

2007 Korea IT Industry Outlook



KOREA INFORMATION SOCIETY DEVELOPMENT INSTITUTE

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Message from the President

The IT industry is continuing to serve as one of the important growth engines for Korean economy. Since 1999, Korea's IT industry has grown rapidly with semiconductors and communications equipment leading the way. As of 2005, the industry's contribution to the GDP stands at 47%. Such accomplishments were made possible by the advancement of supply-side technologies coupled with overall growth in demand for IT, including higher demand for PC and software in the 1980s and wider penetration of mobile communication service and Internet access in the 1990s. Moreover, advancement in information communication technology goes beyond stimulating the growth of not only the ICT industry but also facilitates the development of related industries like e-commerce and contents. It also helps promote economic growth in different ways like, for example, traditional brick and mortar industries using IT for their restructuring. As such, a country with strong competitive edge in IT industry has the right foundation to achieve high growth compared to other countries. To maintain that competitive edge, however, we need to be ready to proactively respond to uncertainties in the industry as we have experienced in the early 2000s during recession in the IT field such as venture bust, weakened stock prices and global economic downturn. We should also focus on improving areas identified as our weak points. In particular, we need to develop the right response to use IT megatrend - digital convergence - as an opportunity for growth and to eliminate the polarization that is hindering the continuous growth of the industry.

The report is divided into three parts and introduces the current status as well as issues facing the Korean IT industry. Part I looks at the current trend and outlook of Korea's IT industry in three sectors namely: telecommunications service, IT equipment and software. Part II talks about digital convergence - the mega trend in the IT industry to take stock of in the future vision of the industry. In Part III, we take a look at polarization, which is regarded as the key issue in the Korean IT industry towards identifying the reasons for failure and possible solutions.

"Korea IT Industry Outlook" is published every year by the Korea Information Society Development Institute. This year's report is the sixth. We try to describe the status of the Korean IT industry in more detail through improved structure. "Korea IT Industry Outlook" is used to introduce the Korean IT industry not only to Koreans but also to other countries to improve their understanding on the Korean IT industry while also serving as a reference for various decision-making processes. We look forward to your honest and frank feedback on how to further improve the report. Thank you.

Hoick Suk, Ph.D.
President
Korea Information Society Development Institute

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Introduction

The report is structured in three parts. Part I looks at the current trend and outlook of the Korean IT industry in 3 sectors, namely: telecommunications service, IT equipment and software. In the area of telecommunications service, we looked at facility-based, special license, value-added communications service and broadcasting service to forecast the number of subscribers and revenues. As for IT equipment, we categorized it into communications, information, broadcasting equipment and components to give an estimation on production and export per item. Lastly, we provide forecast on production of software and digital contents.

Part II deals with digital convergence, the latest mega-trend in the IT industry. To gauge the status of digital convergence in Korea, we analyzed areas where digital convergence has become the name of the game in and out of Korea such as home network, intelligent robot, IP TV and WiBro. More specifically, we described their concepts and service offerings along with projections on the future market size.

Part III describes polarization in the IT industry. From an economic perspective, polarization often refers to disparity in income distribution.¹⁾ But more recently, it has come to mean a deepened gap between leading-edge and backward sectors. In this report, we looked at polarization in IT industry by sector, company size and export-domestic sales in view of difference in their performance. We also analyzed whether income polarization is also affected by changes in employment. Lastly, we identified the structural source of polarization and explored ways to eliminate it by using the results of the analysis.

¹⁾ Duclo, Esteban, and Ray, 2004

 Part I

The Current Status and Outlook of Korea's IT Industry

1. The Overall IT Industry

1.1. Production

IT production in 2006 is expected to increase by 6.1% year on year to maintain its upward trend. By sector, in telecommunications service, voice revenue remained stagnant while broadband Internet posted growth. But thanks to growth in value-added communications and broadcasting services, it is expected to record a 5.4% growth this year. In the IT equipment sector, the production of information equipment is falling with more production bases moving overseas and slowdown in exports of mobile handsets resulting in a slight dip in communications equipment production. But the production of broadcasting equipment rose owing to higher demand for digital TV coming from special demand created during the World Cup period and healthy growth in sale of display panel and memory chip. As such, the sector is expected to post a 6.0% growth. In the software sector, the growth of the system integration market resulting from the recovery in IT investment is expected to deliver a sound 9.3% of growth for the year.

IT production for 2007 is expected to be similar to 2006 to grow at around 6.1% range to around 262 trillion won. In the telecommunications service, the introduction of new services and the growth of broadcasting service is anticipated. But overall decline in tariffs and market saturation from stunted subscriber growth is expected to keep growth at 3.5% range for the year. In the IT equipment sector, communications equipment is expected to post limited growth and production of digital TV, for which price cut is anticipated, is projected to rise slightly while production of monitor and other information equipment will continue its downward spiral. But growth of semiconductor market and rising demand for TV panel is keeping display export strong to bring growth rate to around 6.8%, slightly higher than in 2006. In software, economic recession is expected to decrease investment in IT to post a growth rate of about 7.1%, a little lower than in 2006.

Table 1.1 Forecast on Industry Production

(in million KRW)

	2003	2004	2005	2006	2007	'06-'07 Growth Rate
Telecommunications Service	41.6	46.0	46.9	49.4	51.2	3.5%
IT Equipment	139.1	164.6	165.9	175.8	187.7	6.8%
Communications	38.8	47.1	47.0	46.2	47.5	2.8%
Information	22.0	18.0	16.0	15.9	15.8	-0.2%
Broadcasting	13.4	16.4	14.1	14.9	15.2	2.2%
Components	64.9	83.1	88.8	98.9	109.2	10.4%
Software	18.4	18.7	19.8	21.7	23.2	7.1%
Total	199.2	229.2	232.6	246.9	262.0	6.1%

Source: 2003~2005 Korea Association of Information & Telecommunication (KAIT), KISDI estimates from 2006

1.2. Export

IT export in 2006 is forecast to stand at 113.4 billion dollars or 10.8% increase year on year. Export of information equipment has declined with more production bases moving overseas and a continuing drop in prices. At the same time, decline in handset price and weakened competitive edge slowed down the export of communications equipment. But sharp increase in demand for display panel fueled by strong sales of TV and a continuing growth in semiconductor sales is expected to keep the export of components in the double digit range.

In 2007, IT export is expected to grow by around 12% backed by the healthy growth of component export. Expanded overseas production and price decrease will slow down the export of information equipment but export of mobile handsets supporting new services is expected to remain healthy. Export will also be helped by strong performance of components such as display panel and semiconductors to increase to around 127 billion dollars.

Table 1.2 Export/Import Forecast

(in million USD)

		2003	2004	2005	2006	2007	'06-'07 Growth Rate
Communications Equipment	Exports	18,389	25,877	27,800	28,217	29,099	3.1%
	Imports	3,325	3,720	4,270	5,444	6,368	17.0%
	Balance	15,064	22,157	23,530	22,773	22,731	-0.2%
Information Equipment	Exports	18,365	20,625	16,737	14,648	13,549	-7.5%
	Imports	6,562	7,189	8,596	9,791	10,887	11.2%
	Balance	11,803	13,435	8,141	4,857	2,662	-45.2%
Broadcasting Equipment	Exports	8,778	11,434	10,780	11,059	11,271	1.9%
	Imports	2,663	3,172	3,044	2,919	3,009	3.1%
	Balance	6,115	8,262	7,736	8,139	8,262	1.5%
Components	Exports	25,016	35,745	47,015	59,468	73,096	22.9%
	Imports	29,888	35,673	38,040	40,649	43,040	5.9%
	Balance	-4,872	72	8,975	18,819	30,056	59.7%
Total	Exports	70,548	93,681	102,332	113,391	127,015	12.0%
	Imports	42,438	49,754	53,950	58,803	63,305	7.7%
	Balance	28,110	43,927	48,382	54,588	63,710	16.7%

Source: 2003~2005 KAIT, KISDI estimates from 2005

2. Status and Outlook by Sector

2.1. Telecommunications Service

The revenue for the telecommunications service for 2006 is estimated to grow 5.4% year on year to reach 49 trillion 425.2 billion won. In facility-based telecommunications service, despite the slowdown in growth of voice service and pressure to lower tariff owing to intensified competition, the wider penetration of Internet telephony service and the entry of new broadband service providers like Powercomm are expected to lead to a slight increase in revenue. In the value added service sector, revenue growth will be driven by the continuing growth of Internet contents business and proliferation of new Internet based services. In broadcasting, overall revenue will post increase thanks to the revenue growth of satellite broadcasting service and new services like DMB (Digital Multimedia Broadcasting).

The revenue from the telecommunications service in 2007 is projected to grow 3.5% over 2006 to stand at 51 trillion, 158.1 billion won. Growth will mostly be driven by the entry of new services like Internet telephony and new service providers in broadband coupled with the introduction of new convergence products like TPS (Triple Play Service) and increase in ARPU (Average Revenue Per User) from contents with higher price range. But the downside could come from fierce competition as new players are continuing to enter broadband and voice markets, thus leading to the lowering of tariff charges. Growth can also be stunted with the penetration of existing services like wireline telephony, broadband and cable TV coming close to saturation.

Table 1.3 Revenue Forecast for Telecommunications Service

(in 100 million KRW)

	2003	2004	2005	2006	2007	'06~'07 Growth Rate
Facility-based	286,944	300,627	311,388	321,667	327,373	1.8%
Special License	14,500	19,469	19,143	16,511	16,065	-2.7%
Value-added	45,171	61,968	59,758	62,609	65,737	5.0%
Broadcasting	69,431	77,878	78,527	93,465	102,407	9.6%
Total	416,045	459,941	468,816	494,252	511,581	3.5%

Source: 2003~2005 KAIT, KISDI estimates from 2006

2.1.1. Facility-based Telecommunications Service

2.1.1.1. Wireline Communications Service

■ Wireline Telephony

○ Local Telephony

The revenue for local telephony in 2006 is projected to drop by 2.1% year on year to stand at 4, 415.6 billion won. The growth of subscribers is stagnating and revenue from general voice calls is declining. Also, competition in the corporate market is expected to become more heated with Dacom launching its own service since the mid 2005.

The revenue for 2007 is expected to drop 4.3% over the previous year to record 4, 225.7 billion won. The revenue for local telephony service is continuing its downward trend because of the meager growth in subscribers, decline in call volume, mobile replacing wired service and intensifying competition among operators.

○ Long Distance

The revenue from long distance service is expected to fall 5.7% year on year in 2006 to reach 10, 48.9 billion won. Reasons include introduction of Internet telephony cutting into the revenue of basic voice service in long distance and slow down of revenue growth in value-added services which had maintained healthy growth trend.

Long distance revenue for 2007 is expected to drop 5.0% over 2006 to stand at 996.9 billion won. The revenue for long distance is expected to continue its downward spiral owing to the stagnating market and further penetration of

Internet telephony whose tariff is more competitive than long distance service.

○ International Telephony

The revenue from international telephony is expected to drop 5.7% over the previous year to reach 685.3 billion won as settlement and access charge is different by country to result in arbitrage gain or loss and because most of the business customers have switched over to Internet telephony for their international calls.

The revenue from international telephony is expected to grow 0.2% in 2007 over 2006 to stand at 686.7 billion won. In 2007, although call volume is expected to increase owing to the growth of the national economy, competition among operators will exert downward pressure on tariff to result in overall drop in revenue. Additional revenue loss is anticipated with Internet telephony service becoming more stable.

■ Internet Telephony

The Internet telephony service provided by facility-based operators is expected to grow to 26.7 billion won in 2006 with the introduction of the service by facility-based operators in 2005 and the full launch of the service from December 2005. The sector streamlined the regulatory framework and resolved many outstanding issues such as dialed number identification and interconnection agreement by issuing licenses for facility-based Internet telephony operators. With license issuance for facility-based operators in the early and late 2005 and ironing out issues regarding payment for using Internet network in the first half of 2006, the service is expected to make significant growth from the latter half of 2005.

The Internet telephony service provided by facility-based operators is projected to grow 88.3% year on year in 2007 to reach 50.2 billion won. The penetration of the service is expected to take off from 2006 as the service becomes more stable.

■ Broadband Internet

The revenue from broadband Internet service is projected to grow 6.4%²⁾ over 2005 in 2006 to reach 4,454.5 billion won. When analyzing the revenue by operator as of the end of 2006, KT, LG Powercomm and SOs who have posted

²⁾ Growth rate with consideration to change in statistical classification. It is growth rate between revised figure for 2005 (4 trillion 185.3 billion won) and revenue for 2006 where SO and other are included (4 trillion 454.5 billion won).

net increases in subscribers will see their revenues from Internet grow with the exception of KT.

Revenue from broadband Internet is forecast to grow 3.0% over the previous year in 2007 over the previous year. With growth reaching saturation, net increase of subscribers resulting from new market entrants seemed to have been all reflected in 2006 performance and efforts by broadcasters and SOs armed with lower price make any revenue growth in 2007 very unpredictable.

Table 1.4 Subscriber Forecast of Broadband Internet Service

(in 1,000 subscribers)

	2003	2004	2005	2006	2007	'06-'07 Growth Rate
Old Facility-Based operator (A) (KAIT actual numbers)	10,382	10,846	10,780	11,217	11,338	5.1%
Growth Rate		4.5%	-0.6%	4.1%	2.6%	
SO.RO.NO induded (B) (Estimation)	796	1,328	2,789	2,982	3,580	
Growth Rate		66.8%	64.8%	36.2%	20.1%	
Total (A) + (B)	11,178	12,174	12,968	14,198	14,918	
Growth Rate		8.9%	6.5%	9.5%	5.1%	

Source: 2003~2005 KAIT, KISDI estimates from 2006

■ Leased Line

Leased line business is expected to grow 3.6% over the previous year to stand at 2, 122.9 billion won in 2006. KT's leased line business was steady until the first half of 2006 but the revenues of Dacom and SK Networks in leased line have increased. Growth can be contributed to: 1) Increase in demand for telecommunications lines with expansion of mobile data service market; 2) Higher demand from expanded corporate private networks as well as for financial settlement system.

The revenues for leased line business is expected to grow 3.9% in 2007 over 2006. SK Telecom and KTF plan to complete deployment of nationwide HSDPA network by 2007, which would increase demand for mobile lines to drive the growth of the leased line business. But growth can be constraint due to

continuing downward pressure on price as competition is still very much present in the leased line market.

Table 1.5 Revenue Forecast of Major Wireline Service

(in 100 million KRW)

	2003	2004	2005	2006	2007	'065~'07 Growth Rate
Local	47,517	47,178	45,110	44,156	42,257	-4.3%
Long Distance	12,567	10,727	11,129	10,489	9,969	-5.0%
International	6,314	7,646	7,483	6,853*	6,867	0.2%
Others	9,754	8,203	7,602	7,650	6,575	-14.1%
Leased Line	20,634	20,640	20,500	21,229	22,053	3.9%
Broadband Internet**	37,282	38,768	37,839	39,078	39,307	0.6%
Internet TelePhony***	-	300	344	266	502	88.3%
Total (Wireline)	134,068	133,472	130,008	129,722	127,529	-1.7%

* Status of 2000~2006 (Numbers for 2006 is 12 months translation of the actual figures collected by KAIT up to July 2006) as linear estimation. If international call service from SK Telelink which had not been included in the past is reflected in 2006 revenue, market size will be 876.1 billion won. Revenue trend from 2000 to 2006 excluding that of 2003 where figures were rather abnormal (market size was cut 26.3% year on year) was used for linear projection for the following year.

** KAIT's figures for broadband revenue for 2006-2007 did not include those from SOs and ROs. Those are included in the facility-based operators' revenue (hereinafter referred to as old facility-based operator) before July 2006.

*** Figures include only Internet telephony sales of facility-based operators. Numbers before 2005 is deemed not to include revenue from Internet telephony as facility-based operators had not launched the service yet, and as such not included in the estimations for the following years.

Note: 1. Local telephony includes general voice, LM voice and subscriber access (Subscription and installation charge).

2. Others include number information, intelligent network service, public phone, ISDN and telegraph/telegram.

3. Revenue for 2006 is estimated based on the actual figures up to July 2006 as provided by KAIT

Source: 2003~2005 KAIT, KISDI estimates from 2006

2.1.1.2 Mobile Telephony

■ Mobile Telephony

Mobile telephony in 2006 is forecast to post revenues of 18,998.7 billion won to grow 5.2% year on year. Despite intensifying competition resulting in the continuing decline of service tariff and slowdown in subscriber growth, creation of diverse value added services such as wireless Internet will mean revenue growth can surpass that of subscribers.

Mobile telephony market in 2007 is expected to see a marginal growth of 3.5% over the previous year. Although we can see many growth drivers in 2007

such as the full-fledged launch of WCDMA service and continuing growth of wireless Internet service, if expansion of nationwide WCDMA network is delayed because of the operators' business strategy or if there is no sufficient attraction toward service subscription, it could be some time before we see the growth of service take off.

Table 1.6 Forecast on Mobile Subscribers

(in 1,000 subscribers)

	2003	2004	2005	2006	2007
Number of Subscribers	33,592	36,586	38,342	40,108	41,346
Growth Rate	3.9%	8.9%	4.8%	4.6%	3.0%

Source: 2003~2005 Ministry of Information and Communication, KISDI estimates from 2006

■ Mobile Paging

The revenue for mobile paging in 2006 stood at 2.9 billion won, which is 26% lower than the previous year and the number is expected to decline to 1.9 billion won in 2007 to post a 34.5% negative growth year on year. Although the diversification of service such as traffic information service and transmitting information to micro-payment terminals for deferred payment could influence the market in the future, if new demand cannot be created through the diversification of service or reuse of network, the service would ultimately exit from the market at some point.

■ Trunked Radio System (TRS)

As revenues expand to cover the entire rent service spectrum with system operators aggressively targeting niche market in 2006, the TRS market is poised to grow 7.42% in 2006 to 98.1 billion won.

In 2007, with more handsets and value-added services becoming available, the TRS market is projected to grow to 101.8 billion won. The future growth of the market will depend on whether mobile operators will be able to minimize market erosion coming from the PTT (Push To Talk) service and being successful in developing differentiating services. TRS operators, in turn, need to be able to mount effective response against mobile operators' PTT service and

secure a position differentiated from mobile operators in civic emergency communication network and other areas.

■ **Dedicated Wireless Service**

Revenue for 2006 is expected to come to 14.3 billion won to continue the downward slide from the previous year. The revenue from dedicated wireless service which had been steadily declining since 1999 is expected to accelerate.

Such decline will also continue in 2007 to post revenues of 14.2 billion won, a slight drop from 2006. With mobile operators and other service providers also entering new service areas such as traffic information, wireless security and remote metering, erosion between services will make any big jump in growth unlikely.

■ **WiBro**

With 2006 being the first year of commercial service, the number of subscribers or revenue will remain insignificant. As the service is only available in very limited areas, there is currently almost no attraction for subscription from a consumer's point of view.

In 2007, WiBro is expected to grow to a subscriber base of 608,000 and revenues of 120.8 billion won. Service coverage will expand from Seoul Metropolitan area to other major cities around the country in stages from 2007 and as technology becomes stable, the growth of WiBro is expected to really start to take off to reach 6.7% of subscription rate of the possible total 9.08 million subscribers (number that would be close to saturation).

2. Status and Outlook by Sector

Table 1.7 Revenue Forecast on Major Mobile Communications Service

(in 100 million KRW)

	2003	2004	2005	2006	2007	'06~'07 Growth Rate
Mobile Telephony (WCDMA)	151,147	164,676	179,472	189,987 (221)	196,637 (2,401)	3.5%
Mobile Paging	91	50	40	29	19	-34.5%
TRS	735	940	913	981	1018	3.8%
Dedicated Wireless	180	180	164	143	142	-0.6%
WiBro					1,208	
Others	724	1308	792	804	819	1.9%
Total	152,876	167,155	181,380	191,945	199,843	4.1%
Growth	4.8%	9.3%	8.5%	5.8%	4.1%	-

Source: 2003~2005 KAIT, KISDI estimates from 2006

2.1.2. Special License Communications Service

The special license communication service is expected to decline by 13.7% year on year in 2006 to stand at 1, 651.1 billion won. Market size is declining owing to the continuing weak growth of its flagship voice service and as more number of special license operators are entering into the facility-based telecommunications market.

The market is expected to further decline 2.7% in 2007. Although future prospect of the market is good with foreign operators also entering the Internet telephony business, it will be more swayed by the overall saturation of voice market and depression of wireline market.

Table 1.8 Revenue Forecast on Special License Communications Service

(in 100 million KRW)

	2003	2004	2005	2006	2007	'05~'06 Growth Rate
Total	14,500	19,469	19,143	16,511	16,065	-2.7%
Growth Rate		34.3%	-1.7%	-13.7%	-2.7%	

Source: 2003~2005 KAIT, KISDI estimates from 2006

2.1.3. Value-added Communications Service

■ Network Service

Revenue of network service is expected to stand at 523.7 billion won, a 2.5% growth over 2006 in 2007. Network service can largely be divided into packet exchange, reselling of data lines and other network services. While revenue from Virtual Private Network (VPN) and resales of data lines are increasing, growth is weakened in packet exchange, and other network services.

■ Internet Access/Information & Management Service

The revenue for Internet access/information & management service for 2007 is expected to record 4 trillion 50 billion won, a 5.19% growth year on year. Revenue here includes: 1) Internet access and management service and 2) contents service. Here, although Internet access service provided by value-added communications service providers is recording sharp decline, contents service is continuing to record healthy growth in 2006.

■ Others

Revenue from other value-added communications service is projected to post 2 trillion won in 2007, a 5.26% growth year on year. This area includes services like enhanced fax, CCIS (Credit Card Information System), CRS (Computer Reservation System), EDI (Electronic Data Interchange), remote communications, telephone information and online information processing. As of 2006, many services in other value-added communications are migrating into Internet application service and broadband Internet service for business users.

Table 1.9 Revenue Forecast on Value-added Communications Service

(in 100 million KRW)

	2003	2004	2005	2006	2007	'06-'07 Growth Rate
Network Service	5,382	5,361	4,984	5,109	5,237	2.50%
Internet Access/ Information and Management Service	27,017	39,420	36,651	38,500	40,500	5.19%
Others	12,772	17,186	18,122	19,000	20,000	5.26%
Total	45,171	61,968	59,758	62,609	65,737	5.00%

Source: 2003~2005 KAIT, KISDI estimates from 2006

2.1.4. Broadcasting Service

2.1.4.1. Terrestrial Broadcasting

The revenue for terrestrial broadcasting is expected to record a small increase in 2006 over the previous year. Although aggressive marketing campaigns by many companies targeting World Cup games were expected to result in higher advertisement income in 2006, competition against paid broadcasting media in advertisement market and the slowdown of economic recovery acerbated by North Korea's nuclear issue is expected to result in only a modest increase in revenue.

Terrestrial service's revenue is projected to grow 3.0% in 2007. Higher income from program sales and sponsorship deals, additional revenue with wider penetration of digital broadcasting service is anticipated to increase revenue to 3,671.5 billion won, a 3.0% growth year on year. Advertisement revenue for terrestrial DMB is expected to be around 12 billion won.

2.1.4.2. Cable Broadcasting (System Operator (SO), Relay Operator (RO))

Revenue from cable broadcasting is expected to grow 5.5% in 2006. Cable companies are likely to strengthen broadband Internet service via MSOs and focus on delivering 'convergence' service by combining broadcasting and communication services.

Revenue of cable broadcasting is projected to grow 5.5% in 2007. Subscribers to broadband Internet service using cable network will grow steadily

and with charges for digital service and cable TV coming closer to normal range, average revenue per user is expected to go up.

2.1.4.3. Satellite Broadcasting

The revenue for satellite broadcasting (General + satellite DMB) is forecast to grow 35.5% over the previous year in 2006. Although the continuing expansion of subscribers brought growth in volume for Sky Life, which began its service in 2002, it is still struggling in terms of qualitative growth with accumulated deficit reaching 500 billion won as of 2005. Satellite DMB, which started commercial service in 2005 will post a revenue of 117.9 billion won in 2006 (based on subscription charge of 20,000 won and monthly charge of 13,000 won).

Revenue from satellite broadcasting is expected to rise 31.3% in 2007. The revenue of Sky Life is forecast to grow 13.3% year on year to 432.8 billion won in 2007 thanks to increased ARPU (Average Revenue Per User) helped by the development of profitable contents and stronger sales of convergence products. As for satellite DMB, a cut in monthly charge (11,000/month) will attract more subscribers to increase revenue 89.7% year on year to 223.7 billion won.

2.1.4.4. Broadcasting Channel Business (Program Provider)

The revenue for broadcasting channel business is projected to grow 15% in 2006. As more outlets for programs are now available to program providers such as commercialization of DMB service and digitalization of terrestrial and cable TV, the future for broadcasting channel business and its revenue growth looks very bright.

The revenue for broadcasting channel business is forecast to grow 15% in 2007. Digital programming will further facilitate the growth of data broadcasting to result in bigger market for program providers and we will also see more home shopping networks making forays into overseas markets.

2. Status and Outlook by Sector

Table 1.10 Forecast on Subscribers

(in 1,000)

		2003	2004	2005	2006	2007	'06-'07 Growth Rate
Terrestrial DMB				120 ¹⁾	2,500	4,485	79.4%
Cable TV		12,548 ²⁾	11,357 ³⁾	12,274 ³⁾	12,286	12,298	0.1%
Satellite	General	1,137 ⁴⁾	1,652 ³⁾	1,855 ³⁾	2,041	2,245	10.0%
	S-DMB			372 ⁵⁾	983	2,076	111.1%

Note: Cable TV includes SOs and ROs. Terrestrial DMB refers to number of Handsets (mobile phone, notebook PC, Terminals for vehicles, PC receiver, others).

Source: 1) 2006 National Audit Policy Report

2) KAIT

3) Korea Broadcasting Commission

4) Sky Life

5) TU Media

Table 1.11 Revenue Forecast by Broadcasting Service

(in 100 Million KRW)

		2003	2004	2005	2006	2007	'06-'07 Growth Rate
Korean Broadcasting Commission	Terrestrial	35,482	35,449	35,426	35,659	36,715	3.0%
	TV	31,908	31,841	31,763	31,893	32,754	2.7%
	Radio	3,574	3,607	3,663	3,736	3,840	2.8%
	T-DMB				30	120	300.0%
	Cable TV	11,365	13,846	15,974	16,852	17,779	5.5%
	Satellite	1,496	2,550	3,688	4,999	6,565	31.3%
	SkyLife	1,496	2,550	3,473	3,820	4,328	13.3%
	S-DMB			216	1,179	2,237	89.7%
	Broadcasting Channel Business	23,023	25,884	31,265	35,955	41,348	15.0%
	Total①	71,366	77,728	86,352			
KAIT	Difference (①-②)	1,935	-150	7,826	-	-	-
	Total②	69,431	77,878	78,527	93,465	102,407	9.6%

Note: Cable TV means SOs and ROs.

Source: 2003-2005 Korea Broadcasting Commission and KAIT, KISDI estimates from 2006

2.2. IT Equipment

2.2.1. Communications Equipment

Table 1.12 Communications Equipment Supply & Demand
(Production in 100 Million KRW, Exports/Imports in million USD)

	2003	2004	2005	2006	2007	'06-'07 Growth Rate
Production	387,789	470,733	469,885	461,890	474,990	8.2%
Exports	18,389	25,877	27,800	28,217	29,099	3.1%
Imports	3,325	3,720	4,270	5,444	6,368	17.0%
Balance	15,064	22,157	23,530	22,773	22,731	-0.2%

Source: 2003-2005 Production and export from KAIT and KISDI estimates from 2006

○ Production

The production of communications equipment is forecast to decline around 1.7% year on year in 2006 to record 46 trillion won. Although demand for communications equipment and mobile handsets is expected to grow because of network upgrades and preparation for new services, weakened export of mobile handsets and won depreciation would put production growth in minus territory for 2006.

Production is expected to grow 2.8% in 2007 to 47,400 billion won. The active launch of new services like portable Internet, DMB, W-CDMA and HSDPA coupled with the wider penetration of services like home network, telematics, RFID and VOIP will drive demand for related communications equipment and terminals. Moreover, demand for new network and communications equipment will rise with the creation of new service environment led by the convergence of wired/wireless and telecommunications/broadcasting services.

○ Export

The export of communications equipment is projected to grow 1.5% over the previous to reach 28.2 billion dollars in 2006. But the growth rate of overall communications equipment export is expected to be lower as a slowdown of export growth is expected for mobile handsets, which typically account for 90%

of export volume.

The export of communications equipment for 2007 is forecast to grow 3.1% in 2007 to reach 29 billion dollars. With the wider introduction of next-generation communications services like mobile TV, WiBro, HSDPA and IPTV expected in other countries, related communications equipment and equipment for appliance development will take up a larger share of export. The export of handsets - main driver of export in communications equipment - is expected to increase especially for high performance/function rich mid- to high-end handsets that can support new services and thus, meet the demand for handset upgrade. But the growth of handset export will be constraint with more foreign-makers gaining competitive strength in mid- to high-end market.

■ Mobile Handsets

Table 1.13 Mobile Handset Supply & Demand

(Production in 100 Million KRW, Exports/Imports in million USD)

	2003	2004	2005	2006	2007	'06~'07 Growth Rate
Production	258,609	338,224	337,930	317,681	323,012	1.7%
Exports	16,674	23,734	25,371	25,221	25,591	1.5%
Imports	1,332	1,778	1,862	2,397	2,857	19.2%
Balance	15,342	21,956	23,509	22,814	22,734	-0.4%

Note: Mobile handsets refers to handsets for CDMA, GSM, WCDMA and TDMA. Exports includes CKD, SKD and parts.
Source: 2003~2005 Production and export from KAIT and IITA, KISDI estimates from 2006

○ Production

The production of mobile handsets is projected to drop 6.0% year on year in 2006. With leading handset makers (Samsung Electronics, LG Electronics) accounting for about 80% of Korea's total handset production volume, with the performance of key Korean makers are expected to lag behind that of overseas manufacturers.

Handset production is forecast to grow 1.7% in 2007 to stand at 32, 300 billion won. Weakened demand for handset replacement from mature markets coupled with lower demand for new handsets in newly emerging markets will make the double digit growth we have seen in the past hard to achieve in the

future.

The future growth of Korean handsets will be determined by: 1) How much Korean makers can take up replacement demand in leading markets by advancing network technology and/or integrating efficient value added functions and improving designs and 2) Establishing successful footprint in newly emerging markets. In other words, despite the opportunities arising from the commercialization of new services and increased share of high performance handsets, stronger competitiveness of overseas makers in mid- to high-end handset markets and difficulty of making inroads into emerging markets will mean marginal increase in production volume year on year.

The domestic demand for handset, especially for replacement, will grow in 2007 thanks to the wider launch of W-CDMA, portable Internet and 3.5G HSDPA services. Higher usage of wireless Internet will increase the share of high performance handsets such as smart phones.

○ Export

The export of mobile handsets in 2006 will decline 0.6% year on year to reach 25.2 billion dollars. Lower performance is mostly due to relatively weak performance of Korean handset makers, which again is the results of intensified competition in high- and mid-end product space, disappointing entry into new emerging markets and decline in ASP (average sales price).

The export of handsets is expected to recover growth thanks to strong performance of high-performance handsets supporting new services and premium handsets targeting emerging markets to rise around 1.5% year on year to reach 25.5 billion dollars. Korean handset makers will focus mostly on Europe and North America where the launch of 3G and 3.5G services are gaining momentum. Product wise, priority is likely to go to latest cutting-edge handsets that can stimulate replacement demand by supporting new service offerings.

2.2.2. Information Equipment

Table 1.14 Information Equipment Supply & Demand

(Production in 100 million KRW, Exports/Imports in million USD)

	2003	2004	2005	2006	2007	'06-'07 Growth Rate
Production	220,366	179,975	159,943	158,663	158,346	-0.2%
Exports	18,365	20,625	16,737	14,648	13,549	-7.5%
Imports	6,562	7,189	8,596	9,791	10,887	11.2%
Balance	11,803	13,435	8,141	4,857	2,662	-45.2%

Note: Export and import includes monitor panel parts and package software
Source: 2003~2005 KAIT, KISDI estimates from 2006

○ Production

The production of information equipment in 2006 is expected to drop 0.8% year on year. Despite the rising demand for some items at home and abroad like storage devices and computer parts, the drop in PC and monitor production resulted in overall decline. The aggregated production of information equipment as of August 2006 dipped 1.1% over the same period last year. Production of storage device and computer parts, however, rose 12% and 23% respectively while computer and monitor decreased 32% and 14% respectively.

The production of information equipment for 2007 is projected to decline 0.2% year on year. Despite growth in the export of storage devices and computer parts, the domestic production of information equipment is expected to drop owing to the reimport of Korean PC makers and sluggish export of monitors.

○ Export

The export of information equipment is expected to stand at 14.6 billion dollars in 2006, a 12.5% fall over the previous year. Although export of storage devices led by HDD grew by more than 10% year on year (aggregated up to October 2006), drop in export of other products like computers, monitors and parts are expected to result in significant decline in export of information equipment as a whole.

Export for 2007 is projected to decrease 7.5% year on year to reach 13.5 billion dollars. ODM companies from Asia Pacific enjoying cost advantage are

expected to secure stronger position in PC and monitor markets which are in mature stage while products from Korean and global makers produced in China and Taiwan will continue to be shipped to Korea.

■ PC

Table 1.15 PC Supply & Demand

(Production in 100 million KRW, Exports/Imports in million USD)

	2003	2004	2005	2006	2007	'05-'06 Growth Rate
Production	46,870	28,202	24,490	18,122	16,274	-10.2%
Exports	1,539	769	434	392	369	-5.8%
Imports	990	1,145	1,592	1,852	2,037	10.0%
Balance	550	-377	-1,158	-1,460	-1,668	14.2%

Note: PC refers to desktop and notebook PCs

Source: 2003~2005 KAIT, KISDI estimates from 2006

○ Production

PC production in Korea is projected to suffer around 26% decline in 2006. This is mostly due to the sharp fall in export with continuing relocation of production plants to overseas and market exits of leading PC makers resulting in very weakened production base in Korea.

PC production is again expected to decline 10.2% year on year in 2007 to continue its sluggish trend. With major PC manufacturers relocating their plants overseas, domestic PC production will depend on the growth of domestic market and as price drop is expected to be larger than demand for replacement, production is expected to fall 10.2%. Although the release of 'Windows Vista,' the next generation OS from Microsoft, is expected to accelerate demand for PC upgrade and replacement in 2007, saturated domestic market and increased import volume will keep domestic PC production sluggish.

○ Export

Export in 2006 is expected to decline 9.7% year on year to reach 390 million dollars. Expanded production in China by major PC makers and price decline will stunt the growth of export, and export of notebook PC is projected to decline 24% over the same period last year.

PC export in 2007 will again drop 5.8% to continue its negative growth trend. As we can already see in 2006, there is a significant decline in PC export to key export destinations like the U.S. (19% drop) and Japan (61% drop).

2.2.3. Broadcasting Equipment

Table 1.16 Broadcasting Equipment Supply & Demand

(Production in 100 million KRW, Exports/Imports in million USD)

	2003	2004	2005	2006	2007	'06-'07 Growth Rate
Production	134,307	163,852	140,847	148,772	152,045	2.2%
Exports	8,778	11,434	10,780	11,059	11,271	1.9%
Imports	2,663	3,172	3,044	2,919	3,009	3.1%
Balance	6,115	8,262	7,736	8,139	8,262	1.5%

Source: 2003~2004 KAIT, KISDI estimates from 2005

○ Production

Production of broadcasting equipment in 2006 is forecast to grow 5.6% year on year to reach 14, 800 billion won. The growth of broadcasting equipment production in 2006 will be driven by the increased production of digital TV, which accounts for more than 60% of broadcasting equipment production. Thanks to the special demand created through the World Cup games in Germany and Thanksgiving and Christmas holidays in the second half of the year coupled with strong sales of digital TV, purchase of set-top boxes are also expected to see upward move in 2006.

Production in 2007 is projected to grow 2.2% to stand at 15, 200 billion won. The digital TV market will grow 27.5% (based on volume) and digital set-top box 13.2% (based on volume) in 2007. But intensified competition between PDP and LCD will exert downward pressure on digital TV price and price competition among set-top box makers currently enjoying market expansion will also mean price cut resulting in a slowdown of production growth.

○ Export

Export of broadcasting equipment is expected to grow 2.6% year on year to 11.1 billion dollars in 2006. Export of finished digital TV will decline owing to

increase of overseas production bases. But export of parts will grow with most of the volume going to overseas production plants in Mexico, Poland and Russia. As panels for TV - in particular LCD panel - is included in parts, growth of TV panel export will push volume of digital TV export upward. Despite increased demand for set-top boxes resulting from wider penetration of digital broadcasting service, impact of lower price and Chinese products that are eroding the global marketplace with mid- to low-price strategy will keep the growth level of export marginal.

Export of broadcasting equipment will grow 1.9% year on year to 11.3 billion dollars in 2007. Globally, demand for digital TV will rise driven by growth in North America and European markets. But local production strategy of Korean manufacturers will push export of digital TV from Korea downward. In addition, as digital TVs become easier to produce, more players are entering the marketplace and intensified competition in the market will further accelerate the downward spiral of price to constrict export growth.

■ Digital TV

Table 1.17 Digital TV Supply & Demand

(Production in 100 million KRW, Exports/Imports in million USD)

	2003	2004	2005	2006	2007	'06-'07 Growth Rate
Production	52,020	58,041	53,118	59,525	62,338	4.7%
Exports	3,590	5,782	6,151	7,080	7,743	9.4%
Imports	413	553	501	434	457	5.3%
Balance	3,177	5,229	5,650	6,646	7,286	9.6%

Note 1: Digital TV=DTV + analog TV + parts

Note 2: Export of parts in digital TV does not include some export of TV panels due to limit in statistical compilation.

Source: 2003~2005 KAIT, KISDI estimates from 2006

○ Production

Digital TV production in 2006 is expected to grow 12.1% year on year to 5,900 billion won. The size of global digital TV market in 2006 is expected to grow to 50 billion dollars thanks to a sharp increase in demand for FPD TV mostly led by LCD and PDP products.

Production of digital TV in 2007 is estimated to grow 4.7% to 6,200 billion

won. With conversion to digital broadcasting gaining momentum and higher consumer appetite for flat panel TV, demand for digital TV - particularly for LCD and PDP products are likely to stay high in 2007.

○ Export

Digital TV export in 2006 is projected to grow 15.1% year on year to 7,080 million dollars. Despite increase in demand, the continuing price decline and more plants moving overseas to form global production network to increase the share of direct export based on overseas production will translate into negative growth for export of finished products in digital TV in 2006.

Digital TV export for 2007 is expected to stand at 7,743 million dollars, a 9.4% growth year on year. Korean companies that can procure core modules for LCD and PDP within their supply chain enjoy the reputation as high-end brands in North America and Europe and thus, act as the growth engine of future digital TV market. They will lead the export growth through continuous technology innovation coupled with bold brand marketing efforts.

2.2.4. Components

Table 1.18 Components Supply & Demand

(Production in 100 million KRW, Exports/Imports in million USD)

	2003	2004	2005	2006	2007	'06-'07 Growth Rate
Production	648,879	831,233	888,339	988,782	1,091,615	10.4%
Exports	25,016	35,745	47,015	59,468	73,096	22.9%
Imports	29,888	35,673	38,040	40,469	43,040	5.9%
Balance	-4,872	72	8,975	18,819	30,056	59.7%

Source: 1) Production: 2003~2005 KAIT, KISDI estimates from 2006

2) Export & Import: 2003~2005 Institute of Information Technology Assessment, KISDI estimates from 2006

○ Production

Component production in 2006 is forecast to grow 11.3% year on year to stand at 99 trillion won. With DRAM leading the Korean semiconductor production, turning excess supply of 2005 into excess demand in 2006 to result in price increase, production of DRAM and other semiconductor products is

expected to grow. Large-size TFT-LCD panel that drives the production of display panel will continue its healthy growth trend. In particular, as sharp increase in TV panel production is anticipated, Korean companies who have already prepared production lines for large-size LCDs will increase their production volume.

Component production in 2007 is projected to grow 10.4% to record 101 trillion won. As the global semiconductor market continues to post a healthy growth trend in 2007 with DRAM rather than flash RAM leading the way, Korean semiconductor makers are also expected to see mild increases in their production volume. Demand for large TFT-LCD is expected to grow further in 2007 and this combined with the continuing growth of TV panel is expected to give 2007 a similar growth rate as 2006.

○ Export

Components export in 2006 will grow 26.5% year on year to post 59.5 billion dollars. Constraints in increasing supply of DRAM and higher demand from non-PC sectors like telecommunications and home appliances will push the export growth of Korean manufacturers with strong competitive edge in DRAM. As for display products, the special demand from World Cup games in the first half and seasonal peak in the latter half of the year will further fuel demand for flat screen TVs. At the same time, the higher penetration of LCD TV will increase exports of Korean makers who are expanding production of TV panels.

Export of components in 2007 will grow 22.9% to stand at 73.1 billion dollars. Although there is concern of excess supply of flash RAM, the release of Windows Vista operating system will improve demand for DRAM and with Korean makers pushing DRAM to increase export, a similar mild growth trend as in 2006 is anticipated. With digital broadcasting gaining higher acceptance and stronger demand for high definition TV, the future of global digital TV market for 2007 is bright. This means Korean panel makers with stable base of mass production will enjoy competitive edge and thus act as the growth engine for export in display.

■ **Semiconductors**

Table 1.19 Semiconductors Supply & Demand

(Production in 100 million KRW, Exports/Imports in million USD)

	2003	2004	2005	2006	2007	'06-'07 Growth Rate
Production	239,561	341,782	332,580	371,825	420,534	13.1%
Exports	19,588	27,013	32,003	36,451	41,591	14.1%
Imports	21,215	25,068	26,575	28,488	30,625	7.5%
Balance	-1,627	1,945	5,428	7,963	10,966	37.7%

Source: 1) Production: 2003~2005 KAIT, KISDI estimates from 2006

2) Export & Import: 2003~2005 Institute of Information Technology Assessment, KISDI estimates from 2006

○ **Production**

The production of semiconductors will grow to 37, 200 billion won in 2006, an 11.8% growth year on year. While Nand Flash RAM, one of the key Korean chip makers products, showed sluggish performance owing to excess supply and weakened demand, as DRAM is turning around from excess supply in 2005 to excess demand in 2006, Korean makers are likely to put priority on DRAM to increase their production volume.

Semiconductor production will continue its healthy growth trend to grow 13.1% to 42, 53.4 billion won in 2007. The global semiconductor market is expected to show healthy growth in 2007 and with DRAM rather than flash RAM leading the market, Korean chip makers will also record low growth in production mainly through DRAM.

○ **Export**

Semiconductor export is expected to increase 13.9% year on year to stand at 36.5 billion dollars in 2006. Constraints in increasing supply of DRAM and higher demand from non-PC sectors like telecommunications and home appliances will drive export growth of Korean manufacturers with strong competitive edge in DRAM.

Semiconductor export is projected to increase 14.1% in 2007 to stand at 41.6 billion dollars. Although there is concern of excess supply of flash RAM, release of Windows Vista operating system will improve demand for DRAM and

with Korean makers pushing DRAM to increase exports, a similar mild growth trend as in 2006 is anticipated. Korean makers do enjoy cost competitive edge in flash RAM and have large share of high value added products in DRAM.

■ Display Panel

Table 1.20 Display Panel Supply & Demand

(Production in 100 million KRW, Export & Import in million USD)

	2003	2004	2005	2006	2007	'06-'07 Growth Rate
Production	217,781	284,575	322,687	360,492	398,547	10.6%
Exports	1,664	4,353	10,172	17,065	23,640	38.5%
Imports	3,350	4,201	4,414	5,045	5,437	7.8%
Balance	1,686	152	5,758	12,020	18,203	51.4%

Source: 2003~2005 KAIT, KISDI estimates from 2006

○ Production

Display production is forecast to grow 11.7% year on year to stand at 36,492 billion won in 2006 to continue its upward growth trend. Worldwide demand for large TFT-LCD panel, which stimulates the growth of display panel is expected to post a healthy growth rate of 26.9% in 2006 and as sharp growth of TV panel is anticipated, Korean companies who have already set up large LCD production lines are likely to increase their production volume.

Display production in 2007 is expected to increase 10.6% to stand at 39,854.7 billion won in 2007. Encouraged by the growth of TV panel, whose share is growing rapidly, worldwide demand for large TFT-LCD is expected to rise 20.4% in 2007.

○ Export

Export of display panel is forecast to increase 67.8% year on year to 17.1 billion dollars in 2006. Special demand from World Cup games in the first half and seasonal peak in the latter half of the year will further fuel demand for flat screen TV. At the same time, the higher penetration of LCD TV will increase export of Korean makers who are expanding production of TV panels. In particular, with the strong growth of major wide TV customers for Korean

companies, demand for Korean panel is expected to go up to push exports upward.

Export of display panel is expected to grow 38.5% to 23.6 billion dollars in 2007. The future of worldwide digital product looks bright with the wider acceptance of digital broadcasting and higher consumer demand for high definition TV. Moreover, after the introduction of 32 inch, 42 inch is now emerging as the standard size for LCD TV and as such, LCD is expected to take a larger share of TV market and competitive strength of Korean panel makers who can deliver mass production through stable 7th generation production lines will drive the growth of export upward.

2.3. Software and Digital Contents

2.3.1. Package Software

Table 1.21 Package Software Supply & Demand

(Production in 100 million KRW, Export/Import in million USD)

	2003	2004	2005	2006	2007	'06-'07 Growth Rate
Production	45,932	38,425	40,826	43,465	46,141	6.2%

Source: 2003~2004 KAIT, KISDI estimates for 2005, KISDI projection for 2006 and 2007

○ Production

The production of package software will grow 6.5% year on year to reach around 4, 350 billion won in 2006. In the same year, the domestic package software market saw sharp declines in the growth of system software like those related to telecommunications and system management. But the growth of integrated solution for information protection and enterprise software products like ERP solutions are expected to play the role of growth engine for the package software market.

Although some package software vendors recorded significant improvement in their performance, but this actually includes revenue from other areas as a result of M&As between companies and entry into new markets resulting in business diversification. Therefore, the real growth rate of package software will be similar or slightly better over the previous year.

Production of package software in 2007 is expected to go up 6.2% year on year to stand at around 4 trillion, 610 billion won. With the launch of Widows Vista, demand for hardware replacement as well as for new and upgraded package software is expected to become stronger. At the same time, expansion of integrated solution fueled by increased demand for SOA is expected to push the growth of package software upward. But the growth of ERP, CRM, KM and other enterprise software sales as a whole is projected to go down and a slowdown in information protection software market is also likely, overall growth rate will dip slightly over the previous year.

2.3.2. Computer Related Services³⁾

Table 1.22 Computer Related Services Supply & Demand

(Production in 100 million KRW, Export/Import in million USD)

	2003	2004	2005	2006	2007	'06-'07 Growth Rate
Production	127,877	137,108	144,245	158,052	168,924	6.9%

Source: 2003~2004 KAIT, KISDI estimates for 2005, KISDI projection for 2006 and 2007

○ Production

Production of computer related service is expected to rise 9.6% year on year to reach around 15, 800 billion won in 2006. Although IT budget in the public sector such as those for e-government and ITS fell, expanded investment in U-City aerospace SOC and others along with the next generation system implementation projects and increased IT investment in financial sector to prepare for Basel II are driving the overall computer related service market forward.

Production of computer related service is projected to grow 6.9% year on year to record around 16, 900 billion won in 2007. Continuing system implementation efforts from financial institutions, expanded IT outsourcing, DMB, WiBro, IP TV, HSDPA and other new telecommunications service expanding telecommunication market, and export growth coming from exploring new markets overseas will all act as a growth engine for IT service market in 2007. But economic downturn continuing into 2007 will further reduce facility investment to lower IT investment in companies to result in a slight dip in

³⁾ Computer related services includes SI (System Integration), SM (System Management and Maintenance) and ASP (Application Service Provider). It is the same as IT service market.

computer related service growth in 2007.

2.3.3. Digital Contents

Table 1.23 Digital Contents Supply & Demand

(Production in 100 million KRW)

	2003	2004	2005	2006	2007	'06-'07 Growth Rate
Production	10,587	11,055	13,044	15,037	16,759	11.4%

Source: 2003~2004 KAIT, KISDI estimates for 2005, KISDI projection for 2006 and 2007

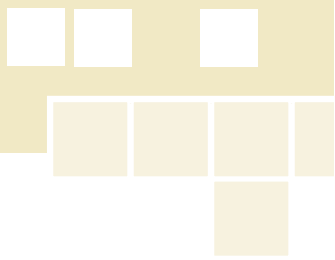
○ Production

Digital contents production is forecast to rise 15.3% to reach 1.5 trillion won in 2006. Educational contents and game contents take up about 70% of the market. In particular, the growth potential of educational contents is very high and hence, is forecast to grow by more than 20%. As for game contents, with online game as an industry entering the mature stage after continuing high growth pattern, performance seem to concentrate on a small number of companies. Also, the intense competition in online game market is even resulting in many companies posting negative growth.

Production of digital contents for 2007 is estimated to grow 11.4% year on year to stand at around 1, 700 billion won. Growth of digital contents will be led by educational content in 2007. As for game contents, market saturation and fierce competition will make companies look outside of Korea for growth. Educational content is expected to maintain its growth trend mainly led by online classes for college entrance exams and foreign language courses to act as a main growth engine for digital content production as a whole. In the online game arena, while large MMORPG market led by hardcore users is saturated, growth momentum is expected to come from casual games with low entry barrier that allows light users to play various games in a short period of time.

■ ■ ■ Part II

Digital Convergence in Korea



Digital convergence refers to video, voice and data being available anytime, anywhere through any device, irregardless of terminal, service and network, thanks to the advancement of technology. For example, there could be convergence of contents like voice, data and video; convergence of network like broadcasting, telecommunications and Internet; or convergence of devices like computer, telecommunications, and information appliances.

Industry-wise, digital convergence changes interconnects horizontally the only vertically-integrated industries. Traditional value chain in broadcasting industry before digital convergence era meant TV-oriented contents being delivered to the TV set at home via network dedicated to broadcasting. Value chains for voice and data communications also were clearly separated from each other. As such, the vertical integration of players was the norm. But digital convergence blurs the boundaries between industries began to disappear and with the expanding scope of competition. Players are also vertically separated into contents, platforms, networks or devices by stages in the value chain. Their interaction will also become more multi-directional. Therefore, Part II looks into the market trends of key components of digital convergence to increase our understanding on the status of digital convergence in Korea.



1. Home Network



1.1. Overview

Home Network refers to a network environment within the home where more than two devices are connected to each other via wired/wireless networks. The network enables communication and information exchange with appliances and devices while different information communication devices are used in and outside of home. It is an industry that creates value added by building infrastructure, developing devices and solutions and providing services.⁴⁾

The IT839 Strategy purported by the Ministry of Information and Communications of Korea migrates from market creation stage to commercialization stage. It has now been revised into u-IT839 as the need for readjusting the strategy had arisen. Therefore, the name Home Network has also been changed to U-Home from 2006.

1.2. Service Types

In the beginning, home networking meant just being able to automatically control lighting or temperature at home. But since then, with more and more households owning PCs and peripheral devices, efficient data networking technology has become necessary to link different devices. Currently, telephone line, powerline or wireless and other sophisticated transmission technologies are advancing rapidly. At the same time, broadband subscriber networks like DSL and cable modem increase the penetration of high-speed Internet. Owing to the advance in technology, PC and other digital information devices at home can now be used for a wide range of services like home entertainment, home automation, home security and home health care.

⁴⁾ Korea Home Network Industry Association (2006)

Table 2.1 Major Services for Home Network

	Overview	Service Type
Home Entertainment Service	High-quality multimedia data like film, MP3 and HDTV transmitted from outside is displayed on audio/video devices connected to wired/wireless home network or contents at home is available to the outside world.	HDTV level broadcasting High-quality VoD Network game
Home Data Service	Data exchange as well as Internet access is possible simultaneously through computer to computer, computer to printer or to scanner and other peripherals connections.	E-mail, Internet search, home shopping, e-government, Internet album, file sharing
Home Automation Service	Using PDA or cell phone you can monitor and control home appliances, sensors, lighting and other appliances as well as the status in and/or outside of your home.	Remote control of information appliances, energy control
Home Security Service	Responsible for safety and security including preventing unwanted intrusions or fires.	Checking visitors, remote surveillance, fire prevention, theft prevention
Home Health Care Service	Link to external medical center to conduct remote health check-up for users via medical appliances or biometric sensor information and notify any emergency.	Remote diagnosis, Silver Care, emergency rescue

1.3. Domestic Market Environment

The growth of the home network industry in Korea is currently led by construction companies. They provide home automation and home security services like gas/lighting/heating/access control as marketing traction for their new branded apartment complexes. Samsung Raemian (Tower Place), GS Xi, LG Heights Xi, POSCO Construction & Engineering's The Sharp and other branded apartment complexes are creating partnerships with KT, SKT and others to offer home networking services.

Korea's home network is moving forward with telecommunications operators, construction companies, consumer electronics makers and service providers doing their parts to leverage their own unique competitive advantage.

Table 2.2 Home Network Players in Korea

	Industry Players	Leaders
Telecommunications Operator	· Seek convergence of broadcasting and telecommunications with IPTV, TV portal and other services leveraging on its network infrastructure	KT (Home Ann, Megapass TV) SKT (Home Care) Hanaro Telecom (Hana TV)
	· Business expanded to home automation and security through multimedia services	
	· Service where mobile phone is used to control access, lighting and home appliances	
	· Convergence of wired and wireless platforms	
Construction Company	· Secure leadership in home network business with strength in home automation like Home Viewer and security services	LG Construction (Xi) Samsung (Raemian)
	· Migrate from home service to a model integrating apartment complex management service	Hyundai Development (Bestin) POSCO E&C (The Sharp)
	· Brand for construction company and home network becoming the same	SsangYong E&C (Swing dot Home)
	· Mid-sized construction companies are also entering home network business	Dong Moon Construction (Lenet)
Broadcaster	· Expects to become first mover as the leader in home networking by leveraging its own cable network · Secure nationwide network with DMC (digitalization) and expand TPS based business	CJ Cable, etc.
Consumer Electronics Maker	· Expects to become first mover in information appliance control by monopolizing PLC solution	Samsung Electronics (HomeVita)
	· Use digital TV and set-top box as home server for home network platform	LG Electronics (HomeNet)
	· Offer some services through subsidiary (construction company)	
Home Automation Provider	· Expand business from home automation to deploying home network (external interface)	Seoul Commtech (EastOn)
	· Migrate from home service to a model integrating apartment complex management service	Hyundai Telecom (IMAJU)
Solution Provider	· Started off as a subsidiary of a construction company to build home network environment · Leverages dual network set up to grow a separate ISP business	Ezville, CV Net, Daelim I&S, etc.

Meanwhile the Ministry of Information and Communications launched a pilot project to induce the participation of various home network players in telecommunications, broadcasting, construction and home appliance industries in December 2003. The pilot project explores diverse service models and promotes the growth of related industries while verifying the interoperability of disparate equipment and services. The Ministry selected KT Consortium and SKT Consortium as the pilot project implementers and invested a total of 32 billion won to 1,300 households in the Seoul Metropolitan area and 5 other major cities (Government 4.47 billion won, private sector: 23 billion won). The consortia provide about 44 services related to interactive digital TV, home automation, health care, home security and infotainment. Members of the selected consortiums include mobile/wireline operators along with consumer electronics makers like Samsung and LG, broadcasting companies KBS, MBC and SBS as well as leading construction companies.

Table 2.3 Outlook for Korean Home Network Market

(in million KRW)

	2005	2006	2007	2008	2009	2010	CAGR
Infrastructure	405,821	515,344	599,815	856,995	1,423,905	1,295,502	26.1%
Appliance	766,045	915,039	1,144,037	1,875,002	3,522,292	4,826,382	44.5%
Solution	224,950	324,626	441,815	815,444	1,423,905	1,892,450	53.1%
Service	123,114	273,903	740,259	1,646,470	3,241,258	4,686,670	107.1%
Total	1,519,930	2,028,912	2,925,926	5,193,912	9,367,798	12,701,004	52.9%

Source: Korea Home Network Industry Association (2006)

2. Intelligent Robot

2.1. Overview

Intelligent robot typically refers to any latest-edge robot with high level of intelligence. Unlike robots that undertake repetitive tasks in factories, intelligent robots developed with existing advanced technologies can deliver the functions and performance required in the current and the near future market. In other words, intelligent robots can recognize external environment (perception), make its own judgement on the situation (cognition) and control its own movements (mobility & manipulation).

2.2. Intelligent Robot Types and Areas of Application

An intelligent robot typically is categorized into industrial and service robots, with service robots again classified into robots for personal and professional services.

Industrial robots support automatic control, re-programming and deliver multi-purpose functions and have manipulators that can program more than 3 motion axis. Service robots refer to semi- or fully-automatic robots delivering services useful to people and equipment, and exclude those used in manufacturing plants. All robots except industrial ones belong to this category. But with IT convergence and intelligence becoming the rule of the game, the concept is being expanded to include 'network-based robots'. Accordingly a robot and IT come together to assign robotic functions to others via network and enable movement within virtual space. The government, therefore, has developed the concept of URC (Ubiquitous Robotic Companion), an IT-based intelligent service robot that offers IT services responding to the user requirements anytime, anywhere.

Table 2.4 Intelligent Robot Types and Application Areas

		Areas of Application
Service Robot	Personal Service	· Cleaning and guarding
		· Leisure support (Entertainment, pet, game, etc.)
		· Support the elderly / rehabilitation
		· Education (Research / tutor)
		· Support house chores, etc.
	Professional Service	· Disaster recovery
		· Military / community security
		· Live wire / construction operation
		· Medical service
		· Agriculture / forestry / mining
Manufacturing (Industrial) Robot	· Space	
	· Automobile production	
	· Electronics production	
	· Semiconductor production	
	· New bio-drugs	
Network-based Robot	· Shipbuilding	
	· Information contents	
	· Public helper (supports public service)	
	· Embedded robot	
		· Software robot

Source: Classified according to IFR (International Federation of Robot) standards

URC (Ubiquitous Robotic Companion) means "a robot that is with the user anytime, anywhere delivering services required by the user" and is a new concept for network-based intelligent robot. Core functions delivered by robots like environment or voice recognition is assigned to an external server to simplify the hardware set-up of the robots. The network will provide various information and services for everyday life like education, unmanned security and customized information.

2.3. Role of Intelligent Robot in the Convergence Environment

The intelligent robot industry combines hardware, software, network,

contents and service areas and will, therefore, have a strong ripple effect in other industries economically, technologically and socially. Intelligent robot is where the convergence and application of 3 different technologies is possible. Mechatronics technology which had been developing for the last 20 years can come together with traditional technologies like machinery, electricity and electronics, and latest-edge technologies like new materials, semiconductors, artificial intelligence, IT, BT and NT. Furthermore, intelligent robot provides essential production technologies and has high relevance to other growth engines so that synergy in industrial collaboration can be maximized. The intelligent robot industry, in other words, can be applied in wide range of areas to deliver new set of values that can satisfy the different needs of users in the convergence environment. As intelligent robot can be used in different areas, large companies and SMEs will have new business opportunities to help them gain further competitive strength.

2.4. Domestic Market Environment

The robot industry of Korea in 2004 was worth 200 billion won in size with its growth mostly coming from industrial robots, making it the world's fourth largest. The market will grow an average of 10.6% a year from 2005 to reach 2.3 trillion won in size by 2025. By 2017, the size of service robot market is expected to surpass that of the industrial robot.

Table 2.5 Market Forecasts for Korean Robot Industry

(in 100 million KRW,%)

	2005	2010	2015	2020	2025	CAGR (’05~’25)
Industrial	2,300	2,905	3,758	4,861	6,288	5.2
Service	700	1,536	3,371	7,398	16,235	17.0
Total	3,000	4,441	7,129	12,259	22,523	10.6

Note: 1. Market size for 2005 is from the ministry of Commerce, Industry and Energy

2. Growth rate after 2005 is the estimation from Korea Development Bank based on the data from the National Academy of Engineering of Korea⁵⁾

Source: 1. "Vision for Mid- to Long-Term Development of RT(Robot Technology) Industry," MOCIE, June 2003

2. "Plan for Developing Robot Industry" National Academy of Engineering of Korea, November 2004

⁵⁾ Estimation differ by the investigating party. The Ministry of Commerce, Industry and Energy estimates Korea's robot market to reach 10 trillion won by 2010 before growing to 100 trillion won by 2020 ("Vision for Mid- to Long-Term Development of RT (Robot Technology) Industry," MOCIE, June 2003)

More specifically, technology development will improve the function of robots to exert positive influence in the supply of industrial robots. This coupled with economic and social changes facilitating demand, is projected to deliver a stable growth of the industry. Diversified customer needs will demand multiple products to be produced in small quantities, and robot production is fit to meet such changes. Moreover, reduction in labor force owing to population aging and people avoiding to work in the so-called 3D (Difficult, dangerous and dirty) jobs will strengthen the need for robots. But with the market maturing, the growth rate is expected to fall short of service robot where rapid increase is anticipated.

As for service robots, sharp growth is anticipated due to technological development responding to changes in customer needs, expansion of service in industrial structure and social changes including the increasing elderly population. Furthermore, the share of the service industry is growing in national income and employment. This, coupled with a rise in elderly population and more interest in leisure, will sharply increase the demand for medical and home-service robots. In particular, by taking advantage of the world class IT infrastructure including leading-edge semiconductor technology and Internet network while maintaining close partnership with the next generation PC and other related technologies and industries, intelligent service robots controlled through network will also see its demand rise very fast. Demand will further be fueled with the launch of pilot projects undertaken by the government like the national public robot project.

3. IPTV

3.1. Overview

IPTV is an interactive service where multimedia contents are transmitted as packet via TV sets linked to digital set-top boxes through a high-speed broadband Internet network like ADSL and FTTH. The multimedia contents are something like VOD, t-commerce, entertainment, banking, information, TV portal and multi-channel broadcasting services. IPTV integrates the PC-based Internet communication with multi-channel TV broadcasting service. In other words, it is a new convergence service offering both communication and broadcasting functions with new interactive contents like VOD, EPG, t-commerce and data service linked with TV programs.

3.2. Service Types

IPTV includes existing communications and broadcasting services but at the same time expands to new areas like VOD, interactive data services, and customized communication and broadcasting convergent services. It offers TV based SD/HD digital video services at the SD/HD level that can be enjoyed via cable TV as well as a wide range of interactive data services (t-commerce, t-learning, t-entertainment, t-information and t-communication) and personalized VOS, PPV and PVR services.

Table 2.6 Key Services of IPTV

Service Type	
Digital Video Service	Digital video channel: Real-time offering of SD and HD level digital channels
	Digital audio channel: Variety of audio channels in 5.1 channel quality
Channel Selection Service	PPV: Contents of different movie genres
	VOD: Drama and movie contents
	PVR: Personal Video Recorder
Interactive Data Service	T-info (Weather, news, traffic, local information, lifestyle information)
	T-commerce (Stock, banking, shopping< auction, marketplaces, order delivery)
	T-communication (SMS, TV messenger, T-mail, video-conference, video chatting)
	T-entertainment (Game, karaoke, photo album, etc.)
	T-learning (Toddler, elementary, middle & high school, language, adult learning, certificates)

Source: KT Homepage

3.3. Domestic Market Environment

In the beginning, venture companies who did not own Internet access network entered the market, but most of them had to exit owing to the shortage of investment, experience and competency in the area. Internet TV Networks and Click TV who had launched the Internet TV business in 1999. However, they also had to discontinue their services in 2001 due to accumulating deficit resulting from failure to satisfy QoS (Quality of Service) required by users.

Since then, telecommunication operators have been preparing IPTV as part of their BcN (Broadband convergence Network) business, but the lack of institutional framework and regulatory equity vis-a-vis cable TV operators are delaying IPTV service commercialization. Currently, KT and SK Telecom are offering trial services as part of their BcN business. KT and Hanaro Telecom are offering IP-VOD type TV portal service and are preparing to have their IPTV service ready for launch when regulatory restrictions are lifted.

Table 2.7 IPTV Business in Korea

KT	· IP and VOD type services being offered through Megapass TV (around 10,000 subscribers as of Sept. 2006)
	· IPTV trial service is currently being offered as part of pilot BcN project
	· Acquired “CyduFNH” with KTF in 2005 to secure contents
	· Invested in “Olive Nine” production company in Sept 06. Olive Nine produced hit dramas like “Ju Mong” and “Lovers in Prague.”
SK Telecom	· Pilot service through partnership with TCC (The Contents Company)
	· Plans to offer IPTV service through digital home project and BcN project
	· Acquired IHQ and Seoul Records in 2005
Hanaro Telecom	· Technology being validated through a series of pilot services going back to 2000
	· Acquired Celrun TV at 5.5 billion won for its TV portal service. Established Hanaro Media as a subsidiary
	· Commercial service “Hana TV” launched in July 2006 as IP-VOD service (number of subscribers 50,000 as of Sept 06)
Internet Portal	· Daum is trying to build a total TV portal system through its “DaumTV.net”
	· NHN (Naver) is participating in trial service for home networking TV portal

With many players giving priority to the business, potential for growth seems to be high for IPTV in the paid TV market. According to the Electronics and Telecommunications Research Institute (ETRI), they will be able to secure a subscriber base of around 3.7 million or at least more than 2 million by 2010 as they aggressively push for in the IPTV business.

Table 2.8 Forecasts for Korean IPTV Market

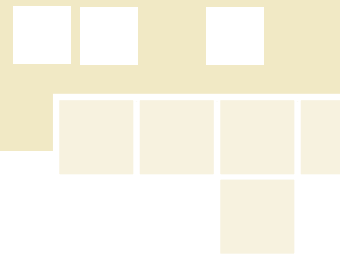
(Scenario/Optimistic/Conservative/Number of Subscribers(Households)/Revenue (100M KRW))

Scenario		2006	2007	2008	2009	2010	CAGR(%)
Optimistic	Number of Subscribers (Households)	670,506	1,484,453	2,540,543	3,318,711	3,701,095	53.3
	Revenue (100M KRW)	1,931	4,074	6,871	8,796	9,664	49.6
Conservative	Number of Subscribers (Households)	479,671	1,009,710	1,555,520	1,845,122	1,958,362	42.1
	Revenue (100M KRW)	1,381	2,764	4,177	4,847	5,086	38.5

Source: Kim, Min-jung et al (2005)



4. WiBro



4.1. Overview

WiBro (Wireless Broadband) is the leading broadband wireless Internet service in Korea that allows users to access Internet at high speed anytime anywhere. Users are able to get Internet access through portable mobile terminal while on the move or rest to enjoy a variety of information and contents. Wibro uses 2.3GHz frequency to offer uninterrupted wireless Internet service even when users are moving at a speed of more than 60km/h. It guarantees 1Mbps or higher speed and can thus provide seamless wireless Internet service.

WiBro service is a new type of wired/wireless convergence service where the need for supplier to develop new service, with voices and broadband markets saturated and explosive growth of wireless data market anticipated, matches with customer interested in enjoying high-speed wireless Internet on the go at low price.

4.2. Service Features and Future Outlook

Technology wise, WiBro service can be positioned as a competing or complementary service, eliminating the gap between wireless LAN and mobile communication service. Wireless LAN offers high-speed broadband Internet access at low price but can only be used in limited areas like within building or campus due to constraints on mobility. It can not provide Internet when users are moving at high speed. Therefore, wireless Internet access via mobile network cannot become a universal service because of its high price and low transmission speed. WirBo complements the shortfalls in all existing services, however. The innovative service delivers the mobility and wide area coverage of mobile networks, and affordability of wireless LAN. Therefore, it is expected to secure wider customer base than other services on the market.

Table 2.9 Comparison of Similar Service

	Wireless LAN	WiBro	Mobile Phone
Transmission speed per subscriber	1Mbps or higher	Around 1Mbps	Around 100kbps
Mobility	Walking	More than 60km/h	More than 250km/h
Terminal	Desktop, Notebook, PDA	Notebook, PDA, Mobile phone	Mobile phone, some PDA
Cell range	About 100m	About 1km	1km~3km
Tariff charge	Fixed price	Usage base + Fixed price	Usage base

In addition, WiBro has now secured positions as international standards with more than 90% of the technology included in WiMAX 802.16e standard. The standard also includes mobility in the MAN (Metropolitan Area Network) standard. As such, Korean equipment and device manufacturers can now leverage their experience in Korea to advance into the global market. Efforts are underway to include WiBro in the 4G mobile communication standardization of ITU-R through the WiBro Evolution Standardization Project. The project is led by Korean companies with the participation of many international players.

The WiBro service is expected to include information search, game, multimedia service, multi-casting service, and wired/wireless integrated messaging, similar to services offered by existing wired broadband services. Furthermore, based on the strength of WiBro technology, a wide range of wireless convergence services will be available, thereby bringing together communication, data, media and commerce. WiBro will provide the services through connection with mobile phone, DMB, high-speed Internet and wireless LAN.

4.3. Domestic Market Environment

WiBro market in Korea is expected to grow to 817.78 billion won in terms of service and 589.02 billion won in terms of equipment by 2010. Besides, WiBro will have strong influence on other ICT infrastructure industries like contents, components and software.

Table 2.10 Market Outlook for Korea After Introduction of WiBro

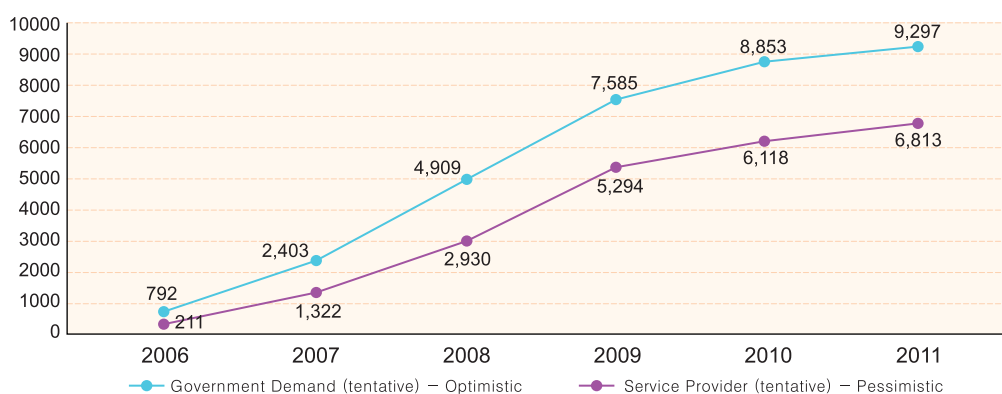
(in 100 million KRW)

	2006	2007	2008	2009	2010	Total
Equipment	15,791	7,856	13,400	11,202	10,653	58,902
Service	1,380	5,875	14,711	25,974	33,838	31,778

Source: Innovation Case Studies (Ministry of Information and Communications, March 2005)

Forecasts on WiBro subscribers in Korea differs by surveyor, but most agree that potential demand is high. In 2006, the first year of service, many predicted that the number of subscribers would easily surpass 211,000 to grow to 6,813,000 by 2011. But despite such rosy forecasts, the number of subscribers up to August 10th since the launch of WiBro service on June 30, 2006 is only 336. Because the service is still in its infancy and is limited to specific regions of Seoul, it is difficult to attract subscription. There are also restrictions on terminal usage as no dedicated device is yet available. As the service is not yet stabilized, operators are also not yet aggressive in promotion and are taking more of a wait-and-see attitude for investing to expand nationwide coverage. For the long term, however, the growth of WiBro service is expected to take off rapidly in Korea as service coverage is expanded and devices that can support DMB, VoIP and IPTV are introduced.

Figure 2.1 WiBro Subscriber Forecast for Korea



Note: Average sales per subscriber assumed to be 30,000 won. Based on government plan (draft)
Source: Han, Sung-soo (2005)

Polarization of the IT Industry

1. Status of Polarization in Korean IT Industry

1.1. Overview

Polarization analysis in IT industry by sector, company size and export-domestic sales show that polarization exists mostly due to performance gap. While the productivity of the hardware industry is steadily improving, the productivity of software industry is stagnating to result in significant productivity gap between the two industries. The size of the gap is also higher than anything we had seen in the past. The performance of large companies as judged from productivity and the profitability indices is significantly higher than those of SMEs in the IT industry with the gap here again being higher than past averages. The gap between export and domestic sales also show the growing gap with export recording healthy growth and domestic sales continuing to be sluggish.

The employment growth in the high performing area surpasses that of the low performing area, showing that polarization based on performance is not leading to income polarization. When looking at sectors, employment in the highly productive hardware industry has returned to upward growth trend while the software industry, with its low productivity, is showing a slight decrease. In terms of company size, employment by large companies, which had decreased during the time of IT recession, is now showing signs of recovery while employment by small and medium-sized companies, which had been stable since the 1997 financial crisis, is recently showing signs of stagnation.

But as employment in Korea lacks flexibility to move in line with changes in productivity, if the performance gap does not improve, it could result in an unwanted side effect, which is income polarization. As such, the performance gap within the same sector or being too dependent on large companies or few strong products in export should be corrected immediately.

1.2. Hardware and Software

1.2.1. Performance Gap (Based on Productivity)

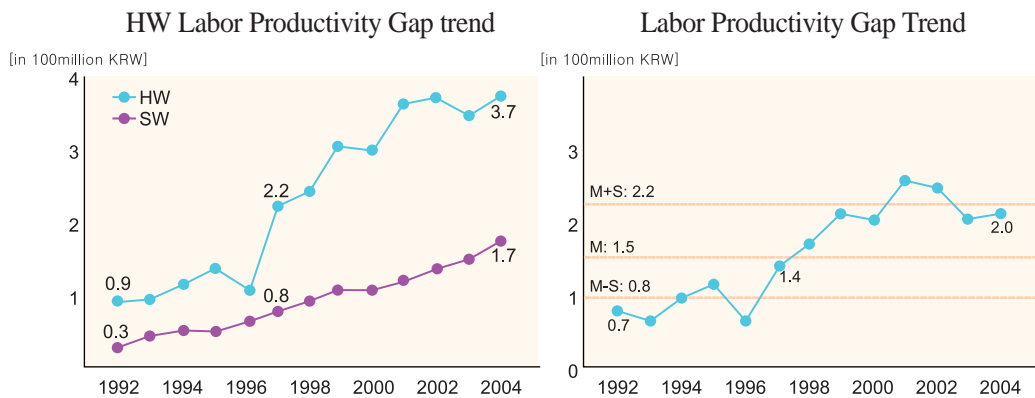
Whereas the continuing productivity growth is evident in the hardware

1. Status of Polarization in Korean IT Industry

industry, the productivity growth in the software industry is stagnating, resulting in a widening productivity gap between the two industries. The labor productivity in hardware grew from 220 million won in 1997 to 370 million won in 2004 while that of the software industry rose only marginally from 80 million won to 170 million won.

The productivity gap between the two industries now far surpasses the average gap we have seen since the 1990s. The average productivity gap from 1992 to 2004 was 150 million won with a standard deviation of 70 million won. But the gap between the hardware and software industries in 2004 was 200 million won, which is near the average+standard deviation (220 million) for the entire period. In other words, the productivity in hardware far exceeds that in software and the fact that the gap surpasses past averages confirms polarization resulting in performance gap.

Figure 3.1 HW-SW Productivity and Productivity Gap Trend in IT Industry



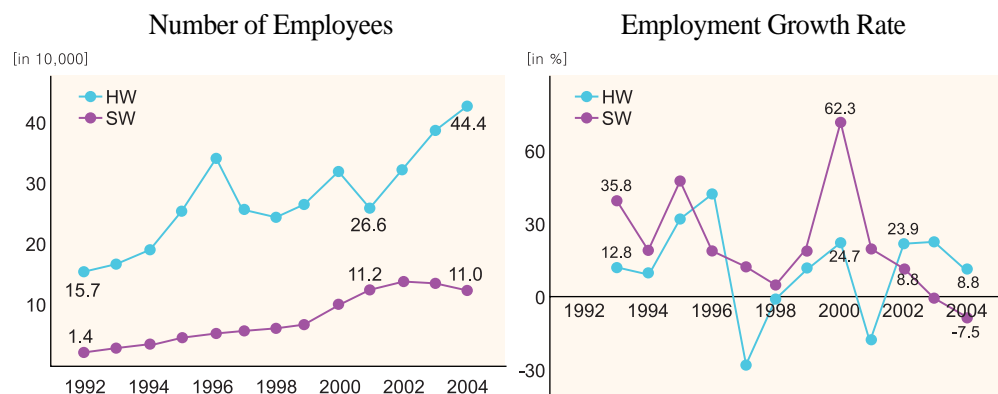
Note: 1) HW: IT equipment and IT component, SW: package software and computer related services
 2) Labor productivity = Production in KRW/Number of full time employees
 3) M=Mean, S=Standard deviation
 Source: KAIT

1.2.2. Changes in Employment

Employment in the hardware industry has been stable since 2001 but that of the software industry is showing signs of slight decline. Employment in hardware industry rose by 178,000 from 266,000 in 2001 to 444,000 in 2004, while that of the software industry declined by over 2,000 over the same 3-year period from 112,000 to 110,000. The employment rate of the software industry started to slowdown in 2002 to 8.8% after peaking at 62.3% in 2000 before dropping to -7.5% in 2004 resulting in an overall slight decline.

Considering that employment is steadily rising in the hardware sector where productivity has been improving significantly while it is going down in software where productivity gain has been relatively smaller, it is difficult to judge if there is an income polarization between the hardware and software industries.

Figure 3.2 Number of Employees and Employment Growth Rate by Industry



Note: HW: IT equipment and IT component, SW: package software and computer related services
Source: KAIT

1.2.3. Hardware Industry

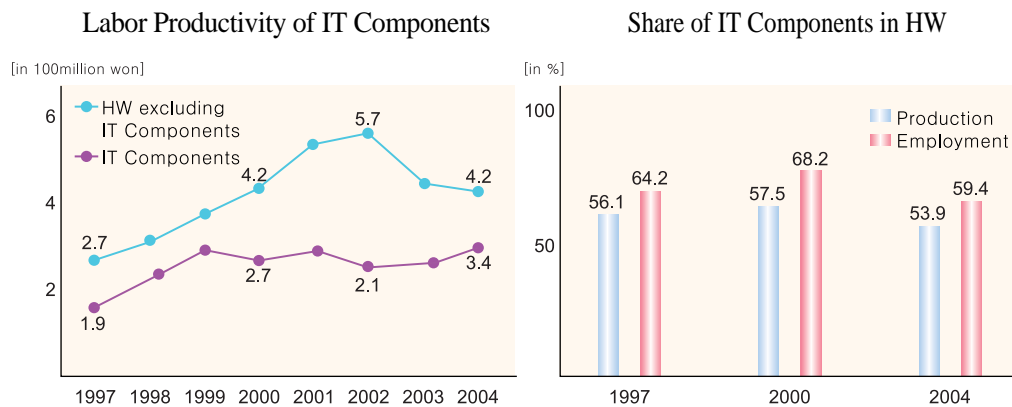
In the hardware industry, IT equipments were able to significantly improve its productivity through restructuring efforts after experiencing financial crisis. But recently, it is posting a downward turn in productivity. Looking at hardware

productivity, excluding IT components, it rose sharply from 420 million won in 2000 to 570 million won in 2002 before dropping to 420 million won in 2004.

As for IT components, although productivity growth has been evident since the IT industry recession of 2001, improvement has been rather weak. The productivity of IT components has been showing small yet steady gain from 270 million won in 2000, 290 million won in 2002 to 340 million won in 2004.

IT components account for 54% of total production, 59% of employment in the hardware industry and its productivity was 340 million won as of 2004, lower than the 420 million won of the hardware industry excluding IT components, showing the need for productivity improvement in the sector.

Figure 3.3 IT Component in Hardware Industry



Note: Labor productivity = Production in KRW/total number of employees
Source: KAIT

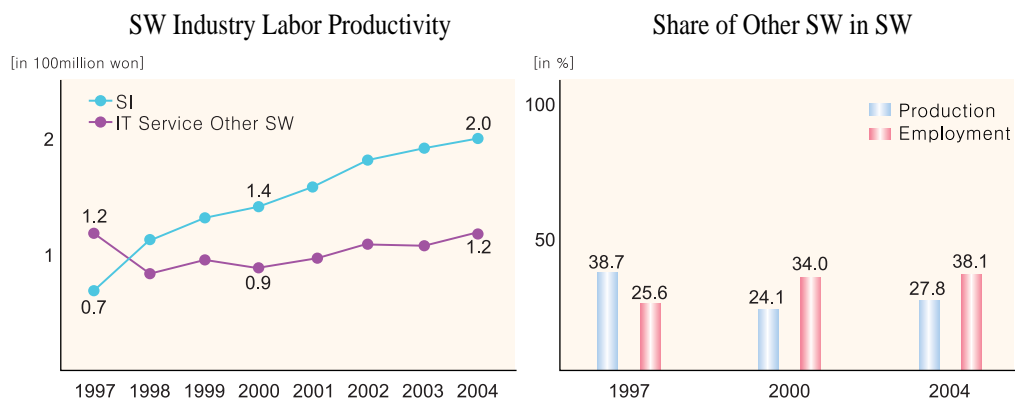
1.2.4. Software Industry

Although the productivity in the IT service sector of the software industry has been gradually improving since the financial crisis, other parts of the software industry are not showing much of a difference compared to during the financial crisis. The productivity of the IT service sector rose by 130 million won from 70 million won in 1997 to 200 million in 2004. But the productivity

in other sectors, excluding IT service, cannot be said to have experienced improvement as it moved from 120 million won in 1997 to 90 million won in 2000, then to 120 million in 2004.

The productivity in IT service (Computer related service), which account for 72% of total production and 62% of employment in the software industry, stood at 200 million won in 2004, higher than that of the entire software industry, excluding IT service, which was worth 120 million won. The number of software companies, excluding SI, accounted for 60.2% of the software industry in 2004, showing concentration of SMEs in other software sectors.

Figure 3.4 Production Trend by Sector within the Software Industry



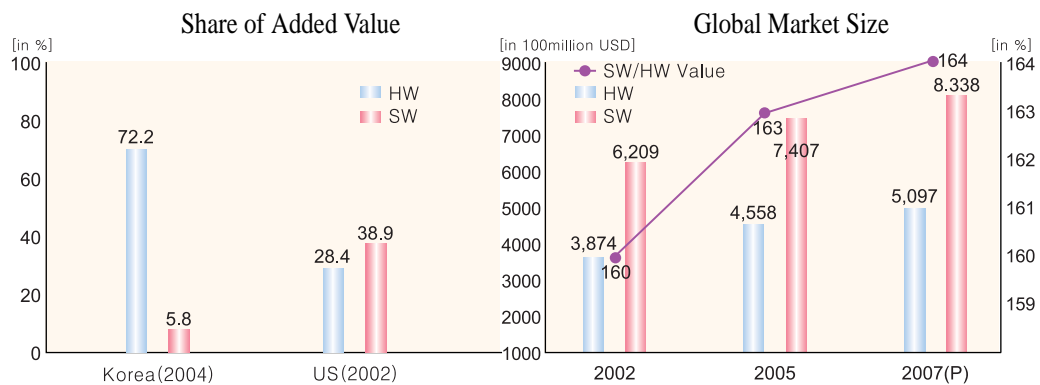
Note: 1) Productivity=Production in KRW/Number of employees
 2) IT service refers to computer related services, SI excluded: Package software + contents + database industry
 Source: KAIT

1.2.5. Imbalanced Growth of Hardware and Software Industries

Globally in terms of market size, the added value of software is higher than hardware. But in Korea, the growth of software is significantly lagging behind hardware. According to IDC, the global market size of hardware in 2005 was worth 455.8 billion dollars while software stood at 740.7 billion dollars. The

hardware and software industries are expected to grow to 509.7 billion dollars and 833.8 billion dollars, respectively in 2007 and the software industry is expected to grow further in market size. The data of the Department of Commerce of the U.S. shows that added value for hardware was 28.4% and software, 38.9% in the total value-added score for 2002. The same data for Korea in 2004 showed hardware at 72.2% and software at 5.8%, reflecting a heavy skew be heavily towards hardware.

Figure 3.5 Share of Added Value and Global Market Size



Source: (Left) KAIT, Department of Commerce (US)

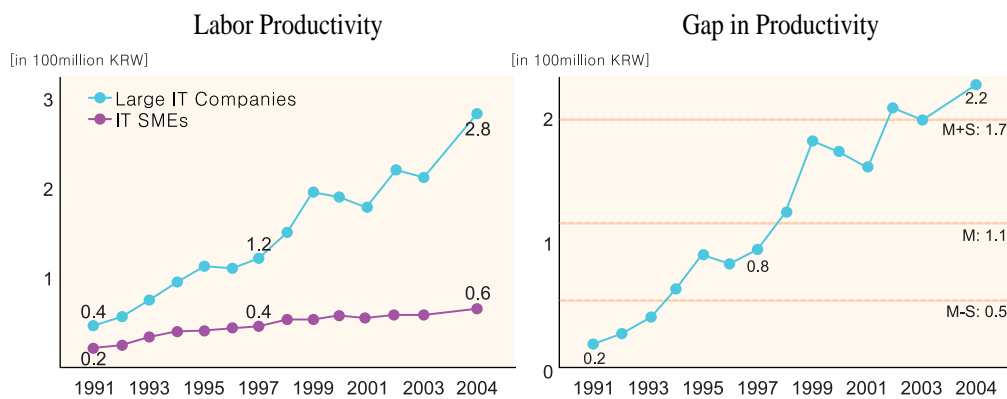
1.3. Large Companies and SMEs

1.3.1. Gap in Performance (Based on Productivity)

Although the productivity of large companies in the IT industry has improved measurably compared to the past, that of SMEs is lagging behind to result in the expanding productivity gap. In fact, while labor productivity of large IT companies rose by 160 million won from 120 million won in 1997 to 280 million in 2004, that of SMEs rose by 20 million won from 40 million won to 60 million won during the same period. The productivity gap from 1991 to 2004 on average stood at 110 million won with a standard deviation of 60

million won. The productivity gap between large companies and SMEs in 2004 was 220 million won, which is higher than 170 million won, sum of standard deviation and average over the entire period.

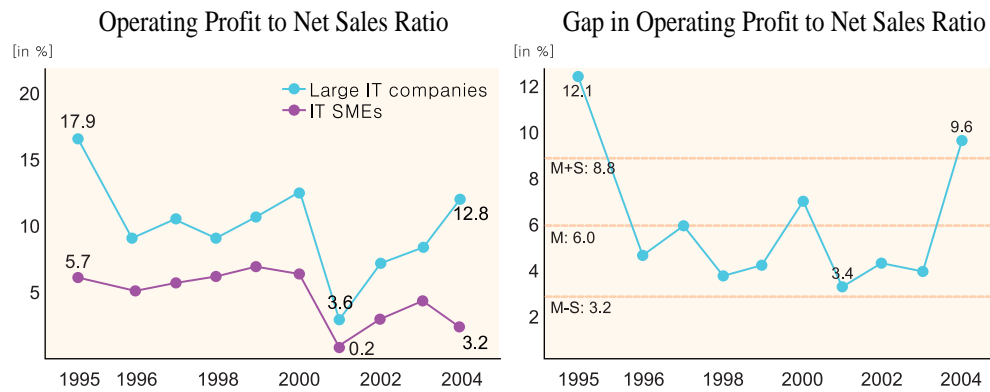
Figure 3.6 Labor Productivity and Gap between Large IT Companies and SMEs



Note: 1) SMEs: With less than 300 employees
 2) Labor productivity= Added value / number of employees 3) M=Mean, S=Standard deviation
 Source: Statistical Survey of Mining and Manufacturing Industries, National Statistical Office

Whereas the profitability of large IT companies has been rising sharply since 2001 when the IT industry went through a recession, the profitability (the ratio of operating profit to sales) of IT SMEs is rising only marginally. The ratio operating profit to net sales of large IT companies in 2001 went up from 3.6% in 2001 to 12.8% in 2004 but that of IT SMEs rose slightly from 0.2% to 3.2% during the same period.

Figure 3.7 Operating Profit to Net Sales Ratio and Gap between Large IT Companies and SMEs

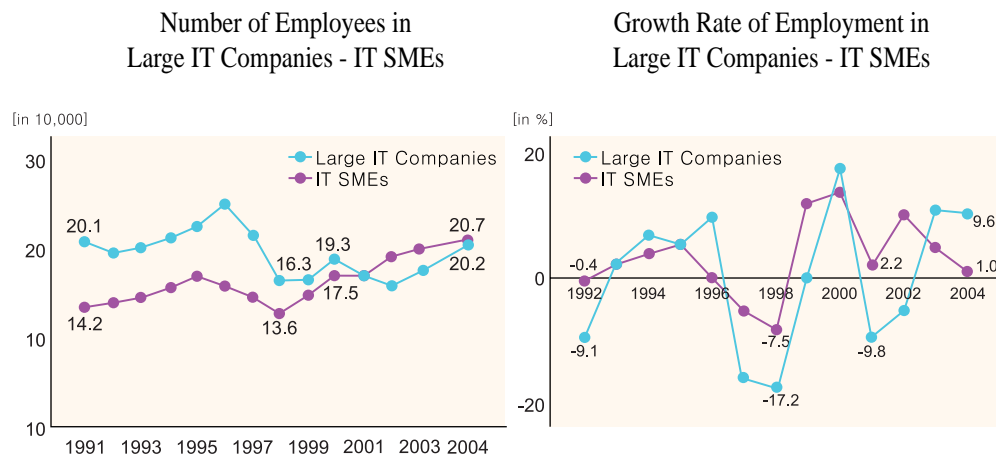


Note: M=Mean, S=Standard deviation
Source: Bank of Korea (2004)

Recently, in 2004, the profitability gap between large IT companies and SMEs widened to 9.6%, which is higher than 8.8%, the sum of average of past gap and standard deviation. IT SMEs profitability in 2004 was 3.2%, which is lower than 4.5%, the average profitability of SMEs from 1995 to 2004. There are concerns about polarization as productivity and profitability of large IT companies in recent years far exceed those of IT SMEs, and the gap is also greater than past averages.

1.3.2. Changes in Employment

Employment in large IT companies enjoying healthy improvement in productivity and profitability has been rising steadily from 2002 but employment in IT SMEs whose jump in productivity or profitability has not been that significant is rather stagnating. As such, it is difficult to conclude that income polarization based on company size is evident in the IT industry.

Figure 3.8 Number of Employees and Growth Rate in Large IT Companies and IT SMEs

Note: SMEs: With less than 300 employees

Source: Statistical Survey of Mining and Manufacturing Industries, National Statistical Office

1.4. Export and Domestic Sales

1.4.1. Gap in Growth (Based on Growth Rate)

Since the recession in the IT field in 2001, exports in the IT industry has recovered greatly to maintain a high growth rate in range of 25~30%, but the recent won depreciation and rise in oil prices is slowing down growth. The IT industry exports had posted a high growth from 24.4% in 2003 to 29.9% in 2004 but it dropped to 9.2% in 2005⁶⁾.

At the same time, saturation in IT service market coupled with weakened demand for telecommunications, information and broadcasting equipment is stagnating domestic sales. The growth of domestic sales in the IT industry was 4.0% in 2003, 7.8% in 2004 and 2.4% in 2005⁷⁾, showing relatively lower growth compared to export. Such numbers are far below 22.0%⁸⁾, the average growth rate of domestic sales from 1995 to 2004.

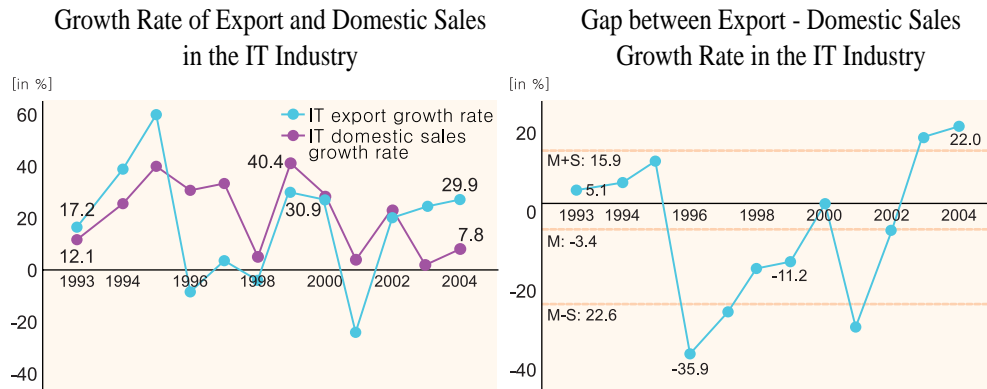
The strong export and weak domestic sales are leading to the performance gap between the two in the IT industry and the gap is higher than -5.8%, the average of the gap from 1995 to 2004.

⁶⁾ 2005 export growth rate is an estimate from KAIT and includes only hardware industry

⁷⁾ 2005 domestic sales growth rate is an estimate from KAIT and includes only hardware industry

⁸⁾ Numerical mean

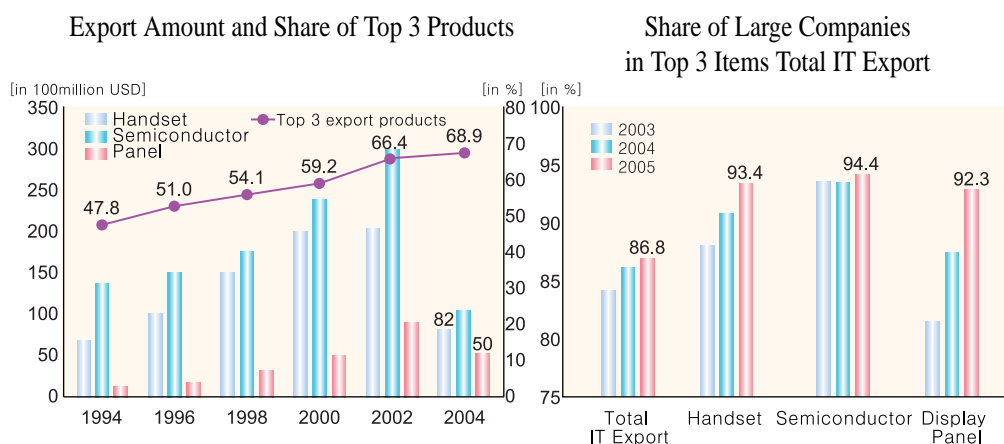
Figure 3.9 Growth Rate and the Gap of Export and Domestic Sales in the IT Industry



1.4.2. Increasing Dependency on Small Number of Products and Large Companies in Export

Despite the healthy growth in export, Korea's IT industry is too dependent on a small number of products for export to be vulnerable to external changes like rise in oil prices and weakened dollar. The share of the Top 3 export products - mobile handsets, semiconductors and display panels - has been rising steadily from 47.8% in 2001 to 54.1% in 2003 and to 66.4% in 2005 to prove too much dependency on a set number of items.

Dependency on large companies in IT export is also growing from 83.8% in 2003 to 86.8% in 2005. In particular, the dependency on large companies manufacturing the above-noted Top 3 products is more than 90%. As of 2005, dependency on large companies for the Top 3 products are: 93.4% on mobile handsets, 94.4% for semiconductors, 92.3% for panels.

Figure 3.10 Share of Large Companies in the Export of the Top 3 Product

Source: IITA

1.4.3. Weak Export Contribution from Commodity-type Components

Export of IT components is on the upward trend but the contribution of commodities excluding semiconductor and panel to export is still very insignificant. Whereas, the share of semiconductors and panels in the IT component export rose from 85.7% in 2002 to 95.9% in 2005, commodity-type components excluding semiconductor and panel actually declined from 14.3% in 2002 to 4.1% in 2005.

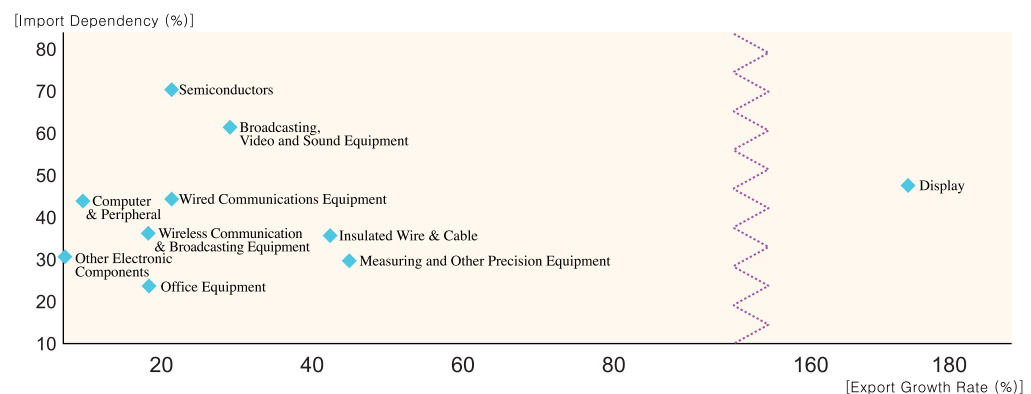
2. Causes of Polarization of the IT Industry

2.1. Uncompetitiveness of the IT Components & Materials Industry

2.1.1. High Dependency on Import in Key IT Items

Import dependency for intermediate goods in the IT industry stands at 49%, which is double the entire industry average of 23%. The import dependency of computer, office equipment, video and communications equipment is more than 40% while wireless communications and broadcasting equipment is 56% and semiconductors 69%. Even the display industry with its high export growth imports 43% of its intermediate goods. They reflect the realities of the Korean IT industry where strong growth in export is not leading to growth in domestic demand.

Figure 3.11 Dependency on Imported Intermediate Goods and Export Growth in the IT Industry



Source: Industry Input-Output Table, Bank of Korea (2000)

Table 3.1 Inducement Coefficient of Import of Key IT Components

	Semiconductor	TFT-LCD	Other Electronic components	Wireline Communication	Wireless Communication	Computer
Inducement Coefficient of Import	0.503	0.544	0.350	0.448	0.489	0.551

Note: Inducement coefficient of import= (△Directly/indirectly induced import)/(△One unit growth in final demand)
 Source: Bank of Korea

The high dependency of import in IT intermediate goods has the potential to weaken market adaptability of finished IT goods⁹⁾, as they are directly linked to the competitive strength of the entire IT industry. We need to first set up a virtuous cycle in the industrial structure, upgrade the intermediate goods industry (components/materials) and secure a strong competitive edge in technology.

2.1.2. Lack of Original Basic Technologies

Lack of basic original technologies mean that the localization ratio of components in key IT products is not very high in Korea. According to the 2005 data, component localization ratio for key IT products was 40% for PDP, 40% for TFT-LCD, 60% for digital TV, 60% for PDA and 50% for PC. Moreover, because of high dependency on Japanese core components, the trade deficit in IT components with Japan rose from 3 billion dollars in 2002 to 3.84 billion dollars in 2004. Key components imported from Japan include SoC, and devices. In terms of technology competitiveness in IT components, Korea is in the top group in memory and display. But it is behind Japan in other areas and the gap with China is also narrowing.

2.1.3. Small in Size and Lack of Competitive Strength

More than 98% of IT components and materials makers are SMEs while their added value is 23%, demonstrating a weak profit structure of a majority of SMEs.

⁹⁾ In the modern society with an ever-changing consumer demand, securing components and/ or materials fitting to the company's product requirement in timely fashion is becoming difficult. As such, there could be delay in immediate product differentiation.

Korean IT components and materials makers have smaller number of items enjoying competitive edge in trade when compared to the U.S. or Japan. Looking at the International Competitive Index¹⁰⁾ for 2004, Japan has 63 products enjoying competitive advantages in export while Korea had 31 clearly showing that Korea is lagging behind Japan in terms of diversity in products with competitive edge. At the same time, in terms of inferior products in IT components and materials, Japan had only 10 while Korea had 42, which means that Korea has to be dependent on import for many components and materials. As for the U.S., it had 38 superior products and 35 inferior products to get ahead of Korea in diversity and competitive edge in the IT components and materials sector.

2.2. Weak Growth Foundation for Software

2.2.1. Internal Trading with Affiliates

As the software industry is very much dependent on internal trading mainly with affiliated companies, it is very difficult for SMEs to grow as a large software maker. As of 2004, large companies' dependency on internal trading was very high with 66% for Samsung SDS, 40% for LG CNS, 69% for SKC&C, 67% for POSDATA and 93% for the Korea Electric Power Data Network. But only Samsung SDS was ranked within the global Top 100 IT service and package vendors at number 90.

Factors weakening profitability and competitive strength of small to medium sized software vendors include unreasonable contract process in the public sector along with unfair subcontracting practice between large companies and SMEs. Looking at the share of Korean-made software in 2005, they were: 27.1% for government/public sector, 27.0% for manufacturing, 24.9% for financial, 11.6% for distribution, 5.7% for telecommunications and (3.7%) for educational/medical service. Because the public sector - the largest customer for local software - typically signs one umbrella contract with large IT service vendor, chronic problems like IT service companies selecting software vendor at its own discretion and exerting heavy pressure for price discounts are still very

¹⁰⁾ International Competitive Index=(Export-Import)/(Export+Import). Range of ICI is -1~1 and items

prevalent. According to the 2005 report of KIPA (Korea IT Industry Promotion Agency), most of the 5,000 software members of KIPA said they had experienced unreasonable demand when participating in software-related contracts for public sector and the 50 CEOs of Korean software vendors identified having a separate contract for software and IT service in projects for the public sector as one of most urgent issues.

Moreover, unreasonable cut and non-payment of subcontract fees, not drawing up of a subcontract agreement and other violation of laws related to subcontracting is hurting profitability and the competitiveness of small- and medium-sized software vendors. A research into non-payment of subcontract fees by the Fair Trade Commission from January 2003 to March 2005 shows that 8 large IT service companies including LG CNS have failed to pay fees and delay charges (total 570 million won) to 208 SMEs for 296 contracts. During the same period, Samsung SDS and other large IT service companies failed to pay a total of 70 million won of delay charges on advance payment to 118 SMEs for 185 contracts.

2.2.2. Shortage of Original Technologies and High Quality Professional Human Resources

One of the issues in the software industry is that the shortage of original basic technologies and professional human resources in high-value added sectors is increasing companies' dependency on technologies from specific foreign vendors. For example, 99.9% of desktop PC operating system is Microsoft Windows and 68.3% of DBMS is Oracle. The Korea software industry will suffer from lack of high quality professional human resources in every area of software from embedded, package to digital contents. While much human resource is required for embedded software, we see unnecessary low to mid-level human resources concentrating on IT service or package software resulting in industry-wide inefficiency.

2.2.3. Low Awareness on the Value of Local Software and Piracy

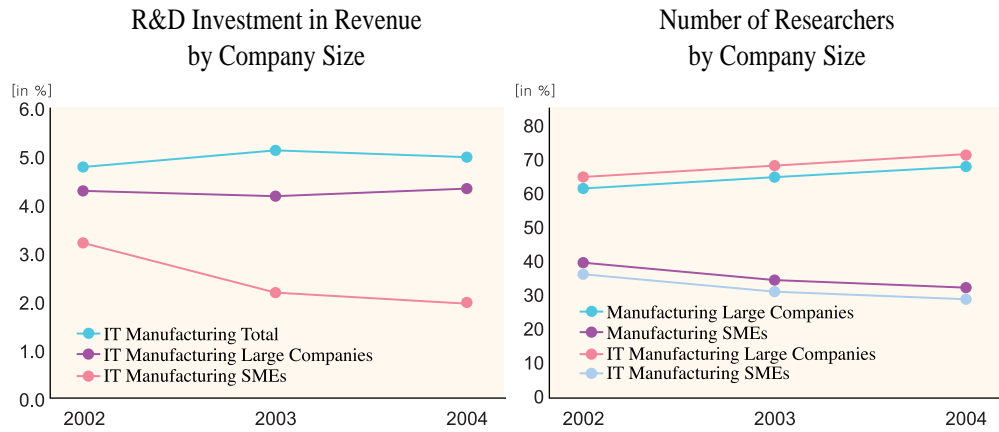
The lack of awareness on the value of local software is keeping prices of local packages lower than imported ones while the continuing practice of illegal copying or piracy is hindering the profit growth of the companies. Usage of local software in the top 15 companies in Korea is less than 20% to illustrate low level recognition on the value of local products. At the same time, the piracy rate is over 30% making Korean software vendors more difficult to achieve profit. In fact, the usage of local software among the top 15 companies in Korea grew by only 1% from 15.8% in 2001 to 16.9% in 2004, while the piracy rate of local software stood at 32.2% in 2005.

2.3. Weak Growth Foundation for IT SMEs

2.3.1. Weak Innovative Capabilities for Innovation for IT SMEs

The base for innovation is found to be weaker for IT SMEs when compared to large companies. In particular, in terms of base for innovation such as R&D investment and number of researchers, the gap between large and small companies has been growing in the IT industry with an even wider gap expected in the future.

Figure 3.12 R&D Investment and Number of Reserchers by Company Size



Note: Share of R&D investment in revenue=R&D investment/Revenue, Share of researchers=Number of researchers/total number of researchers within the relevant industry

Source: Science and Technology Research Activity Survey Report, Ministry of Science and Technology and Corporate Business Analysis, Bank of Korea

The share of R&D investment in revenue for large companies in the IT industry grew from 4.9% in 2002 to 5.2% in 2004 or by 0.3%p, while that of SMEs declined from 3.3% to 2.3% or by 1.0%p during the same period. Share of researchers by company size also saw a similar trend. While that of large companies rose from 64.7% in 2002 to 72.7% in 2004, SMEs declined from 30.1% to 27.3% during the same period. Moreover, the difference in share of researchers by company size in the IT industry is greater than any other difference in all manufacturing sector.

2.3.2. Weak Competitiveness of Mid-Sized IT Companies

The share of mid-sized companies¹¹⁾ in IT manufacturing is 1.9%, which is higher than the 0.5% of the entire manufacturing sector, but productivity (added value per person) of mid-sized companies in the IT industry for 2004 was worth 100 million won, which is significantly lower than the 160 million won registered by mid-sized companies in the entire manufacturing sector. In particular, while productivity of large IT companies is higher than that of large companies in manufacturing, for mid to smaller sized companies, productivity is actually lower for those in the IT industry.

¹¹⁾ Companies with more than 300 but less than 999 employees

Table 3.2 Labor Productivity by Company Size (2004)

	Whole Manufacturing			IT Manufacturing		
	Large Company	Mid Size	SME	Large Company	Mid Size	SME
Productivity (in 100M KRW)	2.6	1.6	0.6	3.2	1.0	0.6

Note: Productivity=Added value/Number of employees

Source: Statistical Survey of Mining and Manufacturing Industries, National Statistical Office

Weak competitiveness of mid-sized companies which can serve as the bridge holding the partnership of large and small companies together could result in the imbalance of the corporate eco-system within the IT industry. Accordingly, the global competitive strength of mid-sized IT companies is essential to improve the competitiveness of Korean IT industry in the global market.

2.3.3. Weak Win-win Partnership Network among Large and Small Companies

The relationship between large companies and SMEs is mostly vertical and unilateral with large companies wielding more power. As such, excessive demand for price cut coming from large companies has become a chronic issue to make any profit growth by SMEs very difficult. According to the research by KAIT in 2006 on the challenges of subcontracting, IT SMEs identified demand for price cut as the biggest problem (32.7%) followed by failure to meet subcontract payment deadline (33.1%), practice of tendering the lowest bid (16.4%), and unscheduled issuance/cancellation of order (7.7%). The biggest problem of demand for price cut seems to come from large companies shifting the burden of worsened business environment resulting from FX fluctuation, hike in oil prices and raw materials directly to SMEs.

3. Way to Overcome Polarization of the IT Industry

3.1. Overview

The high growth of the IT industry was led by the hardware industry and large companies, which in part contributed to the problem of polarization within the IT industry. In fact, the share of production of hardware and large companies in the IT industry amounted to 71% and 78%, respectively in 2005. To eliminate the polarization owing to performance gap in sector and size, we need, above all, to root out the structural sources or the problems within the industry. In other words, the government needs to adopt policies that distribute resources to help improve the competitive edge of IT components and materials industry, promote the growth of software industry and create a solid foundation for growth for IT SMEs. Moreover, eliminating structural problems of polarization goes beyond simply correcting the wide gap. It should rather be recognized as an essential step to create a new growth driver to sustain growth within the IT industry.

In this section, we identify the need to promote the growth of software, IT components and materials and IT SMEs based on the status and issues identified in hardware, software, IT components and materials, finished goods, large IT companies and IT SMEs.

3.2. Promoting the Growth of the Software Industry

In the Korean IT industry, hardware plays a significant role, taking up 70% of production and 99% of export. Although we have world-class products in memory, LCD and mobile handsets, Korean companies account for single digit market share in software despite its substantial market size. At the same time, although the hardware - driven IT industry has achieved strong growth so far, we need to seek ways to grow the software industry, which has higher added value than hardware to realize continued growth and to reach an income of 30,000 dollars per capita.

Although the global software market is worth 711 billion dollars, which is 61% of the total IT in 2006, the size of the Korean software industry is only 1% of the global market to stand at 7.4 billion dollars. At the same time, the

3. Ways to Overcome Polarization of the IT Industry

competitive strength of Korean hardware makers is weakening owing to relocation of production facilities overseas; increasing dependency on imported core components; rising market share of late comers like China in low-end hardware market. In terms of employment, compared to the hardware industry where we see accelerated automation, the software industry still has some potential for employment growth and in reality, although software accounts for 5.8% in value-addedness, it has 16.4% of the jobs in the Korean IT industry.

Moreover, with the coming era of ubiquitousness and digital convergence - a trend that is now spreading from IT to other industries - the importance of software as the core industrial infrastructure is growing. Leading global IT companies have adopted the strategy to focus on brand, R&D, marketing service/software as they have high added value in the value chain. As such, the Korean IT industry also needs to shift its paradigm from a hardware-centric to a software- and service-centric process.

In particular, the proliferation of convergence and digitalization is enhancing the importance of embedded software as the software closely connected to network and hardware. Embedded software is typically built in the hardware to be responsible for control, communication, multimedia and artificial intelligence. It became a 100 billion-dollar market globally in 2004 but the size in Korea only amounts to 5 billion dollars. Of this, the global IT-related market size is 43 billion dollars, while Korean IT-related market size stands at around 3.5 billion dollars.

Table 3.3. Rationale for Promoting the Growth of the Software Industry and Future Direction

Issue	Reasons for Promoting Growth of Software Industry	Future Direction
<ul style="list-style-type: none"> ■ Hardware · Export concentrated on a smaller number of items vulnerable to environment change · Transfer of simple assembly facilities to China, dependent on advanced countries for core components · Saturated domestic market 	<ul style="list-style-type: none"> · High value added industry - Global software market is 1.6 times larger than hardware · Creates jobs · Linked to the advancement of the hardware industry - Embedded software can make hardware lighter, support multimedia, network and saves power 	<ul style="list-style-type: none"> ■ Hardware · Diversify export products and explore new markets · Promote the growth of high value added IT components - Select and support areas with high added value with a strong ripple effect throughout the IT industry · Seek to make SMEs in IT component sector bigger and more specialized
<ul style="list-style-type: none"> ■ Software · Low share of software industry <ul style="list-style-type: none"> - Production 9%, export 1% ('04) · High dependency on imported packaged software with high added value and lack of differentiated software industry · Shortage of original technologies and professional human resources · Market formed around domestic demand · Immaturity in industrial conditions like unfair trade practices and illegal copying or piracy 	<ul style="list-style-type: none"> - Embedded software is typically closely linked to hardware (mobile phone, digital TV, etc.) and can therefore leverage our strength - But packaged software and IT service sectors pose high entry barrier to Korean companies thanks to lock-in effect and global players enjoying first mover advantage in the market 	<ul style="list-style-type: none"> - M&A, collaboration, strategic partnership · Develop resources, support technology partnership - Develop resources to secure original technologies and support partnership with leading technology owners ■ Software · Promote top talent in software <ul style="list-style-type: none"> - In particular, high quality resources are needed in embedded software that can be linked to advancement of hardware industry and where Korea has weak first mover advantage · Support export <ul style="list-style-type: none"> - Policies supporting the export growth of digital contents mainly through the game industry · When issuing orders to SIs in the public sector, guarantee unit price and ensure transparency in transaction to improve the profitability of SMEs

3.3. Promoting the Growth of IT Components and Materials

The advancement of IT components and materials industry can result in virtuous cycle between components & materials with finished goods depending on the relevancy to the finished goods sector. In other words, the advancement of IT components and materials industry, which makes intermediate goods, determines quality and competitive edge prices of finished goods, which ultimately impact the export performance of the finished goods of the IT industry.

In addition to enhancing the competitive edge of finished goods, the reason for the need to promote the growth of IT components & materials industry includes growing demand for high-functional, very compact IT products with the emergence of digital convergence. As industrial segments overlap, IT products are converging for new services. For example, mobile handsets now not only need to handle voice calls, but also offer high end functions like camera and MP3. The emergence of home network is demanding traditional white appliances to transform into high-tech appliances with embedded IT convergence technologies.

But of the IT component and materials imported to Korea in 2004, what we can call core component technologies - i.e. IT-SoC - amounted to 19.8 billion dollars to account for 62.8% of total import. DSP (Digital Signal Processor), USB (Universal Serial Bus) and other intellectual properties are also mostly imported. As IT-SoC is the condensed technology enabling the convergence service, we need to develop original technologies that will help strengthen the competitive edge of IT products to realize the advanced technologies required to produce convergence IT products.

Furthermore, we can no longer find distinctive differences among companies in production and assembly of IT products around the world while Chinese finished goods makers are growing fast, leveraging on low wage and shorter product life cycle. They are, in other words, all clear reasons demanding for structural change in the Korean IT industry, which up to now have been too focused on finished goods. The recent sharp growth of finished Chinese IT goods makers and catch up in technologies are weakening price and technology competitiveness of the Korean IT industry. At the same time, shortened product

life cycle and rapid changes in technology innovation are making it difficult for the finished goods-oriented Korean IT industry to continue to create high added value. As such, the Korean IT industry needs to promote the growth of intermediate products and high-end components & parts to secure the original source technologies to shift the industry's structure to be more intermediate goods-oriented.

3. Ways to Overcome Polarization of the IT Industry

Table 3.4 Rationale for Promoting the Growth of IT Components & Materials Industry and Future Direction

Issue	Reasons for Promoting Growth of IT Components and Materials Industry	Future Direction
<ul style="list-style-type: none"> ■ IT finished goods · Export concentrated around a small number of items <ul style="list-style-type: none"> - Mobile handsets (35.3%), Monitors (14.7%) · High import dependency in core components for IT finished goods · Emergence of China weakening competitive strength of Korean companies · Shortened IT product life cycle and technology innovation adding pressure to companies 	<ul style="list-style-type: none"> · Advancement of IT components and materials industry facilitates the growth of the finished IT goods industry by creating virtuous cycle. · Increased demand for high functional finished IT products with emphasis on convergence <ul style="list-style-type: none"> - Demand for highly dense and compact IT components on the rise · Need to transform IT industry structure to be centered around components and materials <ul style="list-style-type: none"> - Shortened life cycle of finished goods increasing burden to companies - Growth of Chinese finished goods makers leveraging low wage worsening price competitiveness of Korean finished goods makers. 	<ul style="list-style-type: none"> ■ Finished IT goods · Explore new markets and develop differentiated products <ul style="list-style-type: none"> - Analyze the demand of new markets to sell mature products - Development strategy should focus on differentiating from existing premium markets (e.g. handset market) · Joint technology development based on close collaboration between IT finished goods and IT component makers · Analyze technology life cycle to identify business areas in alignment with market structure and demand
<ul style="list-style-type: none"> ■ IT components and materials · Export concentrated around a small number of items vulnerable to external changes <ul style="list-style-type: none"> - Export contribution of semiconductor and panels: 95.9% (2005) · Lack of basic technologies for next-generation IT components with high growth potential <ul style="list-style-type: none"> - Import share of IT-SoC: 62.8% · Competition between small component makers intensifying <ul style="list-style-type: none"> - Share of SMEs: 98% - Share in added value: 23% · Mistrust of large companies on technology competency of component makers and lack of awareness on the importance of joint growth 		<ul style="list-style-type: none"> ■ IT components and materials · Select and grow areas with high potential for added value and impact to the IT industry (e.g.: IT-SoC) · Grow workforce needed to secure basic technologies. Support partnership with advanced technology companies · Induce IT components and materials companies to become larger and more specialized <ul style="list-style-type: none"> - Attract foreign investment and promote M&A. Create clusters within the industry · Create the right legal and regulatory frameworks to support international patent registration and dispute resolution · Develop support measures to lead global standardization in new industries

3.4. Promoting the Growth of IT SME Start-ups

As continuous increase in wage and fast emergence of China are making existing large company-focused growth strategy useless or invalid, there is a growing need to explore new engine for growth in the IT industry by promoting the advancement of innovative SMEs. Innovative SMEs have the advantage of being able to act as the backbone of global economy as they have higher value added technology, stronger productivity and profitability, and are more committed to continuous technology innovation when compared to other SMEs. In fact, when it comes to the R&D share in 2004, while general SMEs stood at only 2.2%, Inno-Biz or innovative SMEs recorded 7% and venture start-ups 6.4%. The number of Inno-Biz or innovative SMEs stood at 10,613 for all industries and 4,725 for the IT industry in 2004.

Innovative SMEs with strong competitiveness for innovation and high profitability are also necessary to help eliminate the polarization between large companies and SMEs in the IT industry. Also, growing IT SME start-ups will further facilitate competition between SMEs as well as between large IT companies and SMEs, which will further contribute to improving large-company oriented IT eco-system and strengthen the competitive edge of the IT industry.

But the numbers show that the growth contribution of SME start-ups in the IT industry is lagging behind that of advanced countries and our competitors. You can recognize such trends through the share of revenue based on the total number of companies. The share of SMEs in the number of companies within the IT industry was 98.2% for Korea but 97.8% for Taiwan, 99.2% for Japan, 85.7% for the U.S., 99.8% for UK and 99.7% for Germany.¹²⁾ But the share of SMEs and venture start-ups in revenue was 28.5% for Korea, 31.5% for Taiwan, 34.4% for the U.S., 52.4% for UK and 43.2% for Germany.¹³⁾

The increase of IT SMEs with strong competitive edge can ensure not only the survival of IT SMEs, but also act as the foundation for growth for large companies through the efficient supply of components and materials. However,

¹²⁾ Based on data from Korea (2004), Taiwan (2003), Japan (2002), U.S (2001), UK (2003), and Germany (2000).

¹³⁾ Based on data from Korea (2003), Taiwan (2003), U.S (2000), UK (2003), and Germany (2003).

3. Ways to Overcome Polarization of the IT Industry

the import dependency on the IT industry is 48.8% in Korea, which is very high compared to average of other industries(23.0%). This means that the competitive strength of Korean IT SMEs alone is rather low. At the same time, organic and flexible partnership between large companies and SMEs in the IT industry can strengthen the industry's competitive edge. In the case of Taiwan, specialization allowed IT SMEs to secure quality growth and flexibility while close partnership with large companies also helped expand their share in the global IT hardware market.

As consumer needs for IT products are becoming diverse, the role of SMEs that can develop products and technologies for special niche markets is being emphasized. More specifically, large IT companies are limited in targeting niche markets that fulfill diverse consumer needs as they determine business priorities based on ROI and require target markets to be of certain size. But such hurdles do not exist for SMEs.

Moreover, with job creation from large companies becoming restricted owing to changes in the industrial structure, we need to grow SMEs so that they can create jobs on a continuous basis. When it comes to the employment of IT SMEs in Korea, although it has grown from 49.2% in 2000 to 55.4% in 2002, it dropped again to 51.9% in 2004. Large companies are adopting efficient business strategies to seek jobless growth to respond to the shift toward a knowledge and technology intensive industrial structure and overcome/cope with intensifying global competition. It is also difficult to say that the current leading positions large Korean companies enjoy in the global market will be permanent. As the potential for shift in position is always there, SMEs will need to play bigger roles in absorbing the workforce in Korea.

Table 3.5 Rationale for Promoting the Growth of IT SME Start-ups and Future Direction

Issue	Reasons for Promoting the Growth of IT SME Start-ups	Future Direction
<ul style="list-style-type: none"> ■ Large companies · Erosion of existing business areas of large companies owing to convergence · Weakened global competitive strength further reducing growth potential · Export concentrating on small number of items, to specific countries 	<ul style="list-style-type: none"> · Growing need to activate the IT industry's eco-system - We can no longer depend on large companies to sustain growth - Increasing importance of components and materials industry · Increased role of IT SMEs with diversifying consumer needs · Increased importance of IT SMEs in absorbing the workforce 	<ul style="list-style-type: none"> ■ Large companies · Explore new businesses through spin-off and identify new profit models · Enhance competency for innovation to secure competitive strength in cost and technology · Restructure the product portfolio and explore new markets to diversify export · Strengthen partnership with IT SMEs - Eliminate unfair trade practices like cost transfer · SMEs · Increase size through M&A, collaboration and strategic partnership - Promote the growth of mid-sized companies in IT components and materials industry · Seek specialization by growing innovative SMEs in the IT industry · Globalize through strategic alliances and global sourcing to secure global competitive edge and make bigger inroads in the global market - IT SMEs should identify overseas niche markets and support their efforts to find new business models
<ul style="list-style-type: none"> ■ SMEs · Small size makes it difficult to enjoy economy of scale · Lack of R&D competency depressing the ability to flexibly respond to the market · Lack of global competitive strength increasing dependency on domestic demand 		



Conclusion

The Korean IT industry is expected to maintain its growth in the future. But a closer look shows that we need to identify new drivers for growth: Voice revenue is stagnating in telecommunications, value added communications is continuing to grow only marginally, expanded overseas production is reducing domestic production of IT equipment, and slowdown of export in mobile handsets is also pulling down domestic production. But the current status of digital convergence, often mentioned as the growth engine of the future, shows the following challenges: In terms of technology, standards are still lacking and there is also no sufficient protection for personal information. Companies preparing services linked to digital convergence still have a difficult time coming up with the right business model. At the same time, consumers do not feel the need for convergence service and find prices for new convergence services and enabling devices to be too high. Regulatory pressure resulting from friction with existing industries is also another detrimental factor to growth. This means that more comprehensive promotional plan should be in place to secure the next generation growth engine based on digital convergence.

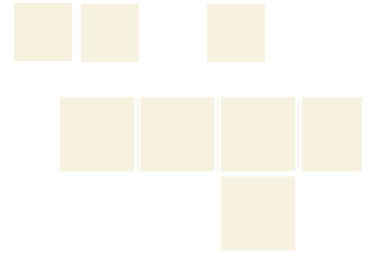
Furthermore, the structural problem of the Korean IT industry that hinder sustainable growth is polarization. The analysis on polarization by industry, company size, export-domestic sales of the IT industry shows that polarization exists based on performance gap. While the hardware industry has been continuously improving its productivity, that of the software industry is stagnating resulting in productivity gap between the two industries - a gap that is growing wider with time. Large IT companies as measured by productivity and profitability metrics perform significantly better than IT SMEs, and the performance gap is bigger than past average. When comparing export and domestic sales, healthy export and depressed domestic sales are leading to performance gap and here also, the gap is bigger than the past. Employment growth in high-performance area is exceeding that in low performance area to show that polarization in terms of productivity or growth ratio is not resulting in polarization of income. But as Korea does not enjoy the flexibility to align jobs with productivity, if the performance gap is not narrowed, it could result in income polarization. As such, the performance gap within the industry or growing dependency on export on a small number of items or on large companies need to be corrected immediately. When looking at the structural

source of the polarization in the IT industry between hardware and software, IT components & materials and finished goods, large IT companies and IT SMEs, promoting the growth of software, IT components & materials, and IT SMEs should be top priority.



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About The Korea Information Society Development Institute

The Korea Information Society Development Institute (KISDI) was established in January 1985 as the only professional research organization specialized in policy studies regarding the information and communications sector. KISDI has conducted extensive research on the trend of IT industry, and the transformation of the traditional economic structure in the emerging information society. KISDI also carried out studies on a regulatory framework for fair competition in the telecommunications service market. Along with development of the information and communications sector in Korea, KISDI has contributed to the overall competitiveness of the nation by providing the vision and policy direction to the government to gear up for the knowledge-based society.

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