

2 The regional entrepreneurial ecosystem

This chapter assesses how policy can improve regional entrepreneurial ecosystem conditions for start-ups and scale-ups in advanced agriculture and biotechnology and food-for-the-future in the Chiang Mai and Chiang Rai regions in Northern Thailand. It assesses the various regional access to resources conditions (connectivity infrastructure, demand for relevant products, business services, talent and skills, access to knowledge, ecosystem leadership and finance) and institutional conditions (regulations, entrepreneurial culture, and networks) for start-ups and scale-ups. The chapter makes policy recommendations to strengthen the regional entrepreneurial ecosystem.

Introduction

The Fourth Thailand SME Promotion Master Plan (2017-2021), prepared by the Office of Small and Medium Enterprise Promotion (OSMEP), sets out the aim: “to foster the growth of Thai SMEs, enabling them to compete in the international arena, strengthening them to become a major driving force in the country’s economy”. It puts the emphasis on supporting all Thai SMEs to upgrade into smart SMEs, i.e. using appropriate technology to support their activities. The Chiang Mai and Chiang Rai regional innovation cluster can be at the forefront of this development with respect to integrating technology into start-up and scale-up SMEs in advanced agriculture and biotechnology and food-for-the-future.

The generation of innovative start-ups and scale-ups¹ will be critical for the development of the advanced agriculture and biotechnology and food-for-the-future sectors in Chiang Mai and Chiang Rai because these are the firms that will exploit new R&D-based technologies and take them to international markets, hence generating regional income growth. Scale-up enterprises in particular make disproportionate contributions to the creation of new jobs and help build investment confidence in a region and attract inward foreign direct investment (FDI).

In recent years, both innovative start-ups and scale-ups have become an important target for public policy initiatives internationally. These policies seek both to create a favourable business environment in which innovative start-ups and scale-ups can emerge and to target specific potential start-up and scale-up firms and entrepreneurs with support such as advice, finance and networking.

This chapter examines the actions that need to be taken in Thailand to strengthen the Chiang Mai and Chiang Rai regional entrepreneurial ecosystem in advanced agriculture and biotechnology and food-for-the-future, in order to provide an environment in which innovative start-ups and scale-ups are encouraged. It argues that for the long term health of the economy, mechanisms need to be in place for the OSMEP to:

- Identify successfully those start-ups and existing SMEs that are most likely to be innovative and become scale-ups and encourage others to develop the necessary characteristics for such a step.
- Support them through the process by ensuring they have access to knowledge (technical, financial and business development knowledge), mentoring, contacts including international contacts, business acumen, opportunities to share infrastructure, especially technology infrastructure, and finance. Some of this involves the OSMEP acting directly and some through third parties including universities.
- Ensure that successful innovative start-ups and scale-ups help others to follow by taking part in evaluations, information dissemination and future mentoring programmes. This itself feeds into the OSMEP work in seeding and identifying new innovative start-ups and scale-ups.
- Lead this policy area and partner with other organisations to develop complementary activities for innovative start-ups and scale-ups.

There are challenges to overcome. In the Northern Region, there are too many very small firms which are not growing, few medium-sized firms, few technologically-advanced firms and low levels of financial capital. Only 0.47% of firms are classified as medium-sized (50-200 employees with a turnover of THB 500 million),² whereas small enterprises account for 99.26% of enterprises. Similarly, only 1.2% of enterprises are in professional, scientific and technical services. Almost all capital is from sources internal to Thailand: 99.9% had no foreign investment or foreign share holdings³. There are very few major national and international firms in the key sectors which could act as anchor firms to mentor SMEs into new business models and introduce them into product and service value chains. Low levels of growth capital need to be addressed.

Furthermore, the Fourth Thailand SME Promotion Master Plan notes that Thai SMEs are likely to face increasing competitive pressures resulting from their lack of knowledge and capability in business management, weakness in technological capabilities, and limited capacity to grow and compete

internationally. This suggests low levels of absorptive capacity – an organisation’s ability to identify, assimilate, transform, and use external knowledge, research and practice (Cohen and Levinthal, 1990).

A further issue is to address low entrepreneurial aspirations in Thailand in the areas of innovative and growth-oriented entrepreneurship.

The sections below review 10 pillars of the Chiang Mai and Chiang Rai regional entrepreneurial ecosystem corresponding to the OECD regional entrepreneurial ecosystem analytical framework. They identify policy issues to address in each pillar. Particular priorities in Chiang Mai and Chiang Rai with respect to innovative start-ups and scale-ups in advanced agriculture and biotechnology and food-for-the-future are:

1. access to finance for scale-ups;
2. talent and skills for entrepreneurship and innovation; and
3. entrepreneurial culture and networks.

The chapter annex offers an overall SWOT analysis of each pillar. The key issues are also outlined in Table 2.1 below.

Table 2.1. Summary of policy issues in the Chiang Mai and Chiang Rai advanced agriculture and food-for-the-future entrepreneurial ecosystem

Ecosystem Pillar	Policy issues	Policy recommendations
Connectivity infrastructure	High logistics costs; low logistics supply chain transparency	Improve digital infrastructure; digital connections by firms; and digital skills training
Demand for relevant products	Untapped opportunities for branding and public procurement	Marketing grants, advice and branding efforts; public procurement initiative for healthcare innovation
Business services	Limited high quality support targeted on scale-ups in existing public business development services schemes	Increase staff capabilities and finance in OSMEP one-stop-shops; increase targeting of advice to scale-ups; channel advice to networks of SMEs
Talent and skills	Student brain drain; few large companies training workers; fragmented public management training programmes; shortages of technical skills	Upgrade university curricula and training quality; support and involve serial entrepreneurs in training
Access to knowledge	Limited university budgets for R&D; low SME absorptive capacity	Develop joint research commercialisation infrastructure across regional universities; support applied research in universities; support universities to provide knowledge to scale-ups; involve retired entrepreneurs as mentors to scale-ups
Ecosystem leadership	National policies lack regional tailoring	Produce a regional entrepreneurship development strategy for Chiang Mai and Chiang Rai
Finance	Little targeting of public financing programmes on high potential start-ups and scale-ups; limited angel and crowdfunding investment	Increase targeting of finance programmes to start-ups and SMEs with scale-up potential; combine finance support with mentoring; develop crowdfunding and business angel initiatives
Regulations	Slow-moving Food and Drug Agency (FDA) license approvals	Provide support to SMEs going through the FDA product license approval process
Entrepreneurial culture	High fear of failure; limited growth-oriented entrepreneurship by women; more potential for academic entrepreneurship; potential for entrepreneurship from returning migrants	Involve entrepreneurs (returning diaspora, university alumni) in awareness raising; provide dedicated entrepreneurship support for women
Networks	Lack of involvement of large firms and universities in firm networks and low trust	Create a networking organisation for the regional innovation cluster

Source: OECD

In developing appropriate policies in these areas, it is essential to adopt a strong focus on start-ups and existing SMEs with the potential to grow, that have scalability (i.e. when their input increases, their output increases faster), and are innovative.

Access to resources conditions

Connectivity infrastructure

To be a player on the national or international scene, firms need to be conveniently connected with collaborators, funders, markets and suppliers. Sometimes physical connectivity is needed but good ICT connectivity can work very well and is sometimes more reliable. For ambitious firms in Chiang Mai and Chiang Rai, physical connectivity to other parts of Thailand's domestic market and international markets is crucial, particularly with ASEAN countries. Connectivity with Bangkok is especially important.

There are two main airports and a number of smaller ones. Chiang Mai International Airport has some 10 million passengers a year, one-fifth of them international. It is a major gateway, with many flights to Bangkok and to China, Singapore and Malaysia. Chiang Rai International Airport is a main domestic gateway airport with frequent Bangkok flights. However there are no direct flights or trains running between Chiang Mai and Chiang Rai. The easiest way to get to Chiang Rai from Chiang Mai is by bus or car taking around three hours. Chiang Mai will benefit from a new rail route linking Chiang Mai to Bang Sue, with onward connectivity to Laos, Cambodia and Malaysia.⁴

ICT connectivity is improving. The "Digital Thailand" initiative aims to transform Thailand through the use of digital technologies in all socioeconomic activities by developing infrastructure, human capital, and other digital resources. There has been progress in putting the digital vision into action, for example through the implementation of "smart city" pilots in Phuket and Chiang Mai and large ICT infrastructure improvements such as extending the coverage of broadband internet to all villages.⁵

Moving physical goods through the supply chain from the North is costly. According to the World Bank Logistics Performance Index, Thailand ranks behind Malaysia and Singapore in overall logistics performance, but ahead of Cambodia, Laos and Myanmar (World Bank, 2018). Logistics costs are currently a limiting factor to importing and exporting. Most raw materials and finished goods are still moved by trucks, which is costly, and there is very little supply chain transparency and very little automation or technology to track processes or identify bottlenecks.

Demand for relevant products

Demand opportunities for scale-ups in advanced agriculture and biotechnology and food-for-the-future are still in the early stages. However, the market for healthy, functional and medicinal foods is expanding as the trend towards healthier living and health-related products grows. The opportunities are being driven by increasing levels of wealth, improved education, targeted government health and wellness campaigns, and globalisation. ASEAN shoppers are increasingly aware of the importance of healthy living, fresh food, nutrition and product sourcing. Another driver will be growing appetites from Chinese consumers for quality agricultural products from Thailand.

The national government is supporting efforts to improve the value chain by focusing on technology and innovation in the following areas:

- Upstream – farming systems, seeding, water, soil and nutrient management, harvesting.
- Midstream – dehydrating, modifying food, packaging, increasing shelf life, food safety.
- Downstream – marketing, distribution.

Branding the regional cluster to distinguish it from other places will enable start-ups and scale-ups to identify with it and use it in their marketing in international markets. A recurrent theme is a lack of a profile of regional success stories.

There is also significant potential to use public procurement in areas related to healthy food to stimulate start-ups and scale-ups in Chiang Mai and Chiang Rai. Box 2.1 gives an example of a scale-up policy in

Canada which aims to scale up companies in health and biosciences by creating a platform for procurement of health innovations by a network of public and private sector health organisations.

Box 2.1. The Canadian CAN Health Network

Description of the approach

The Canadian Health and Biosciences Economic Strategy includes the objective of accelerating innovation adoption through introducing new innovation procurement drawing on the massive scale of health care spending, which reached CAD 253 billion in Canada in 2018 – 11% of the country's GDP. This spending offers many opportunities to procure innovations from start-ups and scale-ups.

In 2020, the Government of Canada announced that it would support a CAD 20 million project proposal to create a network of health care organisations to co-operate on procuring innovations directly from medical technology companies and ensure that the technology is sold into the network, hence stimulating scale-up companies in health and biosciences as well as using innovation to transform products and services.

The CAN Health Network is a national partnership comprised of leading Canadian health organisations, referred to as Edges, and companies across Canada. Edges are a diverse set of public or private organisations with shared challenges that form an integrated network to collaborate, adopt and procure innovative home-grown solutions. Edges may be hospitals, home care organisations, health authorities, private clinics etc. They are health care providers that are committed to being early adopters of innovative Canadian health care solutions. They function as a co-op style placement site working as an integrated marketplace for Canadian businesses to test and enhance their technologies in partnership with the end-user and subsequently scale through innovative procurement processes.

The Network works to introduce new solutions into the health care system, and pave the way for Canadian businesses to scale not only across Canada, but globally. So far the CAN Health Network consists of two regions with 5 provinces; a further four are under development. The Edges identify market-ready needs for the Network and select the best suited companies (which might be mid-to-late stage ventures). They are paired with an Edge, which provides them with multi-level support to ensure optimal product market fit. The companies embed themselves into that Edge for up to a year. A national competitive procurement process is then launched so that all of the Network's members can procure the solution without having to repeat the process.

The Network functions as an integrated market allowing promising companies to work directly with health care organisations to understand their needs and commercialise health technologies and scale up their companies. Through this integrated market, SMEs and leading start-ups work with early-adopter institutions to collaboratively research, develop and refine Canadian medical technologies to make them market-ready. This easy access to a large, consolidated domestic marketplace is designed to provide the opportunity for companies to scale up, commercialising technologies that can be exported around the world, while being anchored in Canada creating jobs.

The network is tackling market access barriers thus enabling Canadian health innovation companies to compete on a national and international level by providing companies with:

- Access to buyers' sites to demonstrate the value of their technology.

- Fast-tracked and scalable procurement utilising existing guidelines.
- An integrated marketplace allowing businesses to scale rapidly.

Success factors

Funding for the establishment of the network has been guaranteed by national government and by two partnerships each worth CAD 3.5 million. This initial investment will build the first points of the national network in Western Canada and Ontario, with further expansion planned for Quebec, Atlantic Canada and Northern Canada. The successes of these initial investments will guide future funding decisions.

The first part of the network in the West of Canada is supported by Western Economic Diversification Canada and led by Saskatchewan Health Authority (SHA). SHA is the largest organisation in Saskatchewan, employing over 40 000 people and physicians responsible for the delivery of high quality and timely health care for the province. SHA leads the Western Network from British Columbia, Alberta, Saskatchewan and Manitoba, with three Edge partners including entire health authorities. SHA is also advising and supporting the creation of the CAN Health Central Network.

It works with:

- Alberta Health Services;
- Children's Hospital Research Institute of Manitoba;
- O'Brien Institute for Public Health, University of Calgary; and
- Vancouver Coastal Health.

In the South East of Canada, CAD 3.5 million will come from FedDev Ontario and Trillium Health Partners and will lead the creation of the CAN Health Network in southern Ontario. It will work with:

- Bruyère;
- Grand River Hospital;
- The Hospital for Sick Children (SickKids);
- Prism Eye Institute;
- SE Health;
- Sinai Health System;
- Sunnybrook Health Sciences Centre;
- University Health Network; and
- Unity Health Toronto.

Challenges

The CAN Health initiative is in its early stages and is yet unproven. However, its aims are consistent with what Hoogenberg (2020) identifies as the main ways forward in scaling up bioscience firms. There is a risk that the model will not be adopted in all the targeted regions, as has been the case with Start-up Canada.

Relevance to Chiang Mai and Chiang Rai

The relevance for the Chiang Mai and Chiang Rai regions lies in the role of national support to create a national network with regional branches that involve regional development agencies, key public sector healthcare organisations and universities. The first two partnerships have been

funded by regional-level organisations, so that the networks are focused on specific local knowledge of demand and expertise. The motto for this approach is ‘Recognizing Unique Regional Needs and Opportunities Under One National Network’.

In Chiang Mai and Chiang Rai, health organisations could work together with potential scale-up firms on Northern Science Park in the areas of biotech and healthy foods, targeted for example at ageing populations, with the involvement of the universities and the Thailand Centre of Excellence for Life Sciences (TCELS). The OSMEP would have a key role to play in providing overall leadership of the initiative.

Sources of further information:

“Government of Canada Commits \$20 Million To Scale Up Health & Bioscience Companies”, July 2019
<https://www.biomb.ca/news/567/government-of-canada-commits-20-million-to-scale-up-health-bioscience-companies>
<https://canhealthnetwork.ca/>

Hoogenberg, D. (2020), “How biotech scale ups can contribute to the health industry transformation”, EY Netherlands, Rotterdam,
https://www.ey.com/en_nl/health/how-biotech-scale-ups-can-contribute-to-the-health-industry-transformation

Business services

Business development services suppliers provide advice, consultancy, management training and mentoring to scale-ups to help them improve their management practices and technologies and to develop entrepreneurial capacity.

Private business services suppliers are service minded, but costs are still high for SMEs. Therefore there is substantial reliance by SMEs on national public business development services programmes. For example, the OSMEP One-Stop Service is present in every province. It offers SMEs support with accessing researchers and experts, testing and analysis, standards and regulation, equipment and machinery and incentives to work with new technology so that they can scale up. However, these programmes provide largely basic support to large numbers of firms, and there is potential to offer public support to private providers to supply higher-quality, more specialised business development services to firms with scale-up potential.

The aim should be to upgrade SMEs through critical points in their development (e.g. start up, scale up, first export, new product). Product and market training services could include value chain competitive analysis, upgrading use of technology (especially digital technology), market analysis, business canvas models⁶, and managing risk and partnerships. Capacity building support should also be provided in intellectual property (IP) and IP protection.

Groups of innovative start-ups and potential scale-ups in advanced agriculture and biotechnology and food-for-the-future could also be supported with business development services to upgrade their business models at the same time as integrating R&D in their products. SMEs should be selected for more intensive business development support on the basis of their absorptive capacity although all SMEs need help in scanning for business opportunities, short to long term.

Common programmes and collective action between business support agencies are also required. This would be helped by the creation of an entrepreneurship hub through which business services and mentoring would be delivered to groups of SMEs.

A further consistent message from regional stakeholders in the provision of business services in the Northern region is that local intervention is needed in training the trainers who then mentor SMEs.

Talent and skills

Talented entrepreneurs

Scale-up entrepreneurship is favoured by the presence of highly-skilled entrepreneurs in a region. In advanced agriculture and biotechnology and food-for-the-future a key potential source of scale-up entrepreneurs is Science, Technology, Engineering and Maths (STEM) graduates from regional universities. However, a challenge is that many STEM graduates from Chiang Mai and Chiang Rai universities are attracted out of the region to work in large employers (like CP, Betagrow, Central Foods, Thai Union Frozen Foods and Thai-Bev) in Bangkok and other regions, which generally offer higher salaries and more diverse opportunities. This may discourage graduates from setting up their own firms. There are also few large enterprises in Chiang Mai and Chiang Rai where employees can receive training and experience in business and management that could help them in subsequently creating their own enterprises.

Potential innovative start-up and scale-up entrepreneurs can also be mentored locally or attracted from other regions and countries. There are government programmes in Thailand that support this, including Career for the Future Academy (run by NSDTA) for mentors and entrepreneurs; and the Smart Visa programme (run by BOI with NIA and DEPA) designed to attract highly-skilled workers, investors, executives and start-up entrepreneurs wishing to work or invest in targeted STEM industries in Thailand.

Serial entrepreneurs have been found to be an important driver of cluster development in many OECD countries. For example in Cambridge, United Kingdom, they have created many spin-out enterprises from the University and other companies (Beveridge, 2001). There is very little evidence of serial entrepreneurship in Chiang Mai and Chiang Rai as yet, but the Northern Science Park has created a fund to reinvest in entrepreneurs to “serialise” them. This would build on the expertise of alumni and develop them as mentors, as is the case in the Little Onion Factory (<https://www.littleonionfactory.com/>).

Management skills in SMEs

Training and mentoring needs to be more available for upskilling SME managers in firms with scale-up potential, for example in the areas of management, marketing and exporting. Mentoring could be organised into groups of SMEs with scale-up potential, enabling co-learning and increasing networking. In the past, management training programmes have been fragmented across agencies and short term. A better approach would be to create a platform management programme with different streams according to SME sector and size of firm and deliver a longer-term programme in co-operation across different government agencies.

Universities, especially Business Schools, should also be more involved in building management skills in industry. Their faculty could provide mentoring and consultancy to start-ups and scale-ups. They could also be involved in introducing continuous professional development for managers and technical staff, as is common in the UK for example.⁷

Workforce skills

In general, there are shortages of skilled workers in agritech and biotechnology in Chiang Mai and Chiang Rai. Most of the relevant technical education is geared towards food sciences (Chong, 2019). A greater emphasis on STEM education as well as critical thinking and decision making skills would complement this and help fill shortages of a range of skills needed for a growing technology company – qualified software engineers, coders, technicians and research scientists etc.

Universities could help ensure that alumni have relevant business skills through developing joint scientific and engineering degree programmes with business schools, involving industry practitioners as well as scientists. An example is the MSc in BioBusiness at Birkbeck, University of London.⁸ This approach would

be consistent with the National Biotechnology Policy Framework 2012-2021 in which the Thai government called for human resource development programmes to increase the number of graduates in the field of modern biological science.⁹ Joint programmes could be developed with international advanced agriculture firms.

Universities could also collectively adopt new models of teaching and new targets to address start-up and scale-up needs, e.g. through advanced apprenticeship programmes, internships, Masters dissertations on industry-relevant problems, or a classroom in a scale-up factory. The latter approach is illustrated by the Faculty on the Shopfloor as delivered by Coventry University in the United Kingdom (Box 2.2).

Box 2.2. Faculty on the Shop Floor, Coventry University, United Kingdom

Description of the approach

Successful technology transfer models in leading-edge technologies all include an essential element of training/staff development in target firms. The collaboration between Coventry University and Unipart Manufacturing Group (UMG) in developing the Institute for Advanced Manufacturing and Engineering (AME), known as the “faculty on the factory floor” illustrates a model for achieving this.

AME was established at Unipart Manufacturing, a car components company in Coventry in the West Midlands region. Its three elements are (i) teaching and skills, (ii) engagement with business and (iii) commercialising R&D. It took its first cohort of students in September 2014.

The region as a whole suffers from skill shortages, with major employers recruiting from a limited pool. To overcome this, the Coventry and Warwickshire Local Enterprise Partnership (LEP) set an initial target of training 5 000 new or unskilled engineers by 2015. It also aimed to increase the number of local SMEs active in R&D. To engage with this agenda, Coventry University and Unipart agreed to build a partnership that incorporated joint R&D activity and training activity, supported by the new AME facility.

Central Government funding of GBP 1 million was allocated to the project from the Local Growth Fund by a competitive process following a bid by the Coventry and Warwickshire Local Enterprise Partnership (CWLEP), which represents local businesses, universities, colleges and local government authorities. Coventry University provided a further GBP 4 million to refurbish the additional building to equip it with state-of-the-art digital manufacturing and materials analysis equipment, and received part funding from the Catalyst Fund of the Higher Education Funding Council for England (HEFCE, which has since been replaced by Innovate UK). Unipart contributes GBP 17.9 million per year towards the partnership and a further GBP 6.5 million towards student scholarships and product research and investment.

Around 100 students study at the site. Since AME was launched, all students who have graduated have been employed in engineering jobs. Selected students receive scholarships of GBP 3 000 and access to summer placements from Unipart. Students can also access career development opportunities after graduation including management training, internships, international placement, and employment opportunities across the Unipart Group and with other leading manufacturers. AME also offers fully funded PhD studentships.

Factors for success

The success of the partnership is that it is embedded in each organisation’s strategy and involves teachers, trainers and researchers from both organisations working together alongside students. Coventry University benefits from access to up-to-date equipment and practical knowledge. Its

'activity-led learning' model underpins teaching, prioritising practical, work-based learning for students. Industrial advisory boards are active in curriculum design to ensure that programmes remain up to date and relevant. The new building and manufacturing equipment has been designed to provide learning spaces and resources.

One key to success is strong leadership from both organisations' senior teams. Another is shared fundamental principles such as a focus on skills development in a workplace environment. Others include close collaboration on applied research, co-location to foster communication, and a desire to align both partners' measures of success. The project would not succeed without senior level engagement, the co-location of staff, and joint appointments.

All of this has fostered the collaboration and the culture change required to work together effectively and speed up decision-making.

External support from the Local Enterprise Partnership (i.e. CWLEP) and the HEFCE Catalyst Fund has also been important. This gave Unipart and Coventry University sufficient confidence to release their own funds to support the initiative. Accreditation from relevant professional bodies (Institution of Engineering and Technology and the Institution of Mechanical Engineers) enhanced its reputation among potential students (particularly from outside the United Kingdom) and with employers. AME's facilities and expertise – as a University research centre – have already been used to secure funding for low-carbon technology research projects focused on aerospace, automotive, rail, oil and gas, and power generation. It has received funding for six research projects worth over GBP 2.5 million.

Obstacles encountered and responses

Early obstacles included getting all the partners to sign up and apply for funding, finding suitable buildings, marketing the degree and making it inclusive in order to attract more women students. Developing new industry-focused and globally-relevant programmes involving considerable employer input also took time. In addition, new working practices created to fit the new "Faculty on the Factory Floor" approach have required time to bed in. Essentially, an initial "culture clash" has been overcome.

Relevance for Chiang Mai and Chiang Rai regions

While AME is in the field of advanced manufacturing rather than biotechnology, the fundamental principles of an offsite facility of a university hosted by a local employer for jointly-designed R&D and training are transferable. The strength of the approach is that it brings together skill sets in the science base, both students and faculty, with those in industry, to give more relevant training and R&D. Teaching by both university and companies leads to a very fast assimilation of new ideas and practices by the students, as well as learning experiences and improved student employability for the university and knowledge transfers and a source of new employees for the participating firm.

The model could be adapted to a group of SMEs in the advanced agriculture and biotechnology and food-for-the-future sectors that could collaborate with a university on projects that are adapted to the specific needs of different firms in the sectors. The national government would need to provide core funding and the universities would need to allocate resources, but these could be 'in-kind' in the form of time of the lecturing staff. The involvement of local firms is also necessary for analysing skills needs and developing appropriate training.

Source: OECD (2019) Local Entrepreneurship Ecosystems and Emerging Industries: Case Study of Coventry and Warwickshire, United Kingdom.

Universities in Thailand often have a problem in teaching the latest skills because of out-of-date teaching materials, kit and methods. Academic staff could be encouraged to apply for study leave to update their knowledge and practice abroad. This would be on an 'education for return' basis as is practised in Malta's university where agreement to go often involves a contractual commitment to return for a period of time. Involving industry in syllabus development also leads to more up-to-date curricula.

Industry mobility schemes can also play a role in upgrading skills in SMEs. Existing public programmes in Thailand include Talent Mobility (operated by ONES), which relocates personnel temporarily from universities and public research institutions to the private sector to increase business competencies in innovation, and Work Integrated Learning (operated by ONES), a programme for producing vocational and undergraduate level workers for particular STEM sectors. In addition, students could undertake 'on the job' technology transfer to SMEs.

Access to knowledge

Start-ups and scale-ups need to be able to access the latest R&D relevant to their own product and service development in order to take innovations to market. The regional universities and science parks play a key role in injecting technologies into firms in advanced agriculture and biotechnology and food-for-the-future in Chiang Mai and Chiang Rai. However a key barrier is the absorptive capacities of existing SMEs.

Universities

A major strength of Chiang Mai and Chiang Rai is the knowledge resources and services that their universities are providing in advanced agriculture and biotechnology and food-for-the-future and their recent engagement with start-ups and scale-ups.

Table 2.2 lists universities and faculties with relevant specialist expertise and gives examples of their industry engagement practice.

Table 2.2. University support for start-ups and scale-ups in advanced agriculture and biotechnology and food-for-the-future in Chiang Mai and Chiang Rai

University and Department/Centre	Support for start-ups and scale-ups
<p>Chiang Mai University (www.cmu.ac.th) (located in Chiang Mai province) Public research university with strong emphasis on engineering, science, agriculture, and medicine. 39 000 students (10 000 masters students)</p>	
<p>Faculty of Pharmacy https://www.pharmacy.cmu.ac.th/eng2016/index.php</p>	<ul style="list-style-type: none"> • Provides graduates to pharmaceutical sectors and aims to develop and disseminate advanced pharmaceutical knowledge that benefits society.
<p>Faculty of Agro Industry</p>	<ul style="list-style-type: none"> • Co-operates with government and private business clusters. • Provides access to the alumni association. • Works with art, cultural and religious organisations and local communities. • Provides seminars, agricultural training, packaging and design. • Provides continuing education to the local community.
<p>Agricultural Technology Service Center http://www.agri.cmu.ac.th</p>	<ul style="list-style-type: none"> • Provides education and training in agriculture. • 19 seminars and workshops in 2018. • Workshops for SMEs, including start-ups, in 2018. • Operates central testing laboratory. • Soil testing. • Plant tissue testing. • Animal feed testing. • Conducts agricultural clinics on best practices for farm, fertilizer and pesticide management.
<p>Food Innovation and Packaging Centre (FIN) www.fin.cmu.ac.th</p>	<ul style="list-style-type: none"> • Supports product development and packaging design. • Provides testing services. • Conducts food innovation policy and R&D support. • Conducts food collaborative research and business development. • Serves as a business incubator.
<p>Science and Technology Park (STeP) – www.step.cmu.ac.th</p>	<ul style="list-style-type: none"> • Provides support on technology and innovation, agriculture, food, medical and biotechnology. • Provides IT software, digital content, IoT, energy technology and materials support. • Supports SMEs and start-up development. • Connects universities with the private sector.

Mae Jo University Business Incubator (MJUBI) (www.mjubi.mju.ac.th)	<ul style="list-style-type: none"> • Provides business education to the university community consisting of faculty members, researchers, students, alumni and small business owners. • Provides consulting services to entrepreneurs in business processes, innovation, production, marketing, management and accounting. • Conducts research collaboration, proof of technology, technology development and commercialisation. • Manages and maintains intellectual property belonging to the university (https://erp.mju.ac.th/researchDetailPublicEN.aspx?rid=6168).
Mae Fah Luang University https://en.mfu.ac.th (located in Chiang Rai province) Public university with a strong emphasis on science, cosmetics, tea and coffee production and agriculture	
School of Science	<ul style="list-style-type: none"> • Works with cosmetics companies – uses knowledge in business research for SMEs to connect to the university. • Works with 3 to 4 SMEs to improve products and processing and enhancing products.
School of Agro-industry http://agro-industry.mfu.ac.th/en	<ul style="list-style-type: none"> • Teaching and research in food technology and technology management of agricultural produce and packaging. • Graduates competent agro-industry technologists for industry and offers continuing professional development. • Helps SMEs with packaging and how to develop products.
Health Science	<ul style="list-style-type: none"> • Works with herb companies, helping them to develop technology, recruit and export.
Tea Coffee Institute http://web2.mfu.ac.th	<ul style="list-style-type: none"> • Provides a knowledge and technology transfer centre for tea and coffee products. • Serves as a centre of educational, research and development on tea. • Works as a collaboration and network centre for tea research in both the domestic and international markets. • Implement policies to improve quality and additional tea and coffee. • Provides services including technical research and clinical trials for entrepreneurs
Center of Excellence in Natural Product Innovation	<ul style="list-style-type: none"> • Provides lab testing services for cosmetic ingredients, and conducts research and development on natural products.
School of Management	<ul style="list-style-type: none"> • Helps companies in coffee industry.
Mae Fah Luang University Business Incubator (MFUBI) (http://mfubi.mfu.ac.th)	<ul style="list-style-type: none"> • Works with SME start-ups in the agriculture, health and cosmetic sectors.
Mae Fah Luang Intellectual Property Management and Innovation Department Office http://mfii.mfu.ac.th	<ul style="list-style-type: none"> • Serves as a centre for technology commercialisation and provides innovation design and IP to the private sector. • Looks after IP rights and patents, undertakes IP asset management for operators and professors in the university • Channels research results to the private sector. • It can refer SMEs to other universities or agencies for example in Bangkok. • Has filed 5 patents for SMEs and drafted more than 100 for faculty.
Chiang Rai Rajabhat University (located in Chiang Rai province) http://www.crru.ac.th/2019/ Public Higher Education Institute	
Faculty of Science and technology http://science.crru.ac.th/	<ul style="list-style-type: none"> • Food Science Programme • Biological Sciences Programme • Agricultural Technology Programme

Faculty of Management Science http://research.crru.ac.th/rdiwebsite/	<ul style="list-style-type: none"> Local industry co-operation on business development and management skills
Rajamangala University of Technology Lanna (includes a campus in Chiang Mai province and a campus in Chiang Rai province) https://www.rmutl.ac.th/ A technology and vocational learning university with campuses across Thailand.	
Faculty of Sciences and agricultural technology https://sat.rmutl.ac.th/	<ul style="list-style-type: none"> Local industry co-operation e.g. co-operation with Siriraj-TCELS and network partners on research and development of an innovative nano dust-mite cloth mask with COVID-19 protection

Source: OECD interviews with regional university stakeholders, 2019.

A major asset and potential anchor for the regional entrepreneurial ecosystem is Chiang Mai University, which was designated as the first provincial university in Thailand. Its mission is to establish innovation in the region including through relevant R&D and generating appropriately skilled labour for industry development. The University has some 2 200 researchers.

In Chiang Rai, a key player is Mae Fah Luang University. Its tea and coffee institute provides specialist expertise to local firms and supports them to improve the standard of their products. The University has its own fund for researchers, which can be used for collaborations with regional start-ups and scale-ups, helps SMEs with IP issues, and helps firms apply for Ministry of Industry funding.

Rajabat University and Rajamangala University of Technology Lanna have somewhat different missions. Rajabat University trains teachers and has a budget from the government to leverage the University's skills for local community development. It has no specific budget for SME development, but holds start-up competitions and organises seminars for start-up entrepreneurs. Rajamangala University of Technology Lanna is a vocational training university and organises a range of training and development activities with local industry.

However, the full potential driving role of these universities for the development of advanced agriculture and biotechnology and food-for-the-future in the regions is constrained by limited budgets to develop R&D that can be translated into commercial opportunities for SMEs in key industries for their regions. For example, although receiving government support, Chiang Mai University has to find matching funding for every project. It does this by submitting proposals to different ministries and to the Chiang Mai provincial government budget. Around half of the budget is from ONES.

In a promising development, Chiang Mai University has recently created a licensing holding company. This enables it to gain revenue by licensing technology to existing companies or tech start-ups. This should increase knowledge transfer to start-ups and scale-ups in a familiar model in advanced economies.

Science Parks

The Northern Science Park (NSP), established in 2012, is based at Chiang Mai University and is the bridge between university and industry. The responsible agency is the Science Park Promotion Agency. The NSP works on an open innovation concept, bringing in businesses to participate in R&D work as needed and seeking commercialisation opportunities. Its objectives include developing successful start-ups and scale-ups and providing opportunities to access venture capital.

The NSP works on a three-stage process from start-up through to scale-up: pre-incubation (3-6 months), incubation (up to 3 years) and acceleration (depends on company). It operates three models:

- 'Inside Out'. This involves licensing to an industry translational research fund to take research to proof of concept stage, and then to upscale the research, including IP protection.
- 'Outside In'. What industry wants. This means finding appropriate experts in the university (working with 45 members of staff) and offering appropriate consultancy and research inputs.
- 'Start-up Approach'. Start-up from research. This involves several sectors, students, alumni and academics.

The NSP has generated some 150 start-ups from 7 universities including approximately 50 in Chiang Mai. Some 17% are in medical and biotechnology, one-half are in agriculture, one-quarter in IT software and digital content, and 10% in energy. However, the largest of these start-ups had only 15 employees in 2019, so the NSP is some way from creating substantial scale-up activity. Most companies are at early stages of development with nearly half getting seed-corn funding and a small percentage waiting for fund-raising (5%). Exit is usually through acquisition.

The NSP might also encourage more commercialisation of R&D to start-ups and scale-ups in the regions by hosting NSTDA events in the field of advanced agriculture and biotechnology and food-for-the-future in the Northern Region. These events are designed to bring technology nearing market to potential SME customers, such as the Tech Shows held in Bangkok¹.

The absorptive capacities of SMEs

Knowledge exchange from universities, research laboratories and science parks to start-ups and scale-ups in the regional cluster faces a substantial barrier in the low capacity of SMEs to absorb and apply the relevant technology developed by the universities and the NSP. This gap between university and industry is known locally as the Valley of Challenge. For example, a recent Global Entrepreneurship Monitor (GEM) National Expert Survey of Thailand (Guelich, 2018) reported that lack of R&D transfer from research institutions, universities and/or government agencies to enterprises is considered a major constraint by experts in Thailand. A number of aspects to this barrier lie in limited SME absorptive capacities.

Financing is an important aspect of the problem. Although there are some funding measures, such as the IRTC, which provides matching funding at 50% to develop R&D-based products in start-ups and scale-ups, there is a general lack of support for growth finance.

Also missing is a realisation by start-ups and scale-ups of the need to assert and protect intellectual property (IP). This is crucial for SMEs to take full advantage of innovations.

Lack of skills and networks can also be an issue. More could be done in Chiang Mai and Chiang Rai to transfer technology from universities to start-ups by involving a student who works with a researcher on the commercialisation. A mentoring programme can also play a role. There are a number of foreign mentors in Chiang Mai and Chiang Rai, often brought in by venture capital firms, who come for a number of days because they can see the high potential of an SME. Mentors also come to the regions from Bangkok. However, Thailand lacks a strong body of retired people working as mentors, which by contrast is very important in innovation clusters in other countries, including in Silicon Valley, United States.

Ecosystem leadership

Ecosystem leadership is about developing a vision and strategy for entrepreneurship and innovation that key local stakeholders support. It implies a system for identifying and addressing obstacles to the development of the advanced agriculture and biotechnology and food-for-the-future industries in Chiang Mai and Chiang Rai working across stakeholders. In some regional entrepreneurial ecosystems this leadership role is taken by prominent successful entrepreneurs, businesses, HEIs, or cluster management organisations. However, ecosystem leadership can also be driven by government actors working at the regional level in a way that brings together local stakeholders to assess how to respond to local issues.

The BOI, DIP and the OSMEP are key government departments and bodies leading policy support for SMEs and start-ups nationally. However, they work largely with a national lens and do not focus strongly on identifying and responding to regional bottlenecks affecting entrepreneurship development in particular driving sectors for future growth of the Thai economy, such as advanced agriculture and biotechnology and food-for-the-future in Chiang Mai and Chiang Rai.

Provincial government could potentially work in collaboration with the national government organisations to help with tailoring of SME and entrepreneurship policies to regional needs. However, the provincial level of government has currently not made strong impacts on regionalising the nature of SME and entrepreneurship support.

Another option for generating the necessary regional entrepreneurial ecosystem leadership is the creation of a cluster management organisation for advanced agriculture and biotechnology and food-for-the-future in Chiang Mai and Chiang Rai. This could work with national and regional government ministries and agencies, HEIs, research laboratories such as NSTDA, science parks, and private firms and their representative organisations, including the Federation of Thai Industries and Chambers of Commerce. It would identify regional bottlenecks in the development of the advanced agriculture and biotechnology and food-for-the-future sectors and develop tailored and co-ordinated solutions. The OSMEP could take a leadership role in setting up this organisation and providing basic operational resources.

A shared policy strategy needs to be developed involving all these stakeholders and setting out the respective roles of the different public ministries and agencies. It could be modelled on regional strategies profiled by the European Entrepreneurial Regions project,² which identifies and rewards European Union regions developing an outstanding and innovative entrepreneurial policy strategy. As well as identifying the issues that policy needs to address and prioritising the policy interventions in areas such as business advice, finance and skills, developing a regional entrepreneurial ecosystem development strategy for Chiang Mai and Chiang Rai (potentially focused on the advanced agriculture and biotechnology and food-for-the-future cluster) would help address other policy challenges affecting the regions, such as increasing coherence across the interventions of different public bodies, making programmes more sustainable over time, and improving policy performance by setting goals and measuring outcomes.

Finance

Finance is a key area where start-ups and scale-ups need support. Very small firms do not have spare capacity for innovation and growth unless funded. Access to bank loans is important, but access to equity finance and a range of alternative financing instruments such as business angel investment and crowdfunding are also vital aspects of a healthy regional entrepreneurial ecosystem.

In terms of access to bank loans, there are a number of obstacles for start-ups and scale-ups in Chiang Mai and Chiang Rai. Based on a Bank of Thailand study, as many as 5.2 million SMEs received loans from Thai commercial banks in 2017. However, the DIP has identified the following significant barriers to accessing bank financing, which are often likely to be particularly important for potential scale-up enterprises:

- Lack of historical records and information at financial institutions.
- Complexity and difficulty of the application procedures.
- Lack of loan collateral.
- High up-front costs (e.g. 3% of desired credit line).
- Inflexible credit plans and facilities.
- Failure of banks to regularly review SME performance.
- Lack of alignment between the key performance indicators (KPIs) of banks and SME pain points.
- Lack of competition among banks for SME business and lack of diversity of financing offers.
- Aggressive pursuit of businesses that do not require capital by banks.

Venture capital is available, including through the firms listed in Table 2.3, and the government has introduced tax privileges for investors to boost supply, such as income tax exemptions for incomes from investments. However, venture capital is generally in short supply in Thailand. Domestic investments could be complemented by foreign venture capital. However, foreign venture capital firms often have difficulty finding suitable businesses in Thailand due to the restrictions of the Foreign Business Act and

the fact that larger deals are constrained by the limited numbers of SMEs in Thailand with an Asian region or multi-national focus. Thailand's banking regulations are not conducive to conducting international business. The inability to trade in U.S. dollars or hold foreign currency and the high cost of letters of credit are also significant obstacles for SMEs.

Table 2.3. Sample of local venture capital firms in Thailand

1.	Beacon Venture Capital (Kasikorn Bank)
2.	N-Vest Venture
3.	Vnet Capital Co., Ltd.
4.	Lombard Investments
5.	InVent (Intouch Holdings PLC)
6.	Bangkok Venture Club (Angel Investment Group)
7.	Finansa PLC
8.	Siri Venture (Siam Commercial Bank)
9.	TukTuk500 Fund

Source: OECD interviews with regional finance stakeholders

The Market for Alternative Investment is a stock exchange for smaller firms in Thailand. SMEs can raise capital there if they have over THB 1 million in paid-up capital after IPO. It provides a platform to raise capital at a lower paid-up level than in the stock exchange of Thailand. In 2016, there were 134 listed companies with a market capitalisation of THB 425 billion. Of these, the only company from the advanced agriculture and biotechnology and food-for-the-future sectors in Chiang Mai and Chiang Rai was Sunsweet in Chiang Mai. The other companies listed were mainly health service firms or property and construction firms. There were none in Chiang Rai.

There is an array of government support programmes that help start-ups and scale-ups to access finance for their development. Current national schemes which are relevant in providing funding to support start-ups and scale-ups advanced agriculture and biotechnology and food-for-the-future in Chiang Mai and Chiang Rai are:

- **Start-up Voucher** (operated by the NSDTA). This supports market expansion for tech start-ups. It offers up to THB 800 000 covering up to 75% of eligible expenses for a market study and consultancy fees from a marketing expert to access foreign and domestic markets. The voucher appears to be effective. However, the focus should be on developing technologies needed in the future. Quality control and feedback also need more consideration.
- **Innovation Vouchers** (operated by the NIA).
- **Technology and innovation-based Enterprise Development Fund** (operated by the MHES). This offers a matching grant or 'conditional recoverable' grant for the development of new products or services or new production/service processes. Target groups are university or vocational education students or students who graduated not over 7 years ago, university or research institution personnel, SMEs, and start-ups which affiliate with universities or research institutions.
- **Competitiveness Fund Programme** (operated by the BOI). This is a new finance programme for private sector companies in 10 target industries.
- **Research Gap Fund** (operated by the NSTDA).
- **R&D and innovation tax incentives** (operated by the NSDTA). All private sector companies are eligible for a tax incentive of between 200% and 300% of R&D and innovation (R&D&I) expenditures up to a project value of THB 3 million. Eligible costs include R&D, training, automation and equipment, IP and technology acquisition, design and IP registration.

- **Credit guarantees** (operated by the Thai Credit Guarantee Corporation – TGC). This is a state-owned specialised financial institution. This aims to ensure that viable SMEs with good credit and at least three years of operational experience have access to bank loans and are not constrained by their lack of capital. A scheme could also be developed to permit SMEs to use IP as collateral. The TCG typically charges SMEs 1.0-2.0% annually based on their annual credit limit.
- **Corporate Income Tax exemption** (operated by the Ministry of Finance). Under this programme, start-ups can receive corporate income tax exemptions when they obtain venture capital and business angel investments.
- **Innovation and Technology Assistance Programme (ITAP)** (operated by the NSDTA). This comprises 18 networks that provide finance for innovation and consultancy. Three of the networks are in the North, accounting for some 13% of ITAP-supported projects in food and agriculture. A new programme ITAP Innovation-Driven Entrepreneurship is being launched for SMEs taking research from lab stage into commercialisation stage with a focus on business growth. However, a bottleneck lies in an insufficient budget for a blanket approach that would enable the programme to cover all SMEs coming forward for support and the problem of lacking a mechanism in current conditions that could channel support only to suitable SMEs that have absorptive capacity.
- **SMEs Private Equity Trust Fund** (operated by the Government Savings Bank). This Fund is worth THB 2 billion for private equity investments in start-ups, scale-ups and SMEs.
- **Venture Capital Fund** (operated by the OSMEP). This is a public venture capital fund that invests in innovative SMEs. The scale of investment has currently been limited, reflecting difficulties in identifying appropriate targets. In the Venture Capital for SME-OTOP programme, government banks provide another source of capital for SMEs through joint investment.
- **The Small and Medium Enterprise Development Bank of Thailand (SMED Bank)** is a state-owned bank that supports SMEs through venture capital funding and business consulting workshops.

However, there is as yet little explicit targeting of the schemes above on those start-ups and scale-ups with the most potential for innovation-based growth in the sectors with potential to drive future Thai economic growth, including high potential firms in advanced agriculture and biotechnology and food-for-the-future in Chiang Mai and Chiang Rai. It is concerning that there are several examples of export-orientated SMEs from Chiang Mai and Chiang Rai (i.e. some of the firms with the highest aspirations) moving to Singapore in order to obtain risk-willing capital. A further obstacle is that there is not enough complementary consultancy, advice, mentoring and other support provided to start-ups and scale-ups alongside the financing.

Furthermore, business angel finance is essential. As Politis (2008) demonstrates, business angels perform a number of important support roles for the businesses they invest in alongside finance, by including business mentoring, network development and due diligence in their interactions. While smart money exists in Thailand, what is desperately short is the kind of finance which brings mentoring into the financing process. Where the Northern region is particular weak is in angel investors. For example, no investments are listed in Chiang Mai and Chiang Rai in the Thailand Startups organisation list of angel investors.³

There is scope for local policy makers to work with local business people and financial organisations to develop a community of business angels with a specific focus on advanced agriculture and biotechnology and food-for-the-future. A model could be the London's Angels programme in MedCity, which brings potential investors together with life sciences experts. It is aimed both at people who are experienced investors as well as people who have little or no experience in the life sciences sector <http://www.angelsinmedcity.org.uk/>.

Crowdfunding is supervised by the Securities and Exchange Commission but needs to be expanded and much better targeted to smart SMEs and scale-ups. An initiative could be taken to stimulate the creation of a crowdfunding platform for innovative SMEs with a Northern regional focus.

Institutional conditions

Regulations

Two major local regulatory conditions, one enabling and one a bottleneck, dominate for innovative start-ups and scale-ups in advanced agriculture and biotechnology and food-for-the-future in Chiang Mai and Chiang Rai. The enabler is the creation of a cluster-based special economic zone (SEZ), Food Innopolis, providing tax incentives to innovative food enterprises located at the NSP at Chiang Mai University, as well as in various other locations in the country. Through the SEZ, investment projects in specific food-related industries are exempt from corporate income tax for five to ten years with a 50% reduction in tax for a further five years (or an additional two years of exemption). In addition, the projects have access to further key national programmes and incentives. Eligible investments can include R&D and scientific testing activities.

The bottleneck is the slow-moving registration process involved in gaining Thai Ministry of Public Health, Food and Drug Administration (FDA) approval for new innovative products. Backlogs occur in the process to obtain licenses for moderate- to high-risk medical devices, novel foods, food supplements, and innovative herbal products. Stakeholders report that the FDA lacks sufficient qualified officers to examine technical dossiers to assess the quality, efficacy, and safety of products. As many of the start-ups and scale-ups in advanced agriculture and biotechnology and food-for-the-future in Chiang Mai and Chiang Rai are innovating through developing health-related products, they need FDA approval before they can market. However, the process is not timely. To get around the problem, many Thai SMEs now seek approval through the Singapore FDA in order to sell products domestically and internationally, which also gives wider credibility and branding. The problem is being addressed nationally but further support could also be offered locally, for example by business development services consultants, to support SMEs through the process without unnecessary delays.

Entrepreneurial culture

Attitudes to entrepreneurship are very positive in Thailand, particularly in the North of Thailand. According to the Global Entrepreneurship Monitor (GEM), some 74% of male adults in the North of Thailand perceived entrepreneurial opportunities in 2018, which is the highest rate in the country. The percentage of women in the North who view entrepreneurship as a desirable career choice was also the highest in the country at 81% (Guelich, 2018). On the other hand, Thais have a high fear of failing compared to other ASEAN countries, 64% for females and 56% for males (Guelich, 2018). This may explain why many Thai entrepreneurs are reluctant to be a 'first mover' and may also contribute to a 'copy culture', whereby entrepreneurs are more comfortable starting a business based on an existing model.

There is particular potential to stimulate more growth-oriented entrepreneurship among women in Chiang Mai and Chiang Rai. The GEM survey indicates that in 2018, women entrepreneurs accounted for 32% of start-up entrepreneurs in Bangkok, but only 11% in the North. Furthermore, female entrepreneurs were less likely than men to expect to grow their companies and much more likely to be fearful of failure (69%), perhaps because they are "entrepreneurs of necessity" (Guelich, 2018). In seeking to support an entrepreneurial culture, there is a need to recognise gender differences and provide appropriate support for women entrepreneurs.

There are many initiatives offered by banks and entrepreneurs to help build an entrepreneurial culture by offering networking and funding to help entrepreneurs to grow their businesses. Examples include NEXT Real by Land & Houses, Kaisikorn Bank's S100 and Everest programmes, SME Transformation, and Siam Commercial Bank's (SCB) Innovative Entrepreneur Programme and Young Entrepreneur Programme. Participants pay high fees to attend but are given access to very successful business people and entrepreneurs. These tools help to promote entrepreneurship and develop positive role models.

Two networks of entrepreneurs are present in Chiang Mai and Chiang Rai, one local and one national. The local one is key for the development of the regional innovation cluster: Chiang Mai Entrepreneurship Association was founded by Thai and international entrepreneurs in Chiang Mai to "connect entrepreneurs, build an ecosystem and develop local talent." This network could be further supported at the regional level, for example by hosting joint network events and developing a regional profile for successful entrepreneurs in the Association.⁴ This would further help build the local entrepreneurial culture.

There is also a case for developing a dedicated public programme focused on influencing attitudes to entrepreneurship among the populations from which high-value start-ups and scale-ups are most likely to come in advanced agriculture and biotechnology and food-for-the-future in Chiang Mai and Chiang Rai. In particular, this includes researchers and graduates in relevant university departments and managers of existing SMEs in the sectors. As well as awareness-raising on entrepreneurship opportunities and issues, policy needs to provide people from these populations with finance, help and incentives to change the mind-set of potential entrepreneurs to become aspirational and 'smart'. In particular, universities can play key roles in improving entrepreneurial culture, both by embedding high-quality teaching of entrepreneurship throughout the curriculum and through working on innovation and business development with local start-ups and scale-ups.

One of the key existing initiatives to promote an entrepreneurial culture is the Startup Thailand initiative, launched by the National Innovation Agency (NIA) in 2016⁵. It involves eight start-up ecosystem development programmes designed to build up awareness, increase ease of doing business, strengthen the ecosystem, and provide incentives and support. These programmes help start-ups to utilise local resources for their product and service development and help support entrepreneurship in potential driving sectors of Thailand's future growth ("locomotive" industries).⁶ Programme 4 is entitled 'Startup regionalism'. This national initiative needs to be better exploited in the Northern region in order to develop grassroots communities, as has been the case with a the Startup Canada initiative (Box 2.3).

Box 2.3. Startup Canada

Description of the approach

Launched in 2012, Startup Canada is a national, entrepreneur-led, volunteer-run, not-for profit network organisation. It works to enhance the nation's competitiveness and prosperity by promoting a vibrant entrepreneurial culture and developing local entrepreneurial ecosystems. It has built a national network of hyper-connected startup communities, facilitated access for entrepreneurs to local sources of support and advice, and initiated high-impact national campaigns to fuel a culture of entrepreneurship across the country. It represents more than 200 000 entrepreneurs in 38 grassroots communities throughout Canada. It helps them to start, manage and scale up. Its main activities include digital programmes and flagship events, and through the Startup Canada Task Force, it influences national entrepreneurship policy. It also provides mentorship services to entrepreneurs, which have been identified as a major need.

Startup Canada Communities (SCC) is its flagship programme. It supports the connectivity, promotion and maturation of bottom-up entrepreneur-led communities across Canada. It started in 2013 with a pilot of 15 SCCs selected for their diversity of community size, demographics and industry sectors. This has now been extended to 38 SCCs. The SCCs provide a focus for the provision of frameworks; technology; branding; impact measurement and reporting tools; national working group sessions; access to leading advisors; national promotions; and connections with financiers and policy makers. Objectives include developing the regional infrastructure to strengthen Canada's entrepreneurial ecosystem and culture.

SCCs, led by local entrepreneurs in each community, are open to entrepreneurs of all types and at all stages of growth. At the local level, each member community acts as a point-of-entry for entrepreneurs in their local ecosystem, providing a connection to other start-up founders, and brokering access to mentors, space, funding opportunities, and support to start and grow their businesses. Communities do this through online resources as well as grassroots events that welcome, engage, and encourage all entrepreneurs. Each community's leaders also engage with local stakeholders in government and industry, as well as with investors, to form a partnership with a common goal of supporting the creation and growth of new companies locally. Because it is community-led, lack of trust is not an issue.

Entrepreneur leaders in each community secure a lead institutional partner with whom to co-chair regular Community Enterprise Partnership (CEP) meetings. CEPs are made up of local enterprise support stakeholders in each community – investor groups, incubators, accelerators, co-working spaces, support organisations, chambers, colleges, universities, associations, etc. Events like Startup Weekend, Startup Drinks and Demo Camp; and campaigns such as Global Entrepreneurship Week are typical events. SCCs provide regular opportunities for entrepreneurs to connect, learn-by-doing, and promote their ventures to the wider community. Local community leaders tap into the national network of communities across Canada and receive support and exposure through Startup Canada, for example through monthly online meet ups, websites, branding, guidelines, case studies and measurement tools.

The individual SCCs have begun to measure their impact and give feedback. Criteria for the assessment are: (1) accelerating the access of entrepreneurs to the support that they need; (2) starting and growing more successful start-up communities in terms of their infrastructure and level of activity; and (3) ecosystem maturation over time.

The 38 start-up communities are not equally active and many specialise. For example, Fredericton, New Brunswick, has specialised in fashion and lifestyle; Lloydminster, Alberta,

primarily works to support entrepreneurs by offering business coaching, networking opportunities and professional learning events; and Moncton, New Brunswick, works closely with industry associations.

The Startup Canada Task Force is a platform to advance entrepreneurship policy in Canada. It aims to increase lack of national co-ordination and knowledge-sharing on entrepreneurship support. It brings together Canada's leading independent organisations representing venture capitalists, angel investors, business incubators, start-up accelerators and university research parks. The Task Force convenes entrepreneurs and cross-sector experts, liaises with government, and undertakes policy activities. It identifies priorities on a bi-annual basis.

The first annual **Startup Canada on the Hill** was held during Global Entrepreneurship Week in November 2013. It involved a large contingent of Canadian entrepreneurs going to Parliament Hill to for a national celebration of entrepreneurship together with the nation's elected representatives. This demonstrated the momentum, impact, and scale of the grassroots start-up movement in Canada engaged government in a discussion of its role in maximising entrepreneurial success.

The Startup Canada Women Entrepreneurs Program supports women entrepreneurs, particularly those from marginalised backgrounds, to start and scale thriving businesses. In 2020 Startup Canada in partnership with the Coca-Cola Foundation, supported 10 000 women entrepreneurs to start and scale thriving businesses through education, training, mentorship, support and resources.

The 2020 Social Impact Program, in partnership with the government's Investment Readiness Program (run by Economic and Social Development Canada), supports social entrepreneurs with access to training, mentorship, funding and resources to scale-up social and environmental impact. According to the 2020 Startup Canada Census, more than 40% of entrepreneurs are impact-driven and are interested in advancing the UN's Sustainable Development Goals. Every entrepreneur can sign up for the 2020 Social Impact Program for free to gain access to inspiration, recognition, support, training, funding and insights.

2020 Canadian Export Challenge. In 2020 Startup Canada, in collaboration with UPS and Export Development Canada, has invited entrepreneurs to join the challenge to become export-ready, connect with the trade and global growth system, and gain global exposure through a series of one-day accelerator events, digital programmes, pitch competitions, and an online community. It engages Canada's export and global growth ecosystem actors to support the 2020 Global Entrepreneurs Cohort of 15 000 entrepreneurs in global activities.

The Canie Awards recognise excellence in Canadian innovation and entrepreneurship in current and aspiring entrepreneurs, and promote social impact among start-ups and SMEs.

Relevance for Chiang Mai and Chiang Rai regions

Startup Canada offers three main lessons for advanced agriculture and biotechnology and food-for-the-future in the Chiang Mai and Chiang Rai regions:

First is the importance of the ambition and organisation of the trusted, nationally-linked, and locally-led Startup Canada Communities (SCCs). They facilitate information flows and broker links between entrepreneurs and governmental and other opportunities. By having a broad base of members, they can provide mentoring and networking skills that are cross-cutting, developing an inclusive ecosystem. A startup community in advanced agriculture and biotechnology and food-for-the-future in Chiang Mai and Chiang Rai would help mobilise entrepreneurs and develop initiatives tailored to local industrial opportunities.

Second is the importance of the advocacy and feedback roles played by the Startup Canada Task Force. This feeds directly into national policy-making. This type of network would support the OSMEP in obtaining information on the needs, views and opportunities of ambitious entrepreneurs in Chiang Mai and Chiang Rai.

Third, the SCCs are inclusive and support women entrepreneurs for example. This type of network would help expand the talent base brought to bear for the development of advanced agriculture and biotechnology and food-for-the-future in Chiang Mai and Chiang Rai.

The Startup Canada approach is different to the existing Startup Thailand programme because it is locally rather than nationally-led so the lines of communication are upwards. As Startup Thailand recognises, ‘the country needs to implement an area-based innovation economy’.

Sources of further information: <https://www.startupcan.ca/about>; <https://www.startupcan.ca/ourwork/startup-canada-task-force>; <http://startupfredericton.ca>; <https://www.startuplloyd.com/about>.

A further option to support entrepreneurship in Chiang Mai and Chiang Rai is to harness the talents of the many highly-skilled and often entrepreneurial return migrants coming back from Bangkok and abroad for entrepreneurship. The OSMEP could introduce a programme providing some resources in order to organise and lubricate the processes of integrating those who are interested in entrepreneurship into the entrepreneurial ecosystem by funding awareness-raising, mentoring and networking activities. As has been found in the Czech Republic (Bernard et al., 2013), returnees have often acquired highly valuable knowledge and know-how as well as personal contacts for entrepreneurship projects. Their participation in social networks focused on entrepreneurship and involvement in entrepreneurship support initiatives is therefore desirable. They may wish to start businesses themselves, or they may be able to advise local entrepreneurs about opportunities using their networks and knowledge. Universities could facilitate this by leading in creating and maintaining networks of entrepreneurs and asking return migrants to speak to potential entrepreneurs, complementing the Entrepreneurial University programme introduced by ONES.

Networks

Networks are important for start-ups and scale-ups by giving access to knowledge about technologies, markets, suppliers, and other opportunities. They are also important to co-ordinating actors in developing and implementing a regional entrepreneurial ecosystem strategy.

There is an increasing number of networks and networking events in Chiang Mai and Chiang Rai, such as in tea and coffee, which support entrepreneurs and serve to raise the profile of the cluster nationally and internationally. However, there are also weaknesses in the networks related to:

- lack of involvement of larger companies and ‘smart firms’ in local networking activities;
- lack of engagement of universities in local networking activities, other than those set up by the universities or the NSP themselves;
- lack of trust between firms; and
- an absence of coordination of and between networks.

Thus a local policy intervention is needed to identify how the network provision can be strengthened, including how to incentivise relevant academics (and students) to play a full part in networks and how to support larger SMEs and entrepreneurs with links to university-based knowledge. A lead on co-ordination is also required.

Three types of networks operate in Chiang Mai and Chiang Rai that are relevant to advanced agriculture and biotechnology and food-for-the-future:

1. Networks of generic SME representative bodies and their regional sub-bodies – Chambers of Commerce and Federation of Thai Industries (FTI);
2. Sector-specific cross-boundary initiatives – Thailand Food Valley North; and
3. The national TCELS network and national networking bodies.

These are discussed below.

Chambers of Commerce and the Federation of Thai Industries

The Chambers of Commerce and the Federation of Thai Industries are important membership and networking organisations active in the Northern Region that also provide support for industry development. The Chamber of Commerce in Chiang Mai has 700-800 members in a range of sectors, with a weighting towards medium-sized firms. One of its main roles is export promotion for SMEs in conjunction with the OSMEP. The Federation of Thai Industries (FTI) is a non-profit organisation with government and private sector support. Its activities include a programme for the development of the agro-food industry start-ups, including financial support to acquire machinery and channels for on-line marketing. The FTI Biotech Industry Group in Chiang Mai has some 30 member companies, including about 20 companies which are relatively advanced. More than 100 are showing an interest in joining. However, in spite of FTI efforts to encourage larger healthcare companies to join the club, they have not yet joined.

There is an opportunity to make greater use of these networks to channel university research to start-ups and scale-ups in the advanced agriculture and biotechnology and food-for-the-future sectors. An example of good practice is the Innovation Longan project.⁷ This is led by the FTI Chiang Mai Chapter with partnership from the Research and Development Innovation Service, NIA, and NSTDA Northern Network. Longan is one of the prize fruits grown in northern Thailand, especially in Lamphun province in Chiang Mai. The Innovation Longan project helps local SMEs to differentiate their products and access new markets exploiting active ingredients of longan – anti-oxidant and anti-carcinogenic nutrients suitable for medicine and supplementary foods – by introducing new product and process innovations researched by Chiang Mai, Maejo, Kasetsart and other universities. The initiative steers university research towards areas with business development feasibility and market potential and promotes market-oriented innovations to SMEs and investors. More projects of this kind could be developed.

Thailand Food Valley North

Thailand Food Valley is a cluster initiative with 300-400 member firms spanning small, micro and large companies. It includes a geographical focus in the north in the form of Thailand Food Valley North, which includes ‘Command Centres’ in Chiang Mai and Chiang Rai. The initiative includes networking among the members, as well as services for SMEs such as training in innovation, help to develop prototypes and product packaging through Chiang Mai University and government funding support for marketing, including sending entrepreneurs on study visits abroad, especially to the Netherlands. The project has an inclusive board representing key stakeholders in the food industry as well as provincial government authorities. It receives NIA funding and a grant from the JICA association. The Chiang Mai Command Centre is in the local office of the FTI, and has two full-time employees and many advisers.

The Food Valley initiative is not yet fully mature. The member firms work together but most of the companies are low tech, many of the entrepreneurs are in the early stages of development of their projects, the entrepreneurs are still not keen to work with universities and the public sector, a culture of collaboration among the firms is missing and there is no innovative ‘anchor firm’ for the network. The only major firm, Sunsweet (700 employees) was listed on the stock market in 2018. It undertakes contract farming and collaborates with other companies and has only recently begun to be more

advanced in biotech, including starting an R&D department. In this context, more investment and budget is needed to support Food Valley to develop clear consistent plans, strong co-ordination, a professional management system, and co-investments and joint activities. Sunsweet has connections in 40 to 50 countries and could act as a potential anchor for the development of the whole cluster. Government funding will be needed as members are not yet at the stage of being able to finance the activities solely through paying membership fees.

The Thai Biotechnology Industry Association

The Thai Biotechnology Industry Association (ThaiBio) is a Bangkok-based national organisation that supports the country's biotechnology businesses to grow sustainably and achieve international competitiveness (<http://www.thaibio.or.th>). A regional branch covering Chiang Mai and Chiang Rai is needed. An international inspiring practice example is provided by One Nucleus, a local specialist network that was originally funded by a regional development agency in the east of England, United Kingdom (see Box 2.4).

Box 2.4. One Nucleus: A regional biotech and life science networking organisation, United Kingdom

Description of the approach

One Nucleus is a regional not-for-profit membership organisation specialising in Life Science, Healthcare, Biotechnology, and Medical Devices, operating on a fee-paying basis. While it was originally focused on the East of England and based in Cambridge, members of One Nucleus are drawn from the Greater London-Cambridge-East of England corridor, Europe's largest life sciences and healthcare cluster. It supports those institutions, companies and individuals undertaking activity in or with the region as a whole. It provides local, UK-wide and international connectivity helping its members to maximise their performance.

The network needed public funding in order to get established. It was originally set up in 1997 as the Eastern Region Biotechnology Initiative (ERBI), 50% funded by the national Government's Department of Trade and Industry. The rest of its funding came from membership subscriptions. Subsequently ERBI was part-funded by the Eastern Region Development Agency (EEDA) established in 1999, its first contribution to the Cambridge biotech cluster.

One of its activities involves face-to-face training programmes, including offering technical courses, for example in biosafety, laboratory health and safety, and introductory courses including introduction to contracts, drug development and on-line courses such as managing life science projects. Soft skill providers include specialist firms and the Wellcome Sanger Institute (a research institute).

Networking is a key element in the activities of One Nucleus. Conferences and events provide a platform for business-to-business interactions. The event portfolio includes monthly networking opportunities at BioWednesdays in London and Cambridge, the Life Science Leadership Series, the annual Cambridge flagship event ON Helix and the flagship event Genesis in London.

Factors for success

Early outcomes of the network's activities included the development of a common pool of expertise, skilled labour, training services, laboratory space and marketing activities. However, collaboration for drug development was less common amongst the region's firms. As the bioscience sector grew, so did the demand for networking and business support activities. By the mid-2000s, ERBI (2006) identified that there were some 200 biotech companies and 350 biotech expertise service providers, plus research institutes and universities and 20 multinationals in pharmaceuticals, agri-bio and food as well as 4 hospitals involved in biotech research.

The key factor for success of the network was the initial funding provided by the UK government and subsequent funding at the regional level. Early national and then regional funding enabled the formation of networks and formal links between the wide range of member organisations. Without public funding there would have been little capacity to broker such interactions, for a networking culture to develop and for the international promotion of the cluster.

Public sector intervention also broadened the scope of ERBI's operations and its role as a central actor in the cluster. For example, Medilink East, supported by EEDA, has been providing a range of services and support to companies in the medical technology sector since 1998. With further support from EEDA, the service was taken over by ERBI with the intention of improving and expanding the services offered. With public support, ERBI was able to extend its operations

internationally as well as nationally. In 2009, ERBI made an agreement with the Massachusetts Biotech Council (MassBio) to encourage and promote the biotechnology industry in both regions – Massachusetts USA and Oxford, London and Cambridge, UK. In April 2010, ERBI merged with the London Bioscience Network (LBN). It was renamed One Nucleus in June 2010.

Obstacles encountered and responses

Obstacles faced by the network were caused by changes in the political system. In 2010 it was announced that the English regional development agencies (RDAs), including EEDA the sponsor of the network, were to be abolished. They were closed in 2012. The principal duty on RDAs was to draw up and keep under constant review a 5 to 10-year Regional Economic Strategy. Without this regional strategy, ERBI/One Nucleus lost funding and regional support. Its response was to expand its membership base and increase the range of its paying services. Merging with LBN also gave it a much stronger base from which to work. This included incorporating a very strong bioscience cluster and one which included headquarters of United Kingdom and international pharmaceutical companies. It also meant that it had better access to finance providers based in London that could be linked with members. Hence it operates a dual strategy of London as well as Cambridge activities. The merger also enabled the Cambridge operation to overcome a problem of being seen to be parochial and isolated.

Relevance for Chiang Mai and Chiang Rai regions

This case demonstrates how public funding established and supported the early and later growth stages of a biotechnology members' network that became very important to fostering collaboration, strategy development, training and research services and building the international profile of a region in biotechnology. It was national funding that got the network started and regional funding that enabled a regional response to the needs of a rapidly growing sector. The national and regional funding enabled the network to become established as the central and most important actor in the cluster.

A similar networking initiative could be built in Chiang Mai and Chiang Rai. It could include services for start-ups and scale-ups in biotech that actively develop the supply chain and open up export markets. A network of this kind could also play a critical role in linking its members to national centres of finance in Bangkok, and in building the international profile of advanced agriculture and biotechnology and food-for-the-future in the North of Thailand. This regional network would build a stronger basis for international sales, research collaborations, inward FDI and so on. The long time period that it takes for a network of this kind to reach maturity should be noted, together with the importance of making a start even from modest beginnings.

Sources of further information: <https://www.theengineer.co.uk/boost-for-east-medtech-firms>; <https://sciencebusiness.net/news/68785/UK-biotech-bodies-to-collaborate-with-MassBio>.

Thailand Centre of Excellence for Life Sciences

The Thailand Centre of Excellence for Life Sciences (TCELS) is a national initiative based in Bangkok, which includes networking for life sciences firms, together with mentoring and consultancy for SMEs, training for entrepreneurs in areas such as IP protection, and support in connecting firms to organisations that can help with access to finance. It also funds university research to develop technology to strengthen the life science ecosystem, including research with potential for start-ups and licensing, and uses a database for matching businesses to university research opportunities. It also approaches university lecturers in relevant subjects to be unpaid mentors, and has identified mentors

in Chiang Mai and Chiang Rai universities. In one of its projects, TCELS works with NSP on a digital health cluster with funding from the OSMEP.

To build its network, TCELS is attempting to find an organisation in each region to act as a focal point and to recruit members. In 2019, it had no member companies in Chiang Mai or Chiang Rai. An option for building networking for advanced agriculture and life sciences firms in Chiang Mai and Chiang Rai is therefore to support the development of a stronger regional branch of TCELS.

Overall, establishing global, regional and local collaborative networks is a key goal of the Thailand 4.0 Strategy (Maesincee, 2018). The various programmes discussed here are designed to build networks of entrepreneurs and SMEs that can share infrastructure and technology and have access to R&D and consulting services. However, there are too many government organisations with the same or similar goals working independently with little collaboration. An overall lead network would help bring together the key members and services.

Conclusions and policy recommendations

There is strong potential for the development of the advanced agriculture and biotechnology and food-for-the-future sectors in the Chiang Mai and Chiang Rai regions, which will support the development of key strategic industries for the Thai economy as a whole. However, future development of the sectors in these regions requires more start-ups and especially scale-ups. There are both strengths and weaknesses in the regional entrepreneurial ecosystem in this respect. The priority areas to address in terms of overcoming bottlenecks and releasing more innovative entrepreneurship are the pillars of the regional entrepreneurial ecosystem concerned with access to finance, regional entrepreneurial talent and skills, entrepreneurial culture, and networks. In addition, specific measures can be promoted in other areas. The key policy recommendations in line with this agenda are set out below. The OSMEP is ideally suited to lead by providing plans, quality control, incentivising people and organisations to take part and targeting public financial support to give maximal leverage.

Box 2.5. Recommendations on the regional entrepreneurial ecosystem

1. Actions in key priority pillars of the regional entrepreneurial ecosystem:

Finance

- Increase targeting of public SME finance support programmes to start-ups and scale-ups with clearly identified and articulated growth potential in strategic sectors for Thai economic growth.
- Combine the offer of finance with advice and mentoring support to start-ups and scale-ups.
- Promote a crowdfunding initiative for start-ups and scale-ups in the Northern region.
- Develop an angel network for the Northern region.

Talent and skills

- Involve the regional universities, especially their business schools, in identifying technical, business, managerial and other skills needed in start-ups and scale-ups in advanced agriculture and biotechnology and food-for-the-future in Chiang Mai and Chiang Rai.
- Improve university teaching of these skills through upskilling staff, updating curricula, and involving practitioners in the teaching, especially those with wide or international experience.
- Promote new models of teaching and new teaching targets at university level to address start-up and scale-up needs, e.g. through advanced apprenticeship programmes, internships, Masters dissertations on industry relevant problems, technology-supported classrooms onsite at a scale up or “Faculty on the Shop Floor” programmes.
- Expand initiatives to create and support serial entrepreneurs; involve them in supporting further entrepreneurship in regions; and publicise them as role models for entrepreneurs through support centres and web presences.

Entrepreneurial culture

- Instigate a programme for raising awareness of entrepreneurship and supporting entrepreneurial culture changing activities. It should include:
 - Involving successful entrepreneurial return migrants and alumni in university entrepreneurship support programmes so that the relevant knowledge is disseminated.
 - Promoting internships in existing SMEs by university students with an ambition to innovate and take the SME forward.
 - Sensitivity to gender differences so that especially females have support tailored to their needs.

Networks

- Allocate sustained, predictable funding for the establishment and operation of an overarching advanced agriculture and biotechnology and food-for-the-future networking organisation in Chiang Mai and Chiang Rai, potentially building on one of the existing networks.
- The networking organisation should include private sector and university members, and offer a range of services as well as networking events, such as consultancy, training, research and connections to financing opportunities. It should also raise the national and international visibility of the region’s activities, and can be connected to a wider national network.

2. Actions in other areas of the entrepreneurial ecosystem

Connectivity infrastructure

- Improve ICT bandwidth outside the main cities so that SMEs can use higher speeds.
- Provide digital training and support for new SME digital users.

Demand for relevant products

- Offer start-ups and scale-ups competitive grants and an advice service delivered through third parties in activities which improve product quality, direct exporting and participation in global value chains.
- Develop and institute a national product quality trade mark to be awarded to start-ups and scale-ups with safe products to support their branding of quality.
- Create a healthcare innovation procurement initiative involving a range of government ministries, agencies and healthcare providers in Chiang Mai and Chiang Rai. Agencies could give a minimum share (say 10%) of their public procurement projects related to advanced agriculture and biotechnology and food-for-the-future to new firms, so that these start-ups can create profiles for later bidding in future government projects. Subsequent project funding could then focus on scaling up activities.

Business services

- Strengthen the OSMEP One Stop Shops by supporting staff training and increasing their funding so that they can act as key hubs with a coordinating role bringing start-ups and scale-ups with common problems together to develop shared or joint solutions.
- Select start-ups and potential scale-up SMEs for business advice support according to their absorptive capacity.

Access to knowledge

- Organise links between universities for shared research commercialisation infrastructure, for example by providing some network funding for training and support to start-ups and scale-ups in establishing and protecting IP.
- Expand funding and provide long-term budgets to universities in Chiang Mai and Chiang Rai for applied research projects relevant to the needs of start-ups and scale-ups in advanced agriculture and biotechnology and food-for-the-future.
- Build R&D absorption capacity in SMEs by providing innovation grants and loans.
- Involve retired entrepreneurs as mentors for ambitious start-ups and scale-ups, rewarding the entrepreneurs by prestige and/or finance.

Ecosystem leadership

- Produce and implement regional entrepreneurial ecosystem development strategy document for the development of advanced agriculture and biotechnology and food-for-the-future in Chiang Mai and Chiang Rai. This should include collaboration among national and provincial government agencies, universities, science parks, research laboratories, and businesses.

Regulations

- Support SMEs going through FDA approval in Thailand through a properly staffed designated lead organisation, such as the Federation of Thai Industries. This support needs to be knowledgeable, timely, and address the common issues that currently cause delays and failures.

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Notes

¹ A scale-up company is defined by the OECD as one that has average annualised growth of at least 10% in turnover or employment in the previous 3 years, starting with at least 10 employees at the beginning of the period.

² Data are not directly comparable with other countries, but in OECD countries the share of firms with 50-249 employees averages 1.7% of the firm population.

³ http://web.nso.go.th/en/survey/bts/datafiles/2014_n_bts_Executive%20Summary.pdf

⁴ <https://www.todayonline.com/world/thailand-plans-trans-asean-bullet-train-linking-china-laos-and-even-singapore>

⁵ See <https://uuku.fi/insights/thailands-leap-towards-a-digital-economy/>.

⁶ <https://www.managementcentre.co.uk/developing-business-model-canvas/>

⁷ <https://cpduk.co.uk/news-articles/view/continuing-professional-development-for-universities>

⁸ http://www.bbk.ac.uk/study/2019/postgraduate/programmes/TMSBIOBS_C/

⁹ <http://www.biotec.or.th/en/images/document/1.pdf>

¹ <https://www.nstda.or.th/thailandtechshow/2019/>

² http://cor.europa.eu/en/documentation/studies/Documents/Forstering_innovation_EER.pdf
(accessed January 12 2017)

³ <https://angel.co/thailand/investors>.

⁴ See https://www.facebook.com/pg/ChiangMaiEntrepreneurs/about/?ref=page_internal.

⁵ <https://startupthailand.org/st2019/>

⁶ <https://www.startupthailand.org/wp-content/uploads/2018/11/white-paper.pdf>

⁷ http://www.value-chains.org/dyn/bds/docs/497/Vichien_ChiangMailInnovation.pdf

Annex 2.A. SWOT analysis

Annex Table 2.A.1. Pillars of the Chiang Mai and Chiang Rai regional entrepreneurial ecosystem for advanced agriculture and biotechnology and food-for-the-future

Connectivity infrastructure	
<i>Strengths</i> Location for cross-border trade	<i>Weaknesses</i> Technology infrastructure High logistics costs Inefficient supply chains
<i>Opportunities</i> Government spending on infrastructure Digital Thailand initiative Smart City in Chiang Mai	<i>Threats</i>
Demand for products	
<i>Strengths</i> Agri-tech and biotech still in very early stages of growth Demand from China Good raw materials for advanced agriculture and biotechnology and food-for-the-future	<i>Weaknesses</i> Products easy to replicate / copy
<i>Opportunities</i> Large market opportunity domestic and international Trends towards healthier and medicinal foods Development of higher value products Branding the Chiang Mai/Chiang Rai cluster Innovative public procurement to stimulate healthy foods	<i>Threats</i> Limited anti-monopoly regulations make it hard to compete with larger Thai conglomerates with distribution
Business services	
<i>Strengths</i> Serviced-minded culture Multiple sources of public business services support Availability of private sector business advice	<i>Weaknesses</i> Most suppliers very centralised in Bangkok or other big cities Poor quality and consistency in public business development services Limited emphasis of public business advice on growth SMEs Lack of targeted and intense support for innovative scale ups
<i>Opportunities</i> Increase quality and professionalisation in government business services Increase use of vouchers for innovation consultancy Collective action for business services	<i>Threats</i>
Talent and skills	
<i>Strengths</i> Creative, self-reliant Networking skills, social media skills STEM graduates from regional universities	<i>Weaknesses</i> Outdated university training programmes Family business mind-set - weak on branding and export Worker skill shortages Culture of not wanting to be first Fear of failure highest in ASEAN Brain drain Lack of serial entrepreneurs
<i>Opportunities</i> University business school support for SME management development Getting more technical experts in various fields	<i>Threats</i> Entrepreneurial culture of copying what is successful rather than innovating

Better quality of life in Chiang Mai, Chiang Rai
University-industry mobility schemes

Access to knowledge	
<i>Strengths</i>	<i>Weaknesses</i>
Access to R&D and IP	Low absorptive capacity of SMEs
Collaboration with universities reducing development costs	Lack of FDI and large firm anchors for knowledge exchange
NSP translating knowledge to industry	
<i>Opportunities</i>	<i>Threats</i>
Track and measure progress from all incubation activities with SMEs	
Maintain active databases on knowledge and allow SME users to access	
Ecosystem leadership	
<i>Strengths</i>	<i>Weaknesses</i>
Government S-curve strategy	Lack of regional tailoring of policies
Multiple government agencies supporting ecosystem	Tick box mentality of programme managers
Strong anchor organisations in universities and science park	Government KPIs not focused on entrepreneurship and SME success
	Lack of large firm leaders
<i>Opportunities</i>	<i>Threats</i>
Creation of a cluster management organisation	
Finance	
<i>Strengths</i>	<i>Weaknesses</i>
Breadth and number of public programmes for SMEs	Difficult and costly to access bank loans without collateral
Foreign and domestic venture capital is available	Most government schemes are 'first come-first served'
	Small range of financial instruments
	Little targeting of government programmes to innovative start-ups
	Not enough complementary advice
	Limited business angel funding
<i>Opportunities</i>	<i>Threats</i>
Build credit ratings of individuals and SMEs	Technology bringing more efficient and cheaper ways to access funds
Share and repeat success stories	
Make SMEs more aware of existing programmes	
Favourable context of new crowdfunding regulations	
Regulations	
<i>Strengths</i>	<i>Weaknesses</i>
SEZ Food Innopolis on NSP facilitating R&D intensive investments	Slow and uncertain FDA regulatory approval process
	Weak IP protection and legal framework
<i>Opportunities</i>	<i>Threats</i>
Government aims to make the overall system more transparent	Lack of continuity between government administrations.
	Programmes lose funding after 4-5 years
	Most SMEs cannot survive a legal challenge
	Too many government agencies with overlapping goals
	Lack of co-ordination between government agencies
Entrepreneurial culture	
<i>Strengths</i>	<i>Weaknesses</i>
Positive attitudes to entrepreneurship in the population	Copy other successful business models rather than innovate
Opportunity perception is high	Afraid to fail
	Low share of women entrepreneurs
<i>Opportunities</i>	<i>Threats</i>
Training to reduce fear of failure	More tech-savvy countries like Malaysia, Singapore, and India competing in the biotechnology and agri-tech sectors
Potential for more growth entrepreneurship among women	
Highly-skilled and entrepreneurial returning migrants	

Stimulation of more entrepreneurs from university students

Networks

Strengths

Multiple existing cluster initiatives
BOI incentives for clusters and SEZ

Opportunities

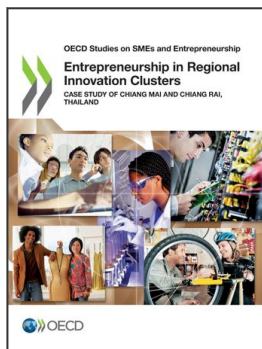
Create an overarching cluster network

Weaknesses

Fragmented networks
Lack of sustainable finance for networks
Limited critical mass of biotech scale ups

Threats

Source: Authors



From:

Entrepreneurship in Regional Innovation Clusters Case Study of Chiang Mai and Chiang Rai, Thailand

Access the complete publication at:

<https://doi.org/10.1787/2a24a552-en>

Please cite this chapter as:

OECD (2021), "The regional entrepreneurial ecosystem", in *Entrepreneurship in Regional Innovation Clusters: Case Study of Chiang Mai and Chiang Rai, Thailand*, OECD Publishing, Paris.

DOI: <https://doi.org/10.1787/41482bc7-en>

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