



**Asia Case
Research Centre**
THE UNIVERSITY OF HONG KONG

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SAMSUNG ELECTRONICS: INNOVATION AND DESIGN STRATEGY

Samsung strives to consistently lead the Consumer Electronics industry in product design and engineering innovation. Therefore, we are extremely pleased and proud that 32 of our products for 2008, in a variety of categories, have been recognized by the Consumer Electronics Association judges. These prestigious awards reinforce Samsung's ongoing efforts to bring to market the most groundbreaking technologies and products that enrich the lives of our customers.

- Dong-Jin Oh, president and chief executive of Samsung Electronics America, Inc.¹

In January 2008, Dong-Jin Oh, president and chief executive of Samsung Electronics America, Inc, was celebrating a grand success at the Consumer Electronics Show ("CES"), the largest show of its kind in the world. Samsung had garnered 32 innovation and design engineering awards for its products, including audio/video products, cell phones, printers, monitors and an ultra-mobile PC.²

Fifteen years earlier, during a visit to an electronics store in Los Angeles, Kun-Hee Lee, chairman of Samsung Electronics Company ("Samsung Electronics"), realised that Americans regarded products from South Korea as nothing more than a cheap commodity. Fukuda Shigeo, the design advisor in Lee's management team, pointed out that Samsung clearly lacked a design identity; the company's product development processes were primordial and senior management discounted the value of design. To reposition itself as a premium electronic products brand, Samsung underwent phases of organisational transformation and adopted innovation and design as key processes in product development.

Samsung's successful formula of combining innovative design with brand management started a new trend in the electronics industry. In 2006, more than 17 leading South Korean

¹ Business Wire (14 November 2008) "Samsung Receives 32 CES Innovation Awards for 2008", bNet Business Network, http://findarticles.com/p/articles/mi_m0EIN/is_2007_Nov_14/ai_n27446119 (accessed 18 November 2008).

² Ibid.

Vishwanath Desai prepared this case under the supervision of Professor Ali Farhoomand for class discussion. This case is not intended to show effective or ineffective handling of decision or business processes.

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Ref. 09/410C

electronics companies, including LG and Hyundai, increased their research and development (“R&D”) investment by 11.9%, while 44 Taiwanese companies reported 30.5% more investment in R&D. With the industry as a whole increasing R&D expenditure and close competitors such as Sony Corporation getting serious about design outsourcing, Oh feared that design was being commoditised. How could Oh make sure that Samsung stayed ahead of the competition?

Company Background and Strategy

In 1939, Byung-Chull Lee started Samsung in Taegu, South Korea as an exporter of agricultural products and dried fish. In the decade that followed, the company expanded into flour mills and confectionary. Building on three decades of success, Lee started investing in heavy industries, petrochemicals, chemical factories, textiles and ship-building. These businesses helped Samsung to enhance its competitive position in the international marketplace by integrating its manufacturing process, from raw materials and machinery to end products.

Samsung Electronics was established in 1969 and initially focused on black-and-white television manufacturing. Over time, Samsung Electronics expanded its product lines, adding household electronics such as VCRs and microwave ovens. In 1974, Korea Semiconductor Inc started South Korea’s first wafer-fabrication entity. That year, Samsung bought a 50% stake in Korea Semiconductor Inc to secure a supply of semiconductors for its own burgeoning consumer electronics business. In 1978, Korea Semiconductor Inc fell into financial difficulties. Samsung Electronics took over the entire company and restructured it as a separate business entity, Samsung Semiconductors.

In the late 1970s, Samsung Electronics ventured into the mass production of consumer electronics goods, largely for foreign original equipment manufacturers.³ It created strategic joint ventures with foreign technology suppliers such as NEC, Sanyo and Corning Glass Works,⁴ who provided it with technology and support in product design. In 1978, the product development team successfully reverse-engineered the design of Panasonic microwave ovens and VCRs.⁵ Though the assembly capabilities of Samsung Electronics were improved through large production contracts with partners, its market knowledge and original production design capabilities were stunted. Given its lack of experience in electronics, Samsung Electronics was largely dependent on product designs from its foreign partners and Japanese rivals.

With the gradual development of Samsung Electronics’ business, its dependence on Japanese integrated circuit suppliers increased. In 1985, Samsung Electronics started Tokyo Design Centre with the intention of developing its own integrated circuits and Dynamic Random Access Memories or widely known as DRAMS. This initiative “improved its ability to develop integrated circuits for its consumer electronics, industrial, and telecommunications products”.⁶ Samsung established R&D centres in South Korea in order to develop DRAMs internally. However, its product development processes only emphasised short-term profits [see **Exhibit 1** for Samsung Electronics’ major exports in the 1980s].

From 1990 onwards, Samsung Electronics shifted its focus from quantitative growth to qualitative growth, which resulted in organisational restructuring and new strategies for

³ Kim, Y. (1997) “Technological Capabilities and Samsung Electronics’ International Production Network in Asia”, BRIE Working Paper 106, p. 6.

⁴ Ibid.

⁵ Ibid p. 8.

⁶ Ibid, p. 13.

technology management. Around the same time, due to the South Korean government's loosening of import restrictions, global electronics firms began entering the South Korean market.⁷ In 1991, imported electronic goods accounted for 5% of the total South Korean market, and this percentage was expected to increase to 15% in the following year.⁸ Major South Korean players such as Samsung Electronics, Daewoo and Goldstar were competing with each other and against foreign players to maintain their share of the domestic market. Meanwhile, Samsung Electronics' low-end products were squeezed out of overseas markets by more technologically advanced and price-competitive electronic products from overseas competitors,⁹ and the key export markets in the US and Europe were saturated. The reduced growth in demand had severely increased price competition in developed markets.¹⁰ To tackle these challenges, Samsung Electronics unveiled its New Management initiative in 1993. The New Management programme was a serious effort to radically transform the company's management. It emphasised four issues: decentralisation, innovativeness, globalisation and outward-looking management.¹¹

In his New Management declaration in 1993, Chairman Kun-Hee Lee identified technology and human resources as critical building blocks for Samsung's growth. By implementing this newly established R&D plan, we can develop the technology that will drive Samsung's future.

- Hak-Soo Lee, vice-chairman of Samsung Electronics¹²

Samsung Electronics established many R&D centres in South Korea and overseas in order to increase the intensity of its in-house product design. In 1991, the first such centre was opened in Osaka, Japan, with five employees working on audio and video products.¹³ In 1992, a centre was established in Frankfurt, Germany to focus on products for the European markets, followed two years later by Samsung Design America, which worked on consumer electronic products for the US market.¹⁴ In the same year, Samsung Electronics hired IDEO, a US-based design consultancy firm, to design computer monitors and other consumer products. In the following year, Samsung Electronics established a research centre to address product planning needs in South-East Asian markets. During the 1997 Asian financial crisis, Samsung Electronics cut its Korean and overseas workforces by 26% and 33%, respectively, and sold the product segments that were not related to its core business. While many Asian companies failed, Samsung Electronics continued to lead the global market, with an over 8% growth rate in gross sales in 1997. In January 1999, *Forbes Global Business & Finance* recognised the firm as the world's premiere consumer goods and services company.¹⁵

In November 2000, Samsung Electronics embarked on a mission to transform itself into a 'Digital – e Company'¹⁶ that would be capable of leading in digital convergence—a process of

⁷ Ibid., p. 19.

⁸ Samsung Electronics' Monthly Magazine (April 1991), as cited in Kim, Y. (1997) "Technological Capabilities and Samsung Electronics' International Production Network in Asia", BRIE Working Paper 106, p. 19.

⁹ Kim, Y. (1997) "Technological Capabilities and Samsung Electronics' International Production Network in Asia", BRIE Working Paper 106, p. 20.

¹⁰ Ibid., p. 19.

¹¹ Kae, H., Hak, C. and Ku, H. (2007) "Corporate Transformation", *Korean Management: Global Strategy and Cultural Transformation*, p. 224.

¹² Newswire (8 November 2005) "Samsung Companies Announce 5-Year, 47 Trillion Won Investment Plan".

¹³ Kim, Y. (1997) "Technological Capabilities and Samsung Electronics' International Production Network in Asia", BRIE Working Paper 106, p. 26.

¹⁴ Ibid.

¹⁵ Funding Universe (2008) "Samsung Electronics Co. Ltd", <http://www.fundinguniverse.com/company-histories/Samsung-Electronics-Co-Ltd-Company-History1.html> (accessed 18 November 2008).

¹⁶ 'Digital-e Company' is described as a company that produces digitally integrated products and connects R&D, production, and marketing to customers, partners, and the market-disciplined approach through e-Processes implemented using internet based

assembling various forms of digital media using a single platform. The firm shifted from a division-centric development model¹⁷ to a portfolio-centric model¹⁸ that brought together multiple divisions and units to create integrated solutions for home networks, mobile networks, office networks and core-component business portfolios. Under this initiative, Samsung Electronics pursued four key areas: R&D, design, brand marketing and corporate citizenship. By 2004, Samsung Electronics had increased its design staff to 470 and had 16 R&D centres around the world. Samsung Electronics increased its design budget by 20% to 30% per year, reaching US\$5.36 billion¹⁹ in 2005, equal to 6.82% of total sales. In the same year, Samsung Electronics spent US\$3 billion²⁰ on branding efforts, including sponsorship of Chelsea Football Club and the Winter Olympic Games held in Torino, Italy.

Samsung Electronics' strategy of combining product design, R&D and brand management turned the firm into a leader in the consumer electronics market. Between 2001 and 2007, Samsung Electronics received 19 awards at the International Design Excellence Awards ("IDEA").²¹ In 2006, the company registered 17,377 patents worldwide, including patents aimed at fusion technology, nanotechnology and biotechnology. In 2007, Samsung Electronics held a dominant worldwide market share²² for LCDs and TVs. The company's unparalleled edge and leadership in R&D and design were underscored by awards for 32 of its products at the CES Innovations 2008 Awards.

Innovation and Product Design at Samsung Electronics

R&D at Samsung Electronics was structured in three layers. 17 R&D centres and six design centres [see **Exhibit 2**] developed technologies that could be used to produce products in 3 year development cycles. The product development teams within each business division were responsible for launching and commercialising the products in various markets across the globe. The Corporate Technology Office ("CTO") was tasked with searching newer software and hardware platform technologies and nurturing new business areas. The CTO acted as a companywide 'control tower' for technology and systematic R&D structure.

Investment in Design and R&D

Samsung Electronics attributed its leading position in the industry to four main factors: creative people in the organisation who could develop technologies; co-operation among business partners throughout the supply chain; the firm's ability to explore and penetrate new markets; and the speed of innovation and product development.²³ The company strived to stay ahead of its competitors, to understand the needs of customers through global marketing operations, and to design suitable products with futuristic technologies. Between 2002 and 2007, Samsung Electronics spent on average 9% of its sales revenue on R&D and the design of new consumer electronics products and technologies for various markets. In November 2005, Samsung Group announced that it would increase its R&D expenditure to US\$10.8

IT systems which bring value to every part of supply chain (definition adopted from Mission and Vision of Samsung Electronics as described on www.samsung.com)

¹⁷ Samsung Electronics (2001) "Annual Report".

¹⁸ Ibid.

¹⁹ US\$1 = W1026 on 30 December 2005.

²⁰ Samsung Electronics (2005) "Annual Report".

²¹ The IDEA programme was a premier international competition co-sponsored by *BusinessWeek* and the Industrial Designers Society of America.

²² Samsung Electronics (2007) "Annual Report".

²³ Samsung (2006) "Annual Report".

billion in 2010.²⁴ Samsung Electronics, the largest division in the group, was expected to account for 80% of the group's total R&D spending [see **Exhibit 3**].

By the end of 2007, Samsung Electronics employed over 39,000 engineers²⁵ in its R&D department, representing 26% of its total workforce, and the number was expected to surpass 50,000 by 2010.²⁶ Among the engineers employed by Samsung, 3,200 held PhDs. Approximately 15% of the R&D team was focused purely on projecting human needs and lifestyles 10 years from present.

Global R&D Network

By 2007, Samsung Electronics operated six R&D centres in South Korea and a total of 16 centres in eight different countries. These R&D centres developed technologies that could be commercialised in the near future. The CTO developed proprietary technologies, managed the deployment of key technologies and guided the overall R&D process within the organisation.

Samsung Information Systems America ("SISA"), a wholly owned R&D subsidiary of Samsung Electronics, conducted advanced research on core and advanced technologies. Since its establishment in 1998, SISA had developed various technologies in computer science, wireless connectivity, digital media solutions, printing solutions and storage. Over 2,000 R&D engineers in two R&D centres in India (Samsung India Software Centre and Samsung India Software Operations Unit) focused on software development for high-end televisions, digital media, telecommunications, wireless and networking products. Samsung Electronics (China) R&D Centre focused on software, television and MP3-player development for the Chinese market. In addition, Samsung Advanced Institute of Technology, a research arm of Samsung Electronics, developed seed technologies in computing and intelligence, communication and networking, display, nano electronics, energy and environment, and biotechnology and health to bolster Samsung's competitiveness.

Field	Areas of research
Computing and intelligence	Image sensing, visual processing, display processing, sound processing, user interfaces
Communication and networking	Access network architecture, security, radio air interface
Display	Ultra large flat panel displays, mobile/flexible displays
Nano electronics	Memory, data storage, micro systems
Energy and environment	Fuel cells, energy storage technology, eco technology, photoelectric technology
Biotechnology and health	Molecular diagnostic technology, connected health care
Basic technologies	Embedded system solutions, advanced materials, nano fabrication, analytical engineering

Table 1: Samsung Advanced Institute of Technology R&D Areas

²⁴ Korea.net (9 November 2005) "Samsung to Invest 47 Trillion Won in R&D by 2010", http://www.korea.net/News/News/NewsView.asp?serial_no=20051108018 (accessed 13 November 2008).

²⁵ Samsung Electronics (2007) "Annual Report".

²⁶ Samsung, "The R&D Workforce and Organization", http://www.samsung.com/no/aboutsamsung/companyprofile/researchanddevelopment/CompanyProfile_RD_WorkforceOrganization.html (accessed 13 November 2008).

User-Centric Design Philosophy

Samsung Electronics stressed that “design and creative strengths were at the heart of corporate competitiveness”.²⁷ The design philosophy at Samsung Electronics profoundly reflected South Korean culture, striking a balance between reason and feelings. Inspired by *Tae Kuk*, the symbol of yin-yang²⁸ [see **Exhibit 4**], Samsung Electronics developed a scale with “reason” on one end and “feeling” on the other to measure perfection of design. In a recent analysis by Samsung’s product design team, products manufactured by Apple Computer Inc (“Apple”) occupied the “feeling” zone, with an emphasis on simplicity of products, whereas Sony products tended toward the “reason” zone, with lots of complex features.²⁹ At Samsung Electronics, designers balanced “reason” and “feeling” by rationalising the design of products using geometric and technological parameters and then enhancing the design such that products made an emotional connection with the user.

Samsung Electronics operated seven design centres, including a corporate design centre in Seoul and six regional design centres in London, Los Angeles, Milan, New Delhi, Shanghai and Tokyo. Over 700 highly skilled designers conducted various research projects in the fields of industrial design, graphic design, interaction design, human factors, lifestyle research, creative business-planning, visual brand strategy, materials exploration, colour theory and computer-aided design.³⁰ The global network of design centres helped the firm understand lifestyles that reflected market conditions, trends and perceptions in each target market. Through its Global Localization strategy, designers developed product design blueprints according to global design standards and themes, while remaining flexible enough to allow local design centres to accommodate specific market needs and cultural contexts.³¹ For example, Younghee Lee, vice-president of marketing, explained that beautiful design of mobile phones could be appreciated by a Parisian or Indian, but noted that the Indian user, who often lacked a reliable electricity supply, needed a longer-lasting battery than a Parisian.³²

The Global Localization strategy helped Samsung Electronics establish itself as an innovative and first-class consumer electronics company. In 2007, the firm received 26 iF Product Design Awards³³ for its products, including LCD TVs, mobile phones, notebooks and laser printers. Similarly, many Samsung products were honoured with Red Dot Design Awards,³⁴ Japan’s Good Design Awards and IDEA awards.

Marketing

In order to achieve its vision of leading in digital convergence, Samsung Electronics used ‘e-processes’ [see **Appendix 3**], that synchronised marketing efforts with R&D, design and production. Between 1999 and 2007, Samsung Electronics spent on average 3% of net sales on marketing and advertisement to reposition its brand as “high-quality” and “high-tech”, and

²⁷ Samsung (2006) “Annual Report”, p. 41.

²⁸ Yin-yang symbolised a Chinese philosophy of duality in nature and the bond between opposite forces of nature, which gave rise to each other. The symbol is composed of dark and light areas inscribed in a circle, with each containing a dot of the opposite colour.

²⁹ Breen, B. (2007) “The Seoul of Design”, <http://www.fastcompany.com/magazine/101/samsung.html> (accessed 13 November 2008).

³⁰ Delaney, M., et al. (2002) “Global Localization”, *Global Design and Cultural Identity*, http://www.idsa.org/absolutenm/articlefiles/summer02_samsung.pdf (accessed 17 November 2008).

³¹ *Ibid.*, p. 44.

³² Ewing, J. (2008) “Samsung’s New Marketing Push”, *BusinessWeek*, http://www.businessweek.com/globalbiz/blog/europeinsight/archives/2008/02/samsungs_new_ma.html (accessed 17 November 2008).

³³ The iF Product Design Awards were annually conferred by the International Forum Design Hannover and regarded as among the most prestigious awards for product design.

³⁴ The Red Dot Design Award was a prestigious international product design prize awarded by the Design Zentrum Nordrhein Westfalen in Germany.

to overcome the company's image as a producer of cheap products. Samsung Electronics' product diversification differentiated the company from its key competitors, many of which were focused on single or smaller numbers of products. Apple, for example, specialised in portable music players and held a major share in the global market for these devices. Nokia and Motorola were best known for mobile phones, and Sony focused on consumer electronics.

	Net Sales	Operating Profit
Digital media	28,263.16	1,131.67
Telecommunication networks	25,335.91	2,938.52
Digital appliances	7,306.98	170.38
Semiconductors	23,805.38	2,502.16
LCDs	18,188.65	2,255.26
Other	2,109.45	1,270.65

* all figures are in US\$ millions

Table 2: Samsung Electronics' Net Sales and Operating Profit in 2007³⁵

Since 2006, Samsung Electronics had been collaborating with Giorgio Armani, one of the world's top fashion designers, in launching mobile-phone and LCD TV lines, and had worked with Jasper Morrison, the world-famous industrial designer, in designing mobile phones, side-by-side refrigerators and electric ranges. In addition, Samsung Electronics had jointly developed a premium music phone with Bang & Olufsen³⁶ and launched a new concept sports phone with Adidas, a famous sportswear company. The firm also engaged in co-operative marketing campaigns with a number of premium brands that promoted quality living, such as BMW and Cartier [see **Exhibit 5**]. Samsung Electronics was an official Worldwide Partner in the Wireless Communications category of the 2000 Sydney Summer Olympic Games, the 2002 Salt Lake City Winter Olympic Games, the 2004 Athens Summer Olympic Games and the 2006 Turin Winter Olympic Games. In 2007, a survey by BusinessWeek/Interbrand indicated a sharp increase in Samsung's brand equity to US\$16.8 billion from US\$15 billion in 2005. In the same year, Samsung Electronics was ranked 21st in the world on *Fortune* magazine's list of Global Most Admired Companies.³⁷

Competitive Landscape

Apple Computer Inc

Apple, established in 1976, designed, manufactured and sold personal computers, portable music players, mobile communication devices, and related software, services and peripherals.³⁸ With overall revenue of US\$24 billion in 2007, Apple held a worldwide market share of 70% in the portable music player market³⁹ and a 5.3% share in the market for smart mobile phone devices,⁴⁰ according to analysis by NPD Group and Gartner. Apple had developed its proprietary operating system, Macintosh, which was used in the Mac series of

³⁵ Samsung Electronics (2007) "Annual Report".

³⁶ Bang & Olufsen is a Danish company that designs and manufactures high end audio products, television sets, and telephones.

³⁷ BusinessWeek (2007) "The 100 Top Brands", http://www.businessweek.com/pdfs/2007/0732_globalbrands.pdf (accessed 30 November 2008).

³⁸ Yahoo Finance, *Apple Inc Profile*, <http://finance.yahoo.com/q/pr?s=AAPL> (accessed 18 November 2008).

³⁹ Bishop, T. (3 October 2007) "Microsoft Wants Zune to Be No. 2", *Seattlepi.com*, http://seattlepi.nwsource.com/business/334041_zune03.html (accessed 10 October 2008).

⁴⁰ Meyer, D. (6 June 2008) "Apple is Third in Global Smartphone Rankings", *ZDNet.co.uk*, <http://news.zdnet.co.uk/communications/0,1000000085,39430493,00.htm> (accessed 10 October 2008).

personal computers and notebooks. With the increasing popularity of Macintosh, Apple was rapidly becoming a sizable player in the PC notebook market, with a 10.6% market share in the US. Apple's marketing efforts, aimed at creating a community around its products, resulted in huge brand loyalty for the firm. Since 2005, the total R&D expenditure of Apple was around 3% to 4%, whereas the industry average was 5.4%. Apple's highly popular products, such as the iPod and iPhone, were built using very simple and commonly available technologies; however, the products featured intuitive design and offered a rich user experience. Apple's design philosophy, "less is more", focused on the usability and energy efficiency of products.

	2007	2006	2005	2004	2003	2002
R&D Investment*	782	712	535	491	471	446
Percentage of Net Sales	3.2%	3.7%	3.8%	5.9%	7.6%	7.8%

* all investment figures are in US\$ millions

Table 3: Apple's R&D Investment⁴¹

In 2007, Apple's sales, general and administrative expenses (including marketing and advertising expenditure) totalled 22% of its net sales. The company's customers were in the education, creative professional, consumer, and business markets. Apple promoted itself as a lifestyle brand. According to Steve Chazin, former sales and marketing executive at Apple, the firm never deeply focused on inventing new technologies and products, but rather chose to improve on designs and functionality of strategically selected products.⁴² For example, Apple took existing MP3 player designs and applied its experience and technology to improve them with elegant design, thumbwheel navigation and ease of moving music to the music player. Moreover, Apple allowed companies such as BMW, Bose and Griffin to create iPod accessories, which helped Apple to associate itself with premium brands and gain credibility for its new products.

LG Electronics

LG Electronics, a Korean *chaebol*⁴³ established in 1958, was a leading producer of mobile handsets, front-loading washing machines, air conditioners, optical storage products, flat panel televisions and home theatre systems. In 2007, LG Electronics was ranked fourth in flat panel televisions across the global industry players, fifth in mobile communication devices and first in digital appliances in research reports by DisplaySearch, Strategy Analytics and GfK Research.⁴⁴ In 2008, with net sales close to US\$48 billion, LG Electronics established 29 R&D centres employing 16,000 R&D professionals across various markets in the world. The firm concentrated on development of five areas: mobile communication, digital appliances, digital displays, digital media and home networking. LG Electronics' products were designed to incorporate four values: concept (or theme), style, interface and finish. In the initial stage of product development, core departments such as design, product planning and marketing developed a clear product concept. These designs were then shared with five regional design centres located in Italy, China, the US, Japan and India, which would customise the products to suit the local culture and customer needs. Over the years, LG Electronics took various

⁴¹ Apple (2002–2007) "Annual Report".

⁴² Worthen, B. (2008) "Innovation Comes Cheap at Apple", <http://blogs.wsj.com/biztech/2008/04/23/innovation-comes-cheap-at-apple> (accessed 18 November 2008).

⁴³ A *chaebol* was one of the large, family-controlled conglomerates in South Korea, which were characterised by strong ties with government agencies. See: Watkins, T. (2002), "The Chaebol of South Korea", <http://applet-magic.com/chaebol.htm> (accessed 18 November 2008).

⁴⁴ LG Electronics (2008) "Korea Invest Forum", Company Presentations, http://www.lge.com/ir/archive_other/list/BIR_OTHER|MENU_IR|MENU.jhtml (accessed 19 November 2008).

initiatives to develop a diverse talent pool to promote open innovation within the firm. LG Electronics garnered 11 iF Design Awards, 29 Red Dot Design Awards and one IDEA Award.

	2007	2006	2005	2004	2003	2002
R&D Investment*	1,188	825	796	801	725	487
Percentage of Net Sales	4.1%	3.2%	3.2%	3.2%	5.1%	4.0%

* all investment figures are in US\$ millions

Table 4: LG Electronics' R&D Investment⁴⁵

LG Electronics originally produced consumer electronics for mass consumption. In 2005, however, the company began concentrating on premium consumer electronics with the intention of attracting premium customers. The company's new brand identity was focused on the use of stylish design and smart technology to develop products that suited its target customers. In 2007, LG Electronics' sales and administrative expenses, which included marketing and advertising expenditure, were close to 19.6% of its net sales. LG primarily used print, television and outdoor media to promote individual products as well as its corporate brand. Its advertisements for products such as air conditioners, refrigerators and vacuum cleaners mainly highlighted value for the customer and the health benefits of the products, whereas the advertisements for mobile communication devices and televisions highlighted how their style, design and technology enhanced the user experience. The firm also established strategic alliances with Prada, Mark Levinson, DOLBY, Siemens, GE and other firms to co-develop products in various categories and to enhance brand identity in premium product segments.

Nokia Corporation

Nokia Corporation, a Finland-based, leading mobile communications company, was founded in 1865 as a wood-pulp mill. Nokia entered the telecommunications market in 1960 with radio transmission equipment. After decades of growth and experience, Nokia made a strategic decision to adopt telecommunications as its core business in the 1990s. By 2007, the company provided a wide range of mobile devices based on GSM⁴⁶/EDGE,⁴⁷ CDMA,⁴⁸ and WCDMA⁴⁹ standards coupled with related services and software, as well as internet and network services. Nokia's net revenue totalled US\$74.6 billion,⁵⁰ with sales in more than 150 countries accounting for a 38% worldwide market share. Nokia's products were categorised into five segments based on technological features and target customer segments.

⁴⁵ LG Electronics (2002–2007) "Annual Report".

⁴⁶ GSM was a digital cellular technology used for transmitting mobile voice and data services and was developed by the European Conference of Postal and Telecommunications Administration. GSM used digital technology and time-division multiple-access transmission methods, offering seamless connectivity across different geographies.

⁴⁷ EDGE was an enhancement of GSM network technology that offered high data capacity. EDGE allowed the delivery of advanced mobile services, such as music and video downloading, multimedia messaging, high-speed internet, and e-mail access on mobile devices.

⁴⁸ CDMA was a spread-spectrum technology that allowed many users to occupy the same time and frequency allocations in a given band/space. CDMA assigned unique codes to each communication to differentiate it from others in the same spectrum. CDMA offered superior voice quality, high-speed broadband data connectivity, and value-added services such as position location, internet telephony, multicasting and push-to-talk.

⁴⁹ WCDMA was a wideband spread-spectrum third-generation mobile telecommunication interface. WCDMA offered lower costs for video phones and better performance than other mobile phone technologies in densely populated areas.

⁵⁰ Nokia Corporation (2007) "Annual Report".

Product Category	Characteristics
Explore (N series)	Advanced product line featuring latest technologies and few features.
Live, Classic	Broad-appeal products with greater focus on phone features
Classic	Broad-appeal products with focus on style and design
Achieve (E series)	Smartphone product range focused on the business users
Entry	Low-end and low-cost models for emerging markets

Table 5: Nokia Corporation Product Segments

In 2007, Nokia operated R&D centres in 11 countries and employed 14,500 professionals, representing 32% of the company's workforce. The R&D centres focused on user and context modelling, human interfaces, user experience, wireless services, and scalable service platforms. The products designed at Nokia followed three principles: simplicity, relevance and experience. However, the actual design process varied for each product series. For example, the N-series mobile smartphones incorporated the latest technologies and presented consumers with new capabilities, whereas the entry-level products were designed to suit specific customer groups in emerging markets. The consumer insight team constantly collected and studied new phenomena in architecture, design, colour and social trends to identify inspirations for Nokia's product design. This process helped Nokia to develop products suited for the demand, fashion and style of future consumers. In addition, Nokia opened satellite design centres, including one in Bengaluru (previously Bangalore), India, where the firm collaborated with a local design school, Srishti, to design products for the Indian market. By 2007, Nokia had won many awards, including the prestigious Red Dot Design Quality Award, for its excellence in product innovation and design.

	2007	2006	2005	2004	2003	2002
R&D Investment	7,172	4,949	4,858	4,795	4,811	3,876
Percentage of Net Sales	11.1%	9.5%	11.2%	12.9%	12.8%	10.2%

* all investment figures are in US\$ millions

Table 6: Nokia Corporation's R&D Investment⁵¹

Considering increased usage of internet services on mobile devices, Nokia positioned itself as a complete consumer solution provider with a wide range of devices and internet services, such as maps and navigation, social networking services, and mobile internet access through Nokia Siemens Networks. By the end of 2007, Nokia invested US\$5.4 (€4.3 billion) in marketing activities, amounting to 8.6% of net sales. Nokia's marketing activities were focused on communicating brand value to customers.

Sony Corporation

Sony was established in 1946 in Japan as a research and manufacturing company for telecommunication and measuring equipment. By 2009, Sony had expanded its business to electronics, games, motion pictures, financial services and other related services. Sony's electronics business, which contributed 65.6% to the group's overall revenue of US\$87.9 billion⁵² in 2007, was engaged in the development, design, manufacturing and marketing of

⁵¹ Nokia Corporation (2002–2007) "Annual Report".

⁵² Sony Corporation (2007) "Annual Report".

audio and video devices, televisions, information and communication products,⁵³ semiconductors, components,⁵⁴ and other electronic products. In 2007, Sony took second position in the North American LCD television market with a 12.5% share,⁵⁵ just behind Samsung's 14.8% market share. The firm garnered leading positions in the markets for video products, information and communication devices, and components. In 2007, Sony's total R&D investment touched US\$5.48 billion, amounting to approximately 6.3% of net sales. Sony's R&D efforts were focused on four key domains: a common development platform technology for home and mobile electronics; and semiconductor, device and software technologies for creating value-added products.⁵⁶ According to the company, "approximately 62% of R&D expenses were for the development of new product prototypes while the remaining 38% were for the development of mid- to long-term new technologies in such areas as semiconductors, communications, displays and next generation optical discs".⁵⁷

	2007	2006	2005	2004	2003	2002
R&D Investment	5,757	5,628	5,313	5,445	4,690	4,585
Percentage of Net Sales	7.1%	7.8%	7.6%	6.9%	5.9%	6.1%

* all investment figures are in US\$ millions

Table 7: Sony Corporation's R&D Investment⁵⁸

The product design philosophy of Sony encompassed four principles: originality, lifestyle, functionality and usability. Sony employed over 400 designers in five design centres located in Tokyo, London, Los Angeles, Singapore and Shanghai to propose original product concepts, to design products, and to customise them according to the local culture and demand. As Takashi Ashida, chief strategist at Sony Creative Centre, explained, "designers generally don't rely on customer surveys, instead try to make something which was never done before".⁵⁹ The company's design activities aimed to create a value-added user experience through feature design, concept development and eco-friendly sustainable design methods. Sony's focus on originality and uniqueness earned it a Good Design Award, iF Design Award, Red Dot Design Award, IDEA award and Design for Asia Award.

Motorola Inc

Founded in 1928, Motorola designed and manufactured car radios and radiotelephones, as well as portable two-way radio communication devices for the US military. Motorola demonstrated the world's first working prototype digital cellular system and phones using the GSM standard in 1991.⁶⁰ Building on its experience and success with cellular communication devices, Motorola expanded its business to offer enterprise mobility solutions, home networks mobility, and mobile devices. Motorola's product portfolio included two-way radios, voice and data communication products and systems for private networks, electronic digital

⁵³ Products for information and communications included PCs, broadcast- and professional-use audio, video and monitors, and other professional-use equipment.

⁵⁴ Examples of components included optical pickups, batteries, audio/video/data recording media, data recording systems and LCDs.

⁵⁵ Tarr, G. (13 February 2008) "iSuppli: Samsung Tops in Q4 LCD TV Share", *This Week in Consumer Electronics*, <http://www.twice.com/article/CA6532356.html> (accessed 12 October 2008).

⁵⁶ Sony Kabushiki Kaisha (2007) "Form 20-F for Fiscal Year Ended 31 March 2007", United States Securities and Exchange Commission, http://www.sony.net/SonyInfo/IR/library/FY2006_20F_PDF.pdf (accessed 18 November 2008).

⁵⁷ Ibid., p. 73.

⁵⁸ Sony Corporation (2002–2007) "Annual Report".

⁵⁹ Hall, K. (22 February 2006) "Sony Strives for Original Design", *BusinessWeek*, http://www.businessweek.com/innovate/content/feb2006/id20060221_140419.htm (accessed 18 November 2008).

⁶⁰ For details, see Motorola's website: <http://www.motorola.com/content.jsp?globalObjectId=7632> (accessed 18 November 2008).

assistants, bar code scanners, RFID⁶¹ readers, wireless LAN infrastructure, end-to-end mobile communication infrastructure, and mobile handsets.

By 2007, Motorola's net sales reached US\$36.6 billion, of which 51% was from the US, 12% was from Latin America and 13% was from Europe.⁶² In the same year, Motorola held approximately 14% market share⁶³ in the worldwide mobile handset market, a 7% year-on-year decline as a result of the "slowing demand for existing mobile phones, delays in introducing new products, and financial factors".⁶⁴ Motorola's overall strategy in 2007 was focused on leadership in broadband solutions to provide services and applications across delivery platforms within home, wired and wireless networks. Motorola also paid attention to development of new revenue-generating services and technologies, enabling customers to experience media mobility. Between 2002 and 2007, Motorola invested 10% to 12% of its net sales on R&D of technologies and products in the mobile devices and enterprise mobility solutions segments. During this period, the company focused on: development of wireless products, applications and services for enterprise markets; applications for government and public safety markets; and next-generation wireless handsets.⁶⁵ By 2007, Motorola operated a strong network of R&D laboratories, including 19 centres in China and five centres in India.

	2007	2006	2005	2004	2003	2002
R&D Investment	4,429	4,106	3,600	3,316	2,979	2,887
Percentage of Net Sales	12.1%	9.6%	10.2%	11.2%	12.9%	12.3%

* all investment figures are in US\$ millions

Table 8: Motorola Inc's R&D Investment⁶⁶

Consumer electronics products at Motorola were designed with a focus on two criteria: personalisation and socialisation. At Motorola Applications Research, a research and product development laboratory, engineers worked on developing technologies that invisibly gathered, sorted and compiled information on users' content and service consumption, and locations, behaviour patterns and situational contexts. These technologies helped Motorola provide the most relevant, most interesting and most important content to users. The research was also focused on developing applications that would enable users to know about other users in their vicinity, allowing them to communicate and socialise with each other more easily. In 2007, Motorola won many awards and accolades for innovation and product design, including Best of CES 2008, Best Cell Phone award for its ROKR E8, and Best of WiMAX World 2008 Award for the USBw 100.⁶⁷

⁶¹ RFID was a data collection technology that used electronic transponder chips mounted on products. Transponders transmitted data in broad ranges of radiofrequencies that were used to track the products on a product line.

⁶² Motorola Inc (2007) "2007 Motorola Net Sales", <http://www.motorola.com/content.jsp?globalObjectId=8892-10907> (accessed 15 October 2008).

⁶³ Motorola Inc (2007) "Annual Report".

⁶⁴ Malykhina, E. (29 January 2008) "Nokia Grows Faster than Other Mobile Phone Makers", *InformationWeek*, <http://www.informationweek.com/news/mobility/business/showArticle.jhtml?articleID=205921304> (accessed 16 October 2008).

⁶⁵ Motorola Inc (2008) "Form 10-K for Fiscal Year Ended 31 December 2007", United States Securities and Exchange Commission, <http://www.sec.gov/Archives/edgar/data/68505/000095013708002935/c23246e10vk.htm> (accessed 18 November 2008).

⁶⁶ Motorola Inc (2002–2007) "Annual Report".

⁶⁷ USBw 100 was Motorola's USB adaptor for laptops that connected to WiMAX networks in each of the three bands approved for its use around the world: 2.3GHz, 2.5GHz and 3.5GHz. Motorola's wi4 WiMAX solutions offered a set of products and services, including broadband access, fixed voice line replacement, mobile data access and mobile communications.

Challenges for the Future

Competition in the consumer electronics market was fierce, as many global players entered the market with large product portfolios. Digital convergence invited more companies from related industries such as software, PC and network services to enter the market. Entry of such new players further intensified the competition. Competitors of Samsung Electronics such as LG, Nokia, Panasonic, Sony and some Chinese firms had started investing heavily in R&D and product design. All major competitors adopted the concept of localising their product design to suit target markets. The design advantage of Samsung Electronics started to diminish as product design strategies and processes became commoditised. Samsung Electronics had to devise strategies to defend not only its position in the market, but also its profitability in the competitive environment.

Advancements in technology had shortened product lifecycles and product replacement had become a key driver for revenue growth. Samsung Electronics invested about 9% of net sales in R&D of newer technologies, features and designs to offer newer products and attract customers. However, some of its competitors, including Apple, Sony and LG Electronics, had significantly lower R&D expenditure per product.

Firms such as Philips, Dell and Motorola were adopting outsourcing of product design to lower R&D costs and shorten time-to-market. These brands were buying product blueprints and technology from contract manufacturers and independent design firms such as IDEO, Quanta Computer, Premier Imaging, HCL Technologies and Wipro Technologies. Companies took varying approaches to design outsourcing. For example, HP contributed key technology and design to its computers, whereas Dell preferred to adopt entire designs from its design partners. Motorola bought complete designs for its low-end mobile phones but kept tight control over the development of its high-end cell phones, such as the Razr.

However, outsourcing of product design and R&D raised serious concerns about intellectual property rights, product management, integrity and incubation of new competitors. For example, Motorola outsourced the design and manufacturing of its mobile phones to Taiwanese manufacturer BenQ. In 2004, BenQ started selling the mobile phones in the Chinese market under its own brand, which resulted in termination of its contract with Motorola. Considering the immediate urge to optimise R&D costs and potential concerns associated with design outsourcing, Samsung Electronics had to rethink its product design and R&D outsourcing strategies.

**EXHIBIT 1: SAMSUNG ELECTRONICS' MAJOR EXPORT PRODUCTS IN THE 1980S
(US\$ MILLION)**

	1982	1983	1984	1985	1986	1987	1988
TVs	88.2	151.7	196.7	141.9	221.6	353.8	408.9
VCRs	-	-	2.6	134.5	297.4	401.7	581.7
Microwaves	59.8	95.2	149.5	127.4	238.8	308.4	367.1
Refrigerators	12.5	10.8	16	24	34.4	53.6	89.8
W/Ms	0.7	1	1.4	2.5	5.6	13.4	18.1
A/Cs	0.2	2.3	2.5	1.6	1.9	12.4	14.6
EPBXs	-	-	-	-	0.4	0.5	1.6
Key phones	-	0.8	0.2	5.2	13.2	62	48.4
FAXs	-	-	-	-	-	-	2.2
Computers	-	-	0.02	0.8	7.9	22.5	69.5
Watch chips	8.1	7.7	12.8	13.1	27.5	21.1	21.9
Linear ICs	4.6	5.9	10.9	15.8	22	37.3	45.6
Transistors	1.2	1.2	7.6	13.7	17.8	38.8	50
64K DRAM	-	-	5.5	12.4	33.2	21.7	76.9
256K DRAMs	-	-	-	27	50.3	134.2	253.4
1 M DRAMs	-	-	-	-	-	6	221.3

Note: W/M = washing machine, A/C = air conditioner, EPBX = electronic private branch exchange, FAX = facsimile machine

Source: Youngsoo, K. (1997) "Samsung Electronics Corporation Major Export Products in the 1980s", *Technological Capabilities and Samsung Electronics' International Production Network in Asia*, Australia Japan Research Centre of Research School of Pacific and Asian Studies at the Australian National University, pp. 10–11.

EXHIBIT 2: SAMSUNG ELECTRONICS' RESEARCH AND DESIGN NETWORK

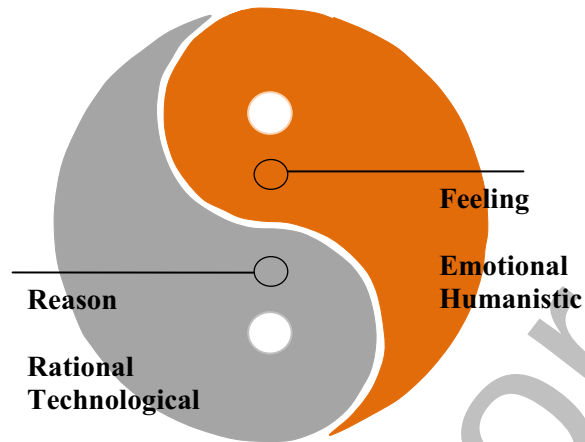
Centre Name	R&D Areas
SAMSUNG Information Systems America, Inc (SISA)	Strategic parts and components, core technologies
Dallas Telecom Laboratory (DTL)	Technologies and products for next-generation telecommunications systems
SAMSUNG Electronics Research Institute (SERI)	Mobile phones and digital TV software
Moscow SAMSUNG Research Centre (SRC)	Optics, software algorithms and other new technologies
SAMSUNG Electronics India Software Operations (SISO)	System software for digital products, protocols for wired/wireless networks and handsets
SAMSUNG Telecom Research Israel (STRI)	Hebrew software for mobile phones
Beijing SAMSUNG Telecommunication (BST)	Mobile telecommunications standardisation and commercialisation for China
SAMSUNG Semiconductor China R&D (SSCR)	Semiconductor packages and solutions
SAMSUNG Electronics (China R&D Centre (SCRC)	Software, digital TVs and MP3 players for China
SAMSUNG Yokohama Research Institute	Core next-generation parts and components, digital technologies

Source: Samsung Electronics company website (2008): , *Research and Development*
http://www.samsung.com/in/aboutsamsung/companyprofile/researchanddevelopment/CompanyProfile_Global_RD_Network.html (accessed 21 October 2008).

EXHIBIT 3: SAMSUNG ELECTRONICS' R&D BUDGET

	R&D Budget	% of sales
2007	KRW5.90 trillion	6.35%
2006	KRW5.58 trillion	9.50%
2005	KRW5.41 trillion	9.40%
2004	KRW4.90 trillion	5.98%
2003	KRW3.58 trillion	3.58%

Source: Samsung Electronics (2003–2007) “Annual Report”.

EXHIBIT 4: SAMSUNG'S DESIGN PHILOSOPHY—BALANCE OF REASON AND FEELING

Source: Delaney, M., McFarland, J., Yoon, G. and Hardy, T. (2002) "Global Localization", Global Design & Culture Identity, http://www.idsa.org/absolutenm/articlefiles/summer02_samsung.pdf (accessed 20 October 2008).

EXHIBIT 5: SAMSUNG ELECTRONICS' PARTNERSHIPS AND ALLIANCES

Partners	Date	Areas of Cooperation
Nokia	Apr. 2007	Co-develop technology for handsets and DVB-H standardisation solutions
Limo	Jan. 2007	Establish a joint venture for developing a Linux platform (Samsung Electronics, Vodafone, DoCoMo, Motorola and NEC)
Alcatel	Oct. 2006	Co-operate on satellite DVB-H
Sony (S-LCD)	Jul. 2006	Jointly invest in eighth-generation LCD line (2200mm x 2500mm motherglass)
IBM	Mar. 2006	Co-develop and market technologies for industrial printer solutions
Intel & Microsoft	Mar. 2006	Co-develop UMPCs
Discovery	Sept. 2005	Co-operate on high-definition content
Salvarani	Jul. 2005	Co-develop new built-in products combining household electronics and furniture
Sun Microsystems	Jul. 2005	Co-operation in [home and business] solution business and next-generation business computing systems
Covad	Jul. 2005	Supply access gateways
Lowe's	Jul. 2005	Supply household electronics to 1,100 Lowe's stores
VDL	Feb. 2005	Co-operate in commercialisation of terrestrial DMB
Charter	Jan. 2005	Co-develop cable broadcasting receiver and set-top box for digital TV Full-Duplex service
KDDI	Jan. 2005	Supply CDMA2000 1xEV-DO network equipment in eastern Japan
Bang & Olufsen	Nov. 2004	Partner in home theater business
Kent State University	Oct. 2004	Co-develop display technologies
Qualcomm	Jul. 2004	Co-operation in MDDI (Mobile Display Data Interface) technology
Toshiba (TSST)	Apr. 2004	Develop and market optical storage devices
Sony (S-LCD)	Mar. 2004	Establish joint venture for seventh-generation LCD (1870 x 2200 mm) line
IBM	Mar. 2004	Co-develop nano-logic process technologies
Dell	Jan. 2004	Supply multifunctional laser printers
Hewlett-Packard	Sept. 2003	Share technology for ink-jet printers
Disney	Sept. 2003	Supply "Movie Beam" set-top box for VOD
Napster	Sept. 2003	Co-develop and market Samsung-Napster player
Sony	Aug. 2003	Expand and consolidate memory stick business
NEC	Jul. 2003	Co-operate in high-end business computer systems
Matsushita	Jan. 2003	Standardise technology, co-produce and jointly market DVD recorders
Best Buy	Jul. 2002	Sell side-by-side refrigerators through a network of more than 500 retailers
Microsoft	Nov. 2001	Co-develop digital household electronics

Source: Samsung Electronics company website (2008), *Strategic Alliances and Partners* http://www.samsung.com/in/aboutsamsung/companyprofile/majorstrategicalliances/CompanyProfile_MajorStrategicAlliances.html (accessed 20 October 2008).

APPENDIX 1: SAMSUNG ELECTRONICS' CONSOLIDATED INCOME STATEMENT

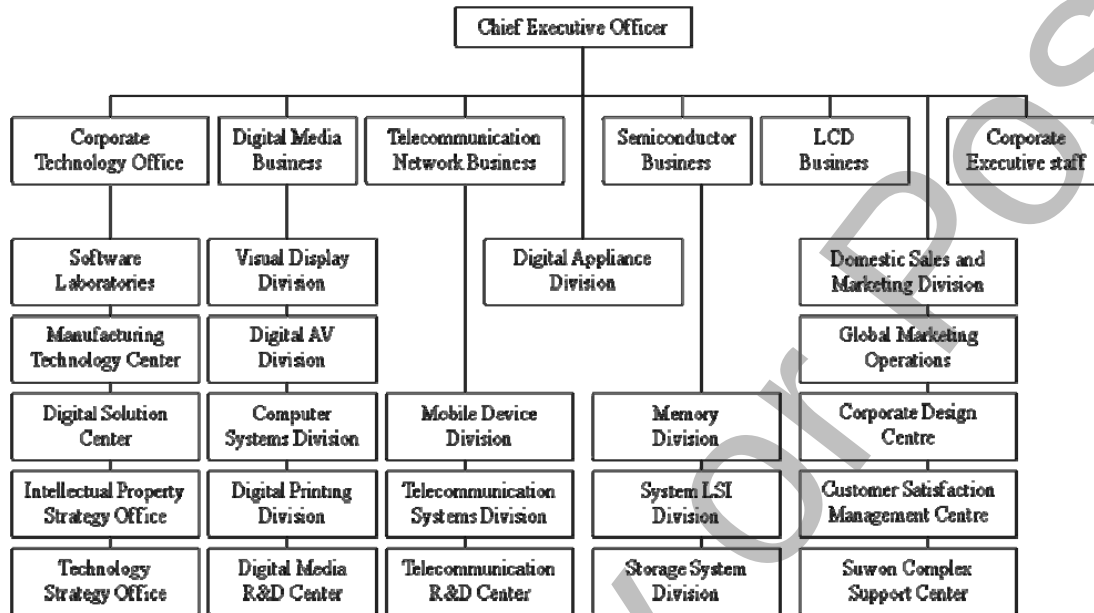
	2002	2003	2004	2005	2006	2007
<u>Sales</u>	<u>63.50</u>	<u>69.09</u>	<u>87.37</u>	<u>85.95</u>	<u>91.06</u>	<u>105.01</u>
- COGS	39.39	45.04	56.45	58.90	63.59	75.56
<u>Gross Profit</u>	<u>24.11</u>	<u>24.05</u>	<u>30.93</u>	<u>27.05</u>	<u>27.47</u>	<u>29.45</u>
(Margin)	<u>38.0%</u>	<u>34.8%</u>	<u>35.4%</u>	<u>31.5%</u>	<u>30.2%</u>	<u>28.0%</u>
- SG&A	14.25	17.34	18.39	18.98	17.87	19.89
<u>Operating Profit</u>	<u>9.86</u>	<u>6.71</u>	<u>12.54</u>	<u>8.08</u>	<u>9.60</u>	<u>9.57</u>
(Margin)	<u>15.5%</u>	<u>9.7%</u>	<u>14.3%</u>	<u>9.4%</u>	<u>10.5%</u>	<u>9.1%</u>
- Non Operating Income (Expense)	0.34	0.14	0.66	0.59	0.87	0.70
Interest Payment (Net)	0.04	0.08	0.20	0.07	0.07	0.18
Equity Method gain (loss)	0.36	0.26	0.53	0.36	0.55	0.40
<u>Income Before Tax</u>	<u>10.20</u>	<u>6.85</u>	<u>13.19</u>	<u>8.66</u>	<u>10.48</u>	<u>10.27</u>
(Margin)	<u>16.1%</u>	<u>9.9%</u>	<u>15.1%</u>	<u>10.1%</u>	<u>11.5%</u>	<u>9.8%</u>
- Income tax expense	2.39	1.15	2.35	1.30	1.74	1.82
- Minority Interests, etc. (Net)	(0.29)	0.65	0.66	0.78	(0.29)	(0.54)
<u>Net Income</u>	<u>7.52</u>	<u>6.36</u>	<u>11.50</u>	<u>8.14</u>	<u>8.45</u>	<u>7.91</u>
(Margin)	<u>11.8%</u>	<u>9.2%</u>	<u>13.2%</u>	<u>9.5%</u>	<u>9.3%</u>	<u>7.5%</u>

* all figures are in US\$ billions

Note: To prepare this statement in US\$, the exchange rate used was W100 = US\$0.1066, based on the conversion rate used in the company's 2007 annual report.

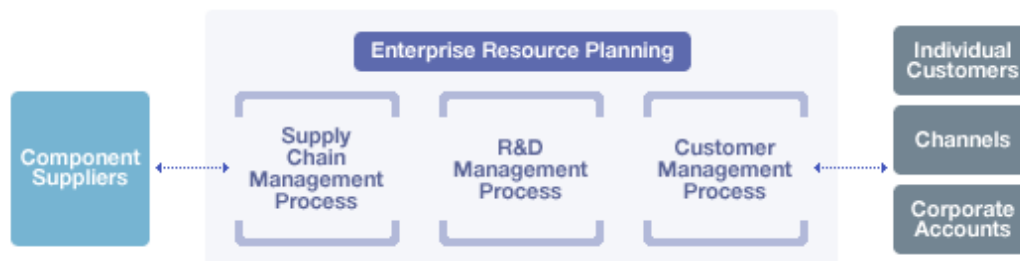
Source: Samsung Electronics (2002–2007) "Annual Report".

APPENDIX 2: SAMSUNG ELECTRONICS' ORGANISATION CHART



Source: Samsung Electronics (2007) "Environmental and Social Report".

APPENDIX 3: 'E-PROCESSES' FRAMEWORK AT SAMSUNG ELECTRONICS



Source: Samsung Electronics website (2008) www.samsung.com (accessed 08 March 2009).