

The Structure of ICT Industries' Global Value Chain: Evolution and Future Progress

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Summary

1. Background and objectives

A massive paradigm shift is taking place in information and communication technology (ICT) industries worldwide today as a result of new and better IT convergence technologies, increasing global economic integration, the intensification of global competition and the development of emerging economies. The global value chain of ICT industries is expanding accordingly. However, continued stagnation and struggles of traditional strongholds of ICT, such as Japan, in conjunction with the ascendancy of China and other emerging economies as producers and consumers of ICT, are also transforming the structure of competition on the international ICT market, exerting far-reaching effects on the global value chain of the world's ICT industries.

A global value chain of a business or an industry encompasses the entirety of processes involved in providing a product, including research and development, parts sourcing, production and manu-

facturing, distribution and customer service. Value-chain activities in the past were confined to individual businesses and nations only, but now they are rapidly expanding and spreading across different businesses and regions around the world.

As the scope of value chains continues to globalize, the terms of trade and the relative extent of value acquisitions among major players are also undergoing revolutionary changes. For instance, a growing volume of intermediate goods are being traded worldwide that are increasingly in demand for the production of IT products. Also, businesses specializing in research, development and other such services are generating values-added at a more rapid pace than businesses specializing in manufacturing and assembly.

Emerging economies are participating more in the global value chain of ICT industries, and this has directly led to their economic development and rising income levels. The majority of these emerging economies, however, are still based on manufacturing and assembly, which can only generate values-added to a limited extent. Advanced economies, on the other hand, have been partnering with emerging economies in Asia for the production of parts and finished products while focusing their more of their attention and resources on such high value-added activities as design, research and development, and standardization.

Korea reaps relatively high values-added on the global value chain, as the country produces such core parts as semiconductors and display screens. Yet Korea leans more toward hardware than software. Consider smartphones produced by Korean companies. Although Korea is the world's largest seller of smartphones, it fails to lead the world's smartphone industry because it lacks effective

product planning and design strategies and has yet to develop platforms and other core software components. Meanwhile, small and medium businesses in Korea remain incapable of effectively participating in the ICT industries' global value chain. Korea, therefore, stands at crossroads and it needs to proactively adopt a new paradigm on ICT and more actively engage with the expanding global value chain and its structural transformations around the globe.

This study focuses on structural changes in the global value chain of ICT industries and how Korean companies have been competing and cooperating with their counterparts around the world. The study also assesses Korean businesses' ability to participate in the global value chain and identifies key issues and obstacles with a view to the reform of Korean ICT industry structure toward increasing its values-added. Unlike similar previous studies that primarily focus on the values-added that the Korean manufacturing sector derives from international trade, this study focuses on ICT industries that produce ICT devices, audiovisual equipment, electronic parts, and software programs and services.

In defining the concept of the global value chain and examining and analyzing its structural changes and capabilities, this study surveys previous studies on global value chains, including the value chain theory of Porter (1985), Gereffi (1994), Hamel and Prahalad (1996), Kaplinsky and Morris (2001), and a host of reports and analyses from international organizations, including the Organization for Economic Cooperation and Development (OECD), the World Trade Organization (WTO), and the United Nations Conference on Trade and Development (UNCTAD). Based on a survey of the literature, this study defines and clarifies the concept and meaning

of the global value chain of ICT industries and introduces a new analysis frame for assessing its structure and the necessary capabilities for joining it. The criteria of assessment is found by dividing the ICT industry global value chain into its multiple intangible dimensions, which includes product planning and research and development; the tangible dimension, which includes the production and distribution of intermediate and finished goods; and the intangible dimension of distribution, marketing and sales and customer service. In addition to analyzing the available quantitative data and statistics, we have also conducted our own poll on people working for ICT businesses in Korea in order to examine and assess the structure and capabilities of Korean businesses' participation in the global value chain and thereby identify future reform tasks.

2. ICT industry global value chain: concept and structural changes

(1) Concept of the global value chain and its role in ICT industries

There may not yet be a universally accepted definition of a global value chain, but we can broadly understand it as a global system of the division of labor, where the activities and tasks of production in the manufacturing or service sector are performed in separate locations at home and abroad. In general, a manufacturing value chain involves a series of core tasks, such as planning, research and development, prototype production, mass-production and assembly, sales, and customer service and maintenance. In this value chain (pires_In5), the most profitable phases are planning

and research and development. The next most profitable phases are marketing and brand development. Maintenance and customer service also tend to generate relatively high values-added in direct contact with customers. However, the intermediate phases—such as the production of parts and semi-finished products and the processing and assembly of finished products—generate relatively less profit.

This explains the growing tendency among multinational corporations to invest more in the phases at both ends of the value chain than in the intermediate phases of processing and assembly. They prefer to outsource these intermediate phases to countries that can serve to minimize manufacturing costs. Because of the increasing digitalization and modularization of products, various economies can now participate in the global market, further prompting and fostering global value chains.

In global value chains for manufacturing, participating businesses are involved in tight and strong partnership that govern the entire business process from manufacturing to logistics to customer service. Intra-business trade around the world based on this division of labor exerts increasing influences on the trade policies of subject countries.

The global value chain of ICT industries involve a series of activities that generate values-added, including product planning and design, research and development, parts sourcing, production/assembly, sales, and customer service. These activities also take place in different locations around the world, with the participation of parts manufacturers, producers of finished goods, distributors, consumers and client companies. The upstream (input) stage, con-

sisting of product planning, design and research and development, occupies the foremost place in an entire global value chain. Visions and management philosophies of particular companies play a decisive role in this stage, along with brainstorming, technology and consumer environment analyses. In the case of ICT industries, platforms also play a pivotal role in this stage. Next, the production stage can be divided between the production of intermediate goods and parts, on the one hand, and the production of finished goods, on the other. The most important factor of competitiveness in this stage is cost. The main role of businesses participating in this stage is to ensure the competitive prices, efficiency and productivity of parts and finished goods by implementing cost-minimizing processes and measures. The downstream stage of this global value chain, i.e., sales and customer service, generate new values-added for businesses and consumers. The tangible dimension of such a global value chain corresponds to the supply chain.

This study on ICT industries divides the supply chain between the sourcing of intermediate goods and the production of finished goods. The study also includes the related software components in the entire ICT industries global value chain. In the sales stage, distribution networks, marketing capabilities, consumer satisfaction and brand images (including consumers' perception) are all of concern.

(2) Structural changes in the global value chain of ICT industries

ICT industries are characterized by very rapid changes and evolution of technology and services. Because it is increasingly be-

coming impossible for a single business or a single national economy to meet all the complex and diverse needs of these industries, ICT companies continue to expand their value chain worldwide, constantly looking for businesses, countries and regions that offer the best possible utility. Sustaining the expansion of this global value chain are ongoing globalization, increasing competition among businesses, and the rise of emerging economies.

In the 1970s and 1980s, businesses involved in different stages of the value chain in IT industries, whether handling design or development, production, sales or customer service, generated roughly equal levels of values-added. Today, however, the levels of values-added vary significantly from stage to stage. Now the intangible stages at both ends of the value chain—design and research and development, at one end, and sales and customer service, at the other—generate far more values-added than the tangible stage of production.

The expansion of the global value chain allows companies to focus on honing and utilizing their core capabilities, while outsourcing other tasks to maximize efficiency and profits (values-added). International trade is thus increasingly becoming a matter of overseas production and sourcing, giving rise to global sourcing, intermediate goods trade, foreign direct investment and supplementary services trade. This division of labor is especially prominent in ICT industries.

On the international ICT market today, a company's global competitiveness and market influence crucially depend upon the innovative technologies and standards it owns. Prior to the 1980s, manufacturers of products or service providers, mostly concentrated in

the United States and Western Europe, wielded relatively greater market influence, leading and determining the production process. At present, however, more power lies with companies that plan and develop products and that own patented platform technologies and other such core elements, rather than with manufacturers and suppliers. Consequently, the comparative advantage on the global value chain in ICT industries today belongs to companies that shape and lead the value chain, not to those that produce products or services.

3. Current status and changes in the structure of the global value chain of ICT industries

The global value chain structure of ICT industries places increasing emphases on intangible dimensions of value, such as product design, research and development and customer service, thus allowing designers of platforms like Intel and Apple to play far more influential roles than other businesses in the global value chain. Companies that fail to join or play an active role in the ever-expanding ICT value chain are likely to be left out of the global market.

The United States, a traditional leader of innovation in ICT, was an active manufacturer prior to 2000, but it now focuses on product design, research and development and other such high-value-added activities, having outsourced manufacturing overseas. The World Input-Output Database (WIOD), which lists the weight of values-added in major economies' export volumes, shows the United States, with a weight of 80.5 percent, as the second-most

profitable exporter next to Japan (82.2 percent). The United States has established an efficient nationwide system of innovation, which allows it to shape and lead the growing global value chain.

Major economies, including the United States, Korea and others, currently outsource the manufacturing of their IT products to emerging economies, such as China and Southeast Asian countries. The structure of the international division of labor and trade has thus undergone many changes since 2000.

In the meantime, advanced economies' relative influence on the world ICT export market has been shrinking, while that of China and other emerging Asian economies has been dramatically increasing. This is mainly because the former have relocated their production bases or outsourced their production activities to the latter, while the latter have increased their influence on the production of parts and finished goods. Less developed countries, lacking sufficient resources and industrial infrastructure, may face rising barriers to their entry into the ICT industries global value chain. China and other Southeast Asian manufacturing countries, on the other hand, participate actively in the global value chain thanks to the abundance of cheap labor they provide as well as the high potential of their industries and domestic markets. China has emerged as the world's largest manufacturer of ICT products, with the share of ICT products in its total exports and values-added multiplying rapidly since 2000. This is not only because major economies have relocated their production bases to China, but also because Chinese ICT industries themselves have actively sought increasing roles and influence in the global value chain.

However, there is also growing transition of production bases

from China to the rest of developing Asia, such as Vietnam. Some US and Japanese companies have also undertaken the re-shoring of manufacturers. An analysis of foreign direct investment shows that Korean ICT companies are increasing their investment in Vietnam and Southeast Asia, transforming the trade structures of these countries, rather than in China. Since 2011, Samsung Electronics and other Korean ICT companies have invested heavily in Vietnam, thus helping Vietnam multiply its volume of smartphone exports to the world as well as its volume of smartphone component exports to Korea.

The Korean IT manufacturing sector surpassed the medium-technology level a while ago, and it boasts the world's most advanced technologies with respect to certain products. So while Korea's ICT industries may lack systemic and technological resources for leading innovation in the global value chain, they have a relatively well-established infrastructure and can still offer the most competitive global-standard DTVs, smartphones, semiconductors, display components, core parts, and broadcasting and communication services.

Korean ICT companies participate quite actively in the global value chain, having joined the international trade structure early on and steadily increased their influence in the value chain above those of the United States, Japan and China. Although Korean ICT companies contribute a great deal to the transition and generation of values-added throughout the global value chain, the weight of values-added in their exports remains below those of the United States, the European Union, Japan and China. The weight of values-added generated domestically is also on the decline.

Yet Korea still remains a leading player on the world ICT export market, being a major producer of core products and parts, such as computer memory chips, semiconductors, display components, TVs, smartphones and SSDs, all of which require immense investment and high-level technologies. While the rate of increase in the exports of these goods has been slowing down recently due to increasing outsourcing of production overseas, high-tech exports continue to rise, notwithstanding the global economic crisis. Korean IT manufacturers are also increasingly investing in the production of complex and advanced goods overseas, with the focus of investment shifting from finished products to parts.

Nevertheless, Korean ICT companies still have a long way to go before reaching the level of their American counterparts in terms of influence on the global value chain. In order to attain that level, Korean ICT companies need to enhance their capabilities for planning and developing innovative products, and to secure innovative systems and software resources necessary for generating high values-added. The increasingly fierce competition on the global market, with the growing participation of China and other latecomers in the higher-value-added stages of the global value chain, should alert Korean ICT businesses to the need to find an effective strategy for optimizing the division of labor and securing core capabilities for prospective technologies and fields of business.

4. Korean ICT companies' participation and capabilities in the global value chain

(1) Criteria of evaluation

In assessing Korean ICT companies' capabilities for a greater influence in different parts of the global value chain, this study divides the value chain into three dimensions—namely, the intangible dimension of input, the tangible dimension (intermediate and finished goods), and the intangible dimension of sale and distribution. The study then identifies and applies a set of assessment criteria based on the theories and performance indicators of Kaplan and Norton (1992) and Kim et al. (2003), as well as the core capability theory of Harmel and Prahalad (1996), the value chain upgrading performance indicators of Kaplinsky and Morris (2001), and the ecosystem evaluation indicators of Seo et al. (2004) and Lee et al. (2011).

(2) Capability evaluation overview

To gain an overview Korean ICT companies' participation in the global value chain and their capabilities for playing a greater role, we conducted an opinion poll on industry insiders and analyzed its major findings. Using a purposive selection method, we chose 200 or so companies involved in related industries, including information and communication devices, audiovisual equipment, IT parts, software programs and solutions, and IT services, and obtained results back from 182.

Table 1. Criteria for the Assessment of ICT Industry Global Value Chain and Capabilities

	Value chain	Main criteria
Tangible value chain (Input)	Product planning (Design)	Investment resources, innovative investment, decision-making (top-down or bottom-up), visions/information sharing, planning and design workforce, response to paradigm shifts
	Research and development	R&D workforce, original and core technologies, applied technologies, software technologies, competitive patents, competitive standards, technology development system, pace of new product development, R&D resources
Intangible value chain (Production)	Intermediate goods	Material competitiveness over intermediate goods, competitiveness over general parts, competitiveness over core parts
	Finished goods	Competitiveness over finished goods manufacturing, cost competitiveness, quality assurance, production (vertical or outsourcing)
Intangible value chain (Sales)	Distribution	Distribution network, e-business
	Marketing/ Sales	Sales network, marketing capability, marketing workforce, market-pioneering ability, brand, partnership with supply industries, market information sharing, compliance response
	Service	Service infrastructure, customer feedback, efforts to provide new services

The poll asked respondents to rate their companies, on a five-point scale, in terms of current and future (planned) levels of participation in the global value chain and of competitiveness in each stage of the chain, according to the assessment criteria provided by this study. In analyzing these companies' capabilities for each stage of the global value chain, we analyzed the dispersion of answers to main questions to test their significance. We also analyzed statistics available from other sources to supplement the findings of the poll.

(3) Assessment of Korean ICT companies' capabilities within the global value chain

Our assessment of a selection of Korea's ICT companies revealed that they lagged a little behind their counterparts in other advanced countries in terms of capabilities within the global value chain—that is, at 89.3 percent of the capabilities of American companies. This level puts Korea ahead of China (79.8 percent) and Western Europe (88.9 percent), but behind Japan (90.9 percent). More specifically, Korean ICT companies' general capability for audiovisual equipment amounted to 94.9 percent of their American counterparts and was significantly higher than the capabilities of Japanese and European companies. In the area of IT services, Korean companies were at 93 percent of their American counterparts and also surpassed their Japanese and European counterparts. With regard to software programs and solutions, however, Korea scored the lowest level at 81.9 percent of the United States'. It significantly lagged behind Japan and even Western Europe as well. With regard to IT parts, Korea scored another low 85.2 percent of the American level of capability. Although it surpassed Western Europe in terms of IT parts, Korea fell behind Japan. These findings indicate the pressing need for Korean ICT companies to enhance their capabilities for participation in the global value chain by switching to an industrial structure with higher values-added. Attention is especially required to software programs and solutions as well as IT parts.

As for Korea's capabilities for different stages of the global value chain, Korean companies scored 3.14 with respect to assembly and

Table 2. Major Economies' Capabilities for ICT Industry Global Value Chain

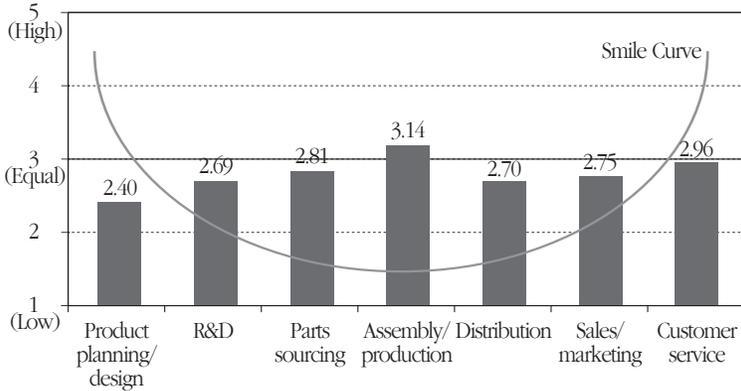
	Unit : %				
	US	Korea	Japan	China	W. Europe
Overall	100	89.3	90.9	79.8	88.9
Information and communication devices	100	89.4	90.1	84.6	89.3
Audiovisual equipment	100	94.5	94.3	79.4	89.5
IT parts	100	85.2	88	76.3	81
Software programs and solutions	100	81.7	92.2	77	94.1
IT services	100	93	91.1	81.6	90.8

Source : KIET survey (August 2014).

production, slightly higher than that of the United States. Yet Korean companies fell behind their American counterparts in terms of product planning and design, research and development, sales and distribution and other such intangible dimensions. Korean companies scored the lowest (2.4) with respect to capability for product planning and design, and also scored quite low (2.7) with respect to distribution, yet they fared slightly better with upstream intangible dimensions, such as sales, marketing and customer service. Korea scored 2.96 on capability for customer service, almost on a par with the United States.

Korean ICT companies export over USD 150 billion-worth of products and services each year, but still generate less values-added than their counterparts in other advanced economies. As the WIOD analysis has shown, the Korean IT manufacturing sector's share in Korea's total values-added in exports has been steadily declining. This is not only because Korean companies depend on overseas sources for high-value-added materials and parts, but also because they lack sufficient capabilities for effective participation in the intangible dimensions of the global value chain.

Figure 1. General Assessment of Korean ICT Companies' Competitiveness in the Global Value Chain



Source : KIET survey (August 2014).

In sum, Korean companies possess relatively greater capabilities with respect to parts sourcing, assembly and production, but still need to improve their capabilities with respect to the intangible dimensions of the global value chain that generate greater values-added. Korean companies need to enhance their competitiveness in core parts and materials and also develop their capabilities for product planning, design, and research and development.

5. Restructuring ICT industries for higher values-added

Korean ICT industry insiders were well aware of the great importance of the intangible dimensions of the global value chain—product planning, research and development—for the growth and values-added of their industries. In the survey, industry insiders gave scores well above 3.0 to intangible dimensions as planning, re-

search and development, customer service, and marketing. They gave the highest score, 4.18, to research and development, and also rated the importance of software highly with a score of 3.75. The survey participants, in other words, were well aware that enhancing software capabilities was crucial for Korea's ICT companies to become leaders in the global value chain. The United States can lead and shape international ICT industries even without a major manufacturing base because it possesses highly advanced platform and software technologies.

The survey participants rated the importance of assembly/production and parts sourcing with slightly lower scores of 3.13 and 3.32, respectively. Yet these tangible dimensions of the global value chain still garnered scores higher than 3.0, indicating that they play and will continue to play a crucial role in the growth of ICT industries in Korea.

In sum, Korean ICT companies lag behind their counterparts in other advanced economies in terms of their capabilities for leading the global value chain. Korean ICT companies' overall capability draws a slow and reverse U-shaped curve.

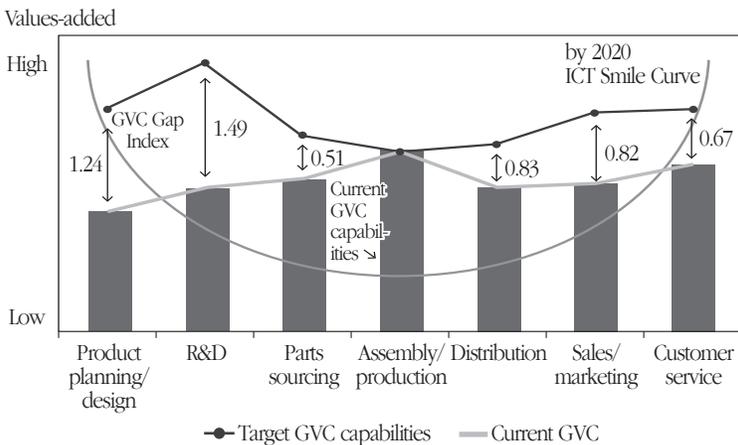
It is crucial for Korean companies to reverse that curve into a proper U- or smile-shaped curve by making and implementing the necessary restructuring decisions that will lead to increased values-added generated. In particular, Korean ICT companies should focus on improving their capabilities for the higher values-added, upstream stage of the global value chain, especially in planning and research and development.

Industry insiders' perception of the importance attached to each stage of the global value chain provides guidelines on how the

structure of Korean ICT industries should be changed. We need to find effective measures to narrow the gap between the perceived importance of each dimension and the current and actual level of Korea’s capabilities in that dimension. This means prioritizing global value chain activities where the gaps between the ideal and the actual are especially noticeable and channeling our strategies, policy measures, resources and efforts to improving them.

For the restructuring of Korean ICT industries to enhance their values-added, we need to find ways to ensure the optimal distribution of the value chain from region to region, making the most effective use of dimensions of value chains spread across multiple regions. We need to decide on which dimension or stage of the global value chain we should increase our participation.

Figure 2. Current Level and Aspirations of Korean ICT Companies’ Capabilities for the Global Value Chain



Notes : 1) “Current GVC” indicates results of general assessment of capabilities for global value chain, and “Target GVC” indicates the importance of each dimension/stage of the global value chain.
 2) GVC Gap Index: the disparity between target GVC and current GVC.

Korean ICT industries may need to concentrate more on high values-added, intangible activities of the global value chain, such as planning, research and development, within Korea rather than at overseas locations, while transferring more of assembly and production activities to emerging economies. In any case, it is important to maintain a certain level of flexibility and balance toward international partnership and outsourcing, so that optimal arrangements can be arrived at—even for planning, research and development—that maximize values-added.

If Korean businesses are to play a leading role in the global value chain, it is important for them to secure core capabilities and governance resources, and to increase small and medium businesses' participation in the high-value-added dimensions of the global value chain.

6. Increasing values-added generated by Korean ICT industries

Korean ICT industries need to increase the values-added they generate in order to increase their influence and leadership over the global value chain.

We need to find a dynamic strategy for enhancing Korean ICT industries' capability to lead the global value chain. As the survey and assessment discussed earlier suggests, we should prioritize the intangible dimensions of input and sales above the tangible ones in the global value chain in developing business strategies and policy measures. More specifically, we should prioritize and concentrate on items where the GVC Gap Indices were the greatest—in the

Figure 3. Changing Korean ICT Industries' Stature in the Global Value Chain

Changing (Upgrading) Korean ICT Industries' Stature in the Global Value Chain	
Switching to a structure with greater values-added	▶ From reverse-U curve to smile curve
Upgrading Korea's position on the global value chain	▶ Starting with dimensions that are more important and for which Korea has relatively few capabilities * R&D → planning → marketing → service → parts
Increasing participation in the global value chain and ensuring efficient distribution of labor along the global value chain	▶ Fostering SMBs' participation in the chain ▶ Increasing values-added that are cumulated in Korea
Enhancing capabilities for leading the global value chain	▶ Securing core technologies for future growth ▶ Expanding the ICT industry infrastructure

order of research and development, product planning, marketing, customer service and parts sourcing—especially channeling our resources into developing capabilities for the first two of these.

First, we need to enhance Korean businesses' capabilities for planning and designing innovative products. This will require upgrading their knowledge of the rapid changes in trends on the global ICT market and enhancing their ability to translate that knowledge into innovative plans and designs. We also need to strengthen chemistry and convergence with other industries, so that the country can achieve the long-term sustainability of ICT industries and their position on the global value chain. Furthermore, we should strengthen channels of interaction and communication with customers to find more creative ideas outside businesses.

Second, we need to enhance Korean ICT businesses' capability

for research and development and provide support through policy and institutional innovations. Businesses themselves need to increase their capabilities for independent research and reduce their dependency on other companies abroad for the development of core technologies such as platforms. This, however, will require innovating the research and development system toward providing fair rewards and evaluations for achievements. We also need to find proactive R&D strategies for future technologies and enhance the synergy between R&D locations in Korea and abroad so that values-added generation is maximized.

Third, we should enhance capabilities for high value-added core parts that serve as hardware platforms on the global value chain. This will require a strong basis for both basic and applied research. For its part, the Korean government needs to provide policy incentives and institutional support for developing core parts and developing research collaboration programs between businesses and universities. Increasing small and medium businesses' participation in the development of core projects will also be necessary to ensure the ongoing innovation of Korean ICT industries and smaller businesses' participation in the global value chain.

Fourth, we need to develop systematic training courses and programs to foster specialized and highly skilled workforces equipped with a global mindset, creativity and innovative skills. This will first involve enhancing education and training programs for people specializing in planning, research and development, and marketing, as well as providing customized education and research programs for people specializing in IT software. We may also need to develop incentives and programs for recruiting talented specialists

from abroad and for encouraging exchanges with major universities and research centers worldwide. As the global value chain and international division of labor continue to expand, we also need management professionals capable of conducting relations and communications among the participants of that value chain.

Fifth, we have to provide policy incentives to encourage small and medium ICT businesses to participate in the global value chain, which will help secure opportunities for growth and capability enhancement. These incentives may include consulting, institutional support and tax breaks for foreign investors looking to invest in and cooperate with Korean small and medium businesses. We also need to establish a system that collects and analyzes value-chain related information and data for small and medium businesses. In the meantime, small and medium businesses themselves should consider launching and expanding value chains of IT parts and services.

Sixth, the Korean laws and regulations on ICT must be brought up to date with global standards, eliminating the Public Certification Requirement, ActiveX controllers and oxygen saturation detectors that obstruct globalization. Korean policymakers should start embracing cloud computing, big data, the Internet of Things and other cutting-edge technologies more actively, while providing support and incentives for strategic partnerships and mergers among businesses that will allow Korean ICT industries to lead the global market.

Seventh, we need to actively combat the leakage of important technologies from Korean ICT industries abroad due to the expansion of the global value chain. Businesses themselves have to first

design and implement human, material and systemic measures to prevent technology leakage, establish security guidelines, provide regular training for employees, and strengthen physical security systems. The Korean government should also establish laws, institutions and solutions for better protecting industrial technologies, making the best possible use of the latest technologies available, including smart devices, USB memory sticks, and cloud computing.

Eighth, Korean policymakers may also consider developing industrial clusters of Korean businesses abroad as a way of ensuring the successful participation of Korean small and medium businesses in the global value chain. Such clusters may be developed under respective countries' foreign investment policies and ICT industry plans. This can also lead to the strengthening of partnerships between Korea and those countries.

Ninth, Korean policymakers could increase Korean businesses' influence on the global value chain through official development assistance (ODA) projects. These projects can create jobs for Koreans as well. With the number of Korean ICT companies establishing operations in Vietnam on the rise, policymakers could select Vietnam as a strategic partner first and create and implement measures for international partnership.

Finally, Korean policymakers could also systematize and organize cooperation over ICT with other advanced economies so that small to medium businesses in Korea can enter their markets with greater ease. International systems of research cooperation would work better at the level of local governments, ICT associations and organizations in regions with large numbers of ICT businesses. Such centers already exist in Beijing and the Silicon Valley. The

Korean government therefore should consider reinforcing the functions of these existing centers or increase cooperation with other countries.