Perspectives of Thai Agriculture and Aquaculture in the Future

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5 January 2017
RMUTL 1st ISHPMNB 2017
7 Major trends in agricultural and aquaculture industries

Global population growth and urbanization in emerging markets
Dramatically rise in income and population growth in emerging markets in which increase demand in many products.

Demographic and behavioral change in consumers
Consumers are increasingly health conscious and taking care of environment

The productivity imperative
Depleting natural resources and climate volatility affect productivity and global food supply.

A Polarized industry structure
Major agribusiness are integrating vertically extending into production and processing and smallholder farmers are gradually integrating into commercial value chain.

Unprecedented price swings
Continuous agricultural input and output price volatility.

Big data and information technology
Exciting potential to use more analytical capability to integrate various sources of information with the goal of optimizing resource usage.

Trade to contribute to food security
Investment opportunity from trade for food security

Although, more than 50% employment rate belongs to the agricultural sector, the sector contributes to Thai economy only 10% of Thai GDP.
### Food export value by product in 2016 (million baht)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Product</th>
<th>Value (MB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rice</td>
<td>160,000</td>
</tr>
<tr>
<td>2</td>
<td>Chicken</td>
<td>95,018</td>
</tr>
<tr>
<td>3</td>
<td>Sugar</td>
<td>91,147</td>
</tr>
<tr>
<td>4</td>
<td>Shrimp</td>
<td>70,133</td>
</tr>
<tr>
<td>5</td>
<td>Tuna Can</td>
<td>69,271</td>
</tr>
</tbody>
</table>

### Trend in Thai food export by product

- **Dairy product**: Increasing
- **Sugar**: Decreasing
- **Rice & cereal**: Decreasing
- **Fruit & vegetable**: Decreasing
- **Beverage**, **Meat**, **Sea food**: Stabilized

*Source: The National Food Institute, Thailand*
Thailand food export market in 2016 by countries

Export ratio in 2016

USA: 11.9%
EU-28: 10.0%
MALAY: 28.4%
CHINA: 13.9%
AFRICA: 9.1%
LATIN AMERICA: 1.2%
OCEANIA: 3.6%

Source: The National Food Institute, Thailand
Enabling factors supporting food Industry in 2017

**Internal Factors**

- Agricultural raw material output recovery
- Improvement of household consumption
- More investment in private sector supporting from BOI incentive package
- More confidence in Thai Fishing Industry from improving watch list from tier 3 to tier 2

**External Factors**

- Weaken Thai Baht and strength US Dollar
- CLMV economics expansion
- MENA region economics recovery
- Chicken import permission from Thailand

Source: The National Food Institute, Thailand
Concerned factors in agricultural and aquaculture industry

Climate change

- Changes in the frequency and severity of droughts and floods could pose challenges for farmers and threatens food security.

- Warmer water temperatures are likely to cause the habitat ranges of many fish and shellfish species to shift and could disrupt ecosystems.

Considered along with other evolving factors that affect agricultural production, such as changes in farming practices and technology.

International agreements to protect environment and human trafficking

International trade agreements and regulation primarily concentrate on environment protection and preserving ecosystem. IUU (Illegal Unreported and Unregulated Fishing) is the international regulation which cause fishery product can be banned by importing countries where having illegal fishing activity.

Source: United States Environmental Protection Agency / The United Nations Food and Agriculture Organization (FAO)
Innovation in agricultural and aquaculture industry

IoTs /Big Data /Automation and Robot /System Integration /Bio Economy/Etc.

Farmers/ Fisherman
- Smart farming/ Fishing
- Bio technology innovation

Manufacturers
- Manufacturing revolution in production process and products

Retailers
- Digitalization in logistics and delivery
After the manufacturing industry went through automation, mass production, and globalization, German (Industry 4.0), U.S.A. (AMP), Japan (4.1J), China (Made in China 2025), and other major countries are actively building agile and predictable cyber-physical systems for smart manufacturing, production, and marketing to address the market demand.

- **AMP (Advanced Manufacturing Partnership)**
- **4.1J (Japan Industry 4.1J)**
Smart Farming Concept in the Future

FUTURE FARMS: small and smart

SURVEY DRONES
Aerial drones survey the fields, mapping weeds, yield and soil variation. This enables precise application of inputs, mapping spread of pernicious weed blackgrass could increasing Wheat yields by 2-5%.

FLEET OF AGRIBOTS
A herd of specialised agribots tend to crops, weeding, fertilising and harvesting. Robots capable of microdot application of fertiliser reduce fertiliser cost by 99.9%.

FARMING DATA
The farm generates vast quantities of rich and varied data. This is stored in the cloud. Data can be used as digital evidence reducing time spent completing grant applications or carrying out farm inspections saving on average £5,500 per farm per year.

TEXTING COWS
Sensors attached to livestock allowing monitoring of animal health and wellbeing. They can send texts to alert farmers when a cow goes into labour or develops infection increasing herd survival and increasing milk yields by 10%.

SMART TRACTORS
GPS controlled steering and optimised route planning reduces soil erosion, saving fuel costs by 10%.

Source: nesta.org.uk
Industry 4.0: Manufacturing Revolution

What is Industry 4.0?

- Cyber-physical systems
- Internet of Things
- Smart Factory
- Internet of Services
- Mass Customization
- Artificial Intelligence
- Integration
- Manufacturing Execution System
Thailand 4.0: Towards Value-Based Economy

- Commodity
- Industrial drives
- Production

- Innovation
- Technology
- Service
Thailand 4.0: Structural Change

- Traditional Farming → Smart Farming
- Traditional SMEs → Smart Enterprises/Startup
- Traditional Services → High Value Services
- Unskilled Labors → Knowledge Workers/High Skilled Labors
Thailand 4.0 (Smart Industry + Smart City + Smart People)

1.0
Agriculture

2.0
Light Industry
Low wages

3.0
Heavy Industry
Advanced Machine

4.0
Creativity + Innovation
Smart Thailand

Four Phase of Industrialization

End 0f 18th Century
Use of water and steam
Power to run mechanical Production facilities

Begining of 20th Century
Use of electrical power to enable work sharing mass production

Early 1970s
Use of electronics and IT to automate production

Today
Use of cyber-physical systems to monitor, analyze, and automate business

สภาอุตสาหกรรมแห่งประเทศไทย
THE FEDERATION OF THAI INDUSTRIES

การพัฒนาแรงงาน (Human Resource Development)
The 12th national economic and social development plan

Enhance competitiveness towards supply chain

Reduce Cost
Improve Standard

Strengthen the Agricultural Sector and Food
(Rice, Cassava, Cane, Corn, Palm Oil and Rubber)

R&D improvement
Agriculture alternative
New Innovation
Value Added

Agriculture to New Industry

Strengthen Agricultural Infrastructure
Water, Land, Smart Farmer, Local Knowledge, Standard, Market, Big Data

Strengthen the Agricultural Sector and Food
(Rice, Cassava, Cane, Corn, Palm Oil and Rubber)
Innovation in Food Products

**Food Packaging**
< Easy & Efficiency >
- Nano-packaging
- Bio-plastics
- Robotics in food packaging industry

**Food Processing**
< Efficient Production >
- Fermentation Technology
- Thermal and Non-thermal Processing
- Drying and Freezing of foods

**Food Chemistry & Analysis**
< New Product Innovation >
- Contaminant analysis
- Proteins, oils & fats
- Nutritional properties
Innovation in Food Products

**Shelf Life**  
Food Preservation
- Shelf Life methods, modelling, accelerated shelf life assessment
- Chemical, physical and determinants for shelf life
- Food quality assessment

**Food Safety**  
Consumer Protection
- Biological hazard risk assessment (Bacteria, viruses, allergens, etc.)
- Food laws and regulations
- Food quality control

**Functional Food**  
Customization in Consumer demands
- Bioactive compounds
- Pre & probiotics, synbiotics
- Nutraceuticals and dietary supplements
Innovation in Packaging and Delivery

**Food Grade Materials**
“Food safety standard for consumers”

**Smart Packaging**
“Prescription of characteristics of the products”

**QR Code Packaging**
Product tractability & the channel of buying products

**Retail Revolution**
Digitalization in Retail Sectors
F.T.I. Roles to support agricultural and aquaculture industries

Promoting Industry 4.0 for Thai manufacturers competitiveness
F.T.I. promotes and supports the industrial sector to uplift productivity leading toward Industry 4.0

Supply Chain Collaboration
F.T.I. encourages manufacturers from agricultural to packaging industries to collaborate and develop products and services

Establishing “The Institute of Agro-based Industry” for Certification and Productivity Improvement
F.T.I. establishes the institute of agro-based Industry for forestry certification and increases productivity in agricultural sectors

Organizing the exhibition and business matching event in agricultural machinery innovation
F.T.I. collaborates with the government sector to hold the “Thailand Tractor and agro-Machinery Show 2016” for agricultural machinery innovation exhibition
Thank you for your kind attention