

NATIONAL CENTRE FOR GENETIC ENGINEERING
AND BIOTECHNOLOGY

By

Ms. Nataporn Chanwarasuth
Policy Researcher, Policy Study and Bio-safety Division,
National Centre for Genetic Engineering and Biotechnology, Thailand

Technology and innovation gain importance because of their ability to address various problems that the world faces today, such as climate change, resource crisis, energy crisis, emerging diseases and environmental pollution. Biotechnology is one such field of knowledge and application that can address these issues mentioned. However, biotechnology ventures usually have long gestation periods and require large investments for research infrastructure. The biotechnology sector also requires social acceptance, intellectual property (IP) protection and governmental regulatory support.

In Thailand, for technology push to occur, biotechnology research and development (R&D) requires information on:

- Regulatory change (food safety, biosafety, traceability, carbon footprint, etc.);
- Technology change (system biology, synthetic biology, etc.);
- Market change (new markets – obesity, memory loss and ageing; personalized, predictive and preventive medicine; green and clean products); and
- Manufacturing change (bioconversion, biorefinery, etc.).

In terms of support for the biotechnology industry, Thailand has a Bio-business Promotion Programme that provides investment incentives in six areas of the industry:

- Seed production or plant and animal improvement;
- Biopharmaceutical agents such as vaccines and therapeutic proteins;
- Diagnostic testing kits for medical, agricultural, food and environmental use;
- Biomolecules and biologically active compounds from micro-organisms, plant cells and animal cells;
- Raw materials and essential materials used in molecular biological experiments or tests; and
- Biological analysis and/or synthesis services.

The investment incentives offered include:

- Import duty exemption of machinery;
- Eight-year corporate income tax holiday; and
- Additional incentive (50 per cent reduction in corporate income tax) if located in a science park.

Thailand has issued a revised version of the “Biosafety Guidelines for Work Related to Modern Biotechnology or Genetic Engineering” and a new “Guideline for Risk Assessment of Plants Carrying Stacked Genes”. As a policy guideline of genetically modified (GM) organisms, the Thai government has readied a blueprint for conducting field trial and food safety assessment of GM papaya and GM tomato.

The National Centre for Genetic Engineering and Biotechnology (BIOTEC) is the premier government research organization in Thailand. The Centre, with a staff of about 600, is focused on four areas: biodiversity utilization; biomedical technology development; genome technology utilization; and food and feed industry development.

Public-private partnership (PPP) involving BIOTEC can be any of the following five types: licensing; contract research; joint research; joint investment; or cluster. Some of the PPP activities of BIOTEC are:

- Chiang Mai University and BIOTEC's Biomedical Technology Research Centre developed the world's first Alpha Thalassemia Immunochromatographic strip test, a rapid test to diagnose Alpha Thalassemia carrier, and licensed the technology to iMed Laboratories;
- Licensed its technology for a clove and cinnamon oil formulation for dust mite fumigation to Kon Dee Group Co. and Natural Herb Product (Thailand) Co.;
- The technology for Microtube Gel Test for detecting antigen-antibody reaction – a low-cost test to detect rapidly the red cell antigen-antibody reaction, allowing to process 12 samples simultaneously – was licensed to Innov (Thailand) Co. Ltd.;
- Thin-Layer Chromatography (TLC) for the densitometric analysis of artemisinin – an easy-to-use protocol for the measurement of artemisinin content in 10 samples simultaneously – was licensed to Artemisinin & Farming International Co., France;
- Contract research from Advance Asian Co. Ltd. to develop DNA markers associated with fibre yield and pathogen resistance in eucalyptus trees;
- Contract research from Manit Farm Co. Ltd. and National Innovation Agency (NIA) to develop the biofloc and nitrification system for tilapia cultivation;
- Contract research for the Department of Medical Sciences on the development of IT system for HIV drug resistance testing;
- Contract research from Japan Bioinformatics KK Co. Ltd. for the development of simple bioinformatic tool for analysing cDNA and SNP arrays;
- Joint research with Mitr Phol and Innova Biotechnology on white leaf disease test kit for sugar cane;
- Joint research with Asia Star Animal Health Co. Ltd. on the production of recombinant xylanase and cellulase as feed additives for poultry;
- Joint research with Biosolution International Co. Ltd. on utilizing micro-organisms as feed supplement for fish;
- Joint research with Bangkok High Lab Co. Ltd. and Mitr Phol Sugar-cane Research Centre on improved sucrose sensor using pulsed amperometric detection;
- Joint research with Hi-Grimm International Co. Ltd. on screening for oil-degrading bacteria to develop into commercial bioremediation products;
- Joint research with SCG Paper Public Co. Ltd. on screening for micro-organisms and enzymes suitable for pulp and paper production;
- BIOTEC (49 per cent) and SPM Science Co. Ltd. (51 per cent) jointly invested to establish a fermentation plant for animal feed production at MicroInnovate Co. Ltd.; and
- The Shrimp Cluster, wherein BIOTEC has established linkages with a business cluster under the auspices of the National Shrimp Cluster Board that functions under the Department of Fisheries.

The lessons that BIOTEC learned from its PPP activities can be summarized as follows:

- Licensing helps create product differentiation;
- Contract research helps speed up the time for a product to hit the market;
- Joint research enhances R&D capability to increase competitiveness;
- Joint investment bestows the ability to conduct translational research; and
- Cluster linkages strengthen the power of industry as a whole.