**Current Status and Forecast of Nano-Convergence Industries in Korea**

With the growth of Korea’s nano-convergence industries, the convergence of nanotechnologies with industries is key to a Creative Economy.

Manufacturing businesses have long been the driving force behind national economic growth, playing a critical role in increasing national incomes since the Industrial Revolution. A 2010 World Bank report indicates that 70 percent of annual GDP growth in 128 countries derives from the growth of manufacturing industries. When considering the share of GDP of manufacturing businesses is less than 20 percent in the major advanced countries, Korea may be considered a “world champion” in terms of manufacturing businesses, whose share of GDP is about 30 percent.

Recently, U.S. President Barack Obama also announced the promotion of the Advanced Manufacturing Partnership Program to restore the global leadership of manufacturing industries. The core of the program consists of applying nanotechnologies to every industry. The EU, China and United Kingdom are also committed to restoring or innovating their manufacturing industries.

Nanotechnology is a core basis technology of future industries. It is also considered a critical technology capable of contributing to the innovation of major industries and the improvement of quality of life by creating brand new concepts of convergence industries, and of enhancing national competitiveness. Accordingly, major advanced countries, including the United States and EU, have planned development strategies for nationwide nanotechnologies and driven ahead with their nanotechnology development programs.

The Korean government has also fiercely promoted the development of nanotechnologies and invested KRW 2.9 trillion (USD 2.7 billion) in the period from 2001 to 2012.

Nanotechnology-based new convergence industry playing key role in Creative Economy

The major focus on nanotechnology is the convergence of nanotechnologies with other industries, a new paradigm that is capable of increasing added value by anywhere from 5 to 50 percent. Nanotechnologies have already been applied to various industries to enhance their competitiveness, including automobiles, textiles, semiconductors and smartphones.

Most industry participants, researchers and officials of relevant planning authorities share the view that the effects of nanotechnology on convergence industries in the future will be so huge, they will be inestimable. For instance, the proportion of semiconductors comprising nanotechnologies was zero in 2000 but rose to 35 percent by 2010, and is expected to reach 50 percent in 2020. Likewise, the pharmaceutical industry’s use of nanotechnologies stood at 0 percent in 2000 but rose to 35 percent by 2010, and is expected to reach 50 percent in 2020. The production value of nano-convergence industries in Korea amounted to KRW 92.3 trillion in 2011, accounting for approximately 6.1 percent of the total production volume of the nation’s manufacturing industries.1 Regarding human resources, the nano-convergence industries employed 130,667 people, a rise of 6.9 percent from the previous year, and 4.9 percent of the total manpower of the manufacturing industries. This figure is much higher than the 2.2 percent rate of increase in the entire manufacturing sector. Korea’s nano industries have now completed the initial phases of research and development and prototype fabrication, and have entered the phases of full-scale production and sales. The industry is also recognized as one of promising growth, with a per capita productivity 1.6 times higher than that of other manufacturing industries. A recent study by the National Nanotechnology Policy Center forecasts that the contribution of the nano-convergence industries to GDP will be approximately 29 percent (KRW 360 trillion) by 2015, and approximately 35 percent (KRW 502 trillion) by 2020.

It is, however, hard to obtain systematic statistical data for the nano-convergence industries2, as they lack both explicit classification systems and an industrial statistics system concerning the characteristics of their convergence with various other types of industries. To improve this situation, the Ministry of Trade, Industry and Energy (MOTIE) has been working on establishing a classification system of nano-convergence industries together with experts from relevant fields of industry since March. MOTIE classifies the nano-convergence industries into four major categories: nano-materials, nano-electronics, nano-biology and medicine, and nano-systems and equipment, as well as 16 intermediate categories and 44 detail categories.

The production and employment status for individual categories of the nano-convergence industry in 2011 are as follows: nano-electronics (85.1 percent, KRW 78.5 trillion), nano-materials (12.1 percent, KRW 11.1 trillion), nano-systems and equipment (2.5 percent, KRW 2.3 trillion), nano-biology and medicine (0.3 percent, KRW 0.3 trillion).

There are 468 nano-convergence-related companies in Korea, 96 percent of which are small- and medium-sized companies. The share of the companies that produce exclusively for nano-convergence products (total revenue of 70 percent or more) increased from 36.3 percent in 2011 to 34.2 percent in 2012. The top four categories of increases are materials, systems and equipment, electronics, and biology and medicine.

The nano-convergence industries are rapidly growing in Korea. But it is also necessary to converge nanotechnologies with every sector of industry to enhance the global competitiveness of Korean companies and to create new industries with the capacity to survive in a global marketplace characterized by increasingly fierce competition. To that end, government-led activities should focus on establishing a close collaboration system with the civil sector.

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2) The nano-convergence industry is defined as an "industry producing nano-convergence products by utilizing nanotechnology." A nano-convergence product is defined as a "product creating innovative functions through minimal operation at a size of 100nm or less."