



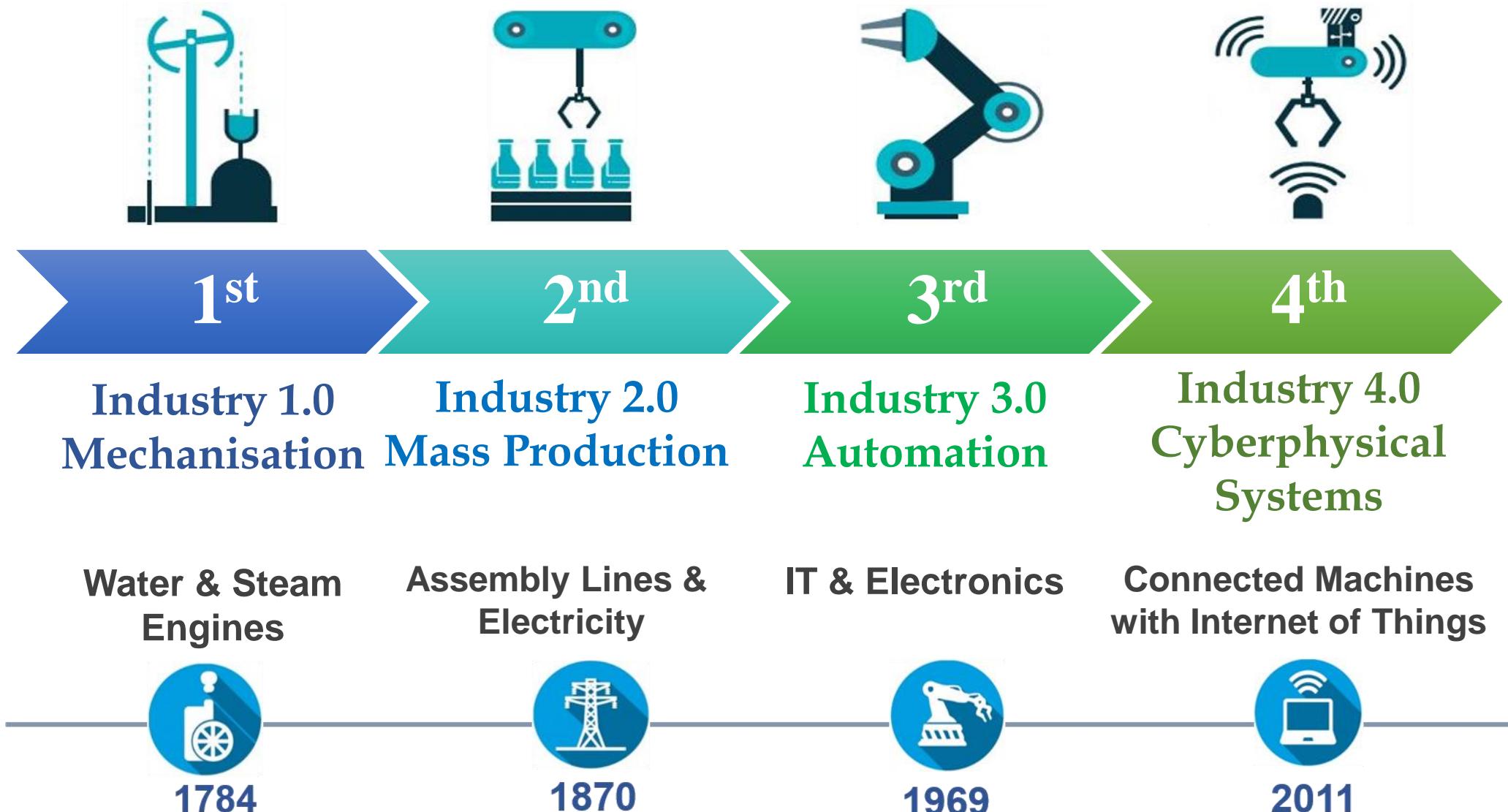
# Thailand 4.0: From Local to Global

H.E. Dr. Atchaka Sibunruang  
Minister of Science and Technology

12 June 2017

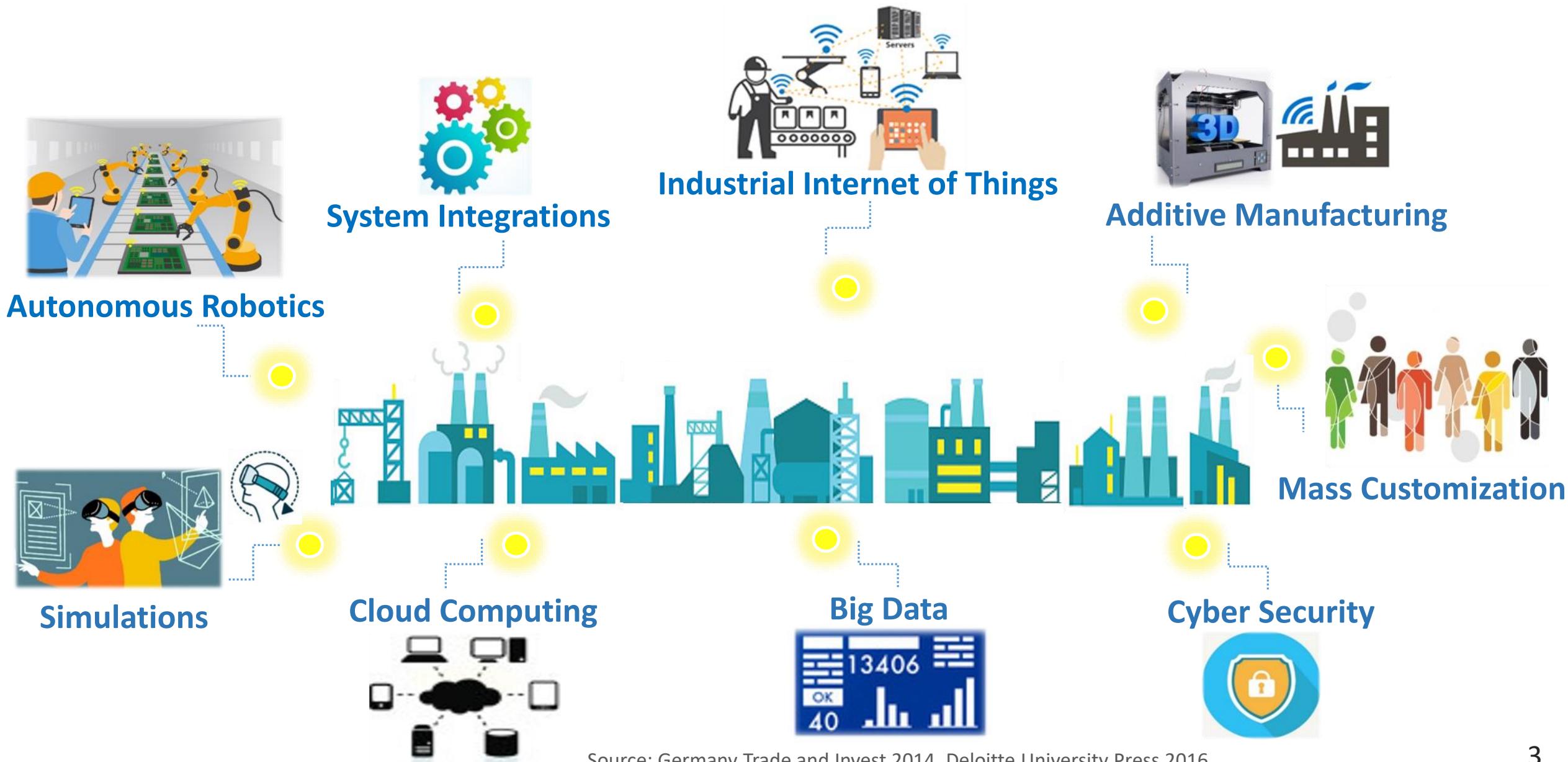


# Revolution of Industry



Source: Germany Trade and Invest, "Industry 4.0 – Smart manufacturing for the future, July 2014,  
Germany's National Academy of Science and Engineering 2013, Deloitte Analysis

# Industry 4.0





# Transformation of Thailand

Thailand  
1.0

Thailand  
2.0

Thailand  
3.0

Thailand  
4.0

- Agrarian Society
- Cottage Industry
- Light Industry
- Import Substitution
- Natural Resources
- Cheap Labor
- Heavy Industry
- Export Promotion
- Inward Foreign
- Direct Investment
- Value-Based & Innovation Driven Economy
- Competitive Advantage

## Systematic Challenges



- Middle-Income Trap
- Inequality Trap
- Imbalanced Development Trap



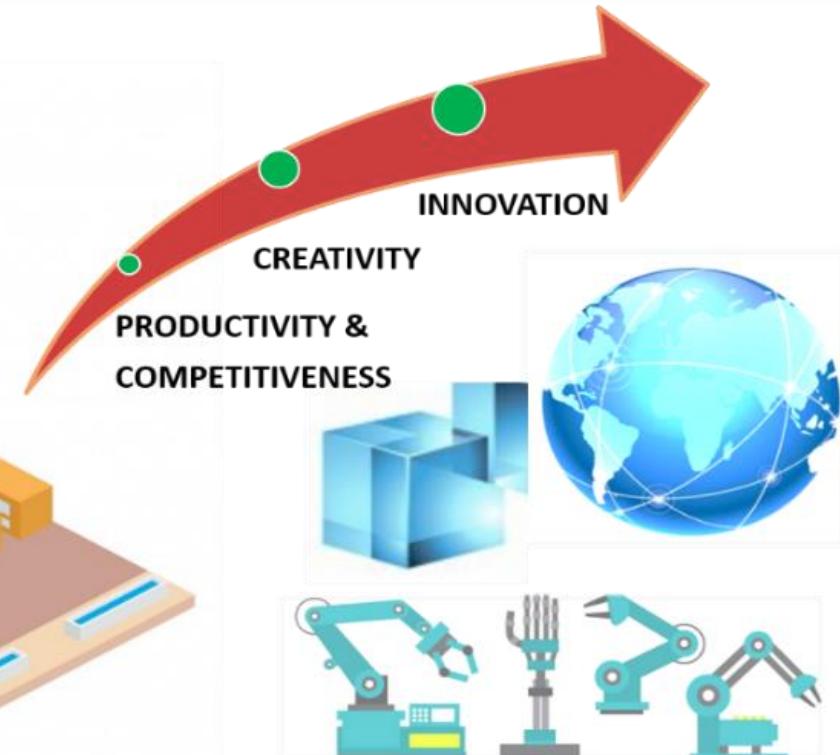
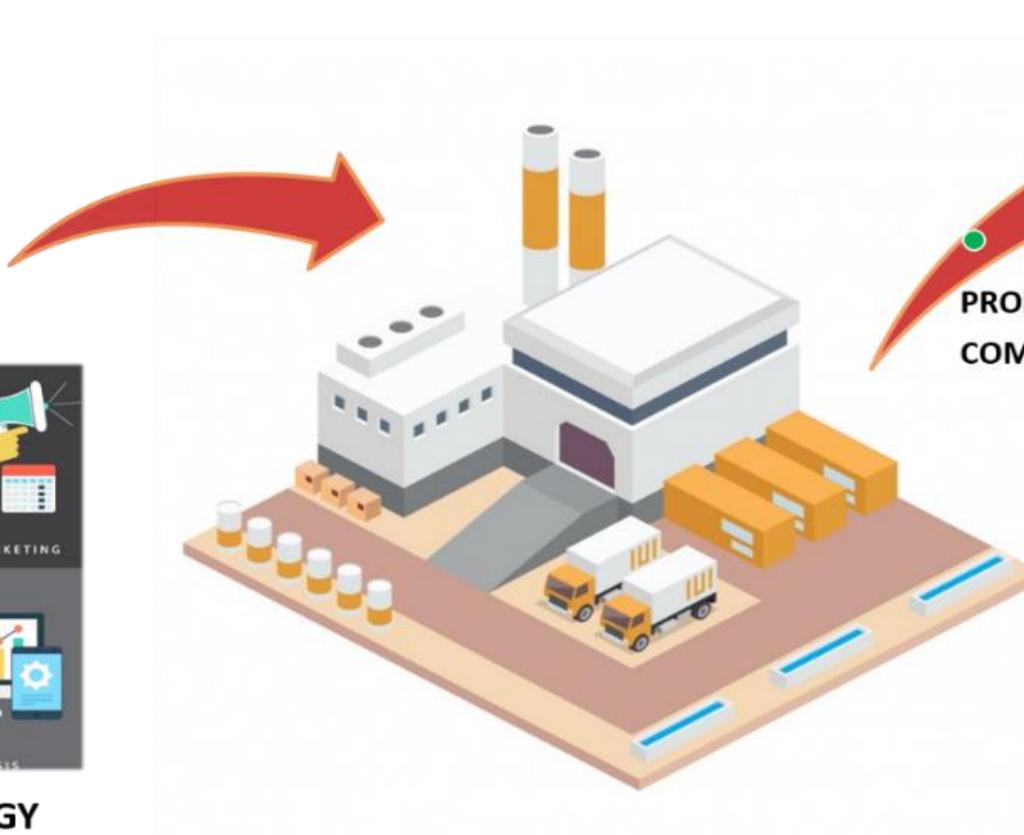
## Thailand 4.0



- Value-Based & Innovation-Driven Economy
  - Less for More
  - Competitive Advantages



- Prosperity
- Security
- Sustainability

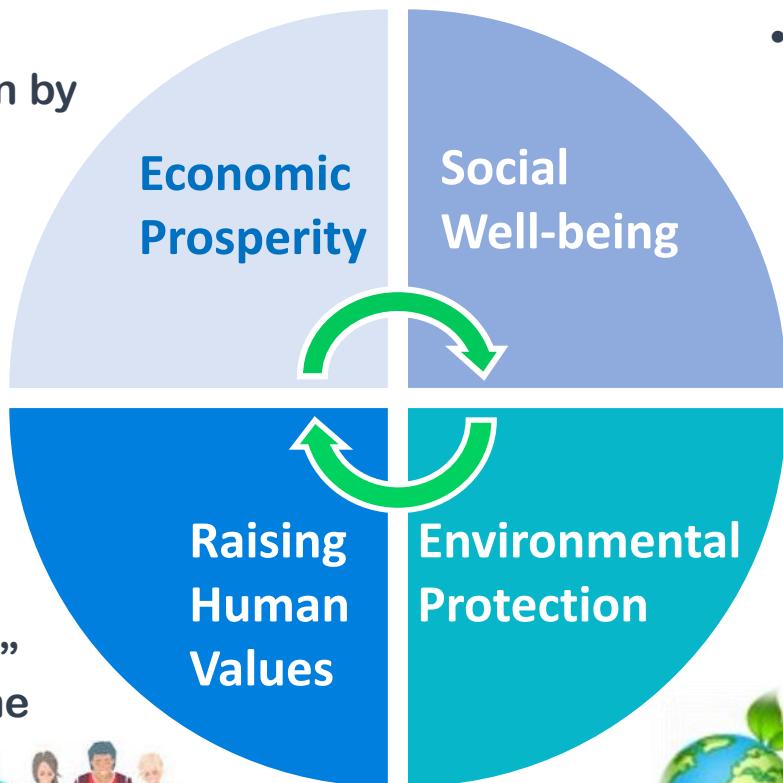




# Thailand 4.0

## Objectives

- Value-based economy driven by innovation, technology & creativity  
 
- Transform Thais into “Competent human beings in the 21th Century” & “Thais 4.0 in the first world”  

- Create “Inclusive society” moving forward without leaving anyone behind  

- Become a livable society possessing economic system capable of adjusting to climate change

## Key Elements





# 10 Targeted Industries

## New Engine of Growth

New S-Curve



Robotics



Medical Hub



Aviation &  
Logistics



Biofuels &  
Biochemicals



Digital



Next-Generation  
Automotive



Smart Electronics



Medical & Wellness  
Tourism



Agriculture &  
Biotechnology



Food for  
The Future

First S-Curve



## ➤ Super Clusters

- **Automotive & Parts Cluster**
- **Electrical Appliances, Electronics & Telecommunication Equipment Cluster**
- **Eco-friendly Petrochemicals & Chemicals Cluster**
- **Digital-based Cluster**
- **Food Innopolis**
- **Medical Hub**



## ➤ Clusters for Innovation & Startups

- **Food Agriculture & Bio-Tech**
- **Health, Wellness & Bio-Med**
- **Smart Devices, Robotics & Mechatronics**
- **Digital, IoT & Embedded Technology**
- **Creative, Culture & High Value Services**





# Thailand 4.0

## Transformative Shift



**Traditional Farming**



**Smart Farming**



**Traditional SMEs**



**Smart Startups**



**Traditional Services**



**High Value Services**



**Unskilled Labors**



**Knowledge Workers  
High Skilled Labors**



**Buy Technologies**



**Make Technologies**

# Global Food Trends

## Market Trends

- Enhanced nutrition & health benefits
- Fresh & natural
- Convenient for consumption
- New taste profiles & flavor combinations
- Information & traceability



## Drivers

- Demographic
- Health conscious & well-being
- Climate & environment
- Economic aspect



## World Population



**7.3 Billion\***  
(2015)



**900.9 Million\***  
(2015)

## World Food Exports

**\$1,486 Million\*\***  
(2014)

# Thailand's Food Industry towards Global Opportunity



## Ready-to-eat Foods (RTE) & Food Ingredients

- Thai exports annually averaged **\$1.38 billion**: Top exports (from 34 major producers): soya sauce, tomato ketchup & sauce and chilly sauce (2016)\*
- Demands for Thai RTE foods are growing overseas
- Foreigners become more familiar with Thai dishes



## Foods for The Elderly

- Global ageing society situation
- Rising of patients with age-associated diseases

- Functional Foods, Drinks, Ingredients and Dietary Supplements



## Halal Foods

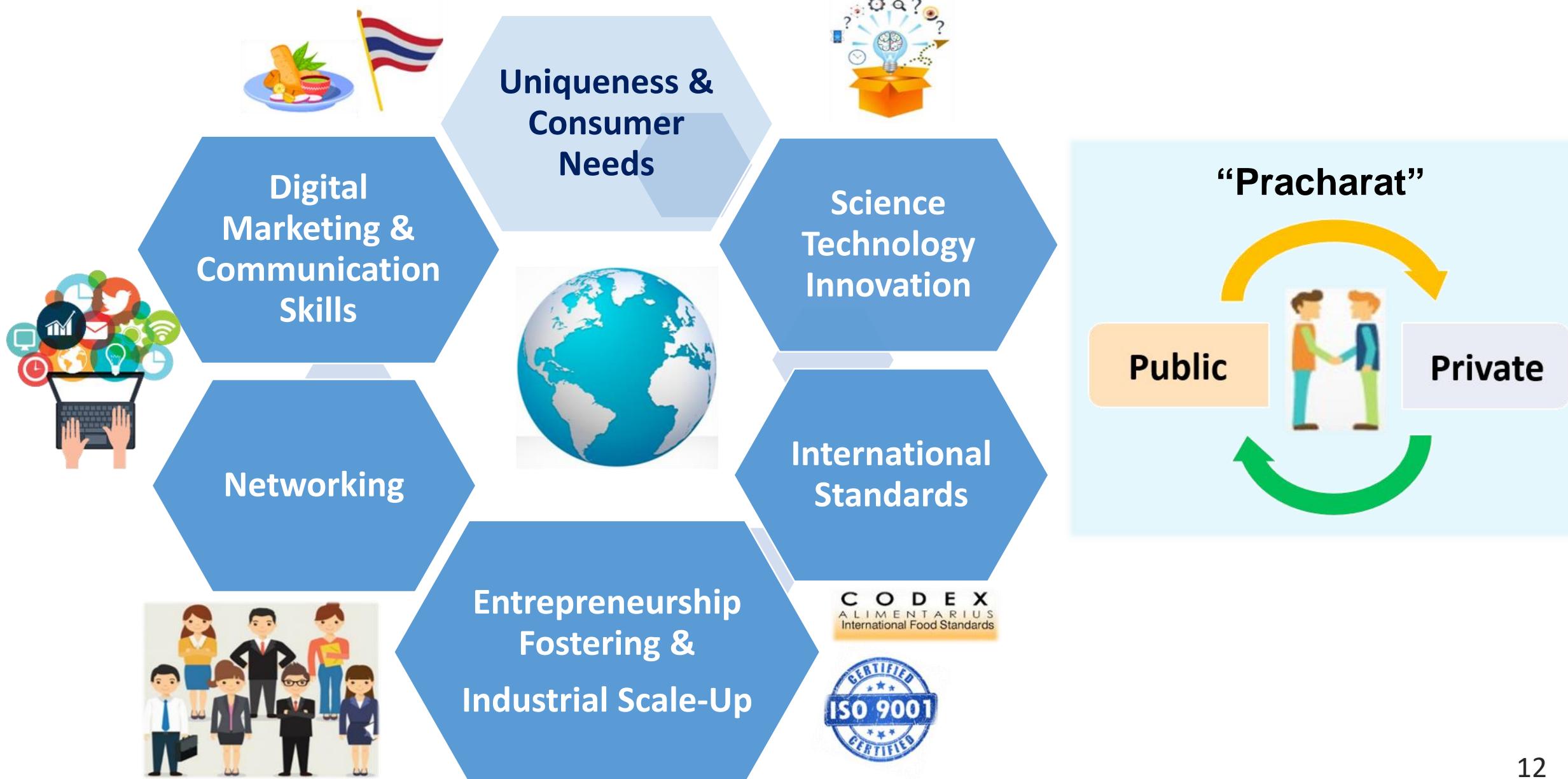
- Estimated **1.7 billion** Muslims around the world (2016)\*\*
- Global halal food exports valued **\$486.5 billion** in the first half of 2016\*\*\*
- Thailand ranked **13<sup>th</sup>** among global halal producers, with **2.7%** market share: Top exports: rice, corn, cassava flour and sugar (2016)\*\*\*



## Personalized Foods

- Genetics-related factors
- Foods suit individual needs

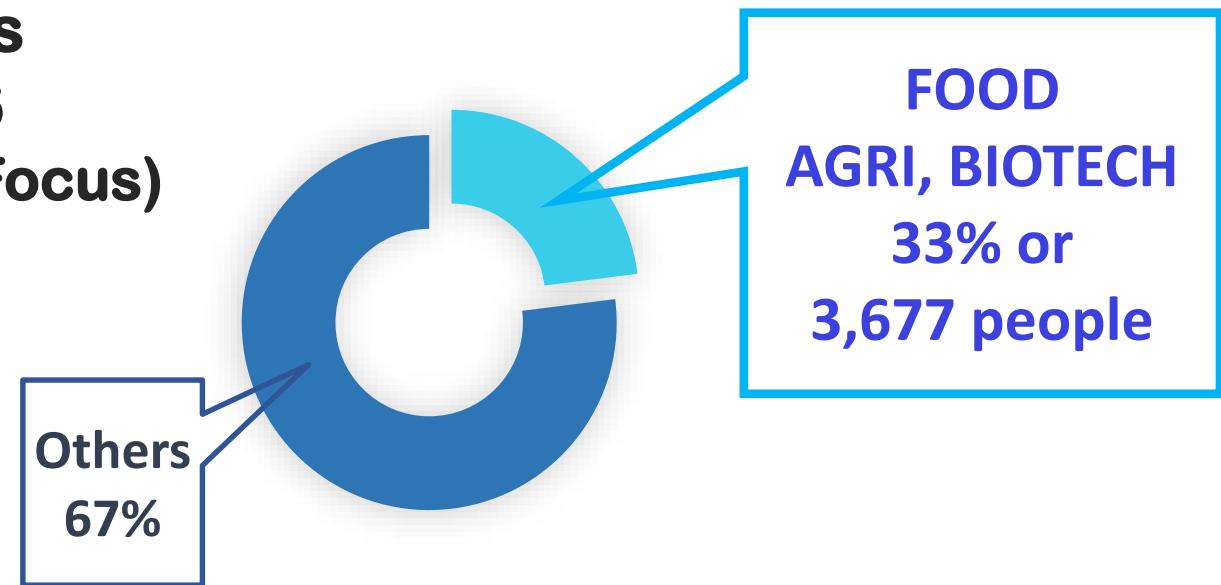
# From Local to Global



# Government Supports on R&D

\*Number of Researchers  
in Public Sector in 2016  
(Targeted Industries Research Focus)

Total **11,142** Researchers



\*Government Supported Food Research in 2016

**446**  
Researchers

**1,132**  
Projects

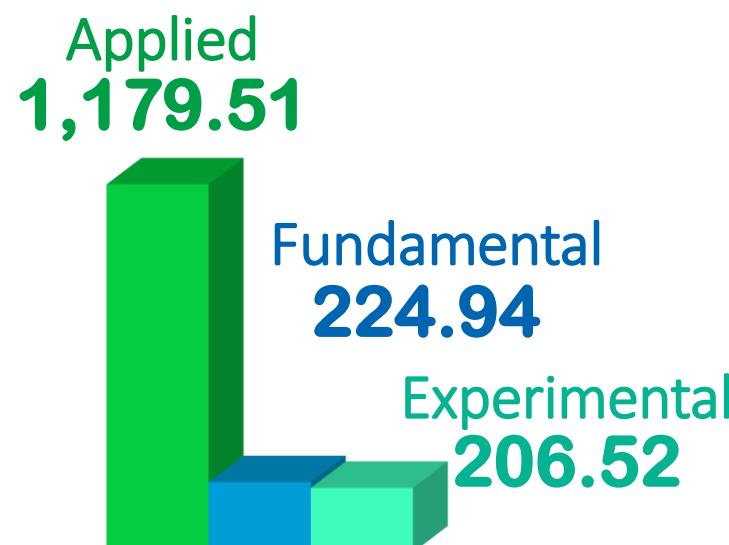
**268.58**  
Total Funds  
(Million Baht)

# Government Supports on R&D

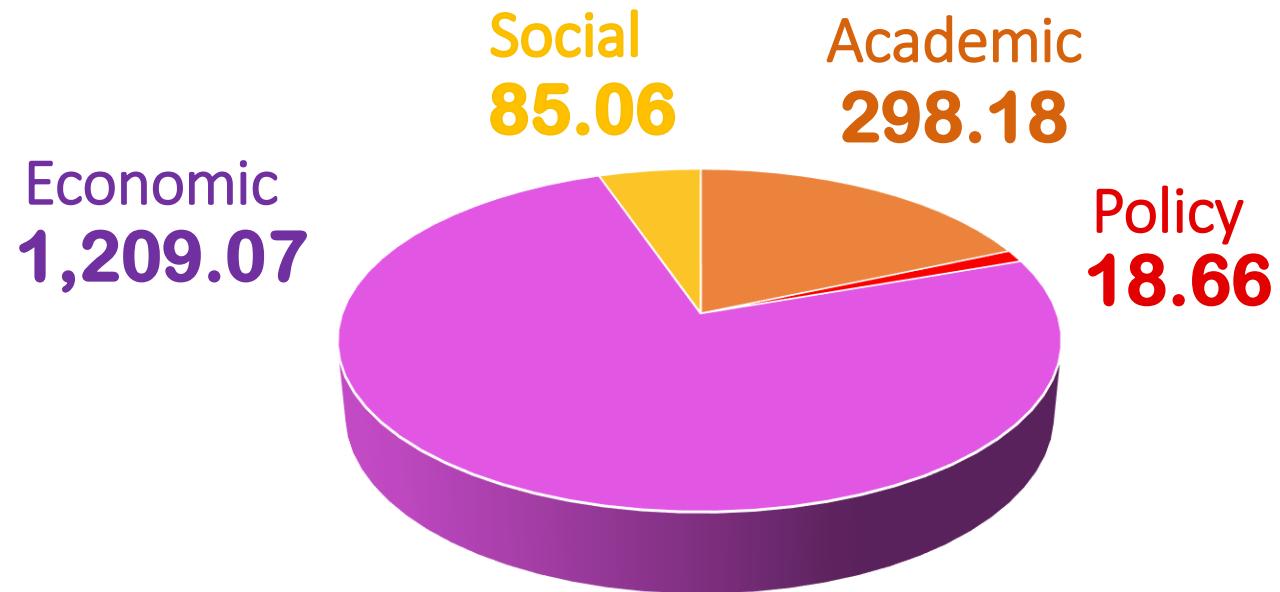
\*Government Research Funding Supported  
Food, Agriculture & Biotechnology Industry in 2016

Total **1,610.97** Million Baht

## Funding Supported Each Type of Research (Million Baht)



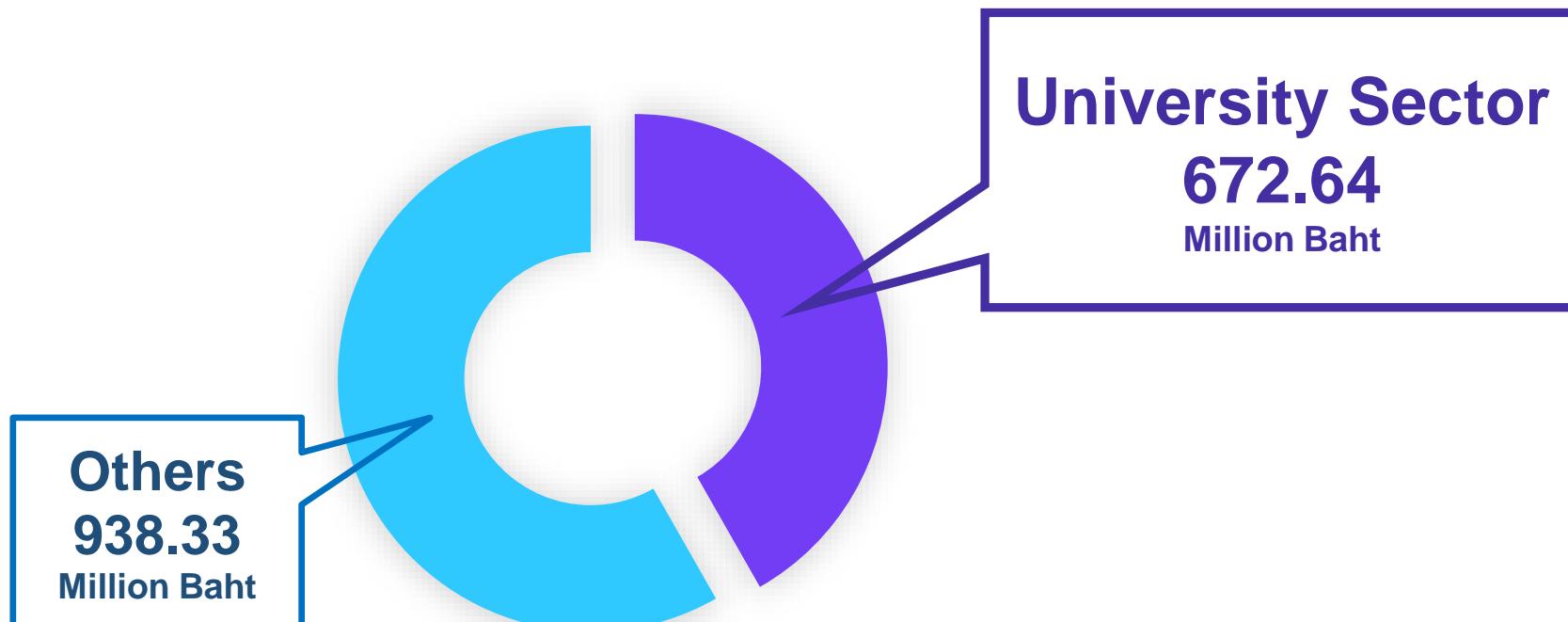
## Funding Supported Each Category of Research Utilization (Million Baht)



# Government Supports on R&D

\*Government Research Funding Supported  
Food, Agriculture & Biotechnology Industry in 2016

Total **1,610.97** Million Baht





# Ministry of Science & Technology

## Food Industry Supports

Technical	Financial	Networking
<ul style="list-style-type: none"><li>• Human Resources</li><li>• R&amp;D/ Innovation</li><li>• Service Infrastructures</li><li>• Advanced Analysis &amp; Testing</li><li>• Calibration Services</li><li>• Certification &amp; Accreditation</li><li>• Training &amp; Consultancy</li><li>• Database &amp; Information</li></ul>	<ul style="list-style-type: none"><li>• 300 % Tax Deduction for R&amp;D/ Innovation Investments &amp; Activities</li><li>• STIM for SME</li><li>• STI Coupon for OTOP Upgrade</li><li>• ITAP</li><li>• Research Gap Funds</li><li>• Competitiveness Funds</li><li>• Innovation Coupon</li></ul>	<ul style="list-style-type: none"><li>• Public</li><li>• Private</li><li>• Domestic</li><li>• International</li></ul>



# Ministry of Science and Technology Supports



**Global Food Innovation Hub  
at Thailand Science Park (200 rai)**

- (1) RDI Center of Companies (INC2)
- (2) Rental Space for Pilot Plant  
(80% occupied)
- (3) 10 rai of Unoccupied Land

## ▪ Extension : Central



## ▪ Extension : Regional



Northern Science Parks



North Eastern Science Parks



Southern Science Parks



# Food Innovation



## Food production

### Agriculture & livestock

Seed  
Breeding technology  
Precision farming  
Organic farming  
LCA/carbon/water footprint

## Food ingredient & additive



Production of ingredient

Nutrition

Health claim

Encapsulation & delivery system

Non-thermal process  
Robotic & automation  
IoT  
Food structure modification  
Sensory evaluation  
Packaging & preservation

## Food quality & manufacturing



## Food chain management



Logistics  
Standard compliance  
Inventory mgt.  
Big data analytics  
IoT

## Food safety

Testing & diagnostic  
Sensors  
Traceability  
Toxicology  
Regulation & international standard





# Ministry of Science & Technology

## Technical Supports



**Human Resources &  
Consultancy Services &  
Training**





# Ministry of Science & Technology

## Technical Supports



- Food Biotechnology Research Unit
- Food & Feed Innovation Center



- Expert Centre of Innovative Health Food
- Thai Packaging Centre



- Talent Mobility Program

R&D/  
Innovation  
Services



- Research in Biological & Medical Science



- Nuclear R&D for Agricultural Produces



# Ministry of Science & Technology

## Technical Supports



### Pilot Plant



- Pilot Plant for Microbial Fermentation



- Pilot Plant for Food and Beverage Production



# Ministry of Science & Technology

## Technical Supports



### Advanced Analysis & Testing Services



- **NSTDA Characterization and Testing Center**
  - Advanced Compounds Analysis
  - Structure Visualization



- **Industrial Metrology and Testing Service Centre**
  - Food Safety Testing & Analysis
- **Thai Packaging Centre**
  - Materials & Package Testing



- **Biological Program**
  - Nutrition Value, Biochemistry, Food Packaging, Microbiology Section
- **Center for ASEAN Food Contact Materials Testing**
  - Testing Properties & Safety of Food Contact Materials



- **Beamline Services**
  - Synchrotron for Food Application



- **Irradiation Center**
  - Provide Radiation for Food Products & Agriculture Products



# Ministry of Science & Technology

## Technical Supports

### ● Certification & Accreditation



#### Office of Certification Body

- Quality System Assurance:  
ISO, HACCP, GMP

- Laboratory Accreditation Section
- Center for ASEAN Food Contact Materials Testing
  - Issuing Certificate of Analysis (COA) for food contact materials to exporters



### ● Calibration Services



#### Industrial Metrology and Testing Service Centre

- Consistent with ISO/ IEC 17025
- Complete range of calibration services
- On-site services available



#### Calibration Services at Primary Level

- Calibrate measuring equipment



# Ministry of Science and Technology Infrastructure & Equipment Database



**STDB**

Science and Technology Infrastructure Databank (STDB)

ฐานข้อมูลโครงสร้างพื้นฐานภาครัฐ  
ด้านวิทยาศาสตร์และเทคโนโลยี

<http://stdb.most.go.th/Home>



**Thailand Scientific Equipment Center Network**  
<http://www.secnet.psu.ac.th/>



# Ministry of Science & Technology Financial Supports

- **300 % Tax Deduction for R&D/ Innovation**



- **STIM for SME**



- **STI Coupon for OTOP Upgrade**



- **ITAP**



- **Research Gap Funds**



- **Competitiveness Funds**



- **Innovation Coupon**



# Examples of University Networking



## Kasetsart University

- Institute of Food Research & Development
- KU-First
- Pilot plant consistent with GMP standards for food processing & Rental food machines



## King Mongkut's University of Technology Thonburi

- Pilot Plant Development & Training Institute
  - Biochemical engineering & pilot plant research & development unit



## Prince of Songkla University

- Processing technology of foods & agricultural products



## King Mongkut's University of Technology Ladkrabang

- KMITL Innovation Center
  - SMEs & Startups fostering



## Mahidol University

- Institute of Nutrition
  - Center of Innovation & Reference on Food for Nutrition



## Chulalongkorn University

- Halal foods
- Sensory science



# Ministry of Science and Technology Support Examples of Food Networking



BANGKOK  
UNIVERSITY  
THE CREATIVE UNIVERSITY



Malee®



TMA



# Thank You



Wat Arun Ratchawararam Ratchaworamahawihan  
(The Temple of Dawn)  
Bangkok, Thailand