AGRICULTURAL TECHNOLOGY COMMERCIALIZATION FROM GOVERNMENT RESEARCH INSTITUTIONS TO AGRIBUSINESS IN TAIWAN

Liang-Jeng Hung
Chief, Division of International Affairs, Industrial Development Center, Agricultural Technology Research Institute (ATRI), Taiwan, R.O.C.

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Outline

- INTRODUCTION
- REGULATION FOR TECHNOLOGY TRANSFER IN TAIWAN
- AGRICULTURAL TECHNOLOGY COMMERCIALIZATION
- FUTURE PROSPECTS
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ABOUT TAIWAN

Total area: 36,193 km²
Population: 23,516,841 (as of August 2016)
Longitude and latitude: 23°30’N 121°00’E
GDP: 537.5 Billion US dollars (2015)
The Roles of Agriculture

- Food nutrition
- Food security
- Energy supply
- Commodity supply
- Social stability
- Climate adjustment
- Air purification
- Water conservation
- Landscape decoration
Transition of Agricultural R & D Results

Past - Traditional Agriculture

Technologies free for farmers

Present - Knowledge-based Economy

Intellectual property protection and management

Future - Agricultural S & T Industry

Expansion of agri-business
Evolution of Agriculture

Knowledge-based agriculture
(Applications of knowledge)

Inputs of service industries
Information, biotechnology, design, integration

Modern agriculture
(Applications of science)

Inputs of industrial products
Chemical fertilizers, pesticides, machineries, seeds, irrigation

Traditional agriculture
(Applications of experience)

Source: Dr. Samson C. S. Tsou 2014
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- INTRODUCTION
- REGULATION FOR TECHNOLOGY TRANSFER IN TAIWAN
  - Government Laws and Regulations
  - National Agricultural Policy
- AGRICULTURAL TECHNOLOGY COMMERCIALIZATION
- FUTURE PROSPECTS
1. Establishment of the legal environment and system for agricultural technology management
   – Fundamental Science and Technology Act 1999
   – Government Scientific and Technological Research and Development Results Ownership and Utilization Regulations 2000
   – Regulations for Scientific and Technological Research and Development Results Ownership and Utilization by the Council of Agriculture 2001

2. Intellectual property right
   – Patent Act
   – Trademark Act
   – The Plant Variety and Plant Seed Act
3. The principles of ownership and utilization of government supported agricultural R&D results:
   - Equity, openness and license fee required.
   - Domestic licensing as first priority.
   - Licensing abroad on condition.
   - Preferential license fee and royalty for farmers and farmer's associations.

4. Gratuitous extension of some new technologies to farmers by training courses, consultation and demonstration.
Agricultural S & T Policy Making Mechanism

S & T policy making

Agricultural S & T Committee

Research area evaluation and planning

Research Area Evaluation Committee

Project proposal and execution

Task Force

S & T Development Planning Group

Think tank (expert opinions)

S & T Policy Sources:
- Agricultural policies
- S & T foresight
- Industry demands
- International trends
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- REGULATION FOR TECHNOLOGY TRANSFER IN TAIWAN
- AGRICULTURAL TECHNOLOGY COMMERCIALIZATION
  - Thinking on Agriculture’s New Value Chain
  - Systematic Process
  - Establishment of ARTI
  - Performance and Examples
- FUTURE PROSPECTS
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REGULATION FOR TECHNOLOGY TRANSFER IN TAIWAN

AGRICULTURAL TECHNOLOGY COMMERCIALIZATION

• Thinking on Agriculture’s New Value Chain
• Systematic Process
• Establishment of ARTI
• Performance and Examples

FUTURE PROSPECTS
Agriculture’s New Value Chain

- **Strategic thinking**
  - Expand from production-oriented agriculture to agriculture with a **new value chain**
The value chain in agriculture

Information ➔ Innovation ➔
➔ Commercialization/Industrialization ➔ Marketing

(Market, big data, clouds...)

Interdisciplinary Cooperation

Value
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- FUTURE PROSPECTS
Systematic Process

Function Support for Agribusiness

- R&D
- Financial Affairs
- Information
- Marketing
- Human Resource
- Production
Governmental Agriculture R&D Framework in Taiwan

Basic Research → Applied Research Technology and Operation → Applications

Universities

Academia Sinica

16 COA affiliated Research Institutes

7 Research Institutes

9 District Research and Extension Stations

Agribusiness, Associations, Cooperatives and Farmers
AIPRC
(Agricultural Intellectual Property Rights Committee)

- To make decisions, or deal with a particular subject about IPR registration and Technology transfer.

COA affiliated research institutes

Non COA affiliated research institutes

Technology Valuation

R & D results

AIPRC

IPR registration

Technology transfer

Licensing fee/Royalty

Feedback
Programs for Improving Agribusiness R&D Capacity

**Industry-Academia Cooperation**

- Public sector’s R&D outputs
- Cooperate with private sector to modify for pre-production
- Pilot running

**Funding the Innovative Private Sectors**

- Private sector’s R&D outputs
- Public sector’s funding for pre-production
- Pilot running or Production

IPRs belong to Public sector, then be licensed to private sector

**Improving R&D Capacity of Private sectors and Commercializing R&D outputs of Public and Private sectors**
# Preferential Loan for ATP company

<table>
<thead>
<tr>
<th>Items</th>
<th>Introduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accommodator</td>
<td>Agribusiness who move into the Agricultural Technology Park</td>
</tr>
<tr>
<td>Use for loan</td>
<td>To build or buy the facilities and for working capital</td>
</tr>
<tr>
<td>Interest rate</td>
<td>1.5%</td>
</tr>
<tr>
<td>Credit limit</td>
<td>80 million NTD (around USD 2.5 million)</td>
</tr>
<tr>
<td>Payback period</td>
<td>Each tenant agribusiness may apply for a 15-year loan from Agricultural Bank of Taiwan</td>
</tr>
</tbody>
</table>
To Hasten Companies to Be Listed

Innovative Agribusiness with potential and foresighted market

On application for being the listed-companies

Evaluating by COA and the non-profit financial organizations

Innovative Agribusiness with the standard amount of capital shall not be limited by the required profitability and periods of establishment.

It could shorten 1 to 2 years for trading of its stock
Human Resources

- Professors in university
- Agricultural entrepreneurs
- Experts in industry
- Officials in government (COA)

• IPR Management
• Technology Package and Transfer
• Finance
• Innovation & Entrepreneurship

• Production
• Marketing/Sale
• Human Resource
• R&D management
• Financial/Account
• Information
Establishment of Innovation Incubation Centers

- 2005: Livestock Research Institute
- 2009: Agricultural Research Institute
- 2009: Fisheries Research Institute
- 2014: Agricultural Technology Research Institute
- 2015: Forestry Research Institute
## Agricultural Biotechnology Park

### Pingtung Agricultural Biotechnology Park (PABP)

<table>
<thead>
<tr>
<th>Area of Park (hectares)</th>
<th>233</th>
<th>175</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget of Capital Construction (USD Million)</td>
<td>261</td>
<td>59</td>
</tr>
<tr>
<td>Park Residents (Enterprises)</td>
<td>55</td>
<td>51</td>
</tr>
<tr>
<td>Investment of Enterprises (USD Million)</td>
<td>293.4</td>
<td>375.6</td>
</tr>
</tbody>
</table>

*Update for 2015*

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**Production**

Taiwan Orchid Plantation
# Exhibition

<table>
<thead>
<tr>
<th>Exhibition</th>
<th>Taipei Int’l Invention and Technomart</th>
<th>BIOTaiwan</th>
<th>BIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Properties</td>
<td>1. R &amp; D Result Exhibition</td>
<td>R &amp; D Result Exhibition</td>
<td>1. Product Publication</td>
</tr>
<tr>
<td></td>
<td>2. Technology Transfer Match</td>
<td></td>
<td>2. R &amp; D Result Exhibition</td>
</tr>
<tr>
<td>No. of Technology</td>
<td>50+</td>
<td>50+</td>
<td>3+</td>
</tr>
<tr>
<td></td>
<td>2. Universities</td>
<td>2. Universities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Private Research Institutes</td>
<td>3. Private Research Institutes</td>
<td></td>
</tr>
</tbody>
</table>

Marketing
TAIWAN Pavilion

• Planning the TAIWAN Pavilion to attend the international agricultural exhibition
• VIV China, AgriWorld, VIV Asia, Pet Fair Asia, SIMA ASEAN, VIET STOCK
Operating Office for Agricultural Technology Industry

- Enforce and propose suggestions
- Suggest the Promotional policies
- Establish the information system
- Establish the management system

Technology Supplier
- License research innovation
- Consulting
- Training

AgriTI™

Business
- Match-making
- Consulting
- Service-providing

ITRI
- Industrial technology supplying
Taiwan Agriculture TechnoMart

Website: http://tatm.coa.gov.tw

agricultural inventions
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Establishment of ATRI

Agricultural Technology Research Institute
(established in January 1, 2014)

Agricultural research system
- Universities
- Private research institutes
- Research and extension institutes

Agricultural industry
- Farmers
- Agricultural groups
- Agribusiness

Provision of agricultural technology and commercialization/industrialization service to agribusiness, agricultural groups and farmers
Accelerate Agricultural Technology Industrialization

- Animal Vaccines
- Feed Additives
- Bio-Pesticides
- Diagnosis and Testing

- New Plant Varieties and Seedlings
- Mushroom Cultivation
- Grouper Culture System
- Agricultural Machines

Promoting Food Safety

Upgrading Traditional Industries

- Ornamental Fish and Accessories
- Pet Foods and Products

Incubating Innovative Industries

Globalization Enhancement

Technical Trade Internationalization
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FUTURE PROSPECTS
## Financial Affairs

<table>
<thead>
<tr>
<th>Preferential loan</th>
<th>Reduction of Expenditures for Corporate Research as Investment</th>
<th>Hastening enterprise to be listed company</th>
<th>Venture capital intermediary platform for Agribusiness</th>
</tr>
</thead>
<tbody>
<tr>
<td>391 approved, USD 62.3 Million (since 2004)</td>
<td>3 cases (since 2011)</td>
<td>OTC:1 Pre OTC: 8 IPO: 2 Pre-Listed: 4 (since 2014)</td>
<td>Matching 4 agribusiness with VC, USD 20 million (since 2015)</td>
</tr>
</tbody>
</table>
Pingtung Agricultural Biotechnology Park was established in 2006. The Park has 233 hectares of lands, with 102 companies operating, 6 major industrial clusters forming, and US$293 million AgriBiz investment.

**Clusters in PABP**

- **Agro-Bio Products**
  - (Bio-Fertilizer, Bio-Pesticide, Probiotics)
  - 13 companies

- **Natural Products for Health & Cosmetics**
  - (Plant Seeds and Seedlings, Functional Food, Cosmeceutical)
  - 52 companies

- **Biotechnical Service**
  - (Diagnoses for animal & plants diseases and pest, Chemical residues, Molecular Analysis)
  - 8 companies

- **Aquaculture**
  - (Ornamental Fish, Rearing, Aqua Breeding, Aquaculture Related Accessory)
  - 15 companies

- **Animal Health and Feeds**
  - (Animal Vaccine, Feed Additives, Probiotics)
  - 9 companies

- **Energy-saving & Ecological Agro-Production System**
  - (Wind Flow & Concentrating Solar Power for Aquaculture)
  - 5 companies
Example of Commercialization

- **Rapid Bio-assay for Pesticide Residue, RBPR**

  - Industry trends and market analysis
  - IPR analysis
  - Feasibility analysis on technologies
  - Feasibility analysis on commercialization of technology
  - SWOT analysis
  - Key Success Factor analysis
  - Financial analysis
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Future Prospects

New Agribusiness of Technology Innovation, Ecologically sustainable and Value Sharing

- International Cooperation
- Distribution
- Employment
- Innovation
- Localization
- Universalization
- Internationalization

- Differentioal

- New Agribusiness

- Technology Innovation

- Competitiveness

- • Intelligent agriculture
- • Food Safety
- • Sustainable agriculture
THANKS for YOUR ATTENTION