

First of all, I would like to express my heart-felt appreciation to the organizers of this conference for their kind invitation for me to deliver the first keynote address at this very important event. The theme of my remarks today is *Innovation and Korea*. I want to share with you some of the insight I have gained through my past experience in government service as well as my present experience as CEO of Hynix Semiconductor, Inc.

**It is no exaggeration to say that Korea has achieved miraculous industrial and economic growth in the past forty years.**

Exports which stood at U\$ 250 million in 1966 have grown 1,302 times to U\$ 325.5 billion in 2006. In the same period, GDP went from U\$ 3.6 billion in 1966 to U\$ 887.4 billion in 2006, representing an unprecedented 240-fold growth and setting a new record in world history. If we look at Korea's industrial achievements for the same period, our shipbuilding, memory chip, and display industries have grown to capture the number one positions in their respective fields in the world while steel, petrochemical, automobile and textile industries have also firmly established their global competitiveness. Moreover, thanks to significant recent improvements in the competitiveness of our parts and machinery industries, Korea's trade deficit with Japan in the parts sector declined for the first time in 2006. Globally, Korea's trade surplus on parts and components widened to almost 32 billion dollars.

One notable feature of Korea's industrial landscape is the balanced development between traditional industries and new ones, a claim only very few countries in the world can make. In fact, Korea is cited as a rare example of success in this regard. Another point that characterizes Korean industries relative to more advanced countries is manufacturing's considerably high contribution to the overall economy, which currently stands at 28% of the total GDP. The manufacturing sector is expected to keep on playing a key role in Korea's economic development. Thanks to growth in manufacturing and the successful advance of many local companies abroad, trade in commodities now accounts for almost 72% of the Korean GDP - a remarkably higher share than those in countries like the United States and Japan, where the figures are roughly around 20% - which portrays another standout characteristic of Korean industries.

**On the other hand, the Korean economy which has enjoyed such phenomenal success to date, is expected to face new challenges ahead.**

The first of several challenges will come from intensified global competition. Unlike the past where it was possible to survive and grow through *imitation*, in the coming days, *creativity* will be the only viable route to survival. At present, Korean companies are exploring which sectors they should newly focus their investments on to ensure the long-term viability of their businesses. Due to the risk of such new financial commitments at the time of shortening technology life cycle, however, not many companies are promptly going ahead with their investments. Nonetheless, companies must move quickly to pioneer new industrial frontiers with potential for creating high value-added items. They must gain a fresh foothold in chosen areas that can sustain and broaden Korea's economic development.

Second challenge posed against us is the rapidly changing economic environment in the Northeast Asian region. The emergence of China as the world's economic growth engine has presented Korean companies with the opportunity to access a new market. At the same time, however, given China's quick rise into a formidable economic rival, Korea's status within the structure of the international division of labor has been significantly altered. Japan, meanwhile, is a major source of key technologies and capital for Korea, but a significant gap still remains between the two countries in terms of the competitiveness of our core industries. Consequently, Korea finds itself caught between China and Japan, at a point where it must define a new position for itself and find a new means of survival.

The third challenge that faces Korea is the changing economic growth engine paradigm. Up until now, the Korean economy was mostly an "input-driven economy" for economic growth. Beginning in the early 1960's, the Korean government opted for an outward-looking economic growth strategy backed by abundant low-cost labor, aggressive mobilization of foreign capital, a high savings rate, and active build-up of SOC, etc. However, our economic growth rate, which posted an annual average of 8.4% in the late 1990s, has dropped significantly in recent years down to an annual range of 4%, indicating that economic growth through greater input of labor force and physical

capital resources has reached its limits. Consequently, we must now shift our focus away from input factors and concentrate more on enhancing our “total factor productivity” to drive economic growth in the future.

**To respond effectively to these challenges, the Korean economy must first and foremost upgrade itself from an “input-driven economy” to an “innovation-driven economy”.**

In other words, we should move from a hardware-based input-driven strategy toward a software-based paradigm to promote creativity across all industries, so that innovative knowledge, technologies, and information can be created and used efficiently by all sectors, ultimately contributing to higher “total factor productivity”. For this to happen, though, we must adopt a comprehensive and systematic approach to driving change.

The resulting creative innovation will serve us well as Korea advances into new industrial areas to drive sustainable growth; help differentiate Korea from emerging economies that are catching up quickly from behind; and be a major catalyst for change in boosting productivity so that Korea can ride out an economic growth slowdown.

Many advanced countries and regions are already implementing these changes across the board in their respective societies. The United States is mapping out a program that focuses on knowledge sharing and the nurturing of human resources to encourage innovation across all industries with the goal of making a more “Innovative America.” Japan, on the other hand, is lining up educational, legal, institutional, and regulatory reforms as part of a development strategy to transform itself into a “New Knowledge-based Society”. Germany and France are also undertaking initiatives that emphasize collaborative links between research and innovation through programs called “Anglo-German Foundation” and “Agence De l’Innovation Industrielle”.

**Korea, however, still has many factors hindering innovation.**

Although education has long been a nation-wide issue of primary concern, Korea’s

public education system is plagued with poor productivity. One of the major problems in the Korean education system these days is drastic reduction in the number of gifted students enrolling in science and technology programs, which has made it doubly difficult to nurture a pool of talented professionals in science and engineering. Universities absorb most of high caliber workforce, and as many as 70% of Ph.D. holders in science and engineering are employed by universities. In contrast, 75% of R&D expenditure comes from industry, underlining a structural imbalance that stymies effective research in Korea.

In addition, the number of patent applications filed by state-run research institutions is quite low with very few of their research findings actually crossing over into practical industrial applications, a clear indication of low research productivity relative to investment. Financial R&D support by corporate sponsors for universities and state-run research institutes is also quite minimal.

From the corporate perspective, there is a lack of joint research work between local and foreign companies. Independent R&D initiatives by individual companies lack adequate resources for effective research and are much smaller compared to advanced countries in terms of allocated budget and human resources.

Moreover, there is a shortage of professionals with expert knowledge in “technology management” which covers the entire scope of the business process from R&D to commercial execution, further undercutting our R&D efficiency. Also, due to poor patent management, the incidence and costs related to international patent disputes are on the rise.

The regional skew in innovation presents another problem. Since corporate activities are primarily concentrated in the Seoul metropolitan area, so is innovation. As a result, almost no innovation is carried out in regions outside the capital. This has had the effect of undermining our national agenda of balanced and comprehensive development between Seoul metropolitan area and the rest of the country, and is cited as another constraint on Korea’s economic growth.

**In response to these various factors, it is important for the drivers of innovation - companies, universities, research institutions and the government – to build up**

**their innovative capabilities and engage in greater cooperation with one another.**

The “Measures for the Innovation of Science and Engineering Universities” which was jointly launched last year by business community, engineering schools and the government is a good example of such cooperation. The measures call for universities to move away from an *a la carte*-type curriculum, and advocates specialization in one of three possible tracks which best fits each school’s area of strength and expertise - research, education, and industrial/academic cooperation. As a means to inspire universities to stay competitive, the government will offer different grades of financial support depending on each school’s performance in their specialized areas of choice. The measure encourages companies to provide greater financial support to universities and suggests commissioning universities for customized training programs in return.

Industry, academia, and local governments must work together to build industrial clusters that adequately reflect unique characteristics of each region outside the Seoul metropolitan area as well. Also, since most industrial complexes in regional locations usually house only manufacturing functions, very little innovation is generated at a regional level, which is why we must provide greater R&D support to regional universities. In the United States and Europe for instance, regional universities are already playing the role of a *vision provider* in the formation of these types of clusters.

**Most importantly, it is imperative for companies to take up an expanding leading role in driving innovation.**

To this end, companies must first make sure they secure and nurture high-quality human resources that are capable of developing and applying technology.

Second, they must build mutually rewarding strategic partnerships with other corporate counterparts and research institutions both at home and abroad.

Third, companies have to be proactive about fostering their “technology management” experts, and put them to work analyzing patent trends, taking part in patent pools, and overseeing licensing contracts, etc.

Fourth, they must work hard to anchor the concept of knowledge-management within their organizations to create intellectual capital and promote innovation throughout the entire echelon of management. Capital and technology notwithstanding, companies must also innovate the way they work in a creative fashion and make it their third source of added-value creation.

**Innovation by individual companies has played a major role in the growth of Korea's semiconductor industry and has been a key factor in making our memory chip industry number one in the world.**

Next to active support by the government for the development of high technologies, Korea's semiconductor companies for their part have made bold investments into R&D as well as extensive efforts to secure and foster the manpower that is critical to the development of next-generation leading technologies. Thanks to continuous innovation in products, services, processes and infrastructure, leading semiconductor businesses now boast world-class process technologies and cost competitiveness.

Our industrial structure, however, is shaped primarily around integrated device manufacturers (IDM) and characterized by poor cooperation with other industries such as non-memory (system, foundry), equipment, materials, etc., and has been pointed out as a major weakness. Moreover, the memory chip sector has much room for improvement in terms of product innovation and underlying infrastructure for the support of innovation.

From a strategic point of view, our challenge is to build strategic partnerships with our internal and external counterparts; formulate a response to environmental and trade-related issues that is consistent with global standards; and step up development of leading products to maintain our front edge position in products and technologies.

Other innovation challenges for the Korean semiconductor industry includes localizing production of equipment and materials; introducing the concept of end-to-end service for our corporate customers; strengthening the competitiveness of the system, foundry, equipment and material industries; and promoting further cooperation between

industry and academia.

**Overall, the future direction of innovation that is most critical to Korea's sustainable growth will evolve around efforts to build intellectual capital and engage in broader exchanges with key players driving innovation.**

According to the World Intellectual Property Organization, Korea ranked fourth behind the United States, Japan, and Germany in 2006 in the number of international patents filed, which was a very positive signal indeed. In 2005, we were sixth behind France and the United Kingdom. That said, however, innovation in Korea is still primarily limited to a handful of large conglomerates and innovative SMEs in cutting-edge industries.

As a matter of fact, though, most SMEs in the parts and materials sector have fallen behind leading rivals and are increasingly pressed to outsource their businesses abroad. Subsequently, the rate of foreign exchange earnings has been on the decline for local manufacturers. From the perspective of individual companies, while many have rushed to introduce knowledge management and process innovation methodologies in the wake of the financial crisis, the results were largely disappointing since they were mostly intent on copying the success of outside case studies. Additionally, although many large companies tried to nurture and support their suppliers, most have not seen satisfying results due to a lack of long-term vision on their part and a lack of innovative capabilities on the part of the SMEs.

Innovation by individual companies should be geared toward solving strategic and operational issues using knowledge management or process innovation techniques as an enabling tool. Also, programs to nurture suppliers should be selectively concentrated on the equipment and materials space and based on a broad-scale vision for the strategic and long-term buildup of competitive edge.

All players at the driving seat of innovation – companies, universities, and the government – must try to disseminate more successful case studies. To overcome the limitations of a purely local effort, we should also make use of the open international trading system to promote exchanges and collaboration with other foreign companies.

Moreover, we should ease regulations so that creativity can manifest itself more freely. Although we will most likely see greater competition as we enter into more FTA agreements with large economies such as the United States, the EU, Japan, etc., what is more important is the fact that they will serve to further promote international cooperation, and I am convinced we should finalize our FTAs without further delay.

With that, I'd like to conclude my speech. I thank you for your kind attention throughout my remarks. Thank you.