Thailand's National Innovation Agency

Supachai Lorlowhakarn
Wyn Ellis

The significance of innovation in creating and enhancing national competitiveness is widely recognized. National innovation systems provide a sustainable development strategy for promoting innovation in R&D institutions and enterprises. Academic and financial support mechanisms along with knowledge management are considered to be crucial driving factors for innovation management. The article discusses the methods and approaches employed by the National Innovation Agency of Thailand for promoting innovation in the country.

Introduction

Thailand has arrived at a major juncture in her journey towards knowledge-based economic and social systems. The country's declining ranking in the global technological capacity sweepstakes has for some time been acknowledged as a serious concern, and policymakers already recognize the crucial importance of innovation as a determinant of Thailand's future national competitiveness. However, the importance of establishing a National Innovation System (NIS) to promote innovation at a practical level is only now being seriously addressed.

It has become clear that, to close this gap between policy and implementation, various levels of co-operation will be required in order to drive a competitive and truly sustainable development strategy. Innovation must therefore be nurtured and harnessed as a priority strategy to achieve national development by leaps and bounds, that is, radical as opposed to incremental innovation.

It was therefore a major step forward when in 2003 the Thai Cabinet endorsed a fresh approach to national innovation development. The National Innovation Agency (NIA) was created as an autonomous organization under the supervision of the Ministry of Science and Technology, operating under the policy guidance of a National Innovation Board, but outside the normal framework of the civil service.

NIA was mandated to act as the operational core organization to facilitate various models of cooperation (at enterprise, sector and macro levels) and to foster linkages between different actors on the academic, technical production, financial, investment and management fronts. NIA uses academic and financial support mechanisms in conjunction with its principal strategy of knowledge management for innovation development, especially to give support for cluster platform-based innovation. Acting as a match-maker and integrator, NIA weaves together technology and marketing finance to ensure that 'near-market' innovative ideas actually make it to the production line.

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This article describes some multi-stakeholder approaches taken by the NIA to address key challenges at enterprise, sectoral and macro levels.

Strategic Innovation

In order to generate turnkey improvements to accelerate innovation capability in key sectors, the NIA has focused on strategic innovation in three core areas, namely **bio-business** (*i.e.* biotechnology, bio-based materials, and natural products), **energy and environment**, and **design and branding**.

NIA supports research in these core areas that meets business needs and encourages development of start-up companies, especially SMEs. There are two main vehicles for this support-the Good Innovation. Zero interest and Technology Capitalization initiatives. These schemes help to spread the risks of investing in innovative businesses, and expedite the emergence of new companies involved in knowledge-based research and development.

The *Good innovation, Zero interest* scheme offers interest support in the form of grants for innovation projects up to a maximum of US$125.000. Under this scheme, NIA bears the interest payments incurred on behalf of the recipient for the first three years. The Technology Capitalization scheme goes further, offering grant support up to US$ 125,000 for the first three years of operation.

Examples of NIA-supported innovations and interventions at individual enterprise and sectoral levels are given later in this article. It is hoped that these enterprise-level schemes, which have already benefited many individual SMEs will also help to drive sectoral growth in knowledge-based industries, clusters or entire industrial sectors, thereby expanding the nation-al productivity base.

Aside from enterprise-level support programmes, NIA works at the macro level lo foster awareness and recognition of the importance of innovation to the national economy, and provides capacity-building support for the development of an effective National Innovation System. To achieve this, NIA has established the following strategic programmes:

- Building the national innovation system;
- Cluster grants and venture capital schemes;
- Innovation Management and Entrepreneurship (IMEs) professional development programme; and
- Promoting an innovation culture.

Building the N.I.S.

A major OECD study recently concluded that the main task of governments is to create conditions that induce firms to engage in investments and in innovative activities. In Thailand, major weaknesses are evident across the policy terrain, and there is an urgent need for Thailand to address issues affecting national competitiveness on a broad front in order to avoid being further impacted by power in

equities inherent in bilateral FTAs (Free Trade Agreements) already concluded or now under negotiation. The relaxation under WTO rules of protective measures hitherto accorded to domestic producers will expose all sectors to strong competition from global corporate players operating in a single global marketplace.

Faced with such challenges, many smaller or less agile companies will surely stumble and fall. Those that survive and thrive will be the innovators who embrace change and move fast. Future national competitiveness in the Asia-Pacific region is thus closely tied to national innovative capacity and the ability to metamorphose to exploit new and existing markets, tap into indigenous knowledge systems, improve value-addition and protect innovations. Clearly, a high degree of coordination and consensus between the public and private sectors will need to be achieved in order to establish an enabling regulatory framework, capacity building measures and market mechanisms that stimulate innovation and increase innovation management skills.

Against this background, in late 2004, the NIA supported the establishment of the University Business Incubator (LJBI) programme, initiated within universities around the country by the Commission on Higher Education of Thailand. The programme's objective is to support and promote developments of commercial value and innovation gained from research through four primary principles:

- **Inspire**: Ignite and propel the interest of individuals in becoming new entrepreneurs.
- **Teach**: Provide information, consultation. and coaching services to help reshape individuals into becoming capable entrepreneurs.
- **Connect**: Develop collaborative partnership networks between public and private organizations to facilitate the establishment of new businesses.
- **Create**: Promote the development of inventions, innovation and new businesses within UBI.

With a broad network of universities and institutions around the country, the University Business Incubators Coordinating Office (UBICO) was initiated as a support hub to help promote UBI's major concepts and assist UBIs in achieving their targets by interconnecting and collaborating among universities and institutions.

Cluster grants and venture capital schemes

Opportunities for young professionals to stay abreast of the latest developments are too frequently lacking in Thailand, where there is a lack of financial infrastructure that rewards profitable business innovation. Many bright young engineers and scientists have started up companies or relocated existing companies to the technology valleys, science parks and innovation clusters abroad. There, they find business incubators and venture capital (VC) firms that in addition to start-up capital, offer them a complete package of management skills and networking capabilities. According to the US National Venture Capital Association, venture capital invested during the last 30 years created 7.6 million jobs and $ 1.3 trillion in revenue as of the end of 2000.

Technology start-ups need access to technical resources that are frequently too expensive to have in-house, including basic equipment for testing, measurement, and calculation, and problem-solving support; they require technical advice on how to best use sophisticated technologies such as new telecommunications networks, information services and patents: how to find technical partners, possible joint venture partners, and gateways to leading edge firms and research institutes. They need encouragement to form groups and alliances with other small start-ups in their field so that they can share what would otherwise be too expensive services.

The Thailand Science Park was the country's first purpose-built technology cluster development. Established in 2003, the Park offers technology incubators in electronics, material science and biotechnology and provides space, shared equipment, rnanagement advice, and access to capital. The main National Science and Technology Development Agency office building, along with the four National Research Centres – National Centre for Genetic Engineering and Biotechnology (BIOTEC), National Metal and Materials Technology Centre (MTEC), National Nanolechnology Centre (NANOTEC), and National Electronics and Computer Technology Centre (NECTEC) - have their individual buildings located in the Park.

The Park is ideally situated, next to the Asian Institute of Technology, Sirindhorn International Institute of Technology, and Thammasat University, providing access to a continual supply of graduates of high calibre. Also located at the Park will be the Technology Information Access Centre, a provider of on-line information services, including access to relevant databases.

Another important duster development is Thailand's Software Park. Software Park Thailand is a government agency under the National Science and Technology Development Agency. It was established to stimulate the development of the Thai soft-ware industry, push it towards a sustainable level and provide it with the means to survive in a rapidly changing global digital economy.

Courses and programmes

Successful innovation within organizations (both large and small, both private and public sectors) requires consideration of a range of issues, from the establishment of a creative organizational culture, to the development of formal processes and systems for developing, protecting and commercializmg innovations. Such formalized systems are rarely found within organizations in Thailand, and innovation management has only recently started to appear in more progressive academic curricula Recognizing the need to disseminate innovation management skills to the current generation of professionals, NIA recently initiated a professional development course in Innovation Management for Executives (lMEs), supported by a total of 17 top local universities and companies. The course aims to enhance the competence and skills of entrepreneurs in creating, fostering and commercializing innovations, and to impart new awareness and new skills required for successful participation in a globalized trading system. These include the use of ICTs, knowledge management systems and change management processes.

The course explores critical questions in innovation management, including the following:

- How do you evaluate and value an innovative project?
- How should commercialization of research be managed?
- What are the critical success factors behind top life sciences and other innovative companies?
- How should you protect your innovations?
- What educational measures can bring long-term benefits in innovation management?
- When bringing new technologies to market, what steps are necessary to maximize "freedom to operate" from a regulatory standpoint?
- What are the best strategies for managing the risks of core business renewal?
- How can companies undertake radical innovation without risk to existing customer relationships?

The IME course is designed to improve vision and business skills for SMEs and to facilitate the application of innovation and new technologies in the individual businesses of participants.

The course provides a framework for innovation management and promotes the development of new knowledge-based businesses. It explains show entrepreneurs may access essential resources for successful innovation (such as R&D support for new ideas, venture capital, and government institutional and financial support for SME's) to benefit their own businesses.

Ultimately, it is hoped that the course will help strengthen companies and organizations through the adoption of more progressive leadership paradigms, and help enhance national competitiveness.

A national innovation culture

Fostering a culture of innovation within organizations of all types is perhaps the biggest challenge for NIA and for the private sector. NIA has four major activities under this programme:

- *InnovAsia 2005* (First Asia-Pacific Conference and Exhibition on Innovation Management);
- *Regional Network for Innovation Management;*
- *Thailand National Innovation Awards;* and
- *Innovate Thailand Programme*

These activities are summarized below.

InnovAsia 2005

With the exception of Singapore, fragmented systems for technology and innovation development in the region have significantly held back ASEAN countries in their efforts to catch up with the more developed countries. This underlines the need to improve existing National Innovation Systems or establish new ones.

As a first step towards raising awareness among ASEAN countries, NIA, in cooperation with UNESCO and IBM Corporation, will convene: "*InnovAsia 2005*" - the First Asia-Pacific Conference and Exhibition on Innovation Management. This will be the first ever event on this theme to be held in the Asia-Pacific region, and will take place from 21 to 23 September 2005 at the Queen Sirikit National Convention Center, Bangkok, Thailand. [www.nia.or.th/innovasia]

Since innovation is an overarching theme, fundamental to both individual and organizational growth, *InnovAsia 2005* will provide a forum for interaction between global players in all concerned spheres of activity and from all sectors - public, private, academic, NGO and the international community. This broad stakeholder involvement and interaction will be necessary to generate the basis for workable recommendations and a practical action plan to stimulate innovation in the Asia-Pacific region.

InnovAsia 2005 will offer a platform where policy makers, regulators, academics, investors, decision makers, managers and other stakeholders in the private and public sectors can exchange views and form strategies to clearly define the role that innovation management can play to augment national competitiveness in the coming years.

Three parallel thematic work-shops will take place as part of the conference. These workshops will explore strategic themes which underpin successful innovation:

- Capacity-building in innovation management: stimulating innovation in the ASEAN region;
- Intellectual property rights: and
- Innovation and entrepreneurship.

Overall, the conference aims to improve understanding and identify opportunities for enhancing innovation management skills within the countries in the region in order to stimulate innovation and enhance national competitiveness.

A regional network for innovation management

To support this goal, a Regional Network for Innovation Management will be created under the auspices of UNESCO, to share knowledge and exchange information and expertise between centres of excellence in member countries. Such a network will serve to enhance formal and informal channels for technology transfer, and facilitate the establishment and strengthening of National Innovation Systems in member countries.

InnovAsia 2005 will also act as a forum to facilitate the establishment of other partnerships (government-to-government, government-to-private sector, etc.) for cooperation in innovation development and management.

Thailand National Innovation Awards 2005

These awards were initiated by NIA to recognize innovative contributions to the economy or society. The awards are part of NIA's action plan for strengthening a

'national innovation culture' and awareness at all levels in industry and in the public sector. There are two award categories for outstanding innovators in economics and society.

A National Innovation Awards 2005 Committee has been established, under the chairmanship of Mr. Kosit Panpiemras, Chairman of Bangkok Bank. Shortlisted candidates will present their project in person to the Selection Committee. The key criteria will be (1) Degree of novelty, (2) Management process; and (3) Overall benefit of the innovation. Candidates will also have to submit a business plan to show that their product can sustain an ongoing business.

Winners in each category will benefit from prize money, the right to use the NIA logo, media advertising, and inclusion in a book "*100 Outstanding Innovations in Thailand*". [Applications for 2005 can be downloaded at www.nia.or.th/niaward and can be submitted from 1st April to 15 July.] The awards will be presented on 21 September during the InnovAsia 2005 conference.

"InnovateThailand"

Also during InnovAsia 2005, a compilation of essays and case studies on innovation in Thailand will be presented. This book presents innovation in the context of Thailand's rapid economic development.

Critical factors for Thailand's innovation climate and culture are examined by noted academics, and the book includes chapters on innovation history, competitive strategy, technology, business, education and government.

Illustrative case studies highlight and feature innovation projects initiated and supported by the National Innovation Agency.

The challenges and opportunities for innovation in Thailand's dynamic economy are explained and analyzed; myths and misconceptions are dispelled; and the evolution of Thailand's National Innovation System is described.

In short - this is a practical book that explains what established businesses - and new ventures - have to know, learn, and do in order to innovate and flourish in Thailand.

Enterprise-level case studies

Some examples are given below of NIA-supported enterprise-level innovations which have already achieved commercial success in the 18 months since NIA's inception in 2003.

Plaitanoids™

This project was initiated through collaboration between NIA, leading herbal companies and five Thai universities (Mahidol, Kasetsart, Prince of Songkhia, Khon Kaen and Chiang Mai) participating in the Postgraduate Education and Research

Programme in (PERCH) Chemistry project. PERCH supports collaborative research in all branches of chemistry, especially the chemistry and biological properties of natural bio-active products. *Plai* is one of 12 herbs selected as Product Champions by the Ministry of Public Health as part of its policy to promote Thailand as a hub for health services in Asia.

This project aimed to produce and commercialize a herbal extract from the *Plai* plant (*Zingiber cassumunar Roxb*), which is native to Thailand, Indonesia and India. Its bactericidal and muscle-relaxant properties have long been known in Southeast Asia, and further research indicates its value in a wide range of ailments, including acne, inflammation, burns and asthmatic conditions.

Basing their work on the existing body of research, the chemistry departments of the five universities joined together to develop new extraction methods. The PERCH team's process yielded three kinds of extract - essential oil, liquid extract and powder - and isolated 36 different compounds with therapeutic properties.

The project research culminated in the isolation of five essential components (arylbutanoids and essential oils such as terpinen-4-ol), which were branded collectively and trademarked as Plaitanoids™. These have been formulated as liquid extracts, massage oils, and powder extract for cosmetics, shampoo, toothpaste and the spa industry. They have also generated much interest as anti-ageing and skin-whitening products. In terms of pharmaceutical efficacy, the five isolates were all found to be equally or more potent than the reference drug diclofenac in terms of their anti-inflammatory properties.

So far the private sector cluster behind Plaitanoids is relatively small, with eight companies engaged in different aspects of the business, from manufacturing to marketing. NIA projects that earnings for each company will reach US$ 5 million annually from products based on Plaitanoids. With approximately 2,000 farms now growing *Plai* around the country, there is an obvious production potential. Furthermore, the domestic market has considerable room for growth.

The most interesting market opportunities identified thus far are in the spa industry, and negotiations between the Plaitanoid cluster and top tier spas are ongoing. The export market potential, however, is even greater where the trend towards natural and herbal products has opened up enormous market opportunities for global brands.

To date approximately US$ 9.7 million has been invested, with a projected contribution to national revenue in excess of US$ 39 million over the next three years.

Lotusia™

Aiming to develop alternative cosmetics with bio-active ingredients extracted from plants, International Laboratories Co. Ltd and ICC International Public Co. Ltd. joined with the PERCH initiative to produce a pollen extract from the Sacred Lotus Flower (*Nelumbo nucifera*). In all, more than 20 cosmetic products were developed for both men and women. NIA supported the work as part of its natural products programme.

An extract of the stamen inhibits melanin production through blocking the action of tyrosinase in skin cells. This promotes even skin tone, and has proved twice as effective as green tea and far better than mulberry in suppressing oxidative changes.

Advances in nanotechnology have been applied to enable the active ingredient to penetrate deeper and increase effectiveness. In the final product, the extract is incorporated into nanospheres - a process developed by Monaco-based Exsysmol.

Nanosphere 100 has tiny spherical particles 100 nanometres in diameter, composed of an absorbent polymer, which gradually releases the retained active ingredients into the surrounding skin tissue.

This time-release process supplies the skin with a constant dosage of Vitamin A-Palminate. Vitamin A-Palmitate is known as a skin "normalizer", acting as an anti-keratinizing agent, helping the skin stay smooth and soft. It causes a significant change in skin composition, with an increase in collagen, DNA, skin thickness and elasticity.

The new cosmetics are now marketed by ICC International under the brand “BSC Pure Care”.

Rapid test kits

In its 2004-201 1 Master Plan for Bio-technology, the Thai government articulated its policy to develop the bio- technology sector. NIA's biotech unit aims to enhance the capability of bio-businesses in agriculture, food, medicine and environmental protection. Its main focus has been to promote commercialization of high quality innovative value-added products in several areas, including organic farming, probiotics, enzyme technology, rice products, and rapid diagnostic test kits.

NIA brought together a group of organizations including BIOTEC, the Department of Livestock Development, the Medical Sciences Department, Thammasat University, and many individual experts. One result of these consultations was a series of innovative rapid diagnostic test kits as follows:

- Avian Influenza Rapid Diagnostic Kit: This diagnostic kit is able to diagnose the H5N1 strain of Avian influenza within five minutes. The kit is locally produced, and comprises the following components:

    - An immunochromatography-based rapid screening kit for Type A *Avian infiuenza*. This uses monoclonal antibodies which are highly target-specific for influenza Type A, and gives great accuracy to the kit's diagnosis.

    - A confirmation test kit for the result of the H5N1 strain of Avian influenza. This uses real time polymerase chain reaction (RTPCR) which also gives a highly accurate diagnosis.

- Salmonella rapid food test kit (AOAC approved): NIA worked with Pattana Wittayasart and Management Co Ltd and Prof. Dr. Wanpen Chaikampha, a

distinguished Thai immunologist, to develop a test kit to detect salmonella in food using locally produced monoclonal anti-bodies and Enzyme-Linked lmmunosorbent Assay (ELISA) techniques.

These techniques give a highly effective and accurate diagnosis. In order to build consumer confidence in the product in Thailand and abroad, the company obtained endorsement of its diagnostic kit from the Association of Analytical Communities (AOAC), a global organization that certifies analysis resuits.

- *Amphetamine diagnostic test kit*: NIA supported Innova Biotechnology Co Lid in the development and commercialization of a rapid but accurate diagnostic test kit for amphetamines. The kit is based on an immunochromatography technique originally developed by Thailand's National Centre for Biotechnology and Genetic Engineering (BIOTEC).

CeraLampang™-blending innovation and culture

Lampang, an ancient city in the north of Thailand, has a rich cultural heritage of innovation, stretching back over 2,000 years. The province is particularly known for its unique and exquisite ceramics. Today, Lampang has over 200 ceramics factories generating an estimated revenue of US$ 75 million a year in domestic and international sales.

The CeraLampang project brought together 11 entrepreneurs in Lampang Province working with the Design and Branding Innovation Project of the Ceramics Development Cluster in Lampang. Support was provided by NIA, and also by eight other state agencies, including the Department of Industrial Promotion. Ministry of Industry, Department of Export Promotion, the Federation of Thai Industries and the Lampang Ceramics Association.

The use of innovations in design, combined with ancient indigenous techniques, resulted in a distinctive range of high quality products, marketed under the brand name 'CeraLampang'.

A joint venture company was established to produce and market the products on a commercial scale, with the ultimate aim of establishing CeraLampang as a world-renowned Thai national brand.

Biodegradable plastics

Biodegradable plastics are derived from natural, renewable starch-based feedstocks, such as corn, cassava, potato or sugarcane. Their key property is their bio-degradability by micro-organisms after disposal.

At present there are several categories of biodegradable plastics available commercially, the two most widely known being Polylactic Acid (PLA) by Nature works and Polyhy-droxyalkanoates (PHA) by Metabolix Inc. Applications range from films, bags, and packaging to specialized engineering plastic such as some automotive parts.

The trend towards biodegradable or environmentally-friendly materials is growing in many developed countries as part of a heightened social and environmental conscience in both public and private sectors.

Thailand is well placed to pro-duce these and other bio-based materials, and this project not only broadens dramatically the options for industries to add value to indigenous natural resources, but also offers a leapfrogging step for technology development in Thailand.

Inspired by DuPont's Bio-PDO (a corn bio-polymer for use in the garrnent industry), NIA explored locally available materials that could substitute for imported corn, and identified cassava as having considerable potential as a feedstock for bio-plastic pellet production.

Thailand is one of the top cassava exporters in the world, producing some 18.75 million tonnes in 2003. However, today's cassava exports are low value-added raw materials such as chips, pellets or starch.

A feasibility study conducted by Stern Stewart and Co. found that the cost of Thai raw material (cassava starch) was 50 per cent cheaper than US corn starch. Also, construction and operating costs of a production plant in Thailand would be 30 per cent cheaper than in more developed countries.

The study's findings encouraged further research into other applications of bio-based materials, which although still ongoing, highlighted the enormous potential of biodegradable plastic to generate additional value-added as well as minimize environmental impact.

Natural rubber and products

Thailand is the world's largest producer and exporter of natural rubber (NR), exporting 2.5 million tonnes in 2003worth US$ 2.375 billion. NR is Thai-land's highest-valued agricultural export. However, domestic consumption for manufacture of higher value products in 2003 was only 290,000 tonnes- just 10 per cent of total NR production. This 10 per cent is used for locally manufactured NR products, such as tyres, gloves, condoms, rubber bands and rubber parts, which are mostly exported, greatly increasing their value-added.

It is thus important to stimulate domestic consumption of NR by the industrial sector in order to create additional value-added and maximize the country's income from NR. The key elements to achieve this are the introduction of new technologies and innovations.

NIA has therefore prioritized strategic innovation projects for NR in order to increase the international competitiveness of the sector, injecting some US$ 925,000 into the NR Strategic Project in order to stimulate private sector investment in innovative rubber-based businesses of more than US$12.5 million. Some examples of current projects are listed below:

- Premium grade natural rubber sheets;
- Super premium grade rubber sheet for constant viscosity;
- Low protein rubber gloves;
- Innovation in production process for medical rubber gloves from natural rubber;
- Natural rubber container for NR latex for export transportation;
- Vacuum oven for rubber wood; and
- Rubber wood composite.

Thai shrimp traceability initiative

Thailand is the biggest shrimp producer and exporter in the world, employing over 700,000 people and using an area of 200,000 acres of land to produce 250,000 to 260,000 tonnes. Thailand has 180 shrimp farms and imports only 9.6 per cent of its shrimp feed. In 2004 Thailand earned US$ 827 million from fresh and frozen shrimp exports.

However, the industry's export markets are under grave threat. Three major factors - more stringent importer requirements, GSP in Europe and anti-dumping duties in the USA- have together contributed to a steep decline in Thai exports over the last few years.

In 2004, Thailand exported only 122,500 tonnes worth US$ 827 million - down 12 per cent in tonnage, and 32 per cent in US$ value, compared with 1999 levels (138,000 tonnes/US$ 1.2 bn). Importing countries, especially Japan, and the EU's General Food Law, stipulate stringent standards with regard to residues of chemical additives and contaminants, and mandate "farm to fork" traceability requirements in all imported produce.

To address the last of these three challenges, the NIA provided support to develop a full traceability system for the Thai shrimp industry.

Under this scheme, a consortium of four software companies (Thaicom Management Group, FXA Co Ltd, Interact Consulting Co Ltd, and TAT Engineering Co Ltd) developed a customized traceability solution for the shrimp industry (the "OpsSmart" system). Pakfood Co Ltd (a leading shrimp producer and exporter), and the White Shrimp Producers' Club also offered to invest and participate in the Thai Shrimp Traceability Initiative.

A computer-based network was developed to allow the consumer to trace back information on food safety for any product batch, for every step of the production chain. Under the system, product safety and quality can be verified and validated, according to any protocol required by buyers or importing country regulations. Software installed at the sites of all parties includes systems to control the automatic feed-mill mix, a programme for quality control and management, and the food-product trace software that integrates information gathered from all processes.

This means that any player in the international shrimp supply chain can quickly access food safety-related in-formation, thus vastly increasing confidence in Thai suppliers and the over-all competitiveness of the sector. A further benefit in terms of

national competitiveness is the fact that in addition to the many direct participants in the supply chain, the Thai software sector also stands to gain considerable credibility and worldwide business advantage from such a pioneering programme.

The shrimp industry was selected for the importance, sensitivity and value of its exports, and also because of the readiness of the sector to collaborate in the effort to develop a pilot model to improve national competitiveness in the sector. Nevertheless, the factors driving change in the shrimp industry also carry wider implications for Thailand's exports of crops, poultry and meat.

Addressing the same issues in these other sectors will of course present a number of different challenges, but the success of this pilot will nevertheless help to demonstrate the value of effective trace ability systems in protecting Thailand's position as a leading exporter of foods, especially to European, Japanese and US markets.

Organic agriculture - a national organic model

NIA recently embarked on a new project lo work with relevant government agencies and other key stakeholders to develop an innovative National organic model lo further stimulate the organic sector in Thailand. The project will focus both on individual innovations (product or process-based) and on their integration and incorporation into an overall national strategy.

Pressure on the farm sector in Thailand has recently increased sharply due to two factors: (a) The establishment of bilateral FTAs, leading to net imports of cheaper agricultural produce from abroad, leading to reduced farm incomes, and (b) introduction of the European Food Law provisions for traceabilily and residue levels, which further restrict access to export markets, particularly for small-holder farmers with limited access to capital, information and (especially) the management skills needed to comply with the new rules.

The concurrent expansion in the organic sector has helped lo some extent to alleviate this pressure, but organic production still represents a relatively small niche market, with limited penetration of export markets.

There is, however, considerable room for expansion, which would assist smallholders add value to their production, stabilizing on-farm incomes, thus increasing agricultural exports and contributing to health and environment through reduced dependence on high levels of chemical inputs.

At present, there are approximately 4.000 ha of certified organic production in Thailand (just 1 ha organic for every 800 ha of farm land in Thailand. The Thai Government recently endorsed its policy in support of organic farming, announcing in a Cabinet resolution on 4 January 2005 an ambitious goal to transform Thailand's agriculture by increasing the importance of organic production systems.

However, specific implementation measures to achieve this goal have yet to be defined, institutional capacity is very limited, and the range of organic produce on the market is still relatively small.

If Thailand is to achieve its policy goals for organic farming, it must establish profitable and sustainable production systems and marketing channels for farmers, ensure effective and trusted internal control systems for traceability and organic certification, and through innovation broaden the existing range of produce either as niche or mass-market products.

The success of the OTOP ("One Tambon, One Product") model in Thailand has demonstrated the value and potential of grassroots innovation when combined with effective political and institutional support. A broad range of "Made in Thailand" OTOP products are now marketed globally, revitalizing many rural communities and strengthening Thailand's brand image abroad.

NIA sees strong potential for innovations in organic farming in Thailand, along the whole supply chain - from product (varietal characteristics e.g. colour, flavour, texture, size), through to cultivation systems (e.g. new organic methods, bio-lertilizers, bio-pesticides), processing, packaging, transport and marketing channels, including innovations in traceability and certification systems.

The National Organic Model willl focus both on the supply side by encouraging smallholder farmers and SMEs to enter the sector (for example by assistance in achieving compliance with regulations and protocols, and on shortening the supply chain to maximize grower margins) and on the demand side by stimulating demand for Thai organic produce through higher brand awareness and consumer confidence - from the stringent quality and safety mechanisms which will be incorporated into the model.

The model's overall goal is lo integrate existing initiatives, encourage the adoption of innovations in products and processes, stimulate growth in domestic and export markets, and effectively channel political and institutional support to enhance stability and national competitiveness in the organic sector.

The future of innovation

In an increasingly fast-changing global economic environment, intellectual property ownership and its role in stimulating innovation are expected to have far-reaching implications for innovation management and culture. NIA is developing a series of initiatives which aim in the medium term to enhance its own core competencies in these areas, with the aim of providing services in several areas, including an "innovation acquisition service (IAS)", a technology licensing office, "Innovation Ambassadors" and an Intellectual Property Valuation programme.

NIA's technically trained and business-oriented experts will work closely with industry, venture capital sources and entrepreneurs to find the best way to commercialize new technologies. NIA's own resources, networks and collaboration with existing innovation clusters will thus be effectively used to facilitate establishment of innovation projects, and also to further enhance innovative capability at the institutional level.