The Research on Transformation and Upgrading of China's Manufacturing Industry under the Background of Industry 4.0

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Research Background

Manufacturing related activities among global nations are rapidly evolving. Manufacturing earnings and experts are stimulating economic prosperity causing nations to increase their focus on developing advanced manufacturing capabilities by investing in high-tech infrastructure and education.

- Nations and companies are striving to advance to the next technology frontier and raise their economic well-being. As the digital and physical worlds of manufacturing converge, advanced technologies have become even more essential to company and country-level competitiveness.
- In the 2016 GMCII, CEO survey respondents were asked to rank nations in terms of current and future manufacturing competitiveness. Top performing nations have each demonstrated strengths across multiple areas of manufacturing excellence. They also clearly illustrate the close to that exists between manufacturing competitiveness and innovation. The 2016 study takes a closer look at 5 focus nations: United States, China, Japan, Germany, and South Korea. Collectively, these countries account for greater than 50 percent of world’s manufacturing GDP, demonstrating the influence these nations have on global manufacturing trends.
- Source: 2016 Global Manufacturing Competitiveness Index

South Korea’s goal is to enhance the competitiveness of manufacturing industry, to promote the integration manufacturing and other industry, especially the information technology to create new industry. South Korean government have issued the Manufacturing Innovation Strategy Implementation Plan 3.0 in March 2015. In this plan the station have launched to three major manufacturing innovation strategy: 1. Promote the intelligent manufacturing, 2. Improve the industry’s core strength in key areas. 3. Consolidate the base of manufacturing innovation.
- Chinese government have put forward the plan named ‘Made in China 2025’ in May 2015 aim to resolve the present problems of China’s manufacturing “big but not strong, and more without fine”, clearly stated to focus on the development of the top ten key areas.
- Source of information from national Government confessed Notices

The Research on Transformation and Upgrading of China’s Manufacturing Industry under the Background of Industry 4.0

In the global manufacturing industry into the era of "Industrial 4.0", manufacturing transformation and upgrading is being considered as the key task of industrial revolution by national governments. Intelligent Manufacturing is reshaping a new ecological manufacturing. German Federal Department of Research and Technology and the Federal Ministry of the Economy in 2013 have put "Industry 4.0" project into the German (High-tech strategy 2020). Soon afterwards, German Machinery and Manufacturers Association (VDMA) have jointly established the German "Industry 4.0 platform". American government promote the integration of information technology and intelligent manufacturing technology, accelerate the platform installation of intelligent manufacturing and impel intelligent manufacturing industry as an engineering project. To make technological innovation and intelligent manufacturing industry support each other.
- Japanese officials, among others, have issued "Robot New Strategy" and proposed three objectives in January 2015: Innovation bases of World robot; the first country of using robot in the world; the new era of the most advanced robotics industries in the world.

Research Background

<table>
<thead>
<tr>
<th>Country</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>20.9%</td>
<td>337.4/hour</td>
<td>1089</td>
<td>$1,407.70/person</td>
<td>$21,107.3 billion</td>
<td>93.8%</td>
</tr>
<tr>
<td>Germany</td>
<td>25.2%</td>
<td>389.5/hour</td>
<td>1012</td>
<td>$1,079.00/person</td>
<td>$32,781.5 billion</td>
<td>87.6%</td>
</tr>
<tr>
<td>Japan</td>
<td>18.8%</td>
<td>253.5/hour</td>
<td>1101</td>
<td>$77,433.00/person</td>
<td>$678.7 billion</td>
<td>47.4%</td>
</tr>
<tr>
<td>Korea</td>
<td>31.1%</td>
<td>353.7/hour</td>
<td>1007</td>
<td>$75,644.00/person</td>
<td>$495.8 billion</td>
<td>66.2%</td>
</tr>
</tbody>
</table>

- A represents: Manufacturing GDP of total GDP in 2013
- B represents: Manufacturing Labor Cost in 2015
- C represents: Researchers per Million in 2013
- D represents: Labor Productivity in 2014
- E represents: Manufacturing Exports in 2014
- F represents: Manufacturing Exports of total Exports in 2014

Date resource: 2016 Global Manufacturing Competitiveness Index

首都経済貿易大学工商管理学院 技術経済経営学博士後期課程 李穎
The Theory of Transformation and Upgrading on (manufacturing) Industry

- The theory of Transformation and Upgrading on (manufacturing) industry-In China
- The theory of Transformation and Upgrading on (manufacturing) industry-Summarize the theories of industrial upgrading mentioned above I will divide these into three levels: micro, meso and macro
- The government use national-level technology strategy and amount of capital to guide the resource flow from high-growth to low-input and high-output industries.

Current Situation of China’s manufacturing industry

- Cost advantage is gradually weaken
- Export growth is slowing
- Internet and manufacturing are closely combined
- The low location of the global value chain
- Environmental pollution and resources cut-down
- Changes in consumer demand

Current Situation of China’s manufacturing industry

- The current situation of China’s manufacturing industry
- Development of major sectors (manufacturing industry) in recent years

The Overview on the Strategy of “German Industrie 4.0”

- Build the information of a physical system (CPS)-the network combine the virtual online world and the real physical system based on information with communication technologies on the rapid development of the country manufacturing resources, such as all kinds of information, goods, people and so on
- To put traditional manufacturing plants into “intelligent factories” and “intelligent production
- With the large-scale application of network technologies, the production efficiency is raised through scientific method, complete process, and past experience, especially the connection between production equipment, products and users. It has formed an intelligent manufacturing network including the whole industry chain’s factors
- The process of intelligent manufacturing is built on the Internet and net-working. We do not need to wait until all of these networks mature enough and perfect then to start develop intelligent Manufacturing. The correct approach is based on current technology, the use of existing scientific and technical intelligence to build a manufacturing platform. The development of intelligent manufacturing may promote the integration of three networks in turn
In summary, there are two ways to transform and upgrade China’s Manufacturing Industry:

1. **To promote the overall manufacturing technology industry through connecting institutional innovation and market innovation, make it from existing production manufacturing to service-oriented manufacturing, just like developed countries.**
2. **Second is direct way to upgrade by breaking through the technical constraints in different manufacturing industries to promote industries to develop.**

This path we can learn from the experience of other Asian countries such as South Korea and Singapore. China can move along the path of “Manufacturing process upgrade” – “Manufacturing Product upgrade” – “Manufacturing capability upgrade”. As a result, it will upgrade in the Global Value Chain.