2016 INDUSTRIAL DEVELOPMENT TAIWAN

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Towards a New Industrial Development Model

The Taiwan industry is facing intense competition from advanced nations and emerging economies over the years. In order to strengthen Taiwan’s industrial competitiveness and raise GDP per capita, our government is committed to building a New Economic Development Model with the core values of “Innovation, Employment and Distribution” in mind. By implementing the “Industrial Innovation R&D Program”, we strive to balance economic development, environmental sustainability and social factors in equal harmony and ensure a shared and equitable economic prosperity for all.

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Acting Director General
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Annual Special Topics:
Promoting a New Industrial Development Model

I Taiwan’s Industrial Development – Current Status and Challenges

(1) The problems and challenges currently faced by Taiwan in regard to its industrial development include obstacles to successful transformation of the industrial structure, the need to develop new sources of energy, difficulty in developing international markets, and low levels of investment.

(2) The aging of the population and the trend towards smaller families have created a situation where Taiwanese industry is being negatively affected by labor shortages. At the same time, however, the aging of the population is creating new demand for medical services and care facilities, and is driving the growth of industries such as biotechnology, health food products, healthcare services, etc.

(3) Global warming has exacerbated environment problems and created new concerns regarding food security; issues relating to environmental awareness and “green” energy are continuing to attract widespread attention in the international community. Taiwan intends to gradually replace its existing nuclear generating capacity with environmentally-friendly “green” energy sources, to realize the vision of a nuclear-free Taiwan.
(4) Faced with the obstacles to Taiwan’s continued industrial development, there is an urgent need for the upgrading and transformation of Taiwanese industry. The government will be helping industry to create higher value-added using fewer resources, thereby enhancing the overall competitiveness of Taiwanese business enterprises and making innovation the core element in Taiwan’s future economic development.

(5) Taiwan will be leveraging its existing strengths in innovation and R&D to develop cutting-edge new product applications and services with global potential, and will be using innovative design to market Taiwan and realize enhanced value-added.

(6) In the future, Taiwanese industry will be characterized by cross-industry technology integration, with an emphasis on digitalization, Internet-enablement, smart technology, and environmentally-friendly technology.

II  Industrial Development Vision

In order to secure opportunities for next-generation industrial development and create the conditions needed for Taiwanese industry to build on its existing strengths, the industrial policy vision formulated by Taiwan’s new administration embodies a “New Economic Development Model” with “Innovation, Employment and Distribution” as its core values. The aim is to move away from “efficiency-driven” growth towards innovation-driven growth, using innovation to strengthen industrial competitiveness, promoting the transformation and upgrading of Taiwanese industry, and ensuring that all of Taiwan’s citizens share in the fruits of economic development.
III Implementing the Industrial Innovation and R&D Plan

Economic development policy needs to take into account employment, wages, income distribution, and regional inequality; the goal must be to ensure that all citizens share in the benefits of economic growth. In planning Taiwan’s future industrial development, the Ministry of Economic Affairs (MOEA) will be taking as its foundation the concept of “linkage with the future, linkage with the global economy, and linkage with local communities,” and will be focusing on promoting the development of five key innovation-oriented industries – Smart machinery, the Asian Silicon Valley initiative, the biotech & pharmaceutical industry, green energy, and national defense – in addition to new materials and the “circular economy,” with the aim of supporting across-the-board industrial transformation and upgrading.

1. Smart machinery

The goal here is for Taiwanese industry to move beyond the manufacturing of precision machinery, in which it already excels, into the realm of “smart machinery,” so as to create new employment opportunities and boost turnkey production line/plant exports; the government’s vision is to transform Central Taiwan (where Taiwan’s largest machinery manufacturing industry cluster is located) into a “smart machinery metropolis,” which in turn will help to drive the development of the Central Taiwan region as a whole.

- Efforts will be made to strengthen smart machinery industry interchange and cooperation between Taiwan and Europe, between Taiwan and North America, and between Taiwan and Japan, promoting the adoption of overseas technology and fostering collaboration between Taiwanese firms and leading international corporations. Taiwan’s machinery manufacturers will be encouraged to develop their export-related system integration capabilities, so as to boost “turnkey” machine tool exports to overseas markets; there will also be a focus on strengthening the marketing of smart machinery products in the aerospace sector.

2. Asian Silicon Valley

The government will be working to help build Taiwan into an ideal location for technology innovation and new business start-up, seeking to realize the “Digital Country, Smart Island” vision. Planning is underway to utilize the Internet of Things (IoT), cloud computing, big data and other key technologies to drive the development of the “Asian Silicon Valley.”

- Taiwan will be building linkages with international venture capital providers, and will be seeking to attract international start-ups to locate themselves in Taiwan; encouragement will be provided for cross-industry, next-generation business start-up.

3. Biotech & pharmaceutical industry

In order to develop Taiwan into a leading Asia Pacific region center for biotech and pharmaceutical R&D, the government will be implementing six key action plans – covering human resources development, funding support, R&D theme selection, resource integration, the legal and regulatory environment, and intellectual property rights protection – as part of its planning for the development of the biotech & pharmaceutical industry.

(1) The government will carefully monitor trends in the global biotech & pharmaceutical industry, and in the development of Taiwan’s domestic biotech & pharmaceutical industry, seeking to identify priority areas in regard to new drug development, medical devices, healthcare etc.
Building a Harmonious Employment Environment Which Benefits both Employers and Employees

Faced with a business environment characterized by increasingly intense competition, the availability of human talent has become a key factor. Helping industry to cultivate the human talent it needs, providing efficient working environments, and creating a brighter future for industry, are the key goals when it comes to talent retention, recruitment and cultivation. The Executive Yuan’s “Contact Taiwan” overseas talent recruitment platform is working in close coordination with the Ministry of Foreign Affairs’ network of overseas embassies and representative offices to recruit more international professionals with specialist expertise to come and work in Taiwan.

In the area of human talent cultivation, the MOEA is promoting the Industry Professional Assessment System (iPAS) to help meet industry’s needs.

4. Green Energy

In order to realize the vision of a nuclear-free Taiwan, with environmentally-friendly “green” energy sources gradually replacing nuclear power for electricity generation purposes, Taiwan will be focusing on the integration of energy creation, energy storage, and energy conservation with “smart” systems to ensure that Taiwan has an industrial development environment that is free from energy shortages.

5. National defense

Given the importance of the national defense industry to both national security and economic development, if suitable policies can be used to provide guidance to and manage needs in the national defense sector, providing the national defense industry with the stimulus it needs for self-directed industrial upgrading, then it should be possible for the industry to successfully develop global markets. Taiwan will therefore be focusing on three key areas in its development of the national defense industry: developing the aerospace industry, developing the shipbuilding industry, and developing the information security industry.

6. New materials and circular economy

The government will be promoting the development of innovative “green” materials that will serve as key materials for innovative new industries; the concept of the “circular economy” will be integrated into the development of these new industries, in line with the goals of realizing sustainable industrial development and recycling energy resources, so as to achieve a “win-win” situation for both environmental protection and economic development.
Conclusions

Industrial innovation and transformation is not something that can be achieved overnight. It requires a joint effort on the part of the government and different sectors within society. Taiwan will be implementing a New Economic Development Model, with "Innovation, Employment and Distribution" as its core values, that seeks to integrate the local with the global and the present with the future, so as to bring about a transformation and upgrading of Taiwanese industry and to foster industrial innovation.

Ensuring Fair Distribution of the Fruits of Economic Activity

To ensure that all of Taiwan’s industries can maximize their potential on the road towards sustained economic growth, Taiwan’s future industrial development will seek to deepen the benefits derived from industry clusters, promoting the development of industrial innovation and R&D oriented clusters, and fostering the emergence of comprehensive industry clusters in different regions within Taiwan, in line with each region's sources of comparative advantage, so as to achieve an appropriate balance between industry cluster development and the needs of regional development. The government will therefore be working to support the development of comprehensive industry value chains in key regions of Taiwan (including Taipei, Taoyuan, Taichung, Tainan, and Kaohsiung), focusing on the national defense industry, biotech & pharmaceutical industry, green energy industry, smart machinery industry and Asian Silicon Valley initiative, with the aim of creating high-quality jobs that are closely integrated with the local community.
IDB's Organization and Responsibilities

The Industrial Development Bureau is in charge of the task of industry development nationwide, upholding the spirit of professional, efficient, active and innovative service in providing industry with comprehensive services according to its needs. The IDB is devoted to guiding Taiwan industry to innovatively upgrade and transform, and actively assists manufacturers to strengthen their business operations and raise their productivity and international competitiveness, so as to better be able to respond to changes in the environment.

The IDB is composed of 7 divisions, under which several industrial promotion task forces and offices, and an Industries Assistance Center have been set up. Their main tasks include the following:

i) Formulation of industrial development policies, strategies and measures
ii) Promotion and implementation of industry upgrading-related programs and plans
iii) Development and management of industrial parks
iv) Formulation of taxation and financial measures related to industry development
v) Industrial pollution prevention and control, industrial safety guidance and assistance, and plant management
vi) General industry administrative management

The IDB's industrial parks division, in addition, is in charge of 62 industrial park management and service organizations, 41 water pollution treatment plants, the Environmental Protection Center of Industrial Parks, the Mailiao Harbor Administration and the Hoping Industrial Harbor Administration.

Industry Promotion Task Forces & Offices

1. Committee of Communications Industry Development (COCIID)
2. Committee of Accelerating Mobile Broadband Service and Industry Development
3. High-Value Petrochemical Industry Promotion Office
4. System Integration Promotion Alliance Project Office (SPIN)
5. Taiwan-Japan Industrial Collaboration Promotion Office (TJPO)
6. Digital Content Industry Promotion Office (DCIPO)
7. Intelligent Electric Vehicle Promotion Office
8. Office of Executive Committee for Industrial Cooperation Program
9. Committee for Aviation Industry Development
10. Biotechnology and Pharmaceutical Industries Promotion Office
11. Industrial Competitiveness Development Center
12. Taiwan-Japan Industrial Cooperation Promotion Office (TJPO)
13. Smart Electronics Industry Promotion Office (SPC)
14. Color Display Industry Promotion Office
15. Taiwan Industrial Innovation Platform Program Office (TIP)
16. Textile Industry Promotion Office (TIP)
17. Smart Machinery Promotion Office
18. 4G-based Smart City Project Office
19. Intelligent Electronics Institute Program Office

Overview of Taiwanese Industry
II. Chronology of Taiwan’s Industrial Development

From the year 1953 – when the first economic development plan was implemented – through 2015, the average rate of economic growth in Taiwan was 7.3%. Per capita GDP rose from less than US$200 in 1951 to US$22,924 in 2015, while the manufacturing segment of GDP increased from US$260 million in 1951 to US$189.5 billion in 2015.

After more than 50 years of industrial development, Taiwan has already established solid foundations, and has become an important part of the global economy. Taiwan has been a member of the World Trade Organization (WTO) since January 1, 2002 (under the name “Chinese Taipei”), and has been working actively to sign economic collaboration agreements with other counties; in the future, Taiwan will be working towards the goal of securing membership of the Trans Pacific Partnership (TPP). Besides Taiwan’s proactive efforts to grow its external economic and trading links, building up the country’s domestic capabilities is also a very important task. All of Taiwan’s measures in this respect – from the Statute for Upgrading Industries of 1991, through the initiative to promote development of the knowledge economy that was launched in 2000 and the Guidelines for Industrial Development that were formulated subsequently, to the recent Industrial Upgrading and Transformation Action Plan – have been important industrial policy measures that were based on careful analysis of international trends and of the then-current state of industrial development in Taiwan. In 2016, the Taiwanese government has launched a new industrial development policy based around promoting the development of the “Five Innovative Industries” – Smart machinery, Asian Silicon Valley, Biotech & pharmaceutical industry, Green energy, and National defense – along with “New materials and circular economy” and “New agriculture,” with the aim of bringing about a wholesale transformation of Taiwanese industry.

<table>
<thead>
<tr>
<th>Period</th>
<th>Development Strategy</th>
<th>Key Measures</th>
<th>Manufacturing Sector GDP (US$ 100 mil.)</th>
<th>Per Capita GDP (US$)</th>
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</thead>
<tbody>
<tr>
<td>1950s</td>
<td>Import Substitution</td>
<td>1953 – Land reforms implemented</td>
<td>1.77 → 2.76</td>
<td>137 → 122</td>
</tr>
<tr>
<td>1960s</td>
<td>Export Expansion</td>
<td>1966 – Export processing zone established</td>
<td>3.28 → 14.32</td>
<td>143 → 320</td>
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<tr>
<td>1970s</td>
<td>Infrastructure Improvement</td>
<td>1971 – Ten Major Construction Projects launched</td>
<td>16.54 → 119.26</td>
<td>360 → 1,758</td>
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<tr>
<td>1980s</td>
<td>Economic Liberalization</td>
<td>1982 – Strategic industries promoted</td>
<td>149.19 → 515.35</td>
<td>2,189 → 7,097</td>
</tr>
<tr>
<td>1990s</td>
<td>Industry Upgrading</td>
<td>1991 – Statute for Upgrading Industries implemented</td>
<td>533.49 → 717.61</td>
<td>7,556 → 12,324</td>
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<td></td>
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<td>2006 – “Big Investment, Great Warmth” industry development plan implemented</td>
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<td></td>
<td></td>
<td>2008 – i-Taiwan 12 infrastructure projects launched</td>
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<td></td>
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<td>2009 – Development of six key emerging industries promoted</td>
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The Current State of Industrial Development in Taiwan

1. Changes in the industrial structure

Nominal GDP can be divided into three sectors: agriculture, forestry and fisheries; manufacturing; and services. As a result of the transformation of Taiwan’s industrial structure, the share of total nominal GDP held by agriculture, forestry and fisheries had already fallen to under 2%, and in 2015 it declined still further, to 1.78%. The share of overall nominal GDP held by manufacturing has been falling steadily for some years now; although the last three years have seen a slight upturn; as of 2015, the manufacturing sector’s share of overall nominal GDP stood at 30.34%, the highest figure since 1992. The service sector’s share of overall nominal GDP slipped down to 62.8% in 2015.

Table 2: Contribution to GDP by Sector

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</tr>
</thead>
<tbody>
<tr>
<td>Production Source</td>
<td></td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>I) Agriculture, forestry, fisheries and livestock</td>
<td></td>
<td>1.61</td>
<td>1.56</td>
<td>1.48</td>
<td>1.55</td>
<td>1.48</td>
<td>1.60</td>
<td>1.72</td>
<td>1.67</td>
<td>1.69</td>
<td>1.81</td>
<td>1.78</td>
</tr>
<tr>
<td>II) Industrial</td>
<td></td>
<td>32.28</td>
<td>32.38</td>
<td>32.96</td>
<td>31.90</td>
<td>31.50</td>
<td>33.76</td>
<td>33.02</td>
<td>32.75</td>
<td>33.46</td>
<td>34.55</td>
<td>35.14</td>
</tr>
<tr>
<td>Manufacturing</td>
<td></td>
<td>27.77</td>
<td>27.72</td>
<td>28.44</td>
<td>27.41</td>
<td>26.73</td>
<td>29.06</td>
<td>28.66</td>
<td>28.57</td>
<td>28.75</td>
<td>29.75</td>
<td>30.34</td>
</tr>
<tr>
<td>III) Services</td>
<td></td>
<td>66.11</td>
<td>66.06</td>
<td>65.59</td>
<td>67.15</td>
<td>66.82</td>
<td>64.63</td>
<td>65.27</td>
<td>65.58</td>
<td>64.85</td>
<td>63.64</td>
<td>62.80</td>
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</tbody>
</table>

(note: data compiled by DSBAS, Executive Yuan)
2. The current state of the manufacturing sector and the technology-intensive services sector

The International Standard Industrial Classification (ISIC) divides the industrial sector into: manufacturing; water, electricity and gas; construction; and mining and quarrying. Manufacturing accounts for by far the largest share of Taiwan’s industrial sector. In 2015, affected by a dramatic drop in global demand and by the fall in international commodity prices, manufacturing output value fell by 10.84% to NT$12,861.1 billion. There has been a transformation of the industrial structure; whereas in 1952 the largest segments within the industrial sector were the food manufacturing industry (30.80% of the total) and textile industry (15.34%), by 2015 the largest segments were the electronic components industry (28.11%), chemical materials industry (12.90%) and basic metals industry (9.53%). As of 2015, the total number of people employed in the manufacturing sector in Taiwan was approximately 2.7165 million.
Table 3: Manufacturing Industry Production, 2015

<table>
<thead>
<tr>
<th>Industry</th>
<th>% of Manufacturing Industry's Total Production</th>
<th>Production Index (the year 2011 = 100)</th>
<th>Production Value (US$1mil.)</th>
<th>Total Workforce (10,000s)</th>
<th>Per Capita Annual Production (US$1 mil.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>100</td>
<td>105.3</td>
<td>403,170</td>
<td>271.65</td>
<td>14.84</td>
</tr>
<tr>
<td>Metals and Machinery</td>
<td>28.92</td>
<td>97.28</td>
<td>116,588</td>
<td>98.11</td>
<td>11.88</td>
</tr>
<tr>
<td>Information Electronics</td>
<td>33.53</td>
<td>113.2</td>
<td>135,165</td>
<td>80.74</td>
<td>16.74</td>
</tr>
<tr>
<td>Chemicals</td>
<td>26.65</td>
<td>103.03</td>
<td>107,465</td>
<td>46.16</td>
<td>23.28</td>
</tr>
<tr>
<td>Consumer Goods</td>
<td>10.90</td>
<td>99.77</td>
<td>43,953</td>
<td>46.64</td>
<td>9.42</td>
</tr>
</tbody>
</table>

(Note: data compiled by DGBAS, Executive Yuan, and Department of Statistics, MOEA)

In 2015, the Taiwan technology services sector’s turnover amounted to US$15.659 billion, for an average production value of US$62,800 for every worker employed in the sector. Developing the technology services sector will be helpful in terms of Taiwan promoting global logistics integrated information applications, and will help industries to create added value in services and strengthen their knowledge capital.

Table 4: State of Development of Technology Services Industry

<table>
<thead>
<tr>
<th>Turnover (US$1mil.)</th>
<th>% of Overall Production</th>
<th>Number of Employed (10,000)</th>
<th>% of Total Workforce</th>
<th>Average Production Value per Employee (US$10,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15,659</td>
<td>2.99</td>
<td>24.94</td>
<td>3.38</td>
<td>6.28</td>
</tr>
</tbody>
</table>

Note: For the purposes of this table, the “technology-intensive services sector” is defined as including the computer systems design services industry, the data processing and data supply services industry, the management consulting industry, the advertising and market research industry, the specialist design services industry and the photography industry. Annual sales data are based on statistics compiled by the Department of Statistics, MOEA, converted using historic interest rates published by the Central Bank. The data given for the share of annual output is the technology-intensive service industries’ share of total annual GDP. The share of the workforce is based on the number of employees of firms in the technology-intensive services sector (249,300) as a share of the total number of employed persons (7,385,400). The average output per employee is calculated by dividing total annual sales revenue by the number of employed persons working in the sector.
IV Taiwan’s Major Industry Clusters

For more than 50 years now, the Industrial Districts designated by the Industrial Development Bureau, MOEA have provided a first-class environment for business enterprises to invest in factory establishment, and as a result industry clusters have developed in and around them, with individual regions within Taiwan developing clusters that reflect their own particular sources of comparative advantage. In recent years, with the stimulus provided by the government’s industrial upgrading and transformation policies and related guidance measures, as well as the various incentive measures used to encourage investment, there has been a gradual process of transformation and adjustment in the development of the industries concentrated in the industrial parks and industry clusters throughout Taiwan; the development process has become more closely integrated with the special characteristics of local industries and with local resources. It is anticipated that this new trend will help to stimulate further upgrading and continued growth in Taiwan’s manufacturing sector.

In the future, regional industrial development will be integrated with the circular economy model, and the development of emerging industries will be linked with the wealth of university and research institute resources located near Taiwan’s industrial parks, to enhance overall innovation and R&D capabilities, while the building of upstream-downstream industry value chain collaboration mechanisms will help to further the development of the manufacturing sector ecosystem as a whole.
2016
Industrial Development in Taiwan, R.O.C.