Major Innovative Industries
New Innovation-driven Growth
Momentum of Industries in Taiwan

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National Development Council
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Outline

- Foreword
- Three Principles of Economic Development
- Three Driving Forces in Revitalizing Investment
- Three Links of the Industrial Policies
- Objectives of Five Innovative Industries
- Conclusion
FOREWORD
Taiwan GDP Growth Rates: 1960-2015

Source: DGBAS
Economic Growth Rates: Taiwan vs. the World

Source: IMF
Declining Domestic Momentum of Economic Growth

<table>
<thead>
<tr>
<th>Period</th>
<th>Economic Growth Rate = (1) - (2)</th>
<th>Contribution of domestic demand (1)</th>
<th>Contribution of foreign demand (2)</th>
<th>Export</th>
<th>(-) Import</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985~1999(1)</td>
<td>7.47</td>
<td>7.35</td>
<td>4.28</td>
<td>0.13</td>
<td>4.49</td>
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<tr>
<td>2000~2014(1)</td>
<td><strong>4.04</strong></td>
<td><strong>1.76</strong></td>
<td><strong>1.42</strong></td>
<td>-0.04</td>
<td>-0.05</td>
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<tr>
<td>Gap (2) - (1)</td>
<td>-3.43</td>
<td>-5.59</td>
<td>-2.86</td>
<td>-2.03</td>
<td>-0.74</td>
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</tbody>
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Source: Meetings of the Board of Directors of the Central Bank of the Republic of China, December 2015
THREE PRINCIPLES OF INDUSTRIAL DEVELOPMENT
Taiwan Has Advanced into Innovation-driven Stage since 2011

Industrial transformation moved from “Efficiency-driven” to “Innovation-driven”

Source: World Economic Forum
Innovation, Employment, Distribution

From focusing on GDP growth to
- Employment
- Salary
- Income Distribution
- Regional Balance
“TROIKA”’POLICY
(A THREE-PRONGED APPROACH)
Industrial Innovation and Transformation Fund

NT$ 100 Billion + Private Equity Fund

 Enterprises correspond with the future industrial development and policies

Ensuring enterprise autonomy
  ● Non-intervention in private businesses
  ● Planning exit mechanism
National Investment Corporation

National Development Fund
State-owned Enterprises
Government Special Funds
Private companies
Large foreign traders

NT$ 10 Billion

Package Plant Export
Search, Found, Integrate, Facilitate
Systems Export

Overseas Market Expansion
Five Innovative Industries

- The “Asian Silicon Valley” initiative
- Biotech & pharmaceutical industry
- Smart machinery industry
- Defense industry
- Green energy

Domestic Demands

SW/HW Integration

R&D Capabilities
THREE LINKS OF THE INDUSTRIES
Links to the Future, International & Local

Links to the Future
- Seize the trend of next-generation industries

Links to the International
- Increasing interaction of talent, capital and market between countries

Links to the Local
- Utilize advantage of industrial clusters
  Establish connections with each local industrial clusters
OBJECTIVES OF FIVE INNOVATIVE INDUSTRIES
The “Asian Silicon Valley” initiative
Trends & Current Status

Global potential economic impact of IoT in 2025: US$3.9-11 trillion

Source: Internet of Things: Mapping the Value Beyond the Hype-Executive summary (MCKINSEY)
Industrial Upgrade & Transformation Relies on Startups

“Taiwan’s industry could successfully be transformed and upgraded if tens of thousands of startup companies appear,” says Morris Chang, Chairman of TSMC.

Many IoT Solutions Will Come from Startups

- According to Gartner Inc., a world famous IT research and advisory institute, the IoT installed base will grow from 0.9 billion units in 2009 to 26 billion in 2020.
- Gartner predicted some 50% of IoT solutions will emerge in startups less than three years old.
The Planning and the Approaches

Taiwan as the ideal place to conduct IoT Testbed experiments

- Engineers w/excellent Quality
- Complete Industrial Supply Chain
- Sound Network Infrastructure
- Comprehensive IP Protection

Ecosystem Optimization
Launch more startup supportive policies on talent, capital, regulations and global networking

Smart Applications
Conduct IoT testbed pilot projects in Taoyuan City

International Links
Connect with prominent innovation hubs worldwide

Infrastructure Construction
Build an international R&D cluster to attract world-class companies
# Smart Machinery

## Trends of development

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<tbody>
<tr>
<td><strong>Technological Revolution</strong></td>
<td>Steam Power Technological Revolution</td>
<td>Electrical Technological Revolution</td>
<td>IT Technological Revolution</td>
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<tr>
<td><strong>Productivity</strong></td>
<td>(Mechanization) Steam power drove mechanized production</td>
<td>(Electrification) Electrical power drove automated production</td>
<td>(Informatization) Electronic equipment and information technology (IT) drive digitized production</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Computerization / digitization / intelligent integration</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>- Cyber-Physical System (CPS)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>- Additive Manufacturing Technological Revolution</td>
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<td>(Intelligentization) Manufacturing by conscientized intelligence</td>
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The Planning and the Approaches (1/2)

- Structural Aspect: Upgrade from precision machinery to smart machinery
- Output Value: To become one of the top five producers in the world and the 3rd largest export country
- Economic Aspect: Industrial transformation and upgrade, job creation, export expansion, solutions for social problems
- Regional Aspect: Taichung city as the hub to drive the development of Central Taiwan

The 60 km long Valley influences the world

The products of Apple, Google (solar energy), Simens (biotechnology), Porsche (key gears), Tesla (motors of electric cars), TSMS (robot arms for Fab15), all rely on this Golden Valley.
1. Set up Key Resource Platform

- Found innovation and R&D clusters for producing smart machinery; acquire the land needed for the bases of production and R&D.
- Breed talents of cross-disciplinary integration; international cooperation and mergers and acquisitions.

2. Coupled with the Demand of Advanced Manufacture

- Application of civil-military Dual Use Technology on aerospace and ship building, intelligent service robots, processing of precision medical equipment, ICT industrial equipment.

3. Expand into Global Market

- Turnkey and project, stand-alone smart machines, aerospace components, Service system of global Cyber Physical System (CPS).
Defense Industry

Trends & Current Status

- Procurement from foreign has considerable uncertainty
- Most components are outsourced and difficult to maintain

- Foreign manufacturers are reluctant to offer their core technologies
- Other countries restrict the export of sensitive technologies
- High level technological thresholds are difficult for SMEs to overcome
- Lack economies of scale, manufacturers are less interested
The Planning and the Approaches (1/2)

• Improve procedure of procurement, strictly regulate manufacturers and products
• Government help firms overcome technological barriers and acquire Certification

Improve the industry, develop better environment

Establish international cooperation

Stabilize market demand

Concentrate R&D, encourage upgrade

• Help the industry stride toward international market
• Strive to acquire the transfer of technology and key parts

• Increase local content requirement of fighters and warships
• Utilize information security advantage to penetrate the international market

• Strengthen the performance of civil-military technologies
• Encourage industrial upgrade
The Planning and the Approaches (2/2)

Three Focuses of Defense Industry
- Cybersecurity Industry: Taipei, Hsinchu
- Aerospace Industry: Taichung, Tainan, Taoyuan National Chung-Shan Institute of Science and Technology (CSIST)
- Shipbuilding Industry: Kaohsiung, Pingtung, Yilan

The clusters of shipbuilding are the most concentrated.

The clusters concentrate in Taipei, Hsinchu and Taichung.

The industrial structure of vertical specialization is the most competitive.
Green Energy Technology
Trends & Current Status

< 3% of energy self-sufficient rate for Taiwan

> 100 trillion, amount of investment in green energy by US, EU, and other countries

The 1st. Taiwan Strait is the best wind farms of the world
Expand Into International Market
Become the next star industries

Utilize Domestic Demand to Promote Green Energy Industries
Exploit offshore wind farms, establish solar photovoltaic power …

Link to Local industries
Precision machinery, Internet of things (IOT), composite materials, ICT

Forge Taiwan as an Ecosystem of Innovative Industries of Green Energy Technology
Establish Shalun, Tainan, as the R&D center, and connect with production and manufacture bases located in various areas
The Planning and the Approaches

Develop Green Energy Technology R&D and Industrial Bases

Innovative Green Technology Park: Shalun, Tainan (R&D Center)

Industrial Clusters (Entire Taiwan)

Technology R&D

International Links

Energy-saving
- Smart grids and meters
- Energy-saving equipment, energy ICT
- Cogeneration, power-heat integration

Energy Creation
- Solar photovoltaics
- Offshore wind energy
- Biomass energy, geothermal, marine energy

Energy Storage
- Lithium batteries, hydrogen and fuel cells
- Power quality improvement and dispatching technology

System Integration
- IOT, ESCO, consulting industry
- System Integrators
Biotech & pharmaceutical

- Global aging population increased will boost the demand on medicines and medical devices; furthermore, improved treatment methods, the development on personalized and precision medicine, emerging infectious diseases and so on, those trends will drive the growth in global pharmaceutical and medical devices market.

- From 2006 to 2015, the compound annual growth rate of output value of the pharmaceutical, applied biotechnology, and medical materials devices industries was 5.8%, enjoying a steady growth, the growth impetus came mainly from the growth of domestic demand and export marketing success.
Vision:

- Establish Taiwan as the Asia-Pacific R&D hub of Biotechnology Pharmaceutical Industry
- Perfect health and welfare service, improve high value-added employment

The Planning and the Approaches (1/2)

Create a friendly capital market and reduce the barrier of fund-raising

Strengthen intellectual property protection, enhance the effectiveness of technology transfer

Harmonize regulations with international standards, implement synergistic cross-strait medical and health cooperation agreement

Foster talent for innovation and leaders of industrial operations

Carefully choose R&D subjects of pharmaceutical products, focus on the special health care of Eastern Asia diseases

Integrate core biomedical facilities and resources to support R&D in biotechnology industry
The Planning and the Approaches (2/2)

**Strategy 1 (Links to the International):**

Strengthen links between Taiwan and international

- **Taiwan**
  - Talent
  - Tech
  - Funds
  - Legislation
  - Biotech & Pharmaceutical Center in the World

- **Taipei**
  - Medical & Pharmaceutical Center of Northeast Asia

- **Taoyuan**
  - Intelligent medical treatments

- **Hsinchu**
  - ICT/Specialty care

- **Taichung**
  - Medical devices in minimally invasive surgery and intelligent assistive devices

- **Tainan**
  - Dental and orthopedic implant materials

- **Kaohsiung**
  - Tropical medicine

- **United States** (Boston, the Bay Area, San Diego)
- **Switzerland**
- **Belgium**
- **Sweden**
- **Netherlands**

**Strategy 2 (Links to the Local):**

integrating local innovation clusters

Projected benefit: Facilitate biotech industry output to reach NT$ 500 billion in 2020 and 5 Biotech & Pharmaceutical flagship companies will reach the milestones of tens of billion
New Agriculture

Three Policy Principles of New Agriculture

- Promote agricultural paradigms
- Establish agricultural security systems
- Improve agricultural marketing capabilities
CONCLUSION
Digitized State, Intelligent Island

- Environments for innovation
- Enhancement of technology
- Regional balance
- Links to the local
- Links to the international
- Links to the future
- Increasing employment
- Reinvigorate industries
THANKS FOR LISTENING

YOUR COMMENTS AND SUGGESTIONS ARE WELCOME