitsu, Toshiba, and NEC—announced renewed efforts to sell PCs in the US in a coincidental timing attributed to a variety of factors: (1) The Japanese were emboldened by

TABLE 2
Japanese Penetration into the US

Products	Total Penetration	Firms	Market Share
Flat Panel Displays (2001)	86%	Sony	34%
		Panasonic	23%
		Fujitsu	15%
		Pioneer	14%
Tuners, Amps, Receivers (2001)	80%	Sony	28%
		Yamaha	17%
		Technics	11%
		Onkyo, Pioneer, Denon, JVC, Aiwa	24%
Home Theater Audio Systems (2001)	72%	Sony	42%
		Panasonic	8%
		Yamaha	8%
		Pioneer, Aiwa, JVC	14%
Televisions (2001)	70%	Sony	19%
		Mitsubishi	19%
		Hitachi	18%
		Toshiba	14%
Fax Machines (1999)	66%	Sharp	23%
		Brother	23%
		Panasonic	20%
CD Players (2001)	60%	Sony	39%
		Technics	11%
		Yamaha, JVC	10%

Table 2 continues on next page.

the success of other Far-East PC firms such as Acer and Mitac; (2) The PC market in the mid-1990's was increasingly consumer-driven, an area of Japanese strength; (3) The importance of a strong presence in the US market, which represented 40% of worldwide sales and the hub of PC innovation, was critical to success in the global PC market; and (4) Japanese consumer electronics giants Sony and Toshiba felt their turf was being threatened by audio-visual features—CD, DVD—that US firms were integrating into their PCs. (See Appendix A for a brief description of each of the Japanese firm's entry strategy and performance during the period 1995-2001.)

TABLE 2 (continued)
Japanese Penetration into the US

Products	Total Penetration	Firms	Market Share
Copiers (1999)	54%	Canon	29%
		Sharp	9%
		Mita, Ricoh, Minolta, Konica	16%
Car Audio (2001)	51%	Pioneer	20%
		Sony	19%
		JVC	12%
Shelf Audio Systems (2001)	50%	Aiwa	17%
		Panasonic	11%
		Sony, Sharp, JVC	22%
VCRs (2001)	42%	Panasonic	14%
		Sony	11%
		Sharp, Sanyo, Toshiba, JVC	17%
Microwaves (1999)	42%	Sharp	31%
		Matsushita	11%
Automobiles (2000)	25%	Toyota	11%
		Honda	10%
		Nissan	4%
Personal Computers	5%	Sony	2.8%
		Toshiba	2.5%

(Source: NPDTechworld, TWICE, 17 (01): 26, Jan. 8, 2002; Dataquest, for Fax Machines and Copiers; Appliance, 57 (9): 85, Sept. 2000, for Microwaves; US Business Reporter for Automobiles; and IDC for PCs)

DISCUSSION

The major market entry initiatives launched in the mid-1990s by NEC, Toshiba, Fujitsu and Hitachi amounted to little more than a skirmish, fought with the wrong weapon—product excellence—at the wrong time—late growth stage of the product life cycle—and on the wrong battlefield—corporate market and VAR distribution channels. On the other hand, only Sony was able to make a successful entry and surpass Toshiba to become the top Japanese PC firm in the US by using the right weapon—service excellence—at the right time—late growth stage of the product life cycle—and on the right battlefield—a niche market yearning for good looking PCs with reliable service.

Sony's Success Factors

A host of metrics demonstrate Sony's success: revenues, percentage of market growth captured between 1996 and 2000, displacement of Toshiba in the notebook market, and ability to command premium prices (Tables 2, A1, and Figure A1). As per The Cycle of Excellence's prescription, Sony succeed in a late growth stage market entry by (1) reaching the appropriate niche home market segment through national retail chains; and by (2) identifying and delivering on two service excellence components—much needed after-sales-service and aesthetically pleasing designs to blend with home entertainment centers.

Target market and channel selection. Sony targeted the consumer/SOHO segment primarily through the retail channel. By steering clear of the corporate sector, Sony avoided battling Compaq, Dell and IBM directly. Sony leveraged its brand recognition in the consumer markets and the relationships it already had with specialty national audio-video retailers, such as Circuit City and Best Buy, where it was able to access shelf space for its PCs. The principal competitors for the retail shelf space were Packard Bell, Compaq and HP. All had weaknesses that Sony exploited. Packard Bell, the mass-merchandising king was besieged by quality problems and dismal after-sales service. Compaq was fiercely battling Dell in the corporate arena. HP was still a rookie in the home segment; having entered only in 1995.

Service excellence: after-sales service and design. The incumbents'—Packard Bell, Compaq and HP—after-sales service was at best poor or inconsistent in the period 1994-1997. We cannot glean this information directly from *PC World*'s reliability and service data, since *PC World*, in this period, did not break out its numbers by market/product segments. However, this information can be deduced from the American Customer Satisfaction Index (ACSI, Figure A2 scores for the PC industry.

The ACSI measures overall quality, reliability and the extent to which a product or service meets the end customer's needs (home market segment). The ACSI for the PC industry was declining year upon year from 1994 to 1997. At the same time the PC sales in the US nearly doubled (Figure A3). Ironically, in this period, PC performance was improving in terms of microprocessor speed, storage capacity, number of peripherals, peripheral performance and most importantly, product prices were dropping simultaneously. So, what were the customers dissatisfied about? How can this incongruity be explained? Experts at *PC World*, IDC, and ACSI all attributed this to poor after-sales-service from the incumbent industry leaders—Compaq, IBM and HP. The growing and captive customer base dissatisfied with the current players' after-sales-service in the industry was a clear window of opportunity that Sony identified and exploited. *PC World* voted Sony as the "Rookie of the Year," in mid-1998. Sony was rated "Outstanding" in quick resolutions, short hold times, technical knowledge and sincere effort in solving problems.

For the consumer segment, Sony simultaneously satisfied a blatant after-sales-service need and a latent need—good looking PCs. While dull, performance-driven, industrial-looking beige boxes satisfied corporate buyers, consumers appeared eager to purchase more elegantly styled designs for their home use. Apple sold 400,000 of the sleek, neon-colored iMacs in its first month. However, the Wintel market segment was still aesthetically starved. So, Sony entered the market with sleek looking designs that were easy to use, compact and easy to

carry. At a time when sub-$1000 PCs accounted for nearly 68% of the retail market, and the market was rejecting high-end, high-performance PCs of other manufacturers, Sony was successfully selling technically comparable PCs at premium prices, by $600 in some cases. This is again consistent with The Cycle of Excellence's prescription of the importance of design and packaging in the late growth and mature stages of the product life cycle.

NEC, Hitachi, Fujitsu, and Toshiba's Failure Factors

NEC, Hitachi, Fujitsu and Toshiba were left scarred in the US PC market by the end of 2001 (Tables 2, A1 and Figure A1). Although Toshiba still had sales of about $1.2 billion in 2001, it had lost nearly $1.4 billion of market share over the previous five years. In 2001 NEC, as owner of Packard Bell, sold about $173 million worth of PC ware and lost nearly $5 billion of its market share between 1996 and 2000. Fujitsu's US sales in 2001 were about $94 million, but by that year it had retracted its operations back to Japan. Hitachi was on life-support in the US, with sales of less than $1.5 million. Where did these Japanese giants go wrong?

Ignored Service Excellence. None of these four firms seem to have identified after-sales-service as an opportunity. At a time when The Cycle of Excellence calls for operations and/or service excellence, these firms remained fixated on offering technically superior, high-performance products. Unfortunately, even these high-end products did not perform reliably.

NEC's purchase of Packard Bell was its attempt to "invade" and conquer the US retail market. Unfortunately, Packard Bell proved to be a "tar-baby" to which NEC became hopelessly stuck. Instead of fixing Packard Bell's product reliability and customer service problems, NEC tried to distance itself from the problem. In 1998, NEC garnered high points for reliability in the PC World surveys but was always dragged down by poor service. PC World's comment on NEC was, "Best-built PCs; support still a question mark."

Toshiba, the granddaddy of notebooks, was inconsistent with reliability. From mid-1997 to early 1998 Toshiba started experiencing an unusually high number of complaints, and owners felt they had been ignored when they sought support. In early 2001, Toshiba announced a turn-around strategy with service as a focal point. Like Toshiba, Fujitsu was inconsistent with its reliability and its service was even worse. Hitachi only fared marginally better than Fujitsu in service. Both firms outsourced their support functions, a strategy that often results in poorer service delivery.

Breadth and Depth of Products – Product Excellence. Hitachi entered the corporate portable market when the leaders—Toshiba, IBM and Compaq—were facing supply shortages and this enabled it to gain a measurable market share in the first year. When the leaders rebounded, its sales rapidly fell. As prices declined sharply in 1997, it was left stranded with unsold high-end products. Toshiba encountered a similar fate in the consumer desktop market. Unlike Sony, its products were not differentiated (great looks and good service) enough to command premium prices. It decided not to engage in brutal price wars in the low-end and exited the market. Both Hitachi and Toshiba violated one of the Cycle of Excellence's prescriptions. In mature technology markets, in the late growth stage and early maturity the main stream customers assume a certain level of Product Excellence but do not use all of the product's technical capabilities. So, consumers have little use for very high end products. This lack of

depth—high, medium and low-end products—harmed these firms. In any case, the availability of all components on the open market made replication of any high-end product virtually instantaneous. Fujitsu did have a full line of portables for both the corporate and retail markets but its constant operational problems diluted all its efforts in the US.

Fujitsu, Toshiba and Hitachi also failed to provide the breadth of products—desktops, laptops and servers—required to compete in the corporate segment, where customers tended to standardize around one vendor. Fujitsu did introduce a broad range of portables for both the retail and corporate segments. However, its announced introduction of desktops never reached the market and it never indicated intentions of supplying servers. NEC was the only firm to offer a full range (breadth and depth) of products: Packard Bell/NEC at the low-end of the retail market and the NEC product lines at the high-end (both retail and corporate) and server markets. Reliability and support problems, however, undermined whatever advantages NEC might have gained from the product-line breadth and depth.

Competing with Dell – Operations Excellence. All four Japanese firms targeted the corporate segment, where they had to use indirect channels (VARs) to compete against Dell and its vaunted direct model. Only Sony, competing principally in the consumer arena, avoided taking on the toughest player in the PC marketplace. In 2000, Dell sold $50 million worth of products per day over the web (up from $3 million in 1998). Mistakes in operational execution in the face of such competition translated into lost market share.

Unfortunately, all these firms ran into major difficulties. NEC's merger with Packard Bell was a costly disaster. It fell behind on speed-to-market and its reseller programs were no different than its competitors. To avoid channel conflicts Toshiba did not approach the direct-sell model until mid-2000 and it was too late by then. VARs also complained that Toshiba was impossible to work with. Channel staples, such as pricing flexibility, large sale discounts, sales training support and co-op funds, were missing from Toshiba's portfolio.

Hitachi tried to leverage the notebook shortage to enhance its relationship with VARs. However, many resellers remained unconvinced that its VAR program was better than the competition's. Hitachi already had a reputable mainframe data storage presence in the U.S. Starting an entirely new subsidiary for its PCs, although catering to the very same corporate segment, and then merging them as an after-thought proved expensive at a time when Dell had started to conquer the server and storage markets.

Fujitsu's attempts to shift to channel assembly and then to a direct, configure-to-order and build-to-order model, were all expensive re-organizations of assembly processes. Each created uncertainty about the roles of the existing channel partners and in-house sales people. Its build-to-order system appeared to be too slow to satisfy the VARs. Again, what was the wisdom of setting up a separate company in the US where Fujitsu already had a successful venture, Fujitsu Personal Systems? Finally, Fujitsu pulled its operations back to Japan.

In summary, these four Japanese firms' strategies violated basic tenets of the contingency model. In the late growth and early maturity stages of the product life cycle, consumers expect a certain level of product excellence and the basis of competition is operations and service excellence. Other than Sony, the others, along with poorer product reliability and

after-sales service as compared to the incumbent US firms, had costly operations foibles. In the late growth stage of the product life cycle, entrants cannot attack the incumbents head-on. While the most lucrative segments are already being served, it is still a time for "market growing;" not "market grabbing." NEC, Toshiba, Fujitsu and Hitachi were all on a collision course with the incumbent leaders with respect to the target market and product offerings. Sony chose the consumer market, where there is low firm loyalty. On the other hand, large corporate customers, who maintain integrated networks of machines, face switching costs if they change providers, and thus tend to be more loyal. Further, the corporate customers have service level agreements (SLAs) with their suppliers and this translates to a higher level of after-sales service as compared to the home segment.

In the PC market place, defect free hardware is necessary but not sufficient. Zero defect software and defect free interoperability is a myth and makes after-sales service all the more important. Even today, most Japanese firms are fixated on hardware, a domain in which they succeeded making audio-visual and other products that did not have language or software components. Thus to some extent, they were impeded by their expertise with "dumb" appliances. Only Sony had a compelling "overarching" vision beyond PC hardware and hence made significant investments in PDAs, content, audio-visual games, and services. The other firms failed to see beyond PCs.

Response of the incumbents – Dell, Compaq, HP, Gateway, and IBM

US firms did not just sit back and watch the Japanese firms make inroads into the market. At the beginning of 1996, Dell, Compaq, IBM and HP owned the corporate segment, where their product breadth and depth and quality and their dominance of the direct and indirect distribution channels created significant barriers to entry. In this period, Dell became one of the leanest firms in the world and IBM, Compaq and HP had close relationships with distributors and VARs. While a couple of them hiccupped briefly—e.g., laptop shortages—they rebounded strongly to nip Hitachi and Fujitsu's rise.

Compaq dominated the retail segment. Its business model of global sourcing, efficient inventory management, channel assembly and market tracking skills enabled it to make profit in the sub-$1000 category, where most assemblers could not. As per The Cycle of Excellence's prescription, in the late growth stages, Dell started to go after seasoned end-consumers (niche markets). Gateway had already carved out a solid niche for itself among the novice end-consumer. When Sony surprised the incumbents with good after-sales service, their response was swift. Both Dell and Gateway, the direct sellers, capitalized on their close contact with their customers to quickly bolster their after-sales service. Dell moved to the #1 position in customer satisfaction in 1999 (Table A3 and Figure A2) and has held that position ever since. The switching costs are very low for the home segment. Hence, service excellence is one of the primary determinants of repeat purchase. However the incumbents had left one base uncovered—aesthetics and design. According to the Cycle of Excellence, this is a window of opportunity for firms attempting a late market entry. As the product life cycle moves into the late growth stage, the market leaders tend to go after the most lucrative segments and ignore niche markets that can easily be served with very little marginal investment. This is precisely what Sony exploited.

CONCLUSION

Sony, Fujitsu and Hitachi were all attempting a late growth stage market entry into the US PC market while NEC and Toshiba were making renewed market penetrating efforts. In looking for answers at to why Sony was successful while the others experienced severe setbacks, we explored two research streams—marketing, and technology and innovation. Each stream provided us only partial answers and guidance. However, we were able to piece together the theories and findings from each of these streams and we proposed a contingency model—The Cycle of Excellence—of when and how to enter a hi-tech assembled goods market.

It so happens that the focus of our discussion was the late growth stage of the product life cycle, which was a time when all the Japanese firms simultaneously decided to make an entry attempt. However, we also covered the earlier portions of the PC product life cycle in the US market and explained via the contingency model why IBM's dominant design (i.e., product excellence) trumped over Apple, only to be later dethroned by Compaq (operations excellence) and finally, Dell captured the top spot via operations and service excellence. Just when the incumbent industry leaders thought that they had a tight lock on the market, Sony identified a blatant paucity (good after-sales-service) and an unsatisfied latent need (good looking PCs) for a certain segment of the market and used this as a window of opportunity to make a successful late entry into the US PC market.

Strategic windows of opportunity open up in every industry at different times of the product life cycle. Identifying these windows, targeting the right market segments and using the appropriate strategic weapons—product excellence, operations excellence and/or service excellence—increases the probability of a successful market entry. Major shifts in the market place are quite predictable. The proposed Cycle of Excellence model for hi-tech assembled products gives us detailed guidelines with respect to identifying these shifts, specifically the emergence of the dominant design, the shift from product focus to process focus, technology outpacing consumers' ability to absorb it, and finally the shift from process focus to service focus. Firms should be aware of these impending shifts and invest and act accordingly. For incumbent firms, the same model can be used to proactively avoid the development of large windows of opportunities and thwart massive invasions by new comers.

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APPENDIX

Re-Entry / Renewal Performance of Japanese Firms during 1996 – 2001

During this period NEC bought Packard Bell and re-introduced its desktop line for the home segment, Toshiba "re-entered" the home desktop market, and Sony, Fujitsu and Hitachi all introduced assembled PC machines for the first time in the US. Four of these firms were worldwide PC leaders in 1995 (NEC—#2 in desktops; Toshiba—#1 in portables; Fujitsu, NEC, Hitachi and Toshiba—#4, #6, #9 and #10 in servers), and Sony was the leading consumer audio-visual electronics brand in the US. Table A1 and Figure A1 show the revenues and market share for the top 5 US and top 5 Japanese firms in the US market. Table A2 provides the percentage of the market grabbed by each firm in the period 1996-2000. Table A3 provides the Reliability and Service data for all the major PC vendors in the period 1994 – 2001. Following is a description of the efforts of the 5 Japanese firms in the period 1996-2001.

NEC

NEC Technology originally entered the US desktop market in 1984. Leveraging its strength in DRAM chips, it became the fourth largest supplier by 1988 and by 1992 accounted for 1.5% of PCs shipped in the US, putting it in the top ten. The company also captured a significant share of the monitor market, where its MultiSync brand was top-rated in 1994. In early 1995, NEC announced plans to (re)introduce the Ready line, a desktop product initiative for the consumer market that had floundered when first launched in 1992. For the first quarter of 1995, the company made significant gains in the reseller channel. A new marketing team and channel development efforts, combined with missteps by competitors, enabled NEC to move from 8th to 4th place in the reseller channel with 133% growth in laptop sales and 150% growth in desktops.

In mid-1996, NEC acquired Packard Bell as part of four-way merger/acquisition deal that also involved units of Groupe Bull and ZDS. In the US, NEC PC manufactured NEC machines as a subsidiary of Packard Bell. NEC Technologies continued to operate independently as a supplier of monitors and other peripherals, reporting to NEC Japan. In spite of a corporate message that split responsibility between Packard Bell and NEC for the home and commercial markets respectively, the NEC division unveiled a new line of Ready PCs for the home and SOHO markets soon after the merger. The NEC division also appeared to distance itself from the Packard Bell name, which carried a reputation for poor quality and worse customer service.

By 1997, NEC and Packard Bell were rated at the bottom in PC World's Reliability and Service rankings (Table A3). Simultaneously, its efforts to cut costs by moving to a direct build-to-order model, dubbed NEC Now, also floundered and NEC/Packard Bell sales declined precipitously. Instead of gaining access to the retail market, NEC was tarred by Packard Bell's poor reputation and eventually drained $1 billion by the time it dissolved the merged company. By late 2000, NEC had lost more than $5 billion in market share over a 5-year period, at a time when the market grew by $15 billion.

TABLE A1
US PC Revenues 1995 – 2001 for the Sample Firms

Vendor	1995	1996	1997	1998
Compaq	$7,562.93	$9,322.11	$12,820.47	$12,600.19
Dell	$2,936.22	$4,428.06	$7,111.68	$11,173.22
Gateway	$3,173.26	$4,277.48	$5,083.61	$6,022.54
HP	$2,517.35	$3,384.35	$4,513.09	$5,987.12
IBM	$4,616.36	$5,573.83	$6,624.81	$6,805.84
Fujitsu	$0.00	$175.02	$540.91	$553.66
Hitachi	$0.00	$364.11	$608.51	$341.18
NEC	$6,085.70	$5,872.48	$4,431.94	$4,033.44
Sony	$0.00	$212.00	$373.37	$470.68
Toshiba	$2,299.91	$4,099.98	$3,913.18	$2,938.09
Others	$24,644.11	$27,000.59	$24,336.47	$24,046.54
Total Market	$53,835.84	$64,710.01	$70,358.04	$74,976.69

Vendor	1999	2000	2001
Compaq	$13,338.84	$13,594.45	$7,280.31
Dell	$16,057.67	$18,918.21	$13,247.07
Gateway	$6,938.74	$6,289.23	$3,000.74
HP	$6,215.99	$7,507.93	$4,704.25
IBM	$7,105.13	$5,960.00	$3,892.42
Fujitsu	$346.18	$228.30	$94.71
Hitachi	$86.44	$2.18	$1.41
NEC	$2,334.98	$826.86	$173.23
Sony	$814.04	$1,583.36	$1,346.79
Toshiba	$3,286.41	$2,627.26	$1,200.84
Others	$23,865.76	$22,569.71	$12,644.19
Total Market	$80,390.18	$80,107.49	$47,585.96

Note: Revenues include all products offered—desktops, portables and servers.

Toshiba

Toshiba was the sole Japanese company that had succeeded in capturing and holding a leadership position in a segment of the US PC market during the early 1990's. By 1995, Toshiba was #1 with 18% of the commercial portable segment and #1 with 34% of the retail portable segment. One key to Toshiba's success was the decision to locate its market research and product planning in the US with experienced US managers, who were responsible for marketing and channel strategy.

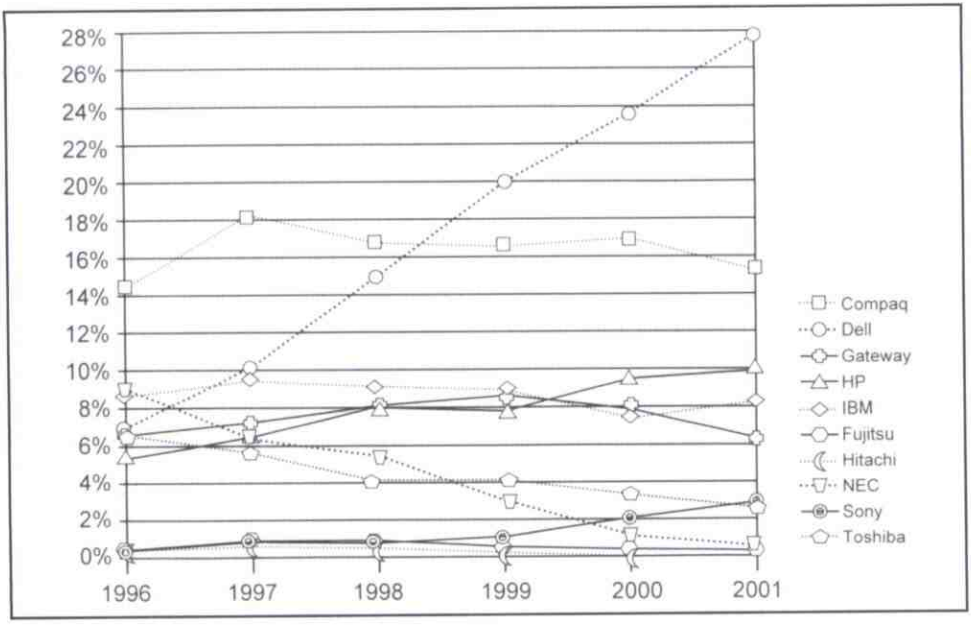

Figure A1: US PC market share 1996 – 2001 of the sample firms.

In 1995, Toshiba started selling Intel-made desktop machines in Japan, an arrangement that Toshiba hoped to transfer to the US, where Intel also made PCs for Hewlett-Packard. In September 1996, Toshiba introduced a desktop for the high-end consumer market. The elegantly styled machine sported an array of features (phone/answering machine, fax, TV, radio, CD-ROM, high quality speakers and remote control) and reflected Toshiba's goal of being a leader in digital convergence. In early 1997, Toshiba introduced its commercial desktop PCs, machines that were well rated but were considered to be over-featured for its small and medium-sized target customers. During 1997, Toshiba added new features such as DVD players and bundled movie-controller software to both its consumer and commercial models. Later that year, however, the company announced that it was pulling out of the consumer marketplace, citing the gap between its full-featured systems and the increasing demand for low-end machines. Toshiba's $1,800 - $2,700 price points were out of line with the market, where 70% of consumer PCs sold for less than $1500. In early 1999, a year later than originally announced, Toshiba introduced its PC server line, the Magnia LiTE10.

In May 2000, Toshiba announced that it was planning to pursue to direct-sell approach and a build-to-order production model, focusing initially on resellers, then business buyers and finally consumers. By early 2001, Toshiba had long lost its leadership (fallen to #6) in the consumer portable segment and had fallen to the 3rd spot in the corporate portable segment. In 1998, Toshiba shared the top spot with 4 others in notebook reliability rankings. However, it could not demonstrate the consistency of the reliability leaders Dell and IBM. The service rankings showed a similar story as well (Table A3). Toshiba maintained an insignificant presence in the other segments and thus did not show up in PC World's reliability and service surveys. In the period 1996-2000, when the entire PC industry grew by nearly $15 billion, Toshiba lost nearly $1.5 billion of market share (Table A2).

TABLE A2
Percentage Market Share Grabbed in the years 1996 to 2000

Vendor	Home-DT	Home-LT	Commercial-DT	Commercial-LT
Compaq	$1,921.67	$741.98	($220.98)	($173.08)
Dell	$1,274.82	$438.91	$7,532.24	$3,355.98
Gateway	$1,858.67	$149.92	($525.99)	$482.43
HP	$3,163.63	$246.90	$42.53	$476.81
IBM	($1,079.34)	$54.96	($206.32)	$970.38
Fujitsu	$0.00	$34.24	$0.00	$19.04
Hitachi	$0.00	$0.00	$0.00	($364.11)
NEC	($3,308.49)	($14.11)	($1,068.95)	($603.99)
Sony	($42.60)	$492.69	$102.24	$819.03
Toshiba	($281.21)	($268.01)	$73.53	($1,032.00)
Total Market	$1,963.62	$1,813.94	$3,031.13	$2,964.27
Sample Firms	$3,507.15	$1,877.48	$5,728.30	$3,950.49

Vendor	Servers	MarketGrabbed	%Grabbed
Compaq	$2,002.75	$4,272.34	27.7%
Dell	$1,888.20	$14,490.15	94.1%
Gateway	$46.72	$2,011.75	13.1%
HP	$193.71	$4,123.58	26.8%
IBM	$646.49	$386.17	2.5%
Fujitsu	$0.00	$53.28	0.3%
Hitachi	$2.18	$ (361.93)	-2.4%
NEC	($50.08)	$(5,045.62)	-32.8%
Sony	$0.00	$1,371.36	8.9%
Toshiba	$34.97	$(1,472.72)	-9.6%
Total Market	$5,624.61	$15,397.57	100.0%
Sample Firms	$4,764.94	$19,828.36	128.8%

DT Desktop

LT Laptop (Portable)

The table gives you the values for each vendor the difference between its revenues in 2000 and 1996.

The total market row gives you the growth in the market for each segment between 1996 and 2000, (i.e., the total market grew by approximately $15 billion in the 5-year period 1996 to 2000).

The %Grabbed column indicates the percentage of the total market grabbed by each firm in those 5 years.

TABLE A3
PCWorld PC Reliability and Service Data

Reliability:	Jun-94	Nov-94	Jun-95	Dec-96	Jun-97
Compaq	5	5	5	5	4
Dell	3	3	5	5	5
Gateway	3	2	3	3	3
HP	5	5	5	5	5
IBM	5	5	4	3	4
Packard Bell	4	3	3	1	1
NEC	4	4	4	3	1

Service:	Jun-94	Nov-94	Jun-95	Dec-96	Jun-97
Compaq	4	5	5	3	3
Dell	5	5	5	5	5
Gateway	4	4	3	3	5
HP	3	3	5	4	4
IBM	4	4	4	3	4
Packard Bell	1	1	1	1	1
NEC	3	3	5	2	1

The star rating system corresponded to 5 (Outstanding), 4 (Good), 3 (Fair), 2 (Poor) and 1 (Unacceptable). A firm was not reported if they did not receive a minimum number of responses. (Note: Blank spaces indicate insufficient responses). Source: PCWorld.

Table A3 continues on next page.

Hitachi

In spite of the strong corporate relationships that its Hitachi Data System (HDS) division had in the mainframe and storage markets, Hitachi formed a new US-based subsidiary, Hitachi PC Corp., in late 1995 to design, develop, market and sell notebook PCs. Hitachi planned to capitalize on its capabilities in LCDs, hard disks, semiconductors, AV technology and multimedia to become one of the top three notebook makers in two years. In early 1996, Hitachi entered the market with high-end, full-featured notebooks for the corporate segment. Persistent shortages of Toshiba, IBM and Compaq notebooks in early to mid-1996 gave Hitachi a window of opportunity, and after only 6 weeks on the market, it sold 19,000 units, giving it the 12th spot in the notebook market. Though it rose to the 9th spot within a year, Hitachi could not hold on to its gains when the leaders struck back in 1998, a year in which the portable market shrank and prices fell by nearly a $1000.

In August 1998, Hitachi PC outlined a new "notebook-to-network" strategy to deliver notebooks, desktops, monitors, and servers aimed at the mainstream corporate customer. Hitachi introduced sleek, futuristic high-end desktops with flat-panel LCDs as well as a

TABLE A3 (continued)
PCWorld PC Reliability and Service Data

Work PCs	Reliability				Service			
	Nov-98	Jan-00	Jan-01	Nov-01	Nov-98	Jan-00	Jan-01	Nov-01
Compaq	4	4	4	4	3	3	3	2
Dell	4	5	5	5	4	4	4	3
Gateway	4	4	4	4	3	3	3	3
HP	4	4	4	4	4	4	3	3
IBM	3	4	4	4	4	4	4	3
Packard Bell	3				2			
NEC	5							

Home PCs	Reliability				Service			
	Nov-98	Jan-00	Jan-01	Nov-01	Nov-98	Jan-00	Jan-01	Nov-01
Compaq	3	3	2	3	3	3	3	2
Dell	5	5	5	5	3	5	5	4
Gateway	3	3	3	3	4	4	3	3
HP	3	3	3	3	3	3	3	2
IBM	4	4	4	4	3	3	3	3
Packard Bell	3				1			
NEC	3	3			3	2		
Sony	4	4	4	4	4	3	3	3

Notebooks	Reliability				Service			
	Nov-98	Jan-00	Jan-01	Nov-01	Nov-98	Jan-00	Jan-01	Nov-01
Compaq	3	3	3	3	3	3	3	2
Dell	4	4	4	4	4	4	4	3
Gateway	4	4	3	3	4	4	3	3
HP	3			4				3
IBM	4	4	4	4	2	4	4	3
NEC	4	3			3	3		
Fujitsu	3	4	3	4	2	2	2	
Hitachi	3				3			
Sony				4				
Toshiba	4	3	3	4	4	3	3	3

PCWorld has been reporting Reliability and Service data from 1994. However, in 1998 PCWorld changed the variables and mode of survey significantly. From 1994 to 1997 PCWorld surveyed PC users on 9 reliability and service variables (problem rate, system dead-on-arrival, component dead-on-arrival, time to reach support staff, time taken to resolve problems and number of unresolved problems, percentage buying again based on service and support, percentage of respondents reporting lower-than-average satisfaction with service and support, and percentage of respondents reporting

higher-than-average satisfaction). A weighted composite star rating system was created—one for overall reliability and one for service—based on the relative rankings generated by raw scores in each of the above variables. In 1998, PCWorld changed some of the variables, added a few more and reported the data from three user categories—Work PCs, Home PCs and Portables. The new reliability measures included: percent of PCs with problems, problems per year, problems on arrival, dead on arrival, component failure and satisfaction with reliability. The new service measures included: short hold time, quick resolution, no resolution, knowledgeable tech support, sincere effort by tech support and satisfaction with service.

family of PC servers. Few sold. In 1999, Hitachi PC merged with HDS. In Feb. 2000, Hitachi started selling over the web and expanded its target customer base from large corporations to small businesses and consumers. In 2001, Hitachi sold about $1.2 million worth of servers and was virtually shut out of the desktop and portable markets. Hitachi showed up only once (1998) in the PC World's reliability and service rankings, where it was rated poorly.

Fujitsu

In 1995, Fujitsu was the #2 PC maker in Japan after NEC and ranked #6 worldwide in the notebook market, but it sold few PCs outside its domestic market. A foray into the US market in 1993 gained Fujitsu little presence, but the company did become a major seller of components to US PC makers. In February 1996, it formed a subsidiary, Fujitsu PC Corporation, to engineer its reentry into the US PC market, with an explicit goal to capture 5% market share within 2 years. Backed by a $25 million marketing budget, Fujitsu introduced a full line-up of 11 portable models in April 1996, targeting consumers and small and mid-size businesses through the retail channel. In November 1996, it launched its corporate line and shifted more distribution through resellers and VARs. Rebate programs, up to 2% of total purchases, attracted smaller resellers, who convinced customers that Fujitsu quality was equal to IBM's. Fujitsu exceeded it corporate sales expectations for the first year, due in part to supply shortages and quality problems with the leading vendors (Compaq, IBM and Toshiba). By mid-1997, Fujitsu had garnered a 1.4% of the notebook market.

In January 1998, Fujitsu piloted a channel assembly program for one PC model with MicroAge, a major national distributor. Also in early 1998, Fujitsu embarked on a major restructuring of its assembly processes. Up to that point Fujitsu shipped fully manufactured portables and components by cargo ship from Tokyo to Milpitas, California and Hillsboro, Oregon for final assembly and packing—a process that required four weeks from order to delivery. In March 1998, Fujitsu announced the planned conversion to a configure-to-order and build-to-order system, managed by FedEx and CTI, a US firm with whom FedEx had experience in subassembly work. The new production system, collocated in Memphis, Tennessee next to the FedEx hub, was to employ an innovative, computerized "parallel line" assembly system intended to facilitate mass customization and enhance efficiency and quality. The goal was to offer a four-day turn-around from order to product delivery.

Process and business issues delayed the launch of the build-to-order program by six months. When it did start up, the system was not able to deliver machines quickly enough to suit many VARs, and the roles of distributors and Fujitsu's own sales force remained unclear. In June 1999, Fujitsu terminated its relationships with distributors Tech Data, Pinacor and Ingram Micro, in order to expand online and direct sales to end-users and to some VARs and retailers. Fujitsu's unit sales fell 25% in 1999, and in March 2000, the corporation closed

down the Memphis center and relocated the operation to Japan, announcing its intention to focus primarily on corporate customers and VAR businesses which did not require a 3-day cycle time. Fujitsu failed to introduce a line of desktop machines, which had been tentatively scheduled for 1997, and never signaled its intention to enter the server market. In 2001, Fujitsu sold $95 million worth of portables in the US. Twice (Jan. 2000 and Nov. 2001) Fujitsu's reliability was comparable to those of the reliability leaders Dell and IBM but lacked consistency. In after-sales service Fujitsu was consistently sub-standard (Table A3).

Sony

Starting in the early 1990's, Sony played a major role in the US PC industry as an OEM, producing portable computers for Apple and Dell, and as a supplier of PC components (CD-ROM drives, SRAM memory chips and semiconductors) and peripherals (Trinitron monitors). In spite of the company's prowess in advertising, marketing, distribution and brand equity, its first attempt to enter the market in 1992 with its own PC flopped. In late 1995 Sony announced a new entry initiative with a line of desktops aimed at home PC buyers.

In addition to leveraging its existing strengths—brand name, strong retailer relationships and broad capabilities in componentry and manufacturing—Sony sought to differentiate its PC offerings through technological innovation, design and customer service excellence. With its strong position in consumer electronics, Sony planned to lead the digital convergence revolution, integrating audio-visual, entertainment and telecommunications functionality into PCs that would be as simple to use as TVs. To exploit the PC industry's reputation for shoddy after-sales service (Figures A2 and A3), Sony built and staffed a call center that offered superior support and the shortest hold-times. Dr. Teri Aoki, President of Sony Electronics, articulated Sony's opportunity: "Most people are satisfied with PC performance, now the competition is over ease of use and design."

Sony's fully featured machines were priced at the high end, and by 1998 it was selling close to a million units per year. Sony's VAIO (Video Audio Integrated Operations) 505 notebook, gained attention for its slick design, which had few rivals and was carving out a viable niche in the portable segment. In spite of prices averaging $600 more than its main rivals, Sony briefly captured the No. 2 position in the retail notebook market, by March 2001, behind Compaq and ahead of surging Dell, who overtook it later. Sony's popularity in the retail segment spilled over into the corporate segment where it ranked #5 in portables (ahead of Toshiba) and had a modest showing in desktops. In the period 1996-2000, Sony managed to capture nearly 9% of the $15 billion growth in the PC market, ranking behind Dell, Compaq, HP and Gateway and ahead of IBM, which captured 2.5%.

When the market precipitously dropped 40% in sales from 2000 to 2001, Sony lost the least with a drop of about 15%, while Dell experienced the next least loss of about 30%. NEC led the pack with about 80% drop in revenues (Table A2). Along with IBM, Sony's home PCs shared the second spot for reliability and just behind Dell. Sony started out as a service leader, along with Gateway, in 1998 and captured PC World's Rookie of the Year Service Award.

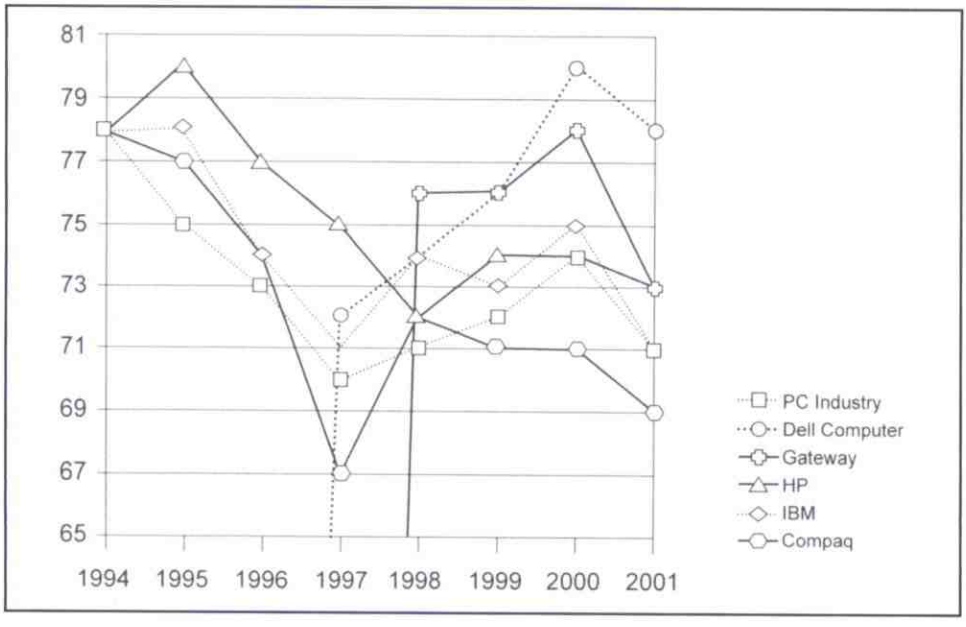

Figure A2: American customer satisfaction index for the PC industry.

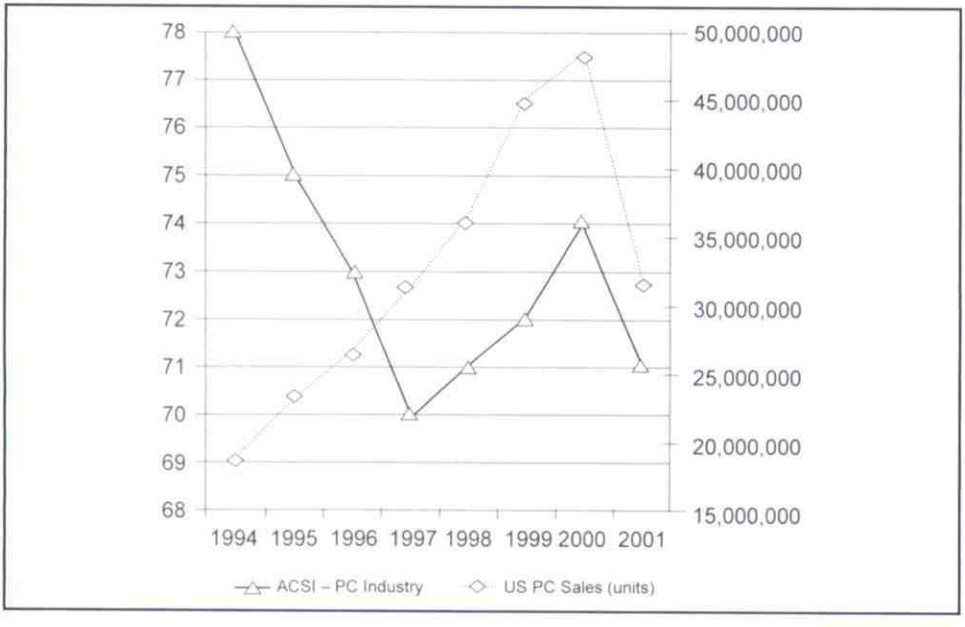

Figure A3: ACSI for the PC industry vs. sales (units).