MICROECONOMICS OF COMPETITIVENESS

Republic of Korea
Online Game Cluster

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EXCUTIVE SUMMARY

Korea has experienced phenomenal economic growth over the past five decades. In the aftermath of the Korean-War in 1950s, the country rebuilt its economy through government-driven economic policies with a heavy emphasis on self-sufficiency and protection of infant industries. The continued growth in GDP per capita seemed to prove the effectiveness of such top-down interventionist programs until the Asian financial crisis in 1997. With aggressive reforms, the country quickly reimbursed its IMF loans and began to show signs of growth again.

Nonetheless, the source of growth this time was different as the Korean economy began a shift away from labor- or capital-intensive manufacturing to knowledge-based and technology-driven higher valued-added activities. The emergence of Korea's online game cluster is the result of this transformation of Korea's economy.

Korea's strong IT infrastructure played a critical role in creating derived demand for online games. Korea has achieved the highest level broadband internet penetration compared any other country in the world, resulting in the availability of cheap and fast internet connections in most households. Supportive cultural factors which stress the importance of education indirectly created demand for online games because Korean parents view computers and the internet as educational tools. Furthermore, unique initial demand conditions were strengthened by the network effect of the online games. As a result, demand soon took off dramatically increasing both the market share and market size of the online and game industry overall.

Without Korea's traditional strength in manufacturing e.g. electronic parts and semi-conductors, Korea would have not been able to take a full advantage of the online game's network effect. 'PC bangs' (internet cafés) are retail firms which play a key role in the delivery of online games to customers. The availability of skilled labor from the IT sector facilitated the creation and management such retail firms. The affordable availability of PCs and broadband internet also contributed significantly to market expansion.

A large number of small and medium size companies specializing in game development keep the rivalry fierce in the game market. The well-capitalized firms which exist alongside the SMEs either focus on game publishing alone or both game development and publishing. Regardless of the cap-size, a clear strategy trend amongst firms in the online game cluster is to move away from the elusive search for a “killer application” blockbuster online game to developing online games with “multi-usability” which cross the industry boundaries into animated movies, comic character development, cartoons, cable TV broadcasting etc. Such cross-industry linkages exhibit a high potential for the online game cluster to be a central part of a greater ‘creative cluster’ which could move Korea to a development model driven by creativity and knowledge.

The Korean government has given strong support for building affordable IT infrastructure and pin-pointed online games as one of the contents to be operated on such infrastructure. Once the game cluster really took off, the government established a game/content export-promotion agency in addition to creating a regulatory environment that is more supportive of online game cluster.

The largest challenge facing the firms in Korea’s online game cluster is the expansion into US and European markets. The domestic Korean market is exhibiting clear signs of market saturation. While the Asian market has been relatively easier to penetrate, in scaling-up the cluster to a truly international level, firms need greater access to venture capital, capital markets which can facilitate the acquisition of U.S. and Europe-based firms, and well-trained labor that can customize the online games to the tastes of Americans and Europeans.

I. OVERALL ECONOMIC PERFORMANCE

1. Economic Growth

By the early 2000s, Korea together with other three East Asian tigers, Hong Kong, Singapore, and Taiwan has almost joined the ranks of developed economies in terms of GDP per capita. In 2004, Korea's GDP per capita in PPP reached US$20,371. The CAGR of GDP was 8.7 percent, 7.2 percent, and 8.5 percent during 1966-1975, 1976-1985, and 1986-1995 respectively.[1] As revealed in Table I.1, Korea outperformed its peers and developed countries in terms of the growth of output, labor, human capital, and physical capital.

Table I.1: Cumulative Average Growth Rates of GDP, Labor, Physical Capital, and Human Capital, 1960-1990

	Output		Labor	Physical Capital		Human Capital	
	GDP	GDP per worker	Number of workers	Capital stock	Capital per worker	Labor quality (*)	Years of schooling
Korea	8.49	5.93	2.56	11.90	9.34	2.18	2.83
East Asia	7.46	4.71	2.75	10.89	8.14	1.33	1.94
Developed countries	3.56	2.38	1.17	4.62	3.44	0.63	0.90

Note: (*) The labor quality index is constructed as the weighted average of educational attainment for workers, where the weights are based on the rate of return from each additional level of schooling.
Source: Hahn and Kim, 2000.

Korea's rapid industrialization in the past was largely driven by government-directed policies, which actively pursued industrial targeting. However, the interventionist policy has led to an unhealthy government-business relationship. The economy has centered on the chaebols, the large family-run conglomerates. Since the chaebols were thought to be too big to fail, and since the government dictated the lending patterns, the banks did not perform serious credit analysis. As result, these chaebols had rushed to expand sales at the expense of profits, and run up very high debt levels.

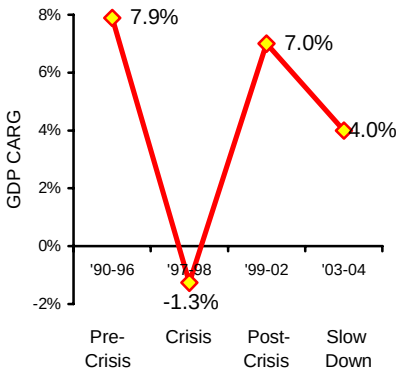
While Korea did not have large current account or budget deficits, foreign exchange reserves were allowed to fall to an astonishingly low level, and the actual level was misstated in the face of mounting short-term debt in the latter half of the 1990s. When several firms (notably

[1] Word Bank, Online World Development Indicators.

Hanbo, the 14th largest conglomerate) went bankrupt in early 1997 and troubles emerged in neighboring countries, the crisis broken in full strength as exchange rates were deeply devalued, interest rates were raised sharply, and the economy contracted by 6 percent in 1998.

In the post-crisis period, Korea was the only one of a few countries that used the crisis as an opportunity to initiate reforms. Political stability is quickly established with the democratic election of a new government. The IMF's financial assistance package was flexibly adjusted and turned into the government's own reform program. Weak banks were closed or merged with stronger banks. With a clean balance sheet and new supervision framework, the banks were able to better allocate capital and respond more effectively to competitive pressures. Protectionist barriers in trade and investment were removed. FDI flew in and helped speed up the corporate restructuring process.

Figure I.1: V-shaped recovery



Source: World Bank, Online WDI

The reforms coupled with favorable external and internal conditions have produced the V-shaped recovery in Figure I.1. However, major structural problems still remain. Rigidity remains in the labor market. The economy was still dominated by the large conglomerates, while small and medium enterprises (SMEs) are marginalized in terms of access to factors of production.[2] Thus, the Korean pattern of growth in the post-crisis era is still one of volatility and sluggishness. The GDP growth rate only averaged just 4 percent during 2003-04.

2. Labor Productivity

The performance of the Korean economy is closely reflected in the pattern labor productivity, the factor the drives economic development and prosperity. As evidenced in Table I.2, while Korea's labor productivity is comparable to other emerging economies, it lags behind its OECD

[2] See detailed discussion in the National Business Environment section.

counterparts. Korea's GDP per hour worked in 2004 is equal to 57 percent, 43 percent, and 40 percent of the levels in Japan, Germany and the US respectively.

Table I.2: Labor productivity

	GDP per hour worked	
	US$	USA=100
Korea	18.6	40
OECD	34.7	75
United States	46.3	100
Germany	42.1	91
Sweden	39.9	86
Japan	32.5	70
Poland	17.7	38
Mexico	13.5	29
Turkey	12.7	28

Source: OECD National Accounts Database.

However, the gap is narrowing as a result of strong productivity growth. During 1990-2000, overall annual labor productivity growth averaged 4.21 percent compared to 1.8 percent in the US. However, while productivity growth in manufacturing is very strong, that in many services sectors remains weak. During the 1990s, productivity grew by 9.6 percent in manufacturing, but only 2.9% in trade and transportation, and declined by 1.1 percent in finance.

3. Structural Change

Table I.3: Structural Changes in Korean Manufacturing

	Percent of total value-added				
	1975	1980	1985	1990	1995
OECD S&T classification					
Resource-intensive	39.6	33.1	28.8	24.9	22.9
Labor-intensive	26.3	24.6	22.5	18.8	16.0
Specialized supplier	9.1	11.5	16.0	21.3	26.9
Scale-intensive	21.3	26.9	28.7	30.9	30.3
Science-based	3.7	3.9	4.0	4.1	3.8
Embodied technology					
High-tech	10.7	12	15.7	19.1	22.7
Mid-tech	17.7	22.4	23.1	30.1	30.9
Low-tech	71.6	65.6	61.2	50.8	46.4

Source: Woo and Lim, 1998.

In the early stage of development, while many Latin American and South Asian countries pursued import-substituting industrialization, Korea reaped the benefits of international trade when it promoted the production of labor-intensive products such as textiles, apparels, shoes and leather products for exports. During the 1960s, labor-intensive manufactures accounted for more than 80 percent of the increase in Korean exports (Yoo, 1996). In early 1970s, Korea began investing heavily in basic metals, general machinery, chemicals, and shipbuilding. The export share of the heavy and chemical industry sector rose from 7.4 percent in 1970 to 19.3 percent in 1980 (Woo, 2001). The late 1970s and early 1980s saw the emergence of electronics and automobiles as the flagship clusters in the

Korean economy. The overall structural change has been the continual shift from labor and capital intensity to technology and knowledge intensity. The share in total value-added of the high-tech clusters increased from 10.7 percent in 1975 to 22.7 percent in 1995, while the combined share of resourced-based and labor-intensive clusters declined from 66 percent to 39 percent during the same period (Table I.3).

By early 2000s, information technology, automobiles, communications equipment, and ship building have become the leading clusters of the economy. Their combined export value totaled US$93 billion. More importantly, they have large and increasing shares in the global exports. In contrast, facing strong competition from China and Southeast Asian economies, textile, clothing and food clusters are losing export market shares, while chemicals and general machinery are stagnant.

While Korea is the world's manufacturing powerhouse, its services clusters are lagging. Apart from transportation and logistics cluster which remains strong with US$17 billion in export value, business services, and tourism are all small and losing shares in the global market. (See Appendix 1.)

4. Innovation

Table I.4: R&D Spending, 1997

	Percent of GDP
East Asia	
Korea	2.89
Japan	2.92
Taiwan	1.92
Singapore	1.52
China	0.65
North America	
United States	2.60
Canada	1.60
Europe	
Sweden	3.85
Germany	2.31
United Kingdom	1.87

Source: World Bank, 2002.

With regard to innovation, Korea has been ranked among the top spenders on R&D. R&D spending has increased steadily from 0.9 percent of GDP in 1982 to 2.5 percent in 1991. And in 1997, its R&D spending of 3 percent of GDP was only behind those of Sweden and Japan (Table I.4).

The capacity for innovation has improved dramatically as a result of the private investment in R&D and government promotion. Patents registration increased from less than 10,000 in 1990 to more than 50,000 in 2002 (Rhee, 2000). In

1990, Korea was not in the top-ten list of patents registered in the US. Ten years later, it was ranked eighth.

General research and scientific training was supported by the government budget with funding being channeled to special research centers for energy and resources, machinery, electronics, telecommunications, and chemicals. Public and public-private joint R&D projects in the high-technology were also supported by the National Project for Research and Development which was initiated in early 1980s. However, R&D spending is still dominated by a few large conglomerates. In 1997, firms with more than 1,000 employees accounted for more than 80 percent of all R&D spending in all clusters of the economy.

Table I.5: Share of R&D spending by firm with more than 1,000 workers

	Percent
All sectors	81.4
Manufacturing	82.6
Construction	80.0
Transportation & telecomm. services	83.8

Source: Woo, 2001.

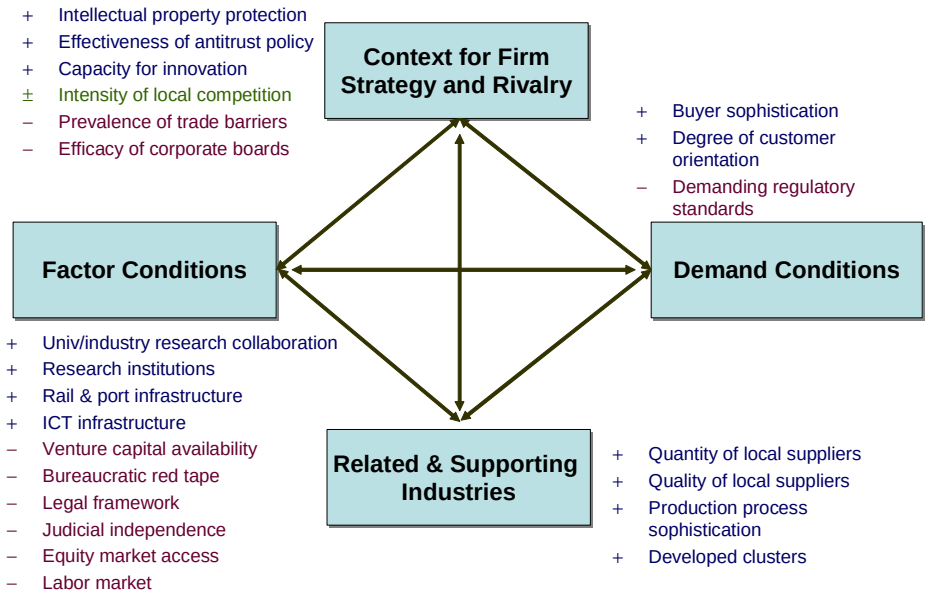
In summary, whether Korea can sustain its growth momentum with continuous industrial upgrading and shifting toward the knowledge-based economy depends crucially on the economy's capacity to innovate. Innovation has become more important than ever before as the traditional source of growth - successful mobilization of capital and labor - is withering away, while copying foreign technologies is becoming increasingly difficult.

II. NATIONAL BUSINESS ENVIRONMENT

The national business environment of Korea has been improving in the last few years. According to the World Competitiveness Report of 2005, Korea's business environment ranking has increased from the 28th in 1998 to the 24th in 2005. This reflects the genuine effort of the government and business community to make Korea a more attractive place to invest and conduct business. Compared to other newly industrializing and emerging economies, Korea's national diamond is very strong. However, it still lags behind major advanced countries. In general, factor conditions in 'hard' infrastructure, demand conditions, and supporting industries

are relatively strong, while factor conditions in 'soft' infrastructure and context for rivalry are relatively week. (See Appendix 2.)

Figure II.1: National Diamond



1. Factor Conditions

Korean higher education consistently turns out a large number of high-caliber engineers and scientist (Table II.1). The Korea Advanced Institute of Science and Technology is one the world's top-tier research institutions. Many of the leading schools in the US, UK, Australia, and France now have joint programs or other arrangements with Korean institutions for higher education.

Table II.1: Scientists and engineers in R&D, per million population, 1985–95

Korea	2,636
US	3,732
Japan	6,309
Singapore	2,728
China	350
Thailand	119
Malaysia	87

Source: World Bank, 2002.

The developed nature of Korea's hard infrastructure such as the roads and ports are well documented and contributed effectively to the economy's manufacturing success (Ro, 2002). Recently, the ICT infrastructure is another world-class feature of Korean factor conditions. In 1995, the Korea Information Infrastructure Project started to build high-capacity and high-speed optical transmission networks in 144 regions and provided bandwidth of 622 Mbps for major cities. According to eMarketer, almost three-quarters of Korean households had subscribed to

broadband services by 2005, compared with 30 percent in the US and 20 percent in Western Europe.

While banking reforms have been producing positive results in terms of sharp reduction in non-performing loans and increase in capitalization, reforms in stock markets and non-bank financial institutions have made little progress. No strong credit-rating agency exists to reduce the transaction costs for firms in issuing securities. Inadequate financial supervision has led to the consumer-loan crisis in 2003. Venture capital is still in its infancy, which significantly inhibits the development of start-up firms.

Korean labor market is suffering from the problem of 'duality'. On the one hand, permanent workers are subject to rigid regulations in which firms are asked to "exhaust all means" before firing off workers. On the other hand, nonregular workers suffer from weak social protection and labor standards (IMF, 2004). Furthermore, confrontational industrial relations and labor union militancy also adversely affect national competitiveness.

2. Demand Conditions

Customers in Korea are becoming increasingly sophisticated as they compel fast upgrading of consumer products. The customer orientation and service have become indispensable for any successful business. The Global Competitiveness Report (2005) in fact ranks the buyer sophistication and the degree of customer orientation at 16. The sophisticated taste and demand are the driving forces behind a variety of consumer products such electronics, automobile, entertainment products, etc.

3. Context for Firm Strategy and Rivalry

Great strides have been made on the intellectual property rights protection. Amendments to the patent, trademark and utility model laws were passed that increased both fines and terms of imprisonment for IPR violators. Online service providers (OSPs) are given greater legal incentives to respond promptly and positively to requests from right holders to take down or cut off access to sites involved in pirated activities. (Chung, 2005). The anti-trust policy has also

been made more effective. The Korea Fair Trade Commission (KFTC) has been focusing its enforcement efforts on the regulations on economic concentration (Rhee, 2000). More and more cases involving price collusion and predatory practices have been brought up.

Korea maintained a relative low barrier for all industrial goods, around 7.5%, and has recently reduced the WTO's bound tariff to zero.[3] However, Korea has used multiple taxes compounded on the tariff to make the effective tariff rate much higher. For instance, Korea's high taxes and auto-related taxes are combined to severely restrict foreign companies' access to Korea's automotive market. Quantitative restrictions, tariff rate quotas and import clearance procedures are also used but mostly applied on agriculture and bio products.

Competition and firm rivalry are also negatively affected by the domination of the chaebols. Beside the break up of Daewoo, there are still many big firms that are not run along real business lines. That is, they still have a "family" structure and their subsidiary relationships are neither clear nor rational. While FDI has entered in significant volume, they are mainly in the form of mergers and acquisition following the resolution of troubled firms after the financial crisis. The role of MNCs in fostering domestic competition is limited. Meanwhile, SMEs continue to face constraints in accessing credit and other critical inputs.

In terms of corporate governance, most listed firms now appoint outside directors who are involved in decision-making process. Minority shareholders can recommend their own candidates for outside directors. However, many outside directors are not independent of the management. Boards of directors have limited power in making decisions on such key issues as selection or removal of the CEO. The transparency practices also fall behind the intent of the law.

4. Supporting Industries

Korea has developed strong and competitive supporting industries. The quality and quantity of local suppliers are relatively high. More and more hi-technology built in the production process also makes it increasingly sophisticated to meet the local and international demand. Many

[3] See http://www.ustr.gov/assets/Document_Library/Reports_Publications/2004/2004_National_Trade_Estimate/2004_NTE_Report/asset_upload_file776_4779.pdf

clusters have been developed and becoming mature, such as the chemical, telecommunication, electronics, marine equipment and textile etc.

5. Government Policy

The government in the past few decades has been changing its approach from top-down planning to facilitating and enabling a competitive business environment. (See Figure II.2.) During the 1960's, the government's aimed at strengthening the factor conditions of the national diamond by investing heavily in basic education and hard infrastructure. At the same time, macroeconomic stability was emphasized. In the 1970s, the focus was on developing basic and supporting industries for industrialization. The top policy priority during the 1980s and early 1990s was economic liberalization to improve the context for firm's strategy and competition which had been neglected in earlier decades. However, liberalization in the context of weak institutions increased the economy's vulnerability to external shocks. In the post-crisis era, the government has been increasingly playing a role of a facilitator and enabler instead of an interventionist in economic development. The challenge, however, is to coordinate various efforts to strengthen the whole national diamond.

Figure II.2: The Changing Role of Government

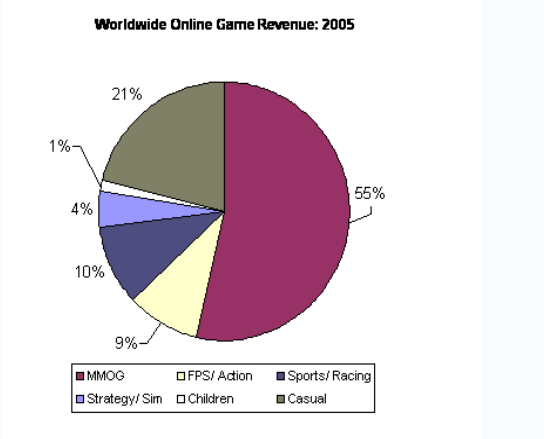
	'62-'71	'72-'81	'82-97	'99-'06
Govt. operations & strategic planning	Top down economic planning Decision making by technocrats		Decentralization	Provider of quality public services Facilitator of business development
Macroeconomic policy	Fiscal conservatism Direct monetary control		Shift toward indirect monetary instruments	Counter-cyclical fiscal policy Social safety net
Finance	Positive real interest rate Subsidized credit for exporters	Directed lending Dominance of state-owned banks	Financial liberalization Expansion of foreign borrowings	Corporate and financial restructuring
Industrial policy	Promotion of labor-intensive light manufacturing	Heavy and chemical industries Shipbuilding	Electronics and high-tech industries	Shift away from interventionist policies
Trade & Investment	Dual exchange rates Removal of restrictions on import of machinery for export prod.	Competitive real exchange rate Allocation of foreign exchange for exporters	Flexible exchange rate Reductions in tariffs & other trade barriers	Open to FDI Trade liberalization
Human Resource Development	Universal primary education	Support for higher education and R&D: Establishment of centers of excellence for education and research		

III. ONLINE GAME CLUSTER

1. Online Game Cluster Definition

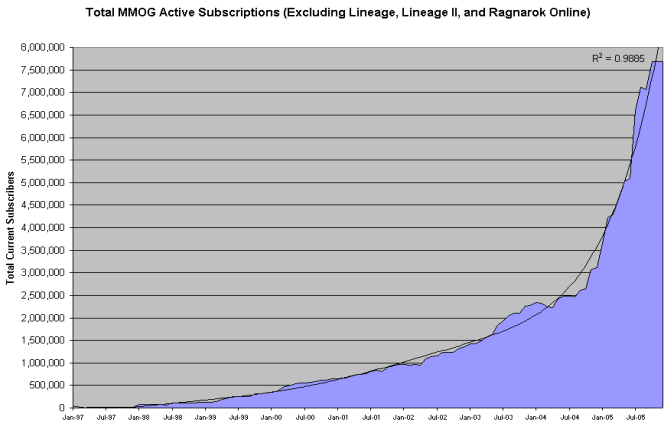
Online games refer to computer games that are played over the internet. These are distinct from traditional video (console) games because they are platform independent, relying solely on client-server technologies. Online games have become immensely popular worldwide in recent years, reflecting the rapid expansion of the internet. The dominant online game genre is the 'massively multiplayer online role-playing games' (MMORPG) in which thousands of players interact with one another in a virtual world over the internet (see Figure III.1 and 2).[4] The total number of active MMORPG subscriptions ramped up from a few thousand in 1998 to 7.5 million in 2005 (see Figure III.2).[5] Other online game genres include Action/First-Person Shooter, Sports/Racing, Casual, Strategy/Simulation and Children.

Figure III.1: Worldwide Revenues by Genre



Source: Kim (2005)

Figure III.2: Worldwide MMORPG Active Subscriptions*



*Excludes NCsoft (Korea) Corporation's "Lineage", the world's most popular online game, with 4 million subscribers.

MMORPGs are distinguished from single-player console games or traditional video games by the online game's persistent world which continues to exist and evolve while the player is away from the game. Players log into a dynamic online community of thousands of players, usually hosted by the game's publisher, where each player's actions permanently shape the community.

[4] DFC Intelligence. "Who Will Benefit from the Growth of Online Game Subscription Revenue?" http://www.dfcint.com/game_article/mar06article.html, Apr-29-2006.
[5] Woodcock and Sterling (2006).

This characteristic further distinguishes online games from console games which provide a single-player experience and tend to involve players pitting their wits against their software by racing cars or surviving dangerous adventures. Online games are typically created by game developers and marketed/operated by game publishers, however there is an emerging trend where some large firms take on both roles.

2. History of Worldwide Online Games

Online games are a relatively new phenomenon and really did not exist before 1997. They became technologically feasible as the internet was transformed in the late 1990s transformed the internet from a limited-access system to a commercial network. Furthermore, the increasing availability of high-speed internet access (broadband) created derived demand for new products, such as online games and video-on-demand, which utilize the new capacity.

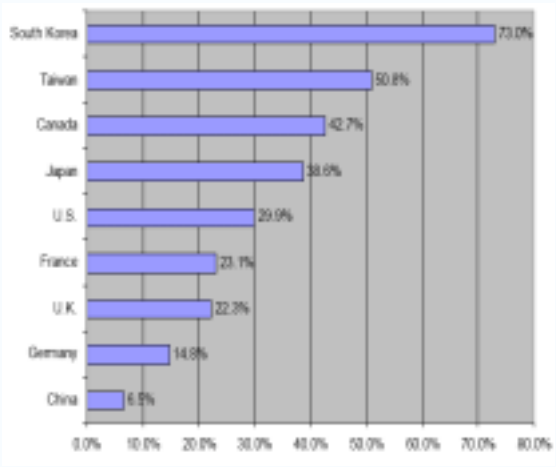
Followings are some important milestones in the history of online games.

- 1995: Jake Song, Korean programmer, co-founds Nexon Inc., a pioneer online game company.
- 1996: Nexon Inc. (Korea) launches the first online game, "*Nexus: Kingdom of the Winds*" which attracted over one million subscribers.
- 1997: US pioneer home computer game company, Electronic Arts, launches "*Ultima Online*" widely credited for popularizing online games.
- 1997: Tak Jin Kim launches NCsoft Corp., a Korea-based online game company; Jake Song joins NCsoft Corp.
- 1998: NCsoft Corp. (Korea) launches "*Lineage*" which goes on to become the world's most popular online game, with over 4 million subscribers.
- 1999: Sony Online Entertainment (Japan) launches "*Everquest*" which remained the most commercially successful game in the US for five years.
- 2001: NCsoft Austin (US sub. of NCsoft Corp. Korea) establishes a partnership with Destination Games (US) to penetrate the North American market.
- 2004: Blizzard Entertainment (US) launches the immensely successful *World of Warcraft* online game, arguably the first game to generate mass appeal in both the East and the West and to challenge for the world's most popular online game title.

3. Birth of Korea's Online Game cluster

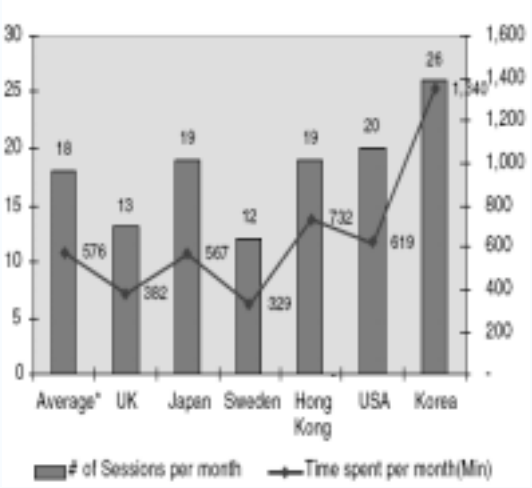
The interplay of Korea's world-leading broadband internet penetration and the availability of sophisticated/technologically-savvy local demand triggered the birth of Korea's online game cluster. Korea has achieved the highest level of broadband internet penetration in the world (see Figure III.3). Koreans also spend the most time online compared to users in any other country.

Figure III.3: Broadband Penetration by Country



Source: eMarkerter, May 2005.

Figure III. 4: Internet Usage (Sessions/Time) by Country



Source: European Journal of Info. Systems (2004).

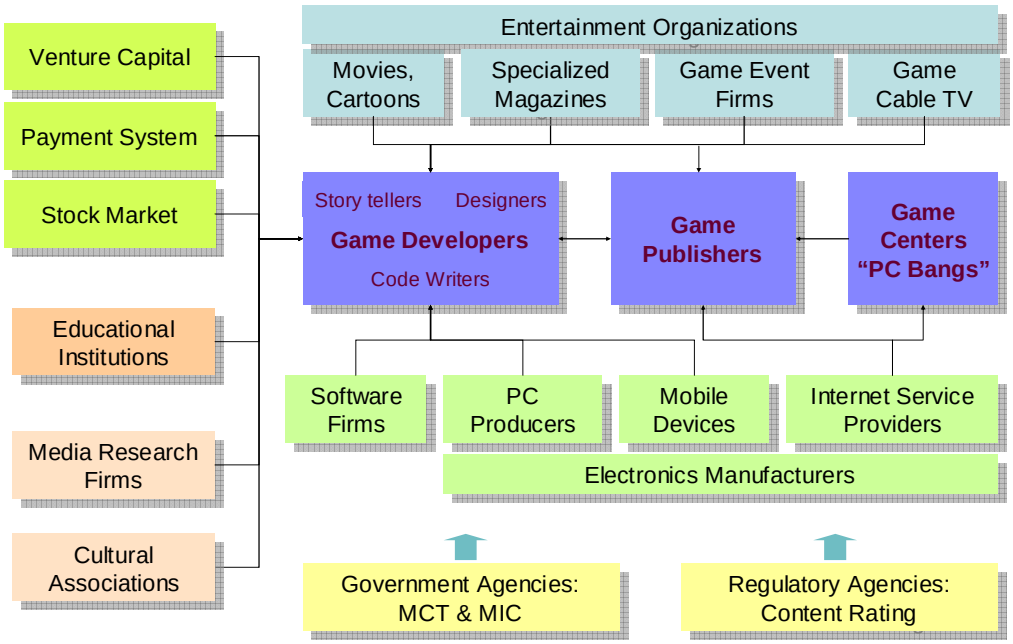
As early as 1995, the government of Korea launched the Korea Information Infrastructure (KII) action plan which placed the development of a high-speed telecommunication infrastructure at the centre of Korea's strategy to develop a knowledge-based economy. The central goal of this plan was to construct an advanced nationwide information infrastructure consisting of communication networks, internet services, application software, computers and information products and services. Following the Asian financial crisis, the government re-doubled efforts to transition to a knowledge-based economy. The KII plan became an absolute top priority.

4. Korea's Online Game Cluster Map

The cluster map reveals that the online game cluster lies at the intersection on the information and communications technology (ICT) cluster and the creative/entertainment cluster. The full development of the online game cluster will therefore depend on the use of insights, skills and resources of firms in both clusters.

Game publishers operate multiple servers which host the persistent worlds inhabited by players. Players gain access to the online game by paying a monthly subscription fee. The online game cluster also comprises of *upstream* firms involved in software development, high-end computer production (required for heavy graphics in online games), broadband internet service providers and *downstream* firms involved in internet service delivery (cafés), online game tournaments, game cable television and animated movies/cartoons.

Figure III.5: Online Game Cluster Map



There is intense competition in the cluster with a total of 2,059 firms engaged in the different activities along the value chain. The top 20 firms account for 36% of the cluster revenues. In earlier years, the largest firms in the cluster were exclusively game publishers. However, internet portal companies and subsidiaries of Korean conglomerates have joined in the fray, lured by net income margins exceeding 30%. The top five firms in the cluster as of 2005 were NCsoft Corporation, Nexon Inc., NHN, CJ, and Neowiz. We will now briefly examine the positioning and strategy of Korea's leading online game company, NCsoft Corporation, to further understand the cluster dynamics.

5. NCsoft Corporation

NCsoft is the world's largest online game company (by gross revenue from online games). Established in 1997 as a systems integration company, NCsoft leapt forward to become the world's leading online game software company on the back of its blockbuster hit game "*Lineage*" which commands a 47% market share in Korea and attracts the greatest number of concurrent users in the world. Currently there are more than four million active subscribers worldwide playing "*Lineage"* (NCsoft, 2006).

NCsoft successfully launched similar games in Taiwan and China by adapting its technology and business model, and taking advantage of cultural similarities. For instance, NCsoft offered pre-paid accounts in China as opposed to monthly billing through mobile phones which China's less developed payment system could not support (Economist, 2003).

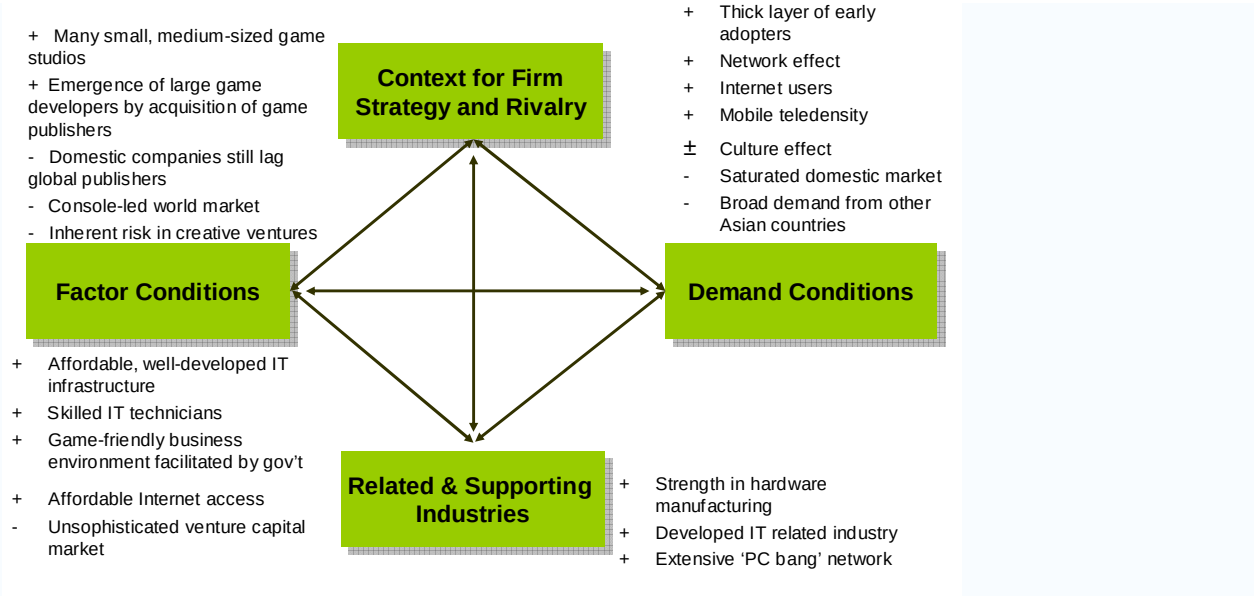
By contrast, NCsoft's first foray into the American market was a failure. The company established a US subsidiary called NCsoft Austin as a partnership with Destination Games (US) in 2001 but did not recognize just how different the tastes of American gamers were. NCsoft is currently facing a saturated domestic market and declining revenue growth rates and is redoubling its efforts to penetrate the US market. Its strategy is to acquire American companies to help it devise games that marry American tastes with NCsoft's networking capabilities.

6. Cluster Analysis: The Diamond Model

The diamond model reveals generally strong conditions across the four dimensions of the diamond. As indicated earlier, Korea's excellent information technology infrastructure has been a critical factor condition in the development of the cluster. A combination of factors which we shall examine also gave rise to unique demand conditions which have spurred the cluster development. Korea's traditional strengths in hardware manufacturing and the existence of a ubiquitous "PC bang" (internet café) network provided strong supporting industries upstream and downstream respectively. Low barriers to entry have also engendered intense competition amongst firms in the cluster.

The diamond also reveals the weakness of the cluster. On the demand side, the domestic market is fast-approaching saturation point and firms in the cluster face the challenge of internationalization to expand demand and maintain growth. Limiting factor conditions include the absence of a sophisticated venture capital market to facilitate the creation of new firms. The structure of the world market for interactive entertainment which is dominated by single-player console game manufacturers such as Sony (Japan), Nintendo (Japan), Electronic Arts (US) and Microsoft (US) is also of critical significance to the future of Korea's online game cluster.

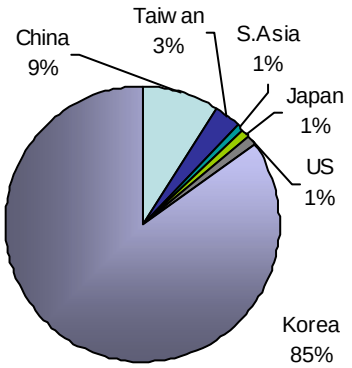
Figure III.6: Online Game Cluster Diamond



Demand Conditions

Korea has the highest number of online game subscribers compared to other countries. Korean firms account for 25% of the $1.8 billion world market for online games ($450 million). 85% of these revenues come from the domestic Korean market, 14% from the Asian market and only 1% from the United States (see Figure III. 7).

Figure III.7: International Penetration by Cluster Firms



Source: Korea game white paper (2004).

Thick layer of early adopters: It is often remarked that Koreans are technology-savvy, open to new technology and tend to be rapid adopters of new and innovative products (Choudrie and Lee, 2004). The widespread adoption of mobile phones in Korea provides some evidence of this. Korea ranks in the top 5 countries by mobile tele-density alongside Finland, Norway, Iceland and Sweden. Similarly, Koreans rapidly adopted broadband internet technology which created derived demand for broadband content such as online games.

Demand-side Internet Promotion: "If we build it, will they come?" Uncertainty about the answer to this question has stunted investment in broadband deployment/services in many countries including the US. It is therefore significant that the Korean government pursued a variety of policy measures to create internet demand alongside policies to develop network infrastructure. Examples include the 'Ten Million Internet Education' program and provision of broadband connection to all elementary, middle and high schools across the country. This focus on the demand side contributed to a nationwide internet boom and the proliferation of high-speed internet cafés (PC Bangs) which first exposed Koreans to the on-line gaming experience.

Cultural Factors: Korean culture places strong emphasis on education, but ironically, this has served to stimulate the demand for online games amongst Korean youth. According to the Korea Education & Research Information Service (KERIS), relatively simple initiatives such as encouraging school teachers to post their homework assignments online and requiring students to submit their assignments by e-mail, provided a strong incentive for parents to invest in computers and internet access for their children, who apparently split their time between homework and online games. A culture of strong respect for elders means that adults dictate the selection of TV programs/channels viewed in a typical home. Furthermore, parents see TV/console games as a distraction to their children's studies and discourage these alternative forms of entertainment very strongly.

Network Effect and Player Loyalty: The network effect of online games and a strong community orientation also account for the rapid development of strong online gaming communities in Korea. A recent survey revealed that 80% of online gamers play with people

they know in real life (Project Massive, 2004). The larger the gaming community grows, the more exciting the gaming experience becomes. This provides a powerful incentive for players to draw new players to an online game.

Online game players invest time and money developing their online characters and communities, practicing combat strategies, improving the skill and experience level of their characters. The more you play, the better you get, the more fun you have. These effects combine to encourage player loyalty as players seek to enjoy their investment.

Factor Conditions

In Korea, the development of broadband content appears to be a natural progression from the creation of the broadband network services. The existence of the broadband network made it technologically feasible for content providers to develop online games for the mass market. In turn, as online games became popular, this drove further investment in broadband network capacity, establishing a mutually reinforcing cycle which powered cluster development.

In terms of skilled IT and creative manpower, the online game cluster enjoys a competitive advantage in the supply of skilled manpower due to its IT strength. This legacy may be traced to the 1960s with the establishment of the Korean Institute of Science and Technology (KIST) in 1966 and the Ministry of Science and Technology (MOST) in 1967. These two institutions, together with the Korean Advanced Institute of Science and Technology (KAIST), have exerted powerful influences over the science and technology community in Korea. MOST has been the main designer of Korea's science and technology policy; KIST has played the role of technology functionary in responding to industrial demands for rapid economic growth; and KAIST first implemented the concept of a research-oriented university into the Korean higher education system (Suh, 2000).

On the creative side, due to escalating labor costs, US entertainment software firms have been outsourcing artistic jobs to Asian countries. For example, "*The Simpsons*", an animated

cartoon series by Fox Entertainment Group (20th Century Fox, US) is animated in Korea.[6] Beyond cheap labor, this trend also appears to be driven by the availability of a pool of skilled creative labor in Korea.

Context for Firm Strategy and Rivalry

There is intense competition in the Korean online game market amongst firms which include pure game publishing companies, internet portal companies (forward integration strategy), and conglomerate subsidiaries (diversification strategy). Competition is also fueled by the fact that early successes cannot guarantee successive hits. First movers such as NCsoft have naturally evolved from game development to game publishing, securing a more important role in the value chain by focusing on marketing and game selection. This minimizes their exposure to the market risk and complements their product line to bridge between the gap big hits. Internet portal companies such as NHN and CJ entered the market around 2003 and caught up quickly.

Table III.1: Major online game companies in Korea by ranking (2004)

Name	Main business	Game focus	Revenue ($M)	CAGR
NC soft	Publisher	MMORPG	120	(-)
Nexon	"	Casual	108	(+160%)
NHN	Internet portal	Casual	40	
CJ	"	Casual	40	
Neowiz	Publisher	MMORPG	32	(+15%)

Source: Korea game white paper (2004).

Table III.2: Salient Characteristics of Firms in the Cluster

Management	• 10% of CEO w/working experience at Samsung (KOSDAQ listed Co) • Most internet CEO have tech education background (KAIST)
Ownership	• Mostly funded by Owners (27%), bank (26%), VC (17%), IPO (4%) • Some chaebols funded by its won VC arm as horizontal expansion (cyworld-SK, Samsung ventures) • ~20 % foreign ownership
Export market	• China (52%), Taiwan (16%), S Asia (6.5%), Jap (6%), US (5.7%)
Employees	• Average 20 (max :1000) • Programmer : 25% • Designer : 22% • PD : 10% • Admin : 19%
Major platform	• Online (60%), Mobile (24%), Console (8%), PC (7%)

Source: Korea game white paper (2004) and compilation by authors.

[6] Prudential Equity Group, LLC Research – Entertainment Software, June 15, 2005.

Switching cost for users: Except for MMORPG-type games which enjoy player loyalty due to the high cost to players of switching to another game after investing substantial resources to build their online social networks to a critical size, other games face the continuous uphill battle to build and maintain their customer base because switching games is just a click away.

Barriers to entry: The average online game development cost is around US$10m and increases every year because of technical sophistication and higher consumer demand. Adding marketing costs to this, the usual upfront cost is around US$15m and this prevents shallow-pocketed firms from venturing into this business. However, small studios with as few as five developers sometimes make a big hit by selling new concept games to big publishing firms which own channels to market. However, because winners can enjoy more than 30% net income, venture capital funds, Internet portals and big conglomerates are launching or funding new games, easing access credit for small startup firms.

Table III.3: Online game developing related costs

Game	Developer	Dev. Cost($M)	Marketing cost($M)	Dev. year	Dev. manpower	Year published
Lineage	NCsoft	8	10	2.8	100	2002
Tantra	HanbitSoft	8	2	3	60	2002
A3	Actozsoft	5	3	2	30	2002
Rfonline	CCR	8	4	5	100	2004
Acroad	NHN	10	4	3	40	2004
Silkroad	JoyMax	10	-	3	-	2004

Source: Hana investment and other financial reports.

Weak competition from console games: Imports of console game hardware and software from Japan (Nintendo, Sony) were prohibited by Korean government until early 1990s. As a result, console game sales were very weak and sold only through small number of specialty stores that supplied illegal imports. Even after lifting the restriction, console games made limited success. This is due in part to the high price of console game for most of teenage players and to cultural factors which work discourage children from playing console games in the living room because adults dictate TV channel selection and view console games as a distraction to studies.

Supporting and Related Industries

Internet Cafés: 'PC bang' is a unique phenomenon in Korea and is now spreading to China, Taiwan, and other South East Asian countries. With close to 40,000 PC bangs across the country, consumers have ubiquitous access to Internet services including online games. Group of teens and young business people frequent neighboring PC bangs, mostly equipped with top-of-the-line LCD panels and high-performance computers. However, with increasing broadband penetration, more people playing online games at home, and the role of PC bangs is changing. Still they are the best place for testing new games. Therefore, newly launched games are usually exempt from service fees from PC bang owners until they get enough popularity.

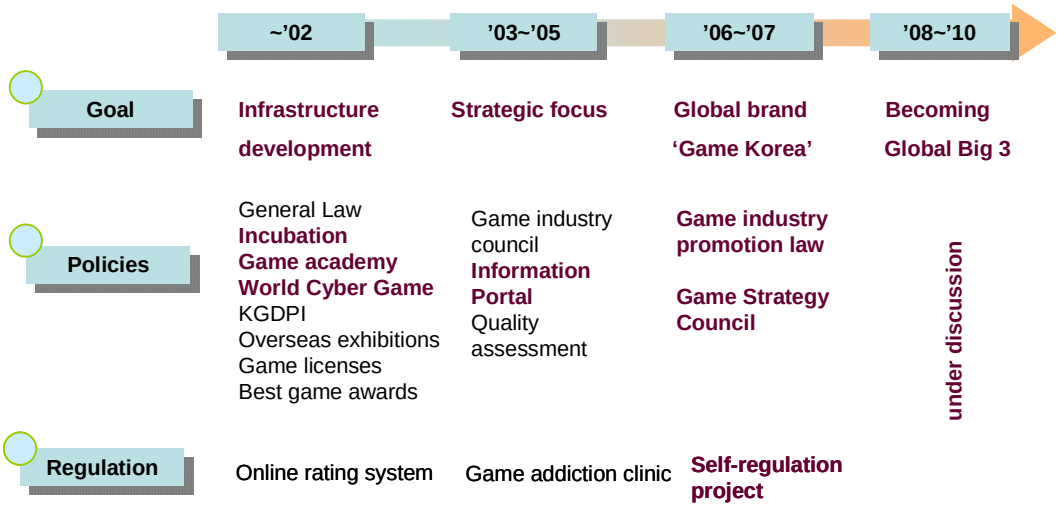
Micro payment: Transaction volumes using payment systems such as mobile and fixed line phones have reached US$1 billion in 2005. This micro payment system supported the online game cluster by providing credible and easy-to-use infrastructure to teens with limited access to credit cards. The unique value proposition of the system is that it allows people to make payments without the use of financial information such as credit card numbers. Also, it handles transactions as small as 30-cents which the regular payment systems cannot accommodate Game companies also use this infrastructure to sell virtual items used in the games to players who want superior performance.

Game channels and other related industries: Interactive media research firms bring in transparency to the market by tracking traffic for online games in real time. This fast feedback mechanism induces rapid iterative process (RIP) and presses game companies to update or fix game features. Spin-off businesses such as E-sports league and game cable channels are emerging in Korea. Recently, conglomerates like Samsung, SKT and KT launched their own game teams to get close to the young population. Some of game event commentators and star players even get TV advertisement endorsement opportunities. Consumer electronics companies like Samsung and LG also helped facilitate early adoption of devices among the population. Since both companies pursue the premium segment of mobile handsets, they devote considerable efforts to develop mobile devices that allow better game playing experience.

Government Policy

Two ministries are involved in promoting and regulating the online game cluster. The Ministry of Information & Communication (MIC) plays a supportive role in IT infrastructure and software. The Ministry of Culture & Tourism (MOC) has primary ownership over contents industry including arcade games and online games.). The year 2002 was the first time that MOC introduced 'GAME KOREA 2002 as an action plan to promote to cluster. In 2006, MOC introduced the game industry law to address the policy framework for the cluster and prioritize budget resources.

Figure III.8: Government Policy Evolution



Government Promotion Programs:

Information sharing and benchmarking: The industry information portal called 'GITISS' (Game Industry Total Information Service System) publishes weekly ranking of popular games, update policy changes and overseas market information, and provide translation service of Japanese game magazines.

Table III.4: Weekly ranking report by GITISS (3rd week of April 2006)

Rank	Game S/W	Weekly change	Rank	Game S/W	Weekly change
1	Guildwar	303.18%	4	Mixmaster	63.23%
2	Time&Tales	76.56%	5	Asgrad	56.12%
3	Netmarble	64.87%	6	Legend of Mir3	54.72%

Source: Compilation by authors.

Funding: MOC co-invested seed money to set up game venture fund (US$20m) in 2001 and financed low-interest loan to related companies for their game development. Also, game company recognized as a venture can enjoy privilege access to special-purpose finance facilities offered by Korean banks.

R&D: ETRI under MIC leads basic or core technologies in this area by developing advanced technologies such as 3D game engine and auto-pilot testing program for MMORPG. Companies can use or rent ETRI's testing machines at affordable rates. Game Institute under MOC also offers some services designed for game quality improvement.

Human resources: MOC opened 'Game academy' and trains 250 people a year through its 2 year program. It also introduced three licenses covering game architecture, programming, and graphic designing. Male game experts can escape military services by working in game companies.

MOC is promoting the online game cluster status not only in Korea but also in the world. World Cyber Game, the only world-class online game event, now boasts 20,000 participants from 50 countries. The agency also presents 'Korean Presidential Award' to the best Korean games every year. Other notable programs include support for overseas marketing via game translation and exhibition cost reimbursement.

Regulation

Content rating: Just like any other country, censorship or rating on Internet contents has been a thorny issue for cluster development. Interestingly, as a turn-around from traditional approach against indecent information and delinquency of young teens, MOC is discussing a new rating system and putting more industry friendly people in the rating committee. One of the reason why the cluster is against rigorous rating system is that the same standard can applied to potential overseas market such as China to stop Korean game adoption.

*Piracy protection***:** MIC has been leading a very aggressive crack down on software piracies, reducing the piracy rate to 30%, which is better than many comparable economies. Also, the

government is putting efforts to stop infringement upon private information in which players create multiple accounts in popular games. The motives of these misdemeanors are to earn money from game item transactions by raising new characters using multiple accounts.

Institution for Collaboration

Notable IFCs are Korean Game Development and Promotion Institute (KGPDI), Game Marketing Forum (GMF), and Korea Game Developers Association (KGDA). KGPDI has organized Korean Game Development Conference (Korean version of World GDC) since 2001, consulted on legal issues, and operated the Game Industry Total Information Sharing System (GITISS). GMF's roles are to offer monthly meetings among game marketers to discuss best practice and conduct overseas market research. KGDA's focus is on career development for game developers and sharing job placement information.

Other IFCs are mobile game industry association, computer game industry association, pro-game association (professional players' club), and game industry association.

IV. STRATEGIC ISSUES AND RECOMMENDATIONS

1. Strategic Issue Facing the Country

The country diamond analysis reveals that Korea has strong factor conditions such as ICT infrastructure road and port systems; unique demand conditions and sophisticated consumers; and a competitive manufacturing sector with rich networks of supporting industries. However, the business environment is negatively affected by weaknesses in accounting system, corporate governance, and the legal framework. Weak competition and protected markets also inhibit the development of the banking system, stock market, and business services.

The strategic issue therefore is to strengthen the 'soft' infrastructure and improve productivity in services to complement the high quality 'hard' infrastructure and competitive manufacturing clusters.

Strengthening accounting transparency, investor rights, accountability of managers and major shareholders are critical to improve corporate governance. Bankruptcy law and competition policy should continue to be the focus in the process of strengthening the legal framework.

Productivity in services will receive a boost if more competition is introduced by further reducing barriers to FDI, and if transaction costs are lowered by minimizing regulatory and licensing requirements.

Creating a level playing field is crucial so that SMEs are not marginalized by the large 'chaebols'. This is critical for the high-tech clusters, including online games. In this area, access to serviced land, research grants and credit should be made available to SMEs.

The labor market flexibility needs to be improved by easing the stringency of employment protection for permanent workers such as reduction of notification periods and relaxation of layoff conditions during bankruptcy. The issue of temporary contracts needs to be deregulated. At the same time, the government has to increase social protection for vulnerable workers by expanding the coverage of social security and accidental insurance to nonregular workers.

2. Strategic Issue Facing the Cluster: Domestic Market Saturation and Global Expansion

The Korean online game cluster firms grew rapidly with the help of easily available and affordable IT infrastructure and soon saturated the entire domestic game market. The success continues in a number of Asian countries with cultural similarities, especially where console and console-based games have been unpopular and in some cases unaffordable such as Taiwan and China. However, the major challenge lies in the insignificant progress made in penetrating the U.S. and European markets. These markets have been traditionally dominated by global console manufacturers such as Microsoft, Sony and Nintendo and the online game cluster has a weak market base in these markets. Also, lower broadband penetration rate and the lack of affordable

high-tech IT infrastructure put an additional challenge to Korean firms. The most critical hurdle may be adapting culturally-specific Korean games to international customer tastes.

As other advanced countries narrow the gap in Internet usage, the key advantage of the Korean cluster will be diminished not only on the supply side but also the demand side. Unless Korea finds a way to sustain its head start, they will have little chance in competing with giant players like Sony and Microsoft on a level-playing field,. Electronic Arts (U.S.) already partnered with some Korean game developers to tap into their capacity and human resources. Soon, much of local skills will be transferred to better uses on Electronic Arts' already well-established platform all over the world. If this trend continues, the challenge for the Korean online game cluster is to capture the benefits from this burgeoning alliance.

Korean game firms are still small in the global market. Only a few of them actually enjoy brand loyalty outside Korea to help them in marketing and negotiating with big retailers. Soon they will have to face a choice of either remaining as regional players or becoming global challengers. China, the biggest foreign buyer from Korea, is also catching up extremely fast and Chinese consumers have started to appreciate local games embedded with Chinese culture, rather than those imported from Korea.

3. Recommendations

Korean firms have a several options to increase their market share in overseas market to complement the already saturated and small domestic market. First, they could acquire firms in foreign markets to gain local knowledge and understand international tastes. This is a more likely option for larger-cap companies and has been actively pursued in recent years. To accelerate the evolution into global players, these firms have to upgrade their management skills to world-class levels and be more aggressive in acquiring and retaining valuable talent.

Second, they could play a more important role (e.g., ODMs) in the coordination and cooperation with the large console manufacturers using some collective power. This option is especially important because increased penetration of broadband internet in some foreign

markets remains unlikely in the foreseeable future. Indeed, without such IT infrastructure and a thick layer of early adopters, an expectation that online games could easily be accepted in the U.S. and European market may be an illusion. The cooperation with console makers may be a rather realistic approach, particularly when these manufactures are less willing to spend large budgets on expanding online-based content. While the market is still favorable for them, Korean game firms should try to strengthen their core activities, and at the same time learn from big players in preparation for future active market participation in which online games and console games converge.

In terms of government policy toward the online game cluster, the challenge will lie in creating an environment where creativity and innovation are encouraged and protected. Protection of intellectual property rights and a shift from passive learning to creative learning in school as well as the provision of game-specific skilled labor through specialized education will be the basis for such promotion.

Also, better access to venture capital and deeper capital markets will be critical to help firms explore many options to compete at an international level. Lastly, the Korean government should continue to take an active role in provision of a consistent regulatory regime facilitating the development of the game cluster. The government also needs to build up communication channels with foreign counterparts to put away any unfavorable regulations and promotion schemes which distort competition in overseas markets.

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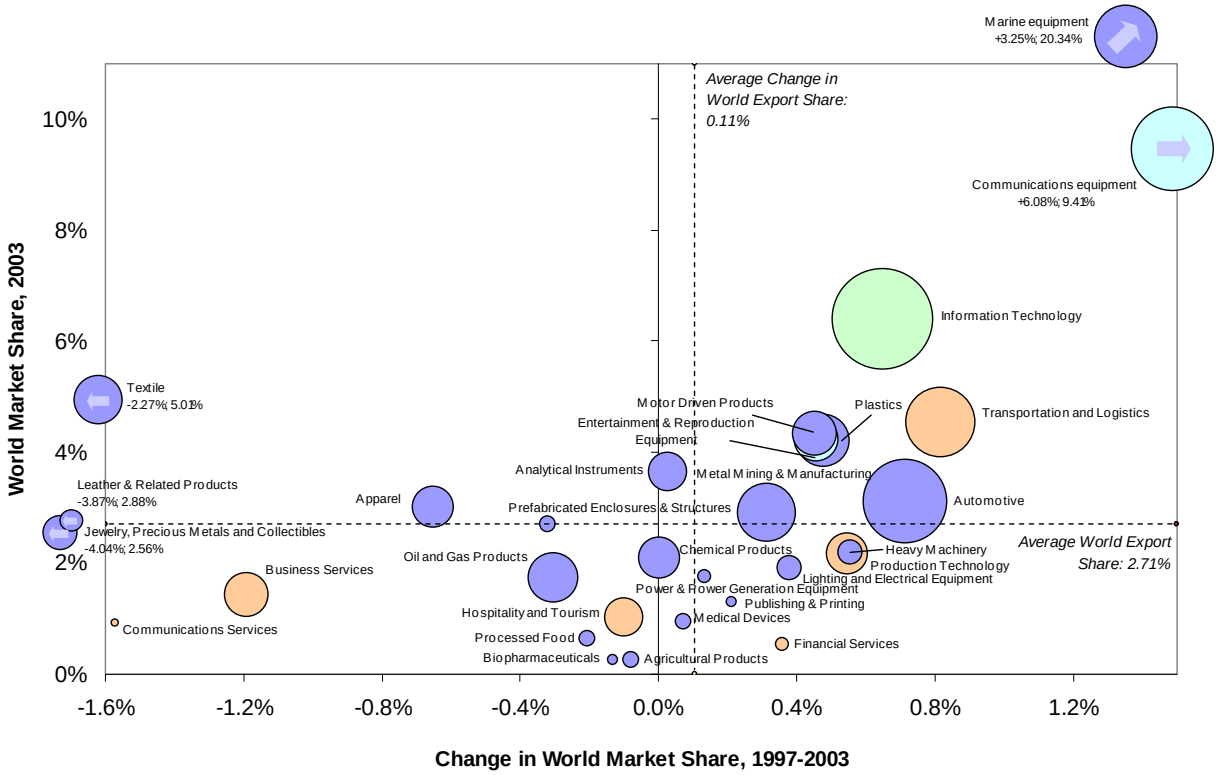
Appendix 1: Korea's Exports Performance by Cluster



Source: International Cluster Competitiveness Project, Institute for Strategy and Competitiveness, Harvard Business School.

Appendix 2: Comparative Ranking of Microvariables Affecting Korea's National Diamond

Competitive Advantages Relative to GDP pc		**Competitive Disadvantages Relative to GDP pc**	
	Factor Conditions		
University-industry research collaboration	10	Venture capital availability	30
Railroad infrastructure development	12	Financial market sophistication	35
Port infrastructure quality	19	Efficiency of legal framework	37
Quality of science research institutions	19	Quality of management schools	38
Overall infrastructure quality	22	Extent of bureaucratic red tape	41
		Judicial independence	44
		Local equity market access	48
	Demand Conditions		
Buyer sophistication	16	Presence of demanding	29
Degree of customer orientation	16	regulatory standards	
Value chain presence	17		
Capacity for innovation	14		
	Context for Firm Strategy and Rivalry		
Effectiveness of antitrust policy	27	Prevalence of trade barriers	41
Favoritism in decisions of gov't officials	25	Efficacy of corp. boards	51
Intellectual property protection	26		
Intensity of local competition	29		
	Related and Supporting Industries		
Local Supplier quality	24		
Local supplier quantity	22		
Production process sophistication	20		

Source: World Economic Forum, Global Competitiveness Database, 2005.